



**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 2020 Survey

Table of Contents

Appendix

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

APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

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

Administration:

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

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

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

Analysis:

- Trace Metals and Mercury analysis conducted at Element Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N₂O) analysis conducted at Maxxam Analytics, Mississauga, Ont.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- Chain of Custody protocols followed for all samples.
- Excellent blank values for all sample types. All samples blank corrected.

Sample Type	Blank Value		
	Unit 1	Unit 2	Unit 3
Second Q 2020 Survey			
Filter	0.8 mg	-0.1 mg	-0.2 mg
Front Half Washings	-1.0 mg	0.4 mg	0.2 mg
Mercury Front	0.00 ug	0.00 ug	0.00 ug
Mercury Back	0.04 ug	0.04 ug	0.03 ug
Trace Metals Front *	<48.4 ug	<35.9 ug	<35.4 ug
Trace Metals Back*	<7.0 ug	<4.0 ug	<5.0 ug
Fluoride	<5.0 ug	<5.0 ug	<5.0 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Reagent Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422954 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514538
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

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

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

Lot ID: **1422954**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514538

Reference Number	1422954-1	1422954-2	1422954-3
Sample Date	May 04, 2020	May 04, 2020	May 04, 2020
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	8	<5	5
Antimony		µg	<2	4	<2	2.5
Arsenic		µg	2	1	2	1
Cadmium		µg	<0.3	<0.3	<0.3	0.25
Chromium		µg	<0.2	<0.2	<0.2	0.2
Cobalt		µg	<0.3	<0.3	<0.3	0.25
Copper		µg	<0.3	<0.3	<0.3	0.25
Lead		µg	<2	<2	<2	1.5
Manganese		µg	<0.3	1.0	6.2	0.25
Nickel		µg	<0.5	7.2	<0.5	0.5
Phosphorus		µg	<2	<2	<2	2.5
Selenium		µg	<2	5.3	5.9	1.5
Tellurium		µg	<2	2	<2	2
Thallium		µg	<2	<2	<2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	0.7	0.8	0.9	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	<5	6	6	5
Antimony		µg	<3	<3	<3	2.5
Arsenic		µg	<1	2	<1	1
Cadmium		µg	<0.3	<0.3	<0.3	0.25
Chromium		µg	<0.2	<0.2	<0.2	0.2
Cobalt		µg	<0.3	<0.3	<0.3	0.25
Copper		µg	1	0.8	2	0.25
Lead		µg	<2	<2	<2	1.5
Manganese		µg	0.4	1	<0.3	0.25
Nickel		µg	<0.5	<0.5	<0.5	0.5
Phosphorus		µg	10	10	<3	2.5
Selenium		µg	2.8	7.6	2	1.5
Tellurium		µg	<2	3.0	<2	2
Thallium		µg	<2	<2	<2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	0.8	<0.5	<0.5	0.5
Volume	Sample	mL	220	220	220	
Volume	aliquot volume	mL	170	170	170	
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	

Analytical Report

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

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

Lot ID: **1422954**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514538

		Reference Number	1422954-1	1422954-2	1422954-3
		Sample Date	May 04, 2020	May 04, 2020	May 04, 2020
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued					
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	<0.05	0.05	0.06
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	220	220	220
Volume	aliquot volume	mL	5.0	5.0	5.0
Volume	Final	mL	40	40	45
Mercury	Fraction 2B	µg/sample	<0.09	0.10	0.1
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	105	105	105
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3A	µg/sample	<0.008	<0.008	<0.008
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3B	µg/sample	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	0.14	0.12	0.11
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	0.044	0.039	0.036

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

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

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

Lot ID: **1422954**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514538

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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



www.Element.com

Project Information

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

Invoice To

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

Report To

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

Additional Reports to

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

Report Results

Requirements

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

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

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

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

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

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

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time sampled	Matrix	Sampling method	Number of Containers ↓	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg								
1		Reagent Blank Unit 1		4-May-20			5	✓	✓	✓	✓	✓	✓								
2																					
3		Reagent Blank Unit 2		4-May-20			5	✓	✓	✓	✓	✓	✓								
4																					
5		Reagent Blank Unit 3		4-May-20			5	✓	✓	✓	✓	✓	✓								
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					

Please indicate any potentially hazardous samples

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

Page _____ of _____ Control #
ED 120-005

Lot: 1422954 COC



Temp. received: 20.7 °C
Date/Time stamp: MAY 12 '20 15:55
Delivery Method:
Waybill:
Received by:

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Field Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422949 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514533
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

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

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

Lot ID: **1422949**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514533

		Reference Number	1422949-1	1422949-2	1422949-3
		Sample Date	May 05, 2020	May 06, 2020	May 07, 2020
		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	8	6	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	3.3	3.4	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	0.37	0.61	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	1	<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	40	26	32	2.5
Selenium	µg	<2	2	4.1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	1	2	1	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	<5	<5	<5	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	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	0.8	0.9	3.4	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.3	0.2	<0.2	0.25
Nickel	µg	0.6	<0.5	<0.5	0.5
Phosphorus	µg	7	4	5	2.5
Selenium	µg	5.0	5.7	3.5	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2	<1	<1	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	1	1.0	0.7	0.5
Volume	Sample	mL	360	360	320
Volume	aliquot volume	mL	310	310	270
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	Project ID: Metro Vancouver WTE Project Name: Field Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422949 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514533
Attn: Missy		
Sampled By:		
Company:		

		Reference Number	1422949-1	1422949-2	1422949-3
		Sample Date	May 05, 2020	May 06, 2020	May 07, 2020
		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
Dilution Factor	As Tested	1	1	1	
Volume	Sample	mL	360	360	320
Volume	aliquot volume	mL	5.0	5.0	5.0
Volume	Final	mL	40	40	40
Mercury	Fraction 2B	µg/sample	<0.1	<0.1	<0.1
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested	1	1	1	
Volume	Sample	mL	125	150	150
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
Dilution Factor	As Tested	1	1	1	
Volume	Sample	mL	500	500	1000
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.08
Mercury	As Tested	µg/L	0.11	0.14	0.09
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	0.036	0.044	0.03

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Field Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422949 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514533
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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



www.Element.com

Project Information

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

Invoice To

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

Report To

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

Additional Reports to

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

Report Results

Requirements

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

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

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

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

Date Required

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

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

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time sampled	Matrix	Sampling method	Number of Containers ↓	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg								
1		Field Blank Unit 1 ('MV Unit 1 Blank' + 4 Bottles)		5-May-20			5	✓	✓	✓	✓	✓	✓								
2																					
3		Field Blank Unit 2 ('MV Unit 2 Blank' + 4 Bottles)		6-May-20			5	✓	✓	✓	✓	✓	✓								
4																					
5		Field Blank Unit 3 ('MV Unit 3 Blank' + 4 Bottles)		7-May-20			5	✓	✓	✓	✓	✓	✓								
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					

Please indicate any potentially hazardous samples

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

Page ____ of ____ Control #
ED 120-005

Lot: 1422949 COC



Temp. received: 21.5 °C
Date/Time stamp: MAY 12 '20 15:53
Delivery Method:
Waybill:
Received by:

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1422946
#101, 9488 - 189 Street	Project Name: Filter Reagent Blanks	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: May 12, 2020
V4N 4W7	LSD:	Date Reported: May 28, 2020
Attn: Missy	P.O.:	Report Number: 2514529
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:

Analytical Report

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

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

Lot ID: **1422946**
Control Number:
Date Received: May 12, 2020
Date Reported: May 28, 2020
Report Number: 2514529

		Reference Number	1422946-1	1422946-2	1422946-3
		Sample Date	May 04, 2020	May 04, 2020	May 04, 2020
		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	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.9	0.8	<0.3	0.25
Nickel	µg	<0.5	4.9	<0.5	0.5
Phosphorus	µg	27	32	25	2.5
Selenium	µg	2	2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2.6	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	<0.5	0.6	0.5
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Filter Reagent Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422946 Control Number: Date Received: May 12, 2020 Date Reported: May 28, 2020 Report Number: 2514529
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 26, 2020	Element Vancouver

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA
-----	------------------------------------

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

Results relate only to samples as submitted.

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



www.Element.com

Project Information

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

Invoice To

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

Report To

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

Additional Reports to

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

Report Results

Requirements

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

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

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

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

Date Required

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

* Please report µg/sample

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time sampled	Matrix	Sampling method	Number of Containers ↓	ICAP	Hg	Enter tests above (✓ relevant samples below)									
1		Reagent Blank Unit 1 Container 1 (filter)		4-May-20			1	✓	✓										
2																			
3		Reagent Blank Unit 2 Container 1 (filter)		4-May-20			1	✓	✓										
4																			
5		Reagent Blank Unit 3 Container 1 (filter)		4-May-20			1	✓	✓										
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

Please indicate any potentially hazardous samples

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

Page _____ of _____ Control #
ED 120-005

Lot: 1422946 COC



Temp. received: 20.0 °C Date/Time stamp: MAY 12 2015 5:53
Delivery Method:
Waybill:
Received by:

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1422951
#101, 9488 - 189 Street	Project Name: Metals and Hg	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: May 12, 2020
V4N 4W7	LSD:	Date Reported: Jun 2, 2020
Attn: Missy	P.O.:	Report Number: 2514535
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
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1422951**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514535

		Reference Number	1422951-1	1422951-2	1422951-3
		Sample Date	May 04, 2020	May 05, 2020	May 05, 2020
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 1 Run 1 (Unit 1 R-1 + 4 bottles)	Unit 1 Run 2 (Unit 1 R-2 + 4 bottles)	Unit 1 Run 3 (Unit 1 R-3 + 4 bottles)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	7	10	10	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	3.4	1	1	1
Cadmium	µg	0.6	<0.3	<0.3	0.25
Chromium	µg	14.8	1.5	0.52	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	2	1	1	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	1	1	0.9	0.25
Nickel	µg	18	2	0.6	0.5
Phosphorus	µg	26	31	31	2.5
Selenium	µg	2	2.8	2.9	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	3.4	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	19	7.9	7.2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	20	10	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<0.8	<0.8	<0.8	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.61	0.60	0.47	0.2
Cobalt	µg	<0.2	0.3	<0.2	0.25
Copper	µg	2	2.9	2.3	0.25
Lead	µg	3.0	<1	<1	1.5
Manganese	µg	0.6	3.1	0.8	0.25
Nickel	µg	0.4	0.7	1	0.5
Phosphorus	µg	10	10	10	2.5
Selenium	µg	2	3.5	1	1.5
Tellurium	µg	3.3	<2	<2	2
Thallium	µg	2.3	<1	<1	1.5
Vanadium	µg	<0.8	<0.8	<0.8	1
Zinc	µg	4.3	3.7	10	0.5
Volume	Sample	mL	900	880	900
Volume	aliquot volume	mL	850	830	850
Mercury by CVAA					
Mercury	As Tested	µg/L	0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1

Analytical Report

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

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

Lot ID: **1422951**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514535

		Reference Number	1422951-1	1422951-2	1422951-3	Nominal Detection Limit
		Sample Date	May 04, 2020	May 05, 2020	May 05, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 1 Run 1 (Unit 1 R-1 + 4 bottles)	Unit 1 Run 2 (Unit 1 R-2 + 4 bottles)	Unit 1 Run 3 (Unit 1 R-3 + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	2.02	0.68	0.46	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	900	880	900	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	15	4.8	3.3	
Mercury	As Tested	µg/L	<0.05	0.20	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	165	165	235	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	0.053	<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	750	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.06	
Mercury	As Tested	µg/L	0.48	0.52	0.38	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	0.15	0.17	0.12	

Analytical Report

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

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

Lot ID: **1422951**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514535

		Reference Number	1422951-4	1422951-5	1422951-6
		Sample Date	May 05, 2020	May 06, 2020	May 06, 2020
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 2 Run 1 (Unit 2 R-1 + 4 bottles)	Unit 2 Run 2 (Unit 2 R-2 + 4 bottles)	Unit 2 Run 3 (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	31	20	10	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	2	<1	<1	1
Cadmium	µg	<0.3	<0.3	0.4	0.25
Chromium	µg	2.0	0.70	4.35	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	0.7	1	<0.3	0.25
Lead	µg	2.9	<2	<2	1.5
Manganese	µg	1	0.6	1	0.25
Nickel	µg	<0.5	0.8	2.8	0.5
Phosphorus	µg	31	28	31	2.5
Selenium	µg	6.1	3.0	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	12	3.5	4.5	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	8	7	10	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<0.8	<0.9	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	<0.2	0.70	0.49	0.2
Cobalt	µg	<0.2	<0.2	0.3	0.25
Copper	µg	<0.2	1	2.4	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.6	0.5	5.0	0.25
Nickel	µg	<0.4	0.6	0.6	0.5
Phosphorus	µg	10	10	10	2.5
Selenium	µg	2	2.5	3.2	1.5
Tellurium	µg	2.6	<2	3.1	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.8	<0.9	<0.9	1
Zinc	µg	2.5	2.8	2.7	0.5
Volume	Sample	mL	930	840	820
Volume	aliquot volume	mL	880	790	770
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422951 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514535
Attn: Missy		
Sampled By:		
Company:		

		Reference Number	1422951-4	1422951-5	1422951-6	Nominal Detection Limit
		Sample Date	May 05, 2020	May 06, 2020	May 06, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 2 Run 1 (Unit 2 R-1 + 4 bottles)	Unit 2 Run 2 (Unit 2 R-2 + 4 bottles)	Unit 2 Run 3 (Unit 2 R-3 + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	0.46	0.51	0.49	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	930	840	820	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	3.5	3.4	3.2	
Mercury	As Tested	µg/L	0.59	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	165	215	215	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.16	<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	750	750	750	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.06	<0.06	<0.06	
Mercury	As Tested	µg/L	1.11	0.14	0.51	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	0.36	0.044	0.16	

Analytical Report

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

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

Lot ID: **1422951**
Control Number:
Date Received: May 12, 2020
Date Reported: Jun 2, 2020
Report Number: 2514535

		Reference Number	1422951-7	1422951-8	1422951-9	Nominal Detection Limit
		Sample Date	May 06, 2020	May 07, 2020	May 07, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (Unit 3 R-1 + 4 bottles)	Unit 3 Run 2 (Unit MV 3 R-2 + 4 bottles)	Unit 3 Run 3 (Unit MV 3 R-3 + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	
Front Half Metals Fraction 1A						
Aluminum		µg	9	10	7	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	3.2	<1	<1	1
Cadmium		µg	<0.3	<0.3	<0.3	0.25
Chromium		µg	1.1	1.7	1.4	0.2
Cobalt		µg	<0.3	<0.3	<0.3	0.25
Copper		µg	1	0.4	1	0.25
Lead		µg	<2	<2	<2	1.5
Manganese		µg	0.4	0.9	1	0.25
Nickel		µg	1	<0.5	1	0.5
Phosphorus		µg	43	44	27	2.5
Selenium		µg	2	<2	3.6	1.5
Tellurium		µg	<2	<2	<2	2
Thallium		µg	2	<2	<2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	11	8.3	7.0	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	9	<4	8	5
Antimony		µg	3	<2	<2	2.5
Arsenic		µg	<0.8	1.0	1	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	0.32	<0.2	<0.2	0.2
Cobalt		µg	<0.2	<0.2	<0.2	0.25
Copper		µg	0.6	2	2	0.25
Lead		µg	<1	<1	<1	1.5
Manganese		µg	1	0.4	0.4	0.25
Nickel		µg	<0.4	<0.4	0.5	0.5
Phosphorus		µg	9	7	10	2.5
Selenium		µg	2.2	2.2	3.5	1.5
Tellurium		µg	2.4	2	<2	2
Thallium		µg	3.0	<1	<1	1.5
Vanadium		µg	<0.8	<0.9	<0.8	1
Zinc		µg	2.2	1	2.2	0.5
Volume	Sample	mL	900	840	900	
Volume	aliquot volume	mL	850	790	850	
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422951 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514535
Attn: Missy Sampled By: Company:		

		Reference Number	1422951-7	1422951-8	1422951-9	Nominal Detection Limit
		Sample Date	May 06, 2020	May 07, 2020	May 07, 2020	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (Unit 3 R-1 + 4 bottles)	Unit 3 Run 2 (Unit MV 3 R-2 + 4 bottles)	Unit 3 Run 3 (Unit MV 3 R-3 + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	0.71	0.49	0.54	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	900	840	900	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	5.1	3.3	3.9	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	183	200	215	
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	750	500	750	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.06	<0.04	<0.06	
Mercury	As Tested	µg/L	0.24	0.15	0.25	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	0.078	0.048	0.080	

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1422951 Control Number: Date Received: May 12, 2020 Date Reported: Jun 2, 2020 Report Number: 2514535
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2020	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	May 27, 2020	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 13, 2020	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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



Received by:

CERTIFICATE OF ANALYSIS

Work Order : **VA20A6153**
Client : **A. Lanfranco & Associates Inc.**
Contact : Mark Lanfranco
Address : Unit # 101 9488 - 189 St
 Surrey BC Canada V4N 4W7
Telephone : 604 881 2582
Project : Metro Vancouver WTE
PO : HF
C-O-C number : ----
Sampler : A. Lanfranco
Site : ----
Quote number : Standing Offer
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 3
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-May-2020 15:35
Date Analysis Commenced : 11-May-2020
Issue Date : 14-May-2020 16:32

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

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



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

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



Analytical Results

Sub-Matrix: Impinger Solution

Client sample ID

					Unit 1 HF Blank	Unit 2 HF Blank	Unit 3 HF Blank	Unit 1 HF Run 1	Unit 1 HF Run 2
(Matrix: Air)									
Client sampling date / time					05-May-2020	06-May-2020	07-May-2020	05-May-2020	05-May-2020
Analyte	CAS Number	Method	LOR	Unit	VA20A6153-001	VA20A6153-002	VA20A6153-003	VA20A6153-004	VA20A6153-005
					Result	Result	Result	Result	Result
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<5.0	<5.0	<5.0	<5.0	<25.0 ^{DLDS}
volume, impinger	----	EP248	0.1	mL	225	215	225	435	425

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

Analytical Results

Sub-Matrix: Impinger Solution

Client sample ID

					Unit 1 HF Run 3	Unit 2 HF Run 1	Unit 2 HF Run 2	Unit 2 HF Run 3	Unit 3 HF Run 1
(Matrix: Air)									
Client sampling date / time					05-May-2020	06-May-2020	06-May-2020	06-May-2020	07-May-2020
Analyte	CAS Number	Method	LOR	Unit	VA20A6153-006	VA20A6153-007	VA20A6153-008	VA20A6153-009	VA20A6153-010
					Result	Result	Result	Result	Result
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<25.0 ^{DLDS}	<100 ^{DLDS}	<25.0 ^{DLDS}	<25.0 ^{DLDS}	<25.0 ^{DLDS}
volume, impinger	----	EP248	0.1	mL	405	436	407	390	420

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

Analytical Results

Sub-Matrix: Impinger Solution

Client sample ID

					Unit 3 HF Run 2	Unit 3 HF Run 3	----	----	----
(Matrix: Air)									
Client sampling date / time					07-May-2020	07-May-2020	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20A6153-011	VA20A6153-012	-----	-----	-----
					Result	Result	----	----	----
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<25.0 ^{DLDS}	<25.0 ^{DLDS}	----	----	----
volume, impinger	----	EP248	0.1	mL	380	380	----	----	----

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



Your Project #: MV WTE[C030050]
Your C.O.C. #: C030050-ONTV-01-01

Attention: Customer Solutions

Bureau Veritas Laboratories
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2020/05/19
Report #: R6178949
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0A9316

Received: 2020/05/05, 10:43

Sample Matrix: Tedlar Bag
Samples Received: 8

Analyses	Date		Laboratory Method	Analytical Method
	Quantity	Date Analyzed		
Nitrous Oxide (1)	8	N/A	2020/05/06 CAM SOP-00203	GC/ECD

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

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

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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



Your Project #: MV WTE[C030050]
Your C.O.C. #: C030050-ONTV-01-01

Attention: Customer Solutions

Bureau Veritas Laboratories
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2020/05/19
Report #: R6178949
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: COA9316

Received: 2020/05/05, 10:43

Encryption Key

Cristina Bacchus

Cristina (Maria) Bacchus
Project Manager
19 May 2020 11:33:30

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

Jade Browne, Project Manager Assistant - Air

Email: Jade.Browne@bvlabs.com

Phone# (905)817-5831

=====

This report has been generated and distributed using a secure automated process.

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BUREAU
VERITASBV Labs Job #: C0A9316
Report Date: 2020/05/19Bureau Veritas Laboratories
Client Project #: MV WTE[C030050]
Sampler Initials: ML**COMPRESSED GAS PARAMETERS (TEDLAR BAG)**

BV Labs ID		MOH719	MOH720	MOH720	MOH721		
Sampling Date		2020/05/04 10:50	2020/05/04 11:52	2020/05/04 11:52	2020/05/04 12:53		
COC Number		C030050-ONTV-01-01	C030050-ONTV-01-01	C030050-ONTV-01-01	C030050-ONTV-01-01		
	UNITS	XS6428-UNIT-1 RUN1	XS6429-UNIT-1 RUN2	XS6429-UNIT-1 RUN2 Lab-Dup	XS6430-UNIT-1 RUN3	RDL	QC Batch

Gas

Nitrous Oxide	ppmv	3.9	6.2	6.2	8.2	0.25	6712768
---------------	------	-----	-----	-----	-----	------	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

BV Labs ID		MOH722	MOH723	MOH725	MOH726		
Sampling Date		2020/05/04 10:47	2020/05/04 11:47	2020/05/04 10:32	2020/05/04 11:32		
COC Number		C030050-ONTV-01-01	C030050-ONTV-01-01	C030050-ONTV-01-01	C030050-ONTV-01-01		
	UNITS	XS6431-UNIT-2 RUN1	XS6432-UNIT-2 RUN2	XS6434-UNIT-3 RUN1	XS6435-UNIT-3 RUN2	RDL	QC Batch

Gas

Nitrous Oxide	ppmv	5.3	5.7	9.4	12	0.25	6712768
---------------	------	-----	-----	-----	----	------	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

BV Labs ID		MOH727		
Sampling Date		2020/05/04 12:32		
COC Number		C030050-ONTV-01-01		
	UNITS	XS6436-UNIT-3 RUN3	RDL	QC Batch
Gas				
Nitrous Oxide	ppmv	9.5	0.25	6712768
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



BUREAU
VERITAS

BV Labs Job #: COA9316
Report Date: 2020/05/19

Bureau Veritas Laboratories
Client Project #: MV WTE[C030050]
Sampler Initials: ML

TEST SUMMARY

BV Labs ID: MOH719
Sample ID: XS6428-UNIT-1 RUN1
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH720
Sample ID: XS6429-UNIT-1 RUN2
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH720 Dup
Sample ID: XS6429-UNIT-1 RUN2
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH721
Sample ID: XS6430-UNIT-1 RUN3
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH722
Sample ID: XS6431-UNIT-2 RUN1
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH723
Sample ID: XS6432-UNIT-2 RUN2
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH725
Sample ID: XS6434-UNIT-3 RUN1
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan



BUREAU
VERITAS

BV Labs Job #: COA9316
Report Date: 2020/05/19

Bureau Veritas Laboratories
Client Project #: MV WTE[C030050]
Sampler Initials: ML

TEST SUMMARY

BV Labs ID: MOH726
Sample ID: XS6435-UNIT-3 RUN2
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan

BV Labs ID: MOH727
Sample ID: XS6436-UNIT-3 RUN3
Matrix: Tedlar Bag

Collected: 2020/05/04
Shipped:
Received: 2020/05/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6712768	N/A	2020/05/06	Iqbal Hasan



BUREAU
VERITAS

BV Labs Job #: C0A9316

Report Date: 2020/05/19

Bureau Veritas Laboratories

Client Project #: MV WTE[C030050]

Sampler Initials: ML

GENERAL COMMENTS

MOH724 received empty, no results to report.

Due to high concentrations of target analytes, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: C0A9316
Report Date: 2020/05/19

QUALITY ASSURANCE REPORT

Bureau Veritas Laboratories
Client Project #: MV WTE[C030050]
Sampler Initials: ML

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
6712768	Nitrous Oxide	2020/05/06	<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 $\leq 2 \times \text{RDL}$).						



BUREAU
VERITAS

BV Labs Job #: COA9316

Report Date: 2020/05/19

Bureau Veritas Laboratories

Client Project #: MV WTE[C030050]

Sampler Initials: ML

VALIDATION SIGNATURE PAGE

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

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

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Sent to: BV Labs Campbell
6740 Campbell Road
Mississauga, ON, L5N 2L8
Tel: (905) 817-5700

BV LABS INTERLAB CHAIN OF CUSTODY RECORD

Page 01 of 01

COC # C030050-ONTV-01-01

REPORT INFORMATION							ANALYSIS REQUESTED										Job Barcode: C0A9316								
Company: Bureau Veritas Laboratories																	05-May-20 10:43								
Address: 4606 Canada Way, Burnaby, British Columbia, V5G 1K5																	Nazeema Rahaman								
Contact Name: Customer Solutions																	C0A9316								
Email: customersolutionswest@bvlab.com, customerservice@bvlab.com																	J L AIR-001								
Phone:																									
BV Labs Project #: C030050																									
Client Invoice To: A LANFRANCO & ASSOCIATES INC. (1301)																									
Client Report To: A LANFRANCO & ASSOCIATES INC. (1301)																									
Incl. on Report? Yes / No																									
#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.											ADDITIONAL SAMPLE INFORMATION								
1	X56428-UNIT-1 RUN 1	AIR	2020/05/04	10:50	ML	1	X										(P: 01)								
2	X56429-UNIT-1 RUN 2	AIR	2020/05/04	11:52	ML	1	X										(P: 01)								
3	X56430-UNIT-1 RUN 3	AIR	2020/05/04	12:53	ML	1	X										(P: 01)								
4	X56431-UNIT-2 RUN 1	AIR	2020/05/04	10:47	ML	1	X										(P: 01)								
5	X56432-UNIT-2 RUN 2	AIR	2020/05/04	11:47	ML	1	X										(P: 01)								
6	X56433-UNIT-2 RUN 3	AIR	2020/05/04	12:47	ML	1	X										(P: 01)								
7	X56434-UNIT-3 RUN 1	AIR	2020/05/04	10:32	ML	1	X										(P: 01)								
8	X56435-UNIT-3 RUN 2	AIR	2020/05/04	11:32	ML	1	X										(P: 01)								
9	X56436-UNIT-3 RUN 3	AIR	2020/05/04	12:32	ML	1	X										(P: 01)								
10																									
SITE LOCATION:							REGULATORY CRITERIA			SPECIAL INSTRUCTIONS				REQUIRED EDDS		TURNAROUND TIME									
SITE #:										Please inform BV Labs immediately if you are not accredited for the requested test(s). **Please return a copy of this form with the report ** Report units in PPM/ WCA Method 1101				National Excel (N001)		☐ Rush Required									
PROJECT #:														2020/05/19		Date Required									
MV WTE														Please inform us if rush charges will be incurred.											
PO/AE, TASK ORDER/SERVICE ORDER, LINE ITEM:																									
COOLER ID: 1							COOLER ID: 2			COOLER ID: 3						RECEIVING LAB USE ONLY									
Custody Seal Present ☒							Custody Seal Present ☒			Custody Seal Present ☒						BV Labs Job #									
Custody Seal Intact ☒							Custody Seal Intact ☒			Custody Seal Intact ☒															
Cooling Media Present ☒							Cooling Media Present ☒			Cooling Media Present ☒															
RELINQUISHED BY: (SIGN & PRINT)							DATE: (YYYY/MM/DD)			TIME: (HH:MM)			RECEIVED BY: (SIGN & PRINT)			DATE: (YYYY/MM/DD)			TIME: (HH:MM)			Samples Labelled By		Labels Verified By	
1. ALFRED NGAI							2020/05/04			13:55			[Signature]			2020/05/05			17:43						
2.																									

APPENDIX - C

COMPUTER GENERATED RESULTS

Client:	Metro Vancouver	Date:	4-May-20
Jobsite:	WTE (Burnaby, BC)	Run:	1 - Particulate / Metals
Source:	Unit 1	Run Time:	11:07 - 13:10

Concentrations:

Particulate	0.93 mg/dscm	0.00041 gr/dscf
	0.50 mg/Acm	0.00022 gr/Acf
	0.74 mg/dscm (@ 11% O2)	0.00032 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.061 Kg/hr	0.134 lb/hr
--------------------	-------------	-------------

Flue Gas Characteristics:

Flow	1091 dscm/min	38517 dscf/min
	18.18 dscm/sec	642 dscf/sec
	2036 Acm/min	71914 Acf/min

Velocity	13.325 m/sec	43.72 f/sec
-----------------	--------------	-------------

Temperature	158.3 oC	316.9 oF
--------------------	----------	----------

Moisture	17.7 %
-----------------	--------

Gas Analysis	8.5 % O2
	12.2 % CO2

	30.284 Mol. Wt (g/gmole) Dry
	28.116 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.6368 dscm	93.117 dscf
Sample Time	120.0 minutes	
Isokineticity	109.0 %	

*** Standard Conditions:**

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

Date: 4-May-20
Run: 1 - Particulate / Metals
Run Time: 11:07 - 13:10

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ΔP	Orifice ΔH (in. H2O)	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
		(ft3)	(in. H2O)		Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	93.667								
1	5.0	96.880	0.27	1.56	67	67	5	307	1.5	108.9
2	10.0	100.140	0.28	1.61	67	67	5	310	4.7	108.7
3	15.0	103.720	0.34	1.94	66	66	4.5	314	8.4	108.9
4	20.0	107.420	0.36	2.05	67	67	4.5	315	12.5	109.3
5	25.0	110.980	0.34	1.94	67	67	5	314	17.7	108.1
6	30.0	114.520	0.33	1.88	67	67	5	314	25.2	109.1
7	35.0	118.300	0.38	2.17	68	68	5	315	45.6	108.5
8	40.0	122.350	0.43	2.46	69	69	5	316	53.2	109.2
9	45.0	126.580	0.47	2.69	70	70	5	317	58.3	109.1
10	50.0	130.720	0.45	2.57	70	70	5	317	62.5	109.1
11	55.0	134.740	0.42	2.41	71	71	7	317	66.1	109.4
12	60.0	138.640	0.40	2.29	71	71	7	318	69.4	108.8
Traverse 2	0.0	138.640								
1	5.0	142.150	0.32	1.84	73	73	5	315	1.5	108.7
2	10.0	145.770	0.34	1.96	73	73	5	316	4.7	108.9
3	15.0	149.060	0.28	1.91	74	74	5	319	8.4	109.0
4	20.0	152.220	0.26	1.49	74	74	5	320	12.5	108.6
5	25.0	155.580	0.29	1.67	75	75	5	320	17.7	109.2
6	30.0	158.820	0.27	1.55	76	76	5	321	25.2	109.0
7	35.0	163.090	0.47	2.71	76	76	6.5	320	45.6	109.1
8	40.0	167.500	0.50	2.89	77	77	6.5	319	53.2	109.0
9	45.0	172.090	0.54	3.12	77	77	6.5	319	58.3	109.2
10	50.0	176.650	0.53	3.06	78	78	6.5	320	62.5	109.4
11	55.0	181.300	0.55	3.18	79	79	7	321	66.1	109.4
12	60.0	186.020	0.57	3.29	79	79	7	322	69.4	109.2
Average:			0.391	2.260	72.1	72.1	5.5	316.9		109.0

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

Date: 5-May-20
Run: 2 - Particulate / Metals
Run Time: 09:06 - 11:08

Concentrations:

Particulate	0.45 mg/dscm	0.00019 gr/dscf
	0.25 mg/Acm	0.00011 gr/Acf
	0.39 mg/dscm (@ 11% O2)	0.00017 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.029 Kg/hr	0.065 lb/hr
--------------------	-------------	-------------

Flue Gas Characteristics:

Flow	1096 dscm/min	38703 dscf/min
	18.27 dscm/sec	645 dscf/sec
	1962 Acm/min	69291 Acf/min

Velocity	12.839 m/sec	42.12 f/sec
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Temperature	149.1 oC	300.3 oF
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Moisture	16.1 %
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Gas Analysis	9.5 % O2
	10.8 % CO2

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

Sample Parameters:

Sample Volume	2.5819 dscm	91.179 dscf
Sample Time	120.0 minutes	
Isokineticity	106.2 %	

*** 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: 5-May-20
Run: 2 - Particulate / Metals
Run Time: 09:06 - 11:08

Control Unit (Y) 1.0042
 Nozzle Diameter (in.) 0.3048
 Pitot Factor 0.8388
 Baro. Press. (in. Hg) 30.16
 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) 0.00110
Total (grams) 0.00115

Traverse 1
 Traverse 2

Gas Analysis (Vol. %):

CO2	O2
10.50	9.73
11.17	9.20

10.83 **9.47**

Condensate Collection:

Impinger 1	190.0
Impinger 2	106.0
Impinger 3	42.0
Impinger 4	10.0
Impinger 5	4.0
Impinger 6	2.0
Gel	17.8

Gain (grams) 371.8

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	186.100								
1	5.0	189.280	0.27	1.53	66	66	6	306	1.5	106.1
2	10.0	192.330	0.25	1.41	66	66	6	308	4.7	105.9
3	15.0	195.580	0.28	1.59	67	67	6	306	8.4	106.3
4	20.0	198.770	0.27	1.53	66	66	6	303	12.5	106.2
5	25.0	202.020	0.28	1.59	67	67	6	303	17.7	106.1
6	30.0	205.380	0.30	1.70	67	67	6	304	25.2	106.0
7	35.0	209.680	0.49	2.79	68	68	8	303	45.6	106.2
8	40.0	214.720	0.67	3.83	69	69	8	302	53.2	106.4
9	45.0	219.630	0.64	3.64	68	68	10	304	58.3	106.4
10	50.0	223.620	0.42	2.40	69	69	10	302	62.5	106.1
11	55.0	227.540	0.40	2.29	70	70	8	301	66.1	106.5
12	60.0	231.350	0.38	2.18	70	70	8	300	69.4	106.1
Traverse 2	0.0	231.350								
1	5.0	234.520	0.26	1.50	71	71	6	298	1.5	106.2
2	10.0	237.820	0.28	1.62	72	72	6	297	4.7	106.3
3	15.0	241.230	0.30	1.73	72	72	6	298	8.4	106.2
4	20.0	245.020	0.37	2.14	73	73	6	298	12.5	106.2
5	25.0	248.870	0.38	2.20	73	73	6	297	17.7	106.4
6	30.0	252.720	0.38	2.21	74	74	6	297	25.2	106.2
7	35.0	256.760	0.42	2.44	74	74	8	297	45.6	106.1
8	40.0	260.860	0.43	2.50	74	74	8	296	53.2	106.3
9	45.0	265.020	0.44	2.56	75	75	9	297	58.3	106.5
10	50.0	269.040	0.41	2.39	76	76	9	298	62.5	106.5
11	55.0	272.690	0.34	1.98	76	76	9	297	66.1	106.0
12	60.0	276.180	0.31	1.81	76	76	9	296	69.4	106.0
Average:			0.374	2.148	70.8	70.8	7.3	300.3		106.2

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

Date: 5-May-20
Run: 3 - Particulate / Metals
Run Time: 11:25 - 13:27

Concentrations:

Particulate	0.6 mg/dscm	0.0003 gr/dscf
	0.4 mg/Acm	0.0002 gr/Acf
	0.5 mg/dscm (@ 11% O2)	0.0002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.042 Kg/hr	0.092 lb/hr
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Flue Gas Characteristics:

Flow	1085 dscm/min	38321 dscf/min
	18.09 dscm/sec	639 dscf/sec
	1951 Acm/min	68908 Acf/min

Velocity	12.768 m/sec	41.89 f/sec
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Temperature	145.7 oC	294.3 oF
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Moisture	17.1 %
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Gas Analysis	9.0 % O2
	11.4 % CO2

30.184 Mol. Wt (g/gmole) Dry
28.098 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5673 dscm	90.663 dscf
Sample Time	120.0 minutes	
Isokineticity	106.4 %	

*** 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: 5-May-20
Run: 3 - Particulate / Metals
Run Time: 11:25 - 13:27

Control Unit (Y)	1.0042	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3048	Filter (grams) 0.00005	CO2 O2	Impinger 1 248.0
Pitot Factor	0.8388	Washings (grams) 0.00160	11.50 9.00	Impinger 2 94.0
Baro. Press. (in. Hg)	30.16	Traverse 1	11.33 8.90	Impinger 3 30.0
Static Press. (in. H2O)	-20.00	Traverse 2		Impinger 4 6.0
Stack Height (ft)	30	Total (grams) 0.00165		Impinger 5 2.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 17.1
Minutes Per Reading	5.0		11.42 8.95	Gain (grams) 398.1
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	278.311								
1	5.0	282.020	0.35	2.03	75	75	4	298	1.5	107.6
2	10.0	285.830	0.37	2.15	75	75	4	297	4.7	107.5
3	15.0	289.850	0.41	2.39	75	75	5	296	8.4	107.7
4	20.0	293.890	0.42	2.43	75	75	5	300	12.5	107.3
5	25.0	297.850	0.40	2.31	75	75	6	301	17.7	107.8
6	30.0	301.550	0.35	2.04	76	76	6	298	25.2	107.2
7	35.0	305.380	0.37	2.15	77	77	6	299	45.6	107.8
8	40.0	309.300	0.39	2.28	77	77	6	297	53.2	107.3
9	45.0	313.320	0.41	2.40	77	77	6	296	58.3	107.3
10	50.0	317.100	0.35	2.11	78	78	6	295	62.5	108.9
11	55.0	320.780	0.34	2.00	78	78	5	292	66.1	107.3
12	60.0	324.350	0.32	1.89	78	78	5	291	69.4	107.2
Traverse 2	0.0	324.350								
1	5.0	327.800	0.30	1.76	77	77	4	293	1.5	107.3
2	10.0	331.080	0.27	1.58	77	77	4	298	4.7	107.8
3	15.0	334.250	0.25	1.48	78	78	4	290	8.4	107.5
4	20.0	337.440	0.27	1.50	78	78	4	293	12.5	104.3
5	25.0	340.680	0.28	1.55	78	78	5	294	17.7	104.1
6	30.0	343.820	0.26	1.44	78	78	5	294	25.2	104.7
7	35.0	347.980	0.46	2.55	79	79	6	295	45.6	104.4
8	40.0	352.250	0.48	2.67	80	80	6	295	53.2	104.8
9	45.0	356.090	0.39	2.16	80	80	8	296	58.3	104.5
10	50.0	360.420	0.49	2.75	81	81	8	289	62.5	104.6
11	55.0	364.620	0.46	2.60	81	81	8	285	66.1	104.4
12	60.0	368.780	0.45	2.54	80	80	8	282	69.4	104.5
					0					
Average:			0.368	2.115	74.5	77.6	5.6	294.3		106.4

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		5-May-20	5-May-20	5-May-20
Test Time		09:32 - 10:32	10:38 - 11:38	11:44 - 12:44
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.16	30.16	30.16
DGM Factor	(Y)	0.9757	0.9757	0.9757
Initial Reading	(m ³)	399.447	400.053	400.746
Final Reading	(m ³)	400.042	400.738	401.446
Temp. Outlet	(Avg. oF)	65.0	70.3	73.4
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.59	0.67	0.68
HF	(mg)	0.003	0.013	0.013
Oxygen	(Vol. %)	9.5	9.5	9.0
HF	(mg/Sm ³)	0.004	0.020	0.019
HF	(mg/Sm ³ @ 11% O2)	0.004	0.017	0.016
Moisture	(Vol. %)	16.1	16.1	17.1
Tstd. (oF)	68		Pstd. (in. Hg)	29.92

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

Date: 5-May-20
Run: 1 - Particulate / Metals
Run Time: 12:27 - 14:30

Concentrations:

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

Emission Rates:

Particulate	0.043 Kg/hr	0.094 lb/hr
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Flue Gas Characteristics:

Flow	1080 dscm/min	38133 dscf/min
	18.00 dscm/sec	636 dscf/sec
	2001 Acm/min	70656 Acf/min

Velocity	13.092 m/sec	42.95 f/sec
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Temperature	157.7 oC	315.9 oF
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Moisture	17.3 %
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Gas Analysis	9.8 % O2
	10.4 % CO2

30.056 Mol. Wt (g/gmole) Dry
27.973 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5151 dscm	88.820 dscf
Sample Time	120.0 minutes	
Isokineticity	103.4 %	

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

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

Date: 5-May-20
Run: 1 - Particulate / Metals
Run Time: 12:27 - 14:30

Control Unit (Y)	0.9835	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3072	Filter (grams) 0.00005	CO2 O2	Impinger 1 226.0
Pitot Factor	0.8517	Washings (grams) 0.00160	10.33 9.77	Impinger 2 102.0
Baro. Press. (in. Hg)	30.09	Traverse 1	10.50 9.73	Impinger 3 28.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 6.0
Stack Height (ft)	30	Total (grams) 0.00165		Impinger 5 3.0
Stack Diameter (in.)	70.90			Impinger 6 13.0
Stack Area (sq.ft.)	27.417			Gel 16.3
Minutes Per Reading	5.0			Gain (grams) 394.3
Minutes Per Point	5.0			
			10.42 9.75	

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	577.190								
1	5.0	581.240	0.42	2.16	70	70	6	310	1.5	103.4
2	10.0	585.380	0.44	2.26	70	70	6	312	4.7	103.4
3	15.0	589.620	0.46	2.36	71	71	7	313	8.4	103.5
4	20.0	593.860	0.46	2.37	71	71	7	312	12.5	103.4
5	25.0	597.960	0.43	2.21	72	72	7	314	17.7	103.3
6	30.0	601.920	0.40	2.06	73	73	7	314	25.2	103.2
7	35.0	605.300	0.29	1.49	74	74	6	316	45.6	103.3
8	40.0	608.510	0.26	1.34	75	75	6	315	53.2	103.3
9	45.0	611.660	0.25	1.29	76	76	6	315	58.3	103.2
10	50.0	614.880	0.26	1.35	77	77	6	315	62.5	103.2
11	55.0	617.980	0.24	1.25	78	78	5	316	66.1	103.3
12	60.0	621.020	0.23	1.20	79	79	5	315	69.4	103.2
Traverse 2	0.0	621.020								
1	5.0	624.310	0.27	1.40	79	79	6	318	1.5	103.3
2	10.0	627.660	0.28	1.45	79	79	6	318	4.7	103.3
3	15.0	631.070	0.29	1.50	80	80	6	319	8.4	103.2
4	20.0	634.420	0.28	1.45	80	80	6	321	12.5	103.3
5	25.0	637.710	0.27	1.40	81	81	6	320	17.7	103.1
6	30.0	640.890	0.25	1.30	82	82	6	319	25.2	103.3
7	35.0	645.350	0.49	2.56	83	83	8	318	45.6	103.5
8	40.0	650.080	0.55	2.88	84	84	8	318	53.2	103.5
9	45.0	654.740	0.53	2.78	84	84	9	315	58.3	103.7
10	50.0	659.360	0.52	2.73	85	85	9	316	62.5	103.6
11	55.0	663.840	0.49	2.57	85	85	9	317	66.1	103.5
12	60.0	668.280	0.48	2.53	86	86	9	316	69.4	103.4
Average:			0.368	1.912	78.1	78.1	6.8	315.9		103.4

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

Date: 6-May-20
Run: 2 - Particulate / Metals
Run Time: 08:45 - 10:50

Concentrations:

Particulate	0.04 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	0.007 lb/hr
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Flue Gas Characteristics:

Flow	1162 dscm/min	41022 dscf/min
	19.36 dscm/sec	684 dscf/sec
	2075 Acfm/min	73291 Acf/min

Velocity	13.580 m/sec	44.55 f/sec
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Temperature	152.0 oC	305.7 oF
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Moisture	15.5 %
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Gas Analysis	10.0 % O2
	10.3 % CO2

30.041 Mol. Wt (g/gmole) Dry
28.172 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.2292 dscm	78.725 dscf
Sample Time	120.0 minutes	
Isokineticity	101.4 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	6-May-20
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 2	Run Time:	08:45 - 10:50

Control Unit (Y)	0.9835	Collection:	Gas Analysis (Vol. %):		Condensate Collection:		
Nozzle Diameter (in.)	0.2870		Filter (grams) 0.00005	CO2	O2	Impinger 1	184.0
Pitot Factor	0.8517		Washings (grams) 0.00005	10.33	9.73	Impinger 2	85.0
Baro. Press. (in. Hg)	30.15		Traverse 1	10.17	10.33	Impinger 3	16.0
Static Press. (in. H2O)	-19.00		Traverse 2			Impinger 4	5.0
Stack Height (ft)	30					Impinger 5	2.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417					Gel	14.4
Minutes Per Reading	5.0			10.25	10.03	Gain (grams)	307.4
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	670.463								
1	5.0	674.480	0.56	2.17	62	62	4	308	1.5	101.5
2	10.0	678.570	0.58	2.24	63	63	4	312	4.7	101.6
3	15.0	682.340	0.49	1.90	64	64	4	309	8.4	101.4
4	20.0	685.920	0.44	1.71	65	65	4	308	12.5	101.3
5	25.0	689.460	0.43	1.67	65	65	4	309	17.7	101.4
6	30.0	693.130	0.46	1.80	66	66	4	307	25.2	101.4
7	35.0	696.390	0.36	1.41	67	67	4	306	45.6	101.4
8	40.0	699.410	0.31	1.21	67	67	4	307	53.2	101.3
9	45.0	702.290	0.28	1.10	68	68	4	307	58.3	101.4
10	50.0	705.010	0.25	0.98	68	68	4	306	62.5	101.2
11	55.0	707.680	0.24	0.95	69	69	4	305	66.1	101.2
12	60.0	710.300	0.23	0.91	69	69	4	305	69.4	101.4
Traverse 2	0.0	710.300								
1	5.0	713.380	0.32	1.26	68	68	4	306	1.5	101.4
2	10.0	716.320	0.29	1.14	69	69	4	304	4.7	101.3
3	15.0	719.210	0.28	1.11	69	69	4	304	8.4	101.4
4	20.0	722.050	0.27	1.07	69	69	4	303	12.5	101.4
5	25.0	724.840	0.26	1.03	69	69	4	302	17.7	101.4
6	30.0	727.730	0.28	1.11	69	69	4	304	25.2	101.4
7	35.0	731.780	0.55	2.17	69	69	4	304	45.6	101.6
8	40.0	735.940	0.58	2.29	69	69	4	304	53.2	101.7
9	45.0	740.350	0.65	2.57	70	70	4	304	58.3	101.7
10	50.0	744.650	0.62	2.45	69	69	4	304	62.5	101.7
11	55.0	748.700	0.55	2.17	69	69	4	304	66.1	101.6
12	60.0	752.600	0.51	2.01	69	69	4	304	69.4	101.6
Average:			0.408	1.601	67.5	67.5	4.0	305.7		101.4

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

Date: 6-May-20
Run: 3 - Particulate / Metals
Run Time: 11:05 - 13:06

Concentrations:

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

Emission Rates:

Particulate	0.01 Kg/hr	0.029 lb/hr
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Flue Gas Characteristics:

Flow	1109 dscm/min	39181 dscf/min
	18.49 dscm/sec	653 dscf/sec
	1979 Acfm/min	69875 Acf/min

Velocity	12.947 m/sec	42.48 f/sec
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Temperature	153.1 oC	307.6 oF
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Moisture	15.2 %
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Gas Analysis	10.0 % O2
	10.4 % CO2

30.066 Mol. Wt (g/gmole) Dry
28.237 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.2845 dscm	80.676 dscf
Sample Time	120.0 minutes	
Isokineticity	101.0 %	

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

Client:	Metro Vancouver	Date:	6-May-20
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 2	Run Time:	11:05 - 13:06

Control Unit (Y)	0.9835	Collection:	Gas Analysis (Vol. %):		Condensate Collection:			
Nozzle Diameter (in.)	0.2923		Filter (grams) 0.00005	CO2	O2	Impinger 1	182.0	
Pitot Factor	0.8388		Washings (grams) 0.00040	Traverse 1	10.50	9.90	Impinger 2	90.0
Baro. Press. (in. Hg)	30.15			Traverse 2	10.33	10.10	Impinger 3	12.0
Static Press. (in. H20)	-19.00						Impinger 4	6.0
Stack Height (ft)	30	Total (grams) 0.0004				Impinger 5	2.0	
Stack Diameter (in.)	70.90					Impinger 6	1.0	
Stack Area (sq.ft.)	27.417					Gel	13.3	
Minutes Per Reading	5.0			10.42	10.00	Gain (grams)	306.3	
Minutes Per Point	5.0							

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	753.177								
1	5.0	756.370	0.33	1.35	69	69	4	303	1.5	100.6
2	10.0	759.350	0.29	1.17	69	69	4	310	4.7	100.6
3	15.0	762.330	0.29	1.18	70	70	4	310	8.4	100.4
4	20.0	765.200	0.27	1.09	69	69	4	310	12.5	100.4
5	25.0	768.020	0.26	1.05	69	69	4	310	17.7	100.5
6	30.0	770.890	0.27	1.09	69	69	4	308	25.2	100.3
7	35.0	774.950	0.54	2.18	68	68	4	309	45.6	100.8
8	40.0	779.200	0.59	2.39	68	68	4	309	53.2	101.0
9	45.0	783.330	0.55	2.25	69	69	4	308	58.3	101.4
10	50.0	787.420	0.54	2.21	69	69	4	308	62.5	101.3
11	55.0	791.470	0.53	2.17	69	69	4	309	66.1	101.3
12	60.0	795.440	0.51	2.09	69	69	4	308	69.4	101.2
Traverse 2	0.0	795.440								
1	5.0	799.120	0.44	1.80	67	67	4	307	1.5	101.2
2	10.0	802.840	0.45	1.84	68	68	4	309	4.7	101.1
3	15.0	806.480	0.43	1.76	68	68	4	308	8.4	101.1
4	20.0	810.090	0.42	1.73	68	68	4	305	12.5	101.3
5	25.0	813.660	0.41	1.69	69	69	4	304	17.7	101.1
6	30.0	817.190	0.40	1.65	69	69	4	305	25.2	101.3
7	35.0	820.330	0.32	1.32	70	70	4	305	45.6	100.4
8	40.0	823.400	0.30	1.23	70	70	4	307	53.2	101.5
9	45.0	826.350	0.28	1.15	70	70	4	308	58.3	101.0
10	50.0	829.140	0.25	1.03	70	70	4	308	62.5	101.1
11	55.0	831.820	0.23	0.95	71	71	4	307	66.1	101.0
12	60.0	834.440	0.22	0.91	71	71	4	307	69.4	100.9
Average:			0.380	1.553	69.1	69.1	3.0	307.6		101.0

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

Sample Type: HF					
Parameter		Test 1	Test 2	Test 3	
Test Date		6-May-20	6-May-20	6-May-20	
Test Time		09:01 - 10:01	10:09 - 11:09	11:15 - 12:15	
Test Duration	(min.)	60	60	60	
Baro. Press.	(in. Hg)	30.15	30.15	30.15	
DGM Factor	(Y)	0.9757	0.9757	0.9757	
Initial Reading	(m ³)	401.463	402.178	402.894	
Final Reading	(m ³)	402.165	402.880	403.583	
Temp. Outlet	(Avg. oF)	58.4	69.9	62.4	
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50	
Gas Volume	(Sm ³)	0.70405	0.68877	0.68602	
HF	(mg)	0.053	0.013	0.013	
Oxygen	(Vol. %)	10.0	10.0	10.0	
HF	(mg/Sm ³)	0.075	0.019	0.019	
HF	(mg/Sm ³ @ 11% O2)	0.068	0.017	0.017	
Moisture (isokinetic)	(Vol. %)	15.5	15.5	15.2	
*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

Date: 6-May-20
Run: 1 - Particulate / Metals
Run Time: 12:10 - 14:12

Concentrations:

Particulate	0.44 mg/dscm	0.00019 gr/dscf
	0.25 mg/Acm	0.00011 gr/Acf
	0.39 mg/dscm (@ 11% O2)	0.00017 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.033 Kg/hr	0.073 lb/hr
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Flue Gas Characteristics:

Flow	1252 dscm/min	44224 dscf/min
	20.87 dscm/sec	737 dscf/sec
	2247 Acm/min	79360 Acf/min

Velocity	14.704 m/sec	48.24 f/sec
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Temperature	154.6 oC	310.2 oF
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Moisture	15.6 %
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Gas Analysis	9.8 % O2
	10.6 % CO2

30.086 Mol. Wt (g/gmole) Dry
28.199 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7281 dscm	96.343 dscf
Sample Time	115.0 minutes	
Isokineticity	103.0 %	

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

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

Date: 6-May-20
Run: 1 - Particulate / Metals
Run Time: 12:10 - 14:12

Control Unit (Y)	0.9815	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3048	Filter (grams) 0.00080	CO2 O2	Impinger 1 254.0
Pitot Factor	0.8517	Washings (grams) 0.00040	CO2 O2	Impinger 2 88.0
Baro. Press. (in. Hg)	30.26		CO2 O2	Impinger 3 10.0
Static Press. (in. H2O)	-19.50		CO2 O2	Impinger 4 5.0
Stack Height (ft)	30		CO2 O2	Impinger 5 2.0
Stack Diameter (in.)	70.90		CO2 O2	Impinger 6 1.0
Stack Area (sq.ft.)	27.417		CO2 O2	Gel 18.7
Minutes Per Reading	5.0		CO2 O2	Gain (grams) 378.7
Minutes Per Point	5.0		CO2 O2	

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	132.462								
1	5.0	137.150	0.58	2.81	60	60	8	300	1.5	103.4
2	10.0	141.980	0.62	3.00	60	60	8	302	4.7	103.2
3	15.0	146.960	0.67	3.20	60	60	8	312	8.4	103.1
4	20.0	151.540	0.56	2.69	61	61	8	310	12.5	103.2
5	25.0	156.080	0.55	2.65	62	62	6	310	17.7	103.0
6	30.0	160.750	0.58	2.79	63	63	6	310	25.2	103.1
7	35.0	164.640	0.40	1.93	64	64	6	311	45.6	103.0
8	40.0	168.120	0.32	1.54	65	65	6	312	53.2	102.8
9	45.0	171.500	0.30	1.45	65	65	5	309	58.3	102.9
10	50.0	174.770	0.28	1.36	66	66	5	310	62.5	102.9
11	55.0	178.150	0.30	1.45	67	67	5	311	66.1	102.7
12	60.0	181.300	0.26	1.27	67	67	5	308	69.4	102.5
Traverse 2	0.0	181.300								
1	5.0	185.350	0.42	2.08	69	69	6	299	1.5	102.9
2	10.0	189.460	0.44	2.14	69	69	6	310	4.7	102.8
3	15.0	193.380	0.40	1.94	70	70	6	314	8.4	102.8
4	20.0	197.200	0.38	1.84	70	70	6	315	12.5	102.9
5	25.0	200.980	0.37	1.80	71	71	7	315	17.7	103.0
6	30.0	204.700	0.36	1.75	71	71	7	314	25.2	102.6
7	35.0	209.350	0.56	2.73	71	71	8	314	45.6	103.1
8	40.0	214.140	0.59	2.88	71	71	8	314	53.2	103.5
9	45.0	219.050	0.62	3.04	73	73	8	312	58.3	103.0
10	50.0	223.800	0.58	2.84	73	73	8	312	62.5	103.0
11	55.0	228.850	0.65	3.18	73	73	8	312	66.1	103.5
12	60.0	233.540	0.56	2.76	74	74	8	309	66.1	103.1
Average:			0.473	2.297	67.3	67.3	6.8	310.2		103.0

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

Date: 7-May-20
Run: 2 - Particulate / Metals
Run Time: 08:30 - 10:32

Concentrations:

Particulate	0.81 mg/dscm	0.00035 gr/dscf
	0.46 mg/Acm	0.00020 gr/Acf
	0.81 mg/dscm (@ 11% O2)	0.00035 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.064 Kg/hr	0.141 lb/hr
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Flue Gas Characteristics:

Flow	1315 dscm/min	46440 dscf/min
	21.92 dscm/sec	774 dscf/sec
	2317 Acm/min	81821 Acf/min

Velocity	15.160 m/sec	49.74 f/sec
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Temperature	153.4 oC	308.1 oF
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Moisture	14.9 %
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Gas Analysis	11.0 % O2
	9.3 % CO2

29.931 Mol. Wt (g/gmole) Dry
28.157 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.9678 dscm	104.807 dscf
Sample Time	120.0 minutes	
Isokineticity	101.8 %	

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

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

Date: 7-May-20
Run: 2 - Particulate / Metals
Run Time: 08:30 - 10:32

Control Unit (Y)	0.9815	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3048	Filter (grams)	0.00120	CO2	O2	Impinger 1	212.0
Pitot Factor	0.8517	Washings (grams)	0.00120	9.33	11.00	Impinger 2	122.0
Baro. Press. (in. Hg)	30.46		Traverse 1	9.33	10.93	Impinger 3	25.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.00240	Traverse 2			Impinger 4	8.0
Stack Height (ft)	30					Impinger 5	3.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417					Gel	18.0
Minutes Per Reading	5.0			9.33	10.97	Gain (grams)	389.0
Minutes Per Point	5.0						

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	234.935								
1	5.0	239.630	0.60	2.88	58	58	10	306	1.5	102.0
2	10.0	244.480	0.64	3.07	59	59	10	308	4.7	102.0
3	15.0	249.050	0.57	2.73	59	59	10	309	8.4	101.8
4	20.0	253.580	0.56	2.69	59	59	10	308	12.5	101.7
5	25.0	258.280	0.60	2.88	60	60	12	308	17.7	101.8
6	30.0	263.120	0.63	3.04	61	61	12	307	25.2	102.1
7	35.0	266.620	0.33	1.59	62	62	9	308	45.6	101.5
8	40.0	270.030	0.31	1.50	63	63	9	306	53.2	101.7
9	45.0	273.350	0.29	1.43	64	64	6	295	58.3	101.4
10	50.0	276.730	0.30	1.47	65	65	6	300	62.5	101.7
11	55.0	280.350	0.34	1.67	66	66	6	298	66.1	102.0
12	60.0	283.850	0.32	1.57	67	67	6	300	69.4	101.6
Traverse 2	0.0	283.850								
1	5.0	288.230	0.50	2.46	67	67	7	299	1.5	101.8
2	10.0	292.280	0.44	2.14	67	67	7	309	4.7	101.0
3	15.0	296.280	0.42	2.04	68	68	6.5	312	8.4	102.0
4	20.0	300.180	0.40	1.94	69	69	6.5	313	12.5	101.8
5	25.0	304.320	0.45	2.19	69	69	6.5	313	17.7	101.9
6	30.0	308.500	0.46	2.24	70	70	6.5	314	25.2	101.7
7	35.0	313.360	0.62	3.01	71	71	10	315	45.6	101.9
8	40.0	318.450	0.68	3.31	71	71	10	315	53.2	102.0
9	45.0	323.480	0.66	3.22	72	72	10.5	315	58.3	102.1
10	50.0	328.800	0.74	3.60	72	72	10.5	316	62.5	102.1
11	55.0	333.920	0.68	3.32	72	72	10	313	66.1	102.3
12	60.0	338.810	0.62	3.05	73	73	10	308	69.4	101.7
Average:			0.507	2.460	66.0	66.0	8.6	308.1		101.8

Client:	Metro Vancouver	Date:	7-May-20
Jobsite:	WTE(Burnaby,B.C)	Run:	3 - Particulate / Metals
Source:	Unit 3	Run Time:	10:45 - 12:47

Concentrations:

Particulate	0.16 mg/dscm	0.00007 gr/dscf
	0.09 mg/Acm	0.00004 gr/Acf
	0.14 mg/dscm (@ 11% O2)	0.00006 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.012 Kg/hr	0.026 lb/hr
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Flue Gas Characteristics:

Flow	1264 dscm/min	44639 dscf/min
	21.07 dscm/sec	744 dscf/sec
	2276 Acn/min	80380 Acf/min

Velocity	14.894 m/sec	48.86 f/sec
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Temperature	157.4 oC	315.3 oF
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Moisture	15.9 %
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Gas Analysis	10.1 % O2
	10.3 % CO2

	30.045 Mol. Wt (g/gmole) Dry
	28.127 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.8857 dscm	101.909 dscf
Sample Time	120.0 minutes	
Isokineticity	102.9 %	

*** Standard Conditions:**

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

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

Date: 7-May-20
Run: 3 - Particulate / Metals
Run Time: 10:45 - 12:47

Control Unit (Y)	0.9815	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3048	Filter (grams) 0.00040	CO2 O2	Impinger 1 246.0
Pitot Factor	0.8517	Washings (grams) 0.00005	Traverse 1 10.17 10.17	Impinger 2 108.0
Baro. Press. (in. Hg)	30.46		Traverse 2 10.33 10.10	Impinger 3 28.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.00045		Impinger 4 6.0
Stack Height (ft)	30			Impinger 5 4.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 17.1
Minutes Per Reading	5.0		10.25 10.14	Gain (grams) 410.1
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	338.995								
1	5.0	342.720	0.36	1.76	74	74	7	314	1.5	102.8
2	10.0	346.550	0.38	1.85	74	74	7	317	4.7	103.1
3	15.0	350.180	0.34	1.66	74	74	7	317	8.4	103.2
4	20.0	353.750	0.33	1.61	74	74	7	316	12.5	103.0
5	25.0	357.580	0.38	1.86	74	74	7	316	17.7	103.0
6	30.0	361.600	0.42	2.05	74	74	7	317	25.2	102.9
7	35.0	366.540	0.63	3.08	75	75	8	317	45.6	103.4
8	40.0	371.780	0.71	3.47	75	75	8	317	53.2	103.4
9	45.0	376.980	0.70	3.42	75	75	10	317	58.3	103.3
10	50.0	382.200	0.71	3.46	75	75	10	318	62.5	103.0
11	55.0	387.250	0.66	3.23	76	76	10	318	66.1	103.1
12	60.0	392.160	0.62	3.05	76	76	10	312	69.4	103.0
Traverse 2	0.0	392.160								
1	5.0	396.920	0.58	2.87	76	76	10	310	1.5	103.1
2	10.0	401.750	0.60	2.94	76	76	10	316	4.7	103.3
3	15.0	406.690	0.63	3.09	76	76	10	316	8.4	103.1
4	20.0	411.520	0.60	2.94	76	76	10	316	12.5	103.3
5	25.0	416.270	0.58	2.84	76	76	11	316	17.7	103.3
6	30.0	420.850	0.54	2.66	76	76	11	315	25.2	103.1
7	35.0	424.490	0.34	1.67	76	76	7	314	45.6	102.9
8	40.0	428.020	0.32	1.58	76	76	7	312	53.2	102.7
9	45.0	431.380	0.29	1.43	76	76	7	313	58.3	102.7
10	50.0	434.850	0.31	1.52	76	76	7	314	62.5	102.7
11	55.0	438.480	0.34	1.67	76	76	7	315	66.1	102.7
12	60.0	441.810	0.30	1.47	76	76	7	315	69.4	100.3
Average:			0.486	2.383	75.3	75.3	8.4	315.3		102.9

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		7-May-20	7-May-20	7-May-20
Test Time		08:50 - 09:50	10:00 - 11:00	11:09 - 12:09
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.46	30.46	30.46
DGM Factor	(Y)	0.9757	0.9757	0.9757
Initial Reading	(m ³)	403.602	404.323	405.033
Final Reading	(m ³)	404.309	405.020	405.746
Temp. Outlet	(Avg. oF)	61.3	64.0	65.0
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.71196	0.69837	0.71254
HF	(mg)	0.013	0.013	0.013
Oxygen	(Vol. %)	11.0	11.0	10.1
HF	(mg/Sm³)	0.018	0.018	0.018
HF	(mg/Sm³ @ 11% O₂)	0.018	0.018	0.017
Moisture (isokinetic)	(Vol. %)	14.9	14.9	15.9
*Wet Basis Calculated on moisture from isokinetic tests				
Tstd. (oF)	68		Pstd. (in. Hg)	29.92

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

Parameter: N₂O

Molecular Weight: 44.00 grams/mol
Lab Detection Limit: 0.1 ppm
Oxygen Correction: 11 %
Reportable Detection Limit: 0.18 mg/Sm³

Sample ID	Date	Time	N ₂ O	N ₂ O	O ₂	N ₂ O	
			ppm	mg/Sm ³	% Vol	mg/Sm ³ @ 11% O ₂	
Unit 1 Run 1	04-May-20	09:50 - 10:50	3.9	7.1	8.00	5.5	Unit 2 ru
Unit 1 Run 2	04-May-20	10:52 - 11:52	6.2	11.3	8.00	8.7	
Unit 1 Run 3	04-May-20	11:53 - 12:53	8.2	15.0	8.00	11.5	
Average						8.6	
Unit 2 Run 1	04-May-20	09:47 - 10:47	5.3	9.7	9.50	8.4	
Unit 2 Run 2	04-May-20	10:47 - 11:47	5.7	10.4	9.50	9.1	
Unit 2 Run 3	04-May-20	11:47 - 12:47	5.5	10.1	9.50	8.7	
Average						8.7	
Unit 3 Run 1	04-May-20	09:32 - 10:32	9.4	17.2	9.60	15.1	
Unit 3 Run 2	04-May-20	10:32 - 11:32	12.0	21.9	9.60	19.2	
Unit 3 Run 3	04-May-20	11:32 - 12:32	9.5	17.4	9.60	15.2	
Average						16.5	

APPENDIX - D

FIELD DATA SHEETS

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PLANT	M.V. W.T.E.	PROBE TIP DIAMETER, IN.	MV-021-3048	IMPINGER	INITIAL	FINAL	TOTAL GAIN
		PROBE LENGTH, FT / Cp	7' C / 0.8388	VOLUMES	(mL)	(mL)	(mL)
RUN No	2 - Metals / Particulate	FILTER NUMBER		Imp. # 1	0	190	190
LOCATION	Unit #1			Imp. # 2	100	206	106
DATE	May 5, 2020	STATIC PRESSURE, IN. H ₂ O	20.0"	Imp. # 3	100	142	42
OPERATOR: Daryl Sampson	CL + SF	STACK DIAMETER	70.9"	Imp. # 4	0	10	10
CONTROL UNIT / Y	JV147 / 1.0042	STACK HEIGHT	30.0'		100	124	24
	ΔH @ 2.003				100	102	2
BAROMETRIC PRESSURE, IN. Hg	30.16	INITIAL LEAK TEST	0.001 @ 15"	0.01 200g			
ASSUMED MOISTURE, Bw	13%	FINAL LEAK TEST	0.001 @ 15"	Upstream Diameters			
				Downstream Diameters			

5 Point	Clock Time	Dry Gas Meter Ft ³	Pitot IN. H ₂ O ΔP	Orifice ΔH IN. H ₂ O	Dry Gas Temp. °F	Temperature °F				Pump Vac. IN. Hg Gauge	Fyrites	
MIN					Outlet °F	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %
1	9:06	186.100										
2		189.78	0.27	1.53	66	306	228	232	67	6		
3		192.33	0.25	1.41	66	308					10.5	10.0
4		195.58	0.28	1.59	67	306	259	250	57	6		
5		198.77	0.27	1.53	66	303						
6		202.02	0.28	1.59	67	303	251	253	60	6		
7		205.38	0.30	1.70	67	304						
8		209.68	0.49	2.79	68	303	247	251	61	8	10.0	10.0
9		214.72	0.67	3.83	69	302						
10		219.63	0.64	3.64	68	304	251	249	60	10		
11		223.62	0.42	2.40	69	302						
12		227.54	0.40	2.29	70	301	251	251	62	8	11.0	9.2
		231.35	0.38	2.18	70	300						
1		234.52	0.26	1.50	71	298	254	253	63	6		
2		237.82	0.28	1.62	72	297						
3		241.23	0.30	1.73	72	298	251	250	59	6	11.5	9.1
4		245.02	0.37	2.14	73	298						
5		248.87	0.38	2.20	73	297	251	250	59	6		
6		252.72	0.38	2.21	74	297						
7		256.76	0.42	2.44	74	297	251	250	59	8		
8		260.86	0.43	2.50	74	296					11.0	9.3
9		265.02	0.44	2.56	75	297	250	252	56	9		
10		269.04	0.41	2.39	76	298						
11		272.69	0.34	1.98	76	297	251	250	57	9	11.0	9.2
12	11:08	276.18	0.31	1.81	76	296						

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PLANT	M.V. W.T.E.	PROBE TIP DIAMETER, IN.	MV-02/.3048	IMPINGER	INITIAL	FINAL	TOTAL GAIN
		PROBE LENGTH, FT / Cp	7' / 0.8388	VOLUMES	(mL)	(mL)	(mL)
RUN No	3 - Metals / Particulate	FILTER NUMBER		Imp. # 1	0	248	248
LOCATION	Unit #1			Imp. # 2	100	194	94
DATE	May 5, 2020	STATIC PRESSURE, IN. H ₂ O	20.0"	Imp. # 3	100	130	30
OPERATOR: Darin Sampson	+CL + SF	STACK DIAMETER	70.9"	Imp. # 4	0	6	6
CONTROL UNIT / Y	JV 14 / 1.0042	STACK HEIGHT	30.0'		100	102	2
	ΔH @ 2.003				100	101	1
BAROMETRIC PRESSURE, IN. Hg	30.16	INITIAL LEAK TEST	0.001 @ 15"	Gel 200g			
ASSUMED MOISTURE, Bw	16%	FINAL LEAK TEST	0.002 @ 15"	Upstream Diameters			
				Downstream Diameters			

Point	Clock Time	Dry Gas Meter Ft ³	Pitot IN. H ₂ O ΔP	Orifice ΔH IN. H ₂ O	Dry Gas Temp. °F	Temperature °F					Pump Vac. IN. Hg Gauge	Fyrites	
						Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %
5	11:25	278.311											
1		282.02	0.35	2.03	75	298	260	235	63	4			
2		285.83	0.37	2.15	75	297						11.0	9.5
3		289.85	0.41	2.39	75	296	256	253	64	5			
4		293.89	0.42	2.43	75	300							
5		297.85	0.40	2.31	75	301	252	253	62	6			
6		301.55	0.35	2.04	76	298						12.0	8.6
7		305.38	0.37	2.15	77	299	252	251	61	6			
8		309.30	0.39	2.28	77	297							
9		313.32	0.41	2.40	77	296	252	252	60	6			
10		317.10	0.36	2.11	78	295						11.5	8.9
11		320.78	0.37	2.00	78	292	250	251	58	5			
12		324.35	0.32	1.89	78	291							
1		327.80	0.30	1.76	77	293	248	230	59	4			
2		331.08	0.27	1.58	77	298						11.5	8.8
3		334.25	0.25	1.48	78	290	248	248	59	4			
4		337.44	0.27	1.50	78	293							
5		340.68	0.28	1.55	78	294	252	251	60	5		11.5	8.6
6		343.82	0.26	1.44	78	294							
7		347.98	0.46	2.55	79	295	252	250	61	6			
8		351.25	0.48	2.67	80	295							
9		356.09	0.39	2.16	80	296	248	249	64	8			
10		360.42	0.49	2.75	81	289						11.0	9.3
11		364.62	0.46	2.60	81	285	249	248	57	8			
12	13:27	368.78	0.45	2.54	80	282							

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A. Lanfranco and Associates Inc.

CLIENT MV WTE				NOZZLE G 3071		DIAMETER, IN. 0.3072		IMPINGER		INITIAL	FINAL	TOTAL GAIN		
SOURCE Unit 2				PROBE ALGVRD		Cp 0.8517		VOLUMES		(mL)	(mL)	(mL)		
PARAMETER / RUN No Metals / Partic Run 1				PORT LENGTH				Imp. #1		0	226	226		
DATE 5 May 2020				STATIC PRESSURE, IN. H2O		-19.0		Imp. #2		190	202	102		
OPERATOR: LA				STACK DIAMETER				Imp. #3		100	128	28		
CONTROL UNIT SCAE2				STACK HEIGHT				Imp. #4		0	6	6		
								Imp. #5		100	103	3		
								Imp. #6		100	101	1		
BAROMETRIC PRESSURE, IN. Hg 30.09				INITIAL LEAK TEST 0.00 @ 15"				Upstream Diameters						
ASSUMED MOISTURE, Bw 17%				FINAL LEAK TEST 0.00 @ 15"				Downstream Diameters						
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites		(Ref 2) CO ppm	NO _x ppm
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %		
1	12:27	581.24	0.42	2.16	70	310	249	251	64	6				
2		585.38	0.44	2.26	70	312					10	10.2	35	69
3		589.62	0.46	2.36	71	313	250	248	63	7				
4		593.86	0.46	2.37	71	312								
5		597.96	0.43	2.21	72	314	250	250	62	7				
6		601.92	0.40	2.06	73	314					10.5	9.6	27	79
7		605.30	0.29	1.49	74	316	250	251	62	6				
8		608.51	0.26	1.34	75	315								
9		611.66	0.23	1.29	76	315	250	252	61	6				
10		614.88	0.26	1.35	77	315								
11		617.98	0.24	1.25	78	316	250	251	60	5	10.5	9.5	28	77
12		621.02	0.23	1.20	79	315								
1	14:30	624.31	0.27	1.40	79	318	251	251	60	6				
2		627.66	0.28	1.43	79	318					10.5	9.7	31	74
3		631.07	0.29	1.50	80	319	250	252	60	6				
4		634.42	0.28	1.43	80	321								
5		637.71	0.27	1.40	81	320	251	251	59	6				
6		640.89	0.25	1.34	82	319					10.5	10.0	11	59
7		645.33	0.29	2.56	83	318	251	250	60	8				
8		650.08	0.55	2.88	84	318								
9		654.74	0.53	2.78	84	315	251	251	61	9				
10		659.36	0.52	2.73	85	316					10.5	9.5	13	57
11		663.84	0.49	2.57	85	317	250	250	61	9				
12		668.28	0.48	2.53	86	316								

[illegible]

CLIENT		MV WTE		NOZZLE	G-292		DIAMETER, IN.		0.2923		IMPINGER	INITIAL	FINAL	TOTAL GAIN		
SOURCE		Unit 2		PROBE	7C		Cp		0.8378		VOLUMES	(mL)	(mL)	(mL)		
PARAMETER / RUN No		Metals/Plastic Run 3		PORT LENGTH								Imp. #1	0	182	182	
DATE		6 May 2020		STATIC PRESSURE, IN. H2O		-19						Imp. #2	100	190	90	
OPERATOR:		LA		STACK DIAMETER								Imp. #3	100	112	12	
CONTROL UNIT		STCAE 2		STACK HEIGHT								Imp. #4	0	6	6	
		Y 0.9835										Imp. #5	100	102	2	
		ΔH@ 1.851										Imp. #6	100	101	1	
BAROMETRIC PRESSURE, IN. Hg		30.15		INITIAL LEAK TEST		0.001015"						Upstream Diameters				
ASSUMED MOISTURE, Bw		17%		FINAL LEAK TEST		0.001015"						Downstream Diameters				
Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H2O	Orifice ΔH IN. H2O	Temperature °F					Pump Vac. IN. Hg	Fyrites		CO ppm		NH3 ppm	
	11:05	753.177			Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO2 Vol. %	O2 Vol. %				
1		756.37	0.33	1.33	69	303	247	250	58	4						
2		759.35	0.29	1.17	69	310					10.5	10.0	23	64		
3		762.33	0.29	1.18	70	310	249	251	53	4						
4		765.20	0.27	1.09	69	310										
5		768.02	0.26	1.03	69	310	250	248	55	4						
6		770.89	0.27	1.09	68	308					10.5	10.0	14	57		
7		774.95	0.54	2.18	68	309	249	252	54	4						
8		779.20	0.59	2.39	69	309										
9		783.33	0.55	2.25	69	308	250	251	54	4						
10		787.42	0.54	2.21	69	308					10.5	9.7	12	61		
11		791.47	0.53	2.17	69	308	250	250	55	4						
12		795.44	0.51	2.09	69	308										
1		799.12	0.44	1.80	68	307	250	252	54	4						
2		802.84	0.45	1.84	68	309					10.5	10.0	15	60		
3		806.48	0.43	1.76	68	308	251	254	55	4						
4		810.09	0.42	1.73	69	305										
5		813.66	0.41	1.69	69	304	251	256	56	4						
6		817.19	0.40	1.65	70	303					10.0	10.5	14	65		
7		820.33	0.32	1.32	70	303	251	257	54	4						
8		823.40	0.30	1.23	70	307										
9		826.35	0.28	1.13	70	308	250	256	53	4						
10		829.14	0.25	1.03	70	308					10.5	9.8	29	79		
11		831.82	0.23	0.95	71	307	250	255	53	4						
12	13:08	834.44	0.22	0.91	71	307										

PLANT	M.V. W.T.E.	PROBE TIP DIAMETER, IN.	M.V. 0.2 / 0.3048	IMPINGER	INITIAL	FINAL	TOTAL GAIN
		PROBE LENGTH, FT / Cp	AL GIRD / 0.8517	VOLUMES	(mL)	(mL)	(mL)
RUN No	1 - Metals / Particulate	FILTER NUMBER		Imp. # 1	0	254	254
LOCATION	Unit # 3			Imp. # 2	100	188	88
DATE	May 6 th 2020	STATIC PRESSURE, IN. H ₂ O	-19.5"	Imp. # 3	100	110	10
OPERATOR: Daryl Sampson & S.F.		STACK DIAMETER	70.9'	Imp. # 4	0	5	5
CONTROL UNIT / Y	CPE 5099 / 0.9815	STACK HEIGHT	30.0'		100	102	2
	ΔH @ 1.775				100	101	1
BAROMETRIC PRESSURE, IN. Hg	30.25	INITIAL LEAK TEST	0.002 @ 15"	Gel 200g			
ASSUMED MOISTURE, Bw	16%	FINAL LEAK TEST	0.002 @ 15"	Upstream Diameters			
				Downstream Diameters			

5 Point Run	Clock Time	Dry Gas Meter Ft ³	Pitot IN. H ₂ O ΔP	Orifice ΔH IN. H ₂ O	Dry Gas Temp. °F	Temperature °F					Pump Vac. IN. Hg Gauge	Fyrites	
						Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %
1	12:10	132.462											
2		137.15	0.58	2.81	60	300	258	231	53	8		10.0	10.1
3		141.98	0.62	3.00	60	302							
4		146.91	0.67	3.20	60	312	257	240	52	9			
5		151.54	0.56	2.69	61	310							
6		156.08	0.55	2.65	62	310	256	260	52	9			
7		160.75	0.58	2.79	63	310							
8		164.64	0.40	1.93	64	311	256	258	53	6.5	10.0	10.5	
9		168.12	0.32	1.54	65	312							
10		171.50	0.30	1.45	65	309	255	256	53	5			
11		174.77	0.28	1.36	66	310							
12		178.15	0.30	1.45	67	311	255	257	54	5	10.5	9.8	
1		181.30	0.26	1.27	67	308							
2		185.35	0.42	2.08	69	299	256	258	53	8			
3		189.46	0.44	2.14	69	310						11.0	9.4
4		193.38	0.40	1.94	70	314	256	257	53	8			
5		197.20	0.38	1.84	70	315							
6		200.98	0.37	1.86	71	315	256	256	55	8			
7		204.70	0.36	1.75	71	314						10.5	9.7
8		209.35	0.56	2.73	71	314	256	255	56	9			
9		214.14	0.59	2.88	72	314							
10		219.05	0.62	3.04	73	312	256	254	58	10			
11		223.80	0.58	2.84	73	312						11.0	9.5
12	14:12	228.85	0.65	3.18	73	312	257	259	58	10			
		233.54	0.56	2.76	74	309							

CLIENT <u>M.V. W.T.F.</u>				NOZZLE <u>MV-02</u> DIAMETER, IN. <u>0.3048</u>		IMPINGER		INITIAL		FINAL		TOTAL GAIN		
SOURCE <u>Unit #3</u>				PROBE <u>AL GYRO</u> Cp <u>0.8517</u>		VOLUMES		(mL)		(mL)		(mL)		
PARAMETER / RUN No <u>Metals / Particulate - Run #3</u>				PORT LENGTH		Imp. #1		<u>0</u>		<u>246</u>		<u>246</u>		
DATE <u>May 7, 2020</u>				STATIC PRESSURE, IN. H2O <u>-19.5"</u>		Imp. #2		<u>100</u>		<u>208</u>		<u>108</u>		
OPERATOR: <u>DS</u>				STACK DIAMETER <u>70.9"</u>		Imp. #3		<u>100</u>		<u>128</u>		<u>28</u>		
CONTROL UNIT <u>CAE JD99</u> Y <u>0.9815</u>				STACK HEIGHT <u>30.6'</u>		Imp. #4		<u>0</u>		<u>6</u>		<u>6</u>		
ΔH@ <u>1.775</u>						Imp. #5		<u>100</u>		<u>104</u>		<u>4</u>		
						Imp. #6		<u>100</u>		<u>101</u>		<u>1</u>		
BAROMETRIC PRESSURE, IN. Hg <u>20.43</u>				INITIAL LEAK TEST <u>0.004 @ 15"</u>		Upstream Diameters								
ASSUMED MOISTURE, Bw <u>16%</u>				FINAL LEAK TEST <u>0.002 @ 15"</u>		Downstream Diameters								
S Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites			
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %		
<u>1</u>	<u>10:45</u>	<u>338.995</u>												
<u>1</u>		<u>342.72</u>	<u>0.36</u>	<u>1.76</u>	<u>74</u>	<u>314</u>	<u>236</u>	<u>255</u>	<u>58</u>	<u>7</u>				
<u>2</u>		<u>346.55</u>	<u>0.38</u>	<u>1.85</u>	<u>74</u>	<u>314</u>					<u>10.0</u>	<u>10.2</u>		
<u>3</u>		<u>350.18</u>	<u>0.34</u>	<u>1.66</u>	<u>74</u>	<u>317</u>	<u>256</u>	<u>259</u>	<u>56</u>	<u>7</u>				
<u>4</u>		<u>353.75</u>	<u>0.33</u>	<u>1.61</u>	<u>74</u>	<u>316</u>								
<u>5</u>		<u>357.58</u>	<u>0.38</u>	<u>1.86</u>	<u>74</u>	<u>316</u>	<u>257</u>	<u>260</u>	<u>57</u>	<u>7</u>				
<u>6</u>		<u>361.60</u>	<u>0.42</u>	<u>2.05</u>	<u>74</u>	<u>317</u>					<u>10.0</u>	<u>10.3</u>		
<u>7</u>		<u>366.54</u>	<u>0.63</u>	<u>3.08</u>	<u>75</u>	<u>317</u>	<u>256</u>	<u>257</u>	<u>56</u>	<u>8</u>				
<u>8</u>		<u>371.78</u>	<u>0.71</u>	<u>3.47</u>	<u>75</u>	<u>317</u>								
<u>9</u>		<u>376.98</u>	<u>0.70</u>	<u>3.42</u>	<u>75</u>	<u>317</u>	<u>258</u>	<u>257</u>	<u>56</u>	<u>10</u>				
<u>10</u>		<u>382.20</u>	<u>0.71</u>	<u>3.46</u>	<u>75</u>	<u>319</u>					<u>10.5</u>	<u>10.0</u>		
<u>11</u>		<u>387.25</u>	<u>0.66</u>	<u>3.23</u>	<u>76</u>	<u>318</u>	<u>256</u>	<u>257</u>	<u>55</u>	<u>10</u>				
<u>12</u>		<u>392.16</u>	<u>0.62</u>	<u>3.05</u>	<u>76</u>	<u>312</u>								
<u>1</u>		<u>396.92</u>	<u>0.58</u>	<u>2.87</u>	<u>76</u>	<u>310</u>	<u>257</u>	<u>258</u>	<u>55</u>	<u>10</u>				
<u>2</u>		<u>401.75</u>	<u>0.60</u>	<u>2.94</u>	<u>76</u>	<u>316</u>					<u>10.5</u>	<u>10.0</u>		
<u>3</u>		<u>406.69</u>	<u>0.63</u>	<u>3.09</u>	<u>76</u>	<u>316</u>	<u>257</u>	<u>257</u>	<u>52</u>	<u>10</u>				
<u>4</u>		<u>411.52</u>	<u>0.60</u>	<u>2.94</u>	<u>76</u>	<u>316</u>								
<u>5</u>		<u>416.77</u>	<u>0.58</u>	<u>2.84</u>	<u>76</u>	<u>316</u>	<u>256</u>	<u>257</u>	<u>51</u>	<u>11</u>				
<u>6</u>		<u>420.85</u>	<u>0.54</u>	<u>2.66</u>	<u>76</u>	<u>315</u>					<u>10.5</u>	<u>10.1</u>		
<u>7</u>		<u>424.49</u>	<u>0.34</u>	<u>1.67</u>	<u>76</u>	<u>314</u>	<u>257</u>	<u>258</u>	<u>51</u>	<u>7</u>				
<u>8</u>		<u>428.02</u>	<u>0.32</u>	<u>1.58</u>	<u>76</u>	<u>312</u>								
<u>9</u>		<u>431.38</u>	<u>0.29</u>	<u>1.43</u>	<u>76</u>	<u>313</u>	<u>256</u>	<u>257</u>	<u>53</u>	<u>7</u>				
<u>10</u>		<u>434.85</u>	<u>0.31</u>	<u>1.52</u>	<u>76</u>	<u>314</u>								
<u>11</u>		<u>438.48</u>	<u>0.34</u>	<u>1.67</u>	<u>76</u>	<u>315</u>	<u>256</u>	<u>257</u>	<u>55</u>	<u>7</u>	<u>10.0</u>	<u>10.2</u>		
<u>12</u>	<u>12:47</u>	<u>441.87</u>	<u>0.30</u>	<u>1.47</u>	<u>76</u>	<u>315</u>								

A. Lanfranco and Associates Inc.

Client MV WTE Y LMU-A (0.9757)
 Source UNIT#1 Cp _____
 Parameter HF Pbar 30.16 Static _____
 Date MAY 5, 2020 Operator SF

Leak Check	Run 1	Run 2	Run 3
Initial	0.0003	0.0002	0.0002
Final	0.0002	0.0002	0.0003

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H₂O		
			DGM Outlet	Stack		R1	R2	R3
1	0932	399.4470	63		100			
			64		100			
			64		0			
			65		66L			
			66					
			66		195			
	1032	400.0420	67		95			
						2		
2	1038	400.0531	70		100			
			70		100			
			70		0			
			71		66L			
			71					
			70					
	1108	400.7380	70					
3	1144	400.7462	71		100			
			72		100			
			73		0			
			74		66L			
			74					
			75					
	1244	401.4458	75					

Client MV WTE Y LMU-A (0.9757)
 Source UNIT#2 Cp _____
 Parameter HF Pbar 30.15 Static _____
 Date MAY 6, 2020 Operator SF

Leak Check	Run 1	Run 2	Run 3
Initial	0.0002	0.0003	0.0002
Final	0.0003	0.0003	0.0002

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H₂O		
			DGM Outlet	Stack		R1	R2	R3
1	0901	401.4626	57		100			
			58		100			
			58		0			
			58		66L			
			59					
			59					
	1001	402.1648	60					
2	1009	402.1778	69		100			
			69		100			
			69		0			
			70		66L			
			70					
			71					
	1109	402.8800	71					
3	1115	402.8935	61		100			
			61		100			
			62		0			
			62		66L			
			63					
			64					
	1215	403.5830	64					

J.H.

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

Leak Check	Run 1	Run 2	Run 3
Initial			
Final			

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

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

A.Lanfranco & Associates inc.

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

Model #: **JU 14**
Serial #: **0028-030615-1**

Date: **08-Jan-20**
Barometric Pressure: **29.72** (in. Hg)
Theoretical Critical Vacuum: **14.02** (in. Hg)

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

----- DRY GAS METER READINGS -----										-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.			Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)					Initial (deg F)	Final (deg F)	Average (deg F)
4.10	18.00	770.900	789.742	18.842	56.0	56.0	56.0	56.0		73	0.8185	15.0	55.0	62.0	58.5
2.15	20.00	790.400	805.582	15.182	56.0	56.0	57.0	57.0		63	0.5956	17.0	62.0	58.0	60.0
1.30	18.00	806.400	817.032	10.632	57.0	57.0	59.0	59.0		55	0.4606	18.5	61.0	58.0	59.5
0.74	16.00	817.400	824.582	7.182	58.0	58.0	57.0	57.0		48	0.3560	20.0	60.0	65.0	62.5
0.33	16.00	824.900	829.813	4.913	54.0	54.0	54.0	54.0		40	0.2408	21.0	52.0	56.0	54.0

***** RESULTS *****															
--- DRY GAS METER ---				----- ORIFICE -----		-- DRY GAS METER --				----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)		CALIBRATION FACTOR Y				CALIBRATION FACTOR dH@					
						Value (number)	Variation (number)			Value (in H2O)	Value (mm H2O)	Variation (in H2O)		Ko (value)	
19.338	547.6	19.229	544.6	19.018		0.994	-0.010			2.054	52.17	0.051		0.674	
15.492	438.7	15.525	439.7	15.399		1.002	-0.002			2.038	51.76	0.035		0.673	
10.795	305.7	10.811	306.2	10.712		1.001	-0.003			2.053	52.13	0.050		0.672	
7.289	206.4	7.406	209.7	7.381		1.016	0.012			1.969	50.01	-0.034		0.676	
5.015	142.0	5.051	143.0	4.952		1.007	0.003			1.901	48.28	-0.102		0.695	
Average Y----->						1.0042		Average dH@----->		2.003	50.9		Average Ko----->	0.678	

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

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

Calibrated by: Scott Ferguson

Signature:



Date: January 8, 2020

A.Lanfranco & Associates inc.

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

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

Date: **07-Jan-20**
Barometric Pressure: **29.66** (in. Hg)
Theoretical Critical Vacuum: **13.99** (in. Hg)

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

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.50	22.00	48.900	72.686	23.786	65.0	65.0	66.0	66.0	73	0.8185	17.0	68.0	73.0	70.5
1.85	23.00	74.200	92.143	17.943	65.0	65.0	68.0	68.0	63	0.5956	20.0	73.0	76.0	74.5
1.10	21.00	94.500	107.248	12.748	68.0	68.0	69.0	69.0	55	0.4606	21.5	78.0	80.0	79.0
0.65	22.00	107.900	118.060	10.160	69.0	69.0	71.0	71.0	48	0.3560	22.7	76.0	81.0	78.5
0.32	18.00	118.500	124.189	5.689	70.0	70.0	71.0	71.0	40	0.2408	24.5	80.0	86.0	83.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)		
23.887	676.5	23.188	656.7	23.512	0.9707	-0.011			1.765	44.83	-0.023	0.728		
17.912	507.3	17.574	497.7	17.954	0.9811	0.000			1.772	45.01	-0.016	0.721		
12.655	358.4	12.357	350.0	12.730	0.9765	-0.005			1.770	44.95	-0.018	0.725		
10.046	284.5	10.010	283.5	10.303	0.9965	0.015			1.744	44.30	-0.044	0.716		
5.615	159.0	5.517	156.2	5.726	0.9825	0.001			1.890	48.02	0.102	0.698		
Average Y----->					0.9815	Average dH@----->		1.788	45.4	Average Ko---->		0.718		

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

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

Calibrated by: Scott Ferguson

Signature: 

Date: January 7, 2020

A.Lanfranco & Associates inc.

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

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

Date: **08-Jan-20**
Barometric Pressure: **30.03** (in. Hg)
Theoretical Critical Vacuum: **14.17** (in. Hg)

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

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.70	16.00	607.500	624.641	17.141	64.0	64.0	67.0	67.0	73	0.8185	13.0	67.0	71.0	69.0
1.90	23.00	625.900	643.842	17.942	67.0	67.0	69.0	69.0	63	0.5956	15.5	72.0	77.0	74.5
1.15	20.00	645.200	657.405	12.205	70.0	70.0	71.0	71.0	55	0.4606	17.0	76.0	76.0	76.0
0.69	15.00	658.000	664.962	6.962	71.0	71.0	71.0	71.0	48	0.3560	18.5	77.0	80.0	78.5
0.35	16.00	665.500	670.564	5.064	57.0	57.0	58.0	58.0	40	0.2408	19.0	54.0	58.0	56.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)		
17.435	493.8	17.099	484.2	17.075	0.981	-0.003			1.838	46.68	-0.013	0.708		
18.085	512.2	17.794	503.9	17.954	0.984	0.000			1.792	45.52	-0.059	0.716		
12.222	346.1	11.949	338.4	12.090	0.978	-0.006			1.810	45.98	-0.041	0.717		
6.957	197.0	6.910	195.7	7.025	0.993	0.010			1.825	46.36	-0.026	0.704		
5.188	146.9	5.093	144.2	4.961	0.982	-0.002			1.989	50.53	0.138	0.682		
Average Y----->					0.9835	Average dH@----->			1.851	47.0	Average Ko---->			0.705

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

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

Calibrated by: Scott Ferguson

Signature:



Date: January 8, 2020

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-20**
Barometric Pressure: **29.55** (in. Hg)
Theoretical Critical Vacuum: **13.94** (in. Hg)

!!!!!!!

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

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (m³)	Volume Final (m³)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
0.00	22.00	377.0640	377.2633	7.038	66.0	66.0	62.0	62.0	40	0.2408	20.0	61.0	62.0	61.5
0.00	15.00	377.2670	377.4029	4.799	62.0	62.0	63.0	63.0	40	0.2408	20.0	62.0	64.0	63.0
0.00	15.00	377.4060	377.5421	4.806	63.0	63.0	64.0	64.0	48	0.2408	20.0	64.0	66.0	65.0

***** RESULTS *****											
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----		
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR			CALIBRATION FACTOR		
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)
7.001	198.3		6.855	194.1	6.858	0.979	0.003		0.000	0.00	0.000
4.788	135.6		4.667	132.2	4.683	0.975	-0.001		0.000	0.00	0.000
4.786	135.5		4.658	131.9	4.692	0.973	-0.002		0.000	0.00	0.000
Average Y----->						0.9757		Average dH@----->	0.0000	0.00	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

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

Calibrated by: Scott Ferguson

Signature: 

Date: January 10, 2020

A. LANFRANCO and ASSOCIATES INC.**ENVIRONMENTAL CONSULTANTS****GLASS NOZZLE DIAMETER CALIBRATION FORM**

Calibrated by: Scott Ferguson
Date: February 10, 2020

Signature: _____

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft ²)
A	0.1250	0.1240	0.1245	0.0010	0.1245	0.0000845
G-165	0.1640	0.1655	0.1660	0.0020	0.1652	0.0001488
G-178	0.1780	0.1780	0.1790	0.0010	0.1783	0.0001735
J	0.1880	0.1880	0.1880	0.0000	0.1880	0.0001928
E	0.1880	0.1895	0.1882	0.0015	0.1886	0.0001939
L	0.2112	0.2120	0.2105	0.0015	0.2112	0.0002434
G-215	0.2140	0.2150	0.2155	0.0015	0.2148	0.0002517
Q	0.2190	0.2170	0.2185	0.0020	0.2182	0.0002596
G-218	0.2180	0.2175	0.2190	0.0015	0.2182	0.0002596
G-223	0.2220	0.2230	0.2225	0.0010	0.2225	0.0002700
G-225	0.2245	0.2250	0.2240	0.0010	0.2245	0.0002749
G-2251	0.2230	0.2260	0.2245	0.0030	0.2245	0.0002749
P-18	0.2375	0.2370	0.2380	0.0010	0.2375	0.0003076
G-247	0.2450	0.2470	0.2470	0.0020	0.2463	0.0003310
G-253	0.2525	0.2520	0.2525	0.0005	0.2523	0.0003473
G-257	0.2570	0.2570	0.2570	0.0000	0.2570	0.0003602
P	0.2580	0.2570	0.2575	0.0010	0.2575	0.0003616
G-275	0.2750	0.2740	0.2750	0.0010	0.2747	0.0004115
G-278	0.2780	0.2770	0.2780	0.0010	0.2777	0.0004205
P-2	0.2787	0.2790	0.2785	0.0005	0.2787	0.0004237
G-287	0.2870	0.2880	0.2860	0.0020	0.2870	0.0004493
G-292	0.2922	0.2920	0.2926	0.0006	0.2923	0.0004659
G-304	0.3040	0.3050	0.3040	0.0010	0.3043	0.0005052
MV-02	0.3050	0.3040	0.3055	0.0015	0.3048	0.0005068
MV-01	0.3050	0.3045	0.3055	0.0010	0.3050	0.0005074
G-3071	0.3075	0.3070	0.3070	0.0005	0.3072	0.0005146
G-3072	0.3070	0.3070	0.3080	0.0010	0.3073	0.0005152
G-309	0.3090	0.3090	0.3085	0.0005	0.3088	0.0005202
G-310	0.3090	0.3105	0.3095	0.0015	0.3097	0.0005230
G-316	0.3160	0.3160	0.3170	0.0010	0.3163	0.0005458
V-06	0.3200	0.3210	0.3210	0.0010	0.3207	0.0005608
G-337	0.3380	0.3365	0.3380	0.0015	0.3375	0.0006213
P-27	0.3387	0.3385	0.3390	0.0005	0.3387	0.0006258
G-343	0.3435	0.3430	0.3435	0.0005	0.3433	0.0006429
I	0.3785	0.3785	0.3785	0.0000	0.3785	0.0007814
P-14	0.3910	0.3935	0.3920	0.0025	0.3922	0.0008388
P-17	0.4070	0.4075	0.4065	0.0010	0.4070	0.0009035
C	0.4255	0.4225	0.4235	0.0030	0.4238	0.0009798
#21	0.4335	0.4325	0.4330	0.0010	0.4330	0.0010226
G-437	0.4350	0.4345	0.4355	0.0010	0.4350	0.0010321
G-468	0.4677	0.4670	0.4670	0.0007	0.4672	0.0011907
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
P-7	0.4965	0.4940	0.4930	0.0035	0.4945	0.0013337
B	0.5015	0.5030	0.5025	0.0015	0.5023	0.0013763
G-540	0.5405	0.5400	0.5405	0.0005	0.5403	0.0015924

Where:

- (a) D1, D2, D3 = three different nozzle diameters; each diameter must be measured to within (0.025mm) 0.001 in.
- (b) Difference = maximum difference between any two diameters; must be less than or equal to (0.1mm) 0.004 in.
- (c) Average = average of D1, D2 and D3

Pitot Tube Calibration

Date: 10-Jan-20
Pbar (in.Hg): 29.69

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

Pitot ID: **7A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.045	0.060	14.1	0.8574	0.0024
0.115	0.155	22.5	0.8527	0.0022
0.300	0.400	36.4	0.8574	0.0024
0.520	0.700	47.9	0.8533	0.0017
0.610	0.820	51.9	0.8539	0.0011
Average :			0.8549	0.0020

Pitot ID: **ST 8A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.065	0.090	16.9	0.8413	0.0008
0.100	0.140	21.0	0.8367	0.0054
0.220	0.300	31.2	0.8478	0.0057
0.450	0.620	44.6	0.8434	0.0013
0.650	0.900	53.6	0.8413	0.0008
Average :			0.8421	0.0028

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.080	0.110	18.8	0.8443	0.0000
0.100	0.140	21.0	0.8367	0.0075
0.220	0.300	31.2	0.8478	0.0035
0.400	0.550	42.0	0.8443	0.0000
0.690	0.940	55.2	0.8482	0.0039
Average :			0.8442	0.0030

Pitot ID: **ST 8B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.030	0.040	11.5	0.8574	0.0034
0.105	0.140	21.5	0.8574	0.0034
0.220	0.300	31.2	0.8478	0.0061
0.520	0.700	47.9	0.8533	0.0007
0.610	0.820	51.9	0.8539	0.0001
Average :			0.8539	0.0027

Pitot ID: **AL GVRD 1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.045	0.060	14.1	0.8574	0.0057
0.090	0.120	19.9	0.8574	0.0057
0.280	0.380	35.2	0.8498	0.0019
0.550	0.750	49.3	0.8478	0.0039
0.650	0.890	53.6	0.8461	0.0056
Average :			0.8517	0.0046

Pitot ID: **ST 8C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.090	0.130	19.9	0.8237	0.0012
0.110	0.160	22.0	0.8209	0.0041
0.200	0.290	29.7	0.8222	0.0028
0.350	0.500	39.3	0.8283	0.0033
0.590	0.840	51.0	0.8297	0.0048
Average :			0.8249	0.0032

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	14.9	0.8367	0.0021
0.080	0.110	18.8	0.8443	0.0055
0.190	0.270	29.0	0.8305	0.0083
0.540	0.740	48.8	0.8457	0.0069
0.650	0.910	53.6	0.8367	0.0021
Average :			0.8388	0.0050

Pitot ID:

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

* Average absolute deviation must not exceed 0.01.

Calibrated by: Michael Goods

Signature: 

Date: January 10, 2020

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	January 16, 2020	100.3	29.62	29.55	29.62	0.00
DS	January 22, 2020	101.6	30.01	29.87	29.94	0.07
CL	January 16, 2020	100.3	29.62	29.56	29.63	-0.01
ML	January 6, 2020	101.8	30.07	29.96	30.03	0.03
SB	January 16, 2020	100.3	29.62	29.54	29.61	0.01
SH	January 16, 2020	100.3	29.62	29.46	29.53	0.09
JB	January 16, 2020	100.3	29.62	29.51	29.58	0.04
SF	January 6, 2020	101.8	30.07	29.96	30.03	0.03
JG	January 16, 2020	100.3	29.62	29.52	29.59	0.03

Calibrated by: Scott Ferguson

Signature:



Date: January 16th, 2020

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

TEMPERATURE CALIBRATION FORM

Signature:

Paula

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	ALA #	Serial #	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation
Omega HH11A	3	300132	33	0.20%	101	0.18%	200	0.00%	300	0.00%	499	-0.10%	800	0.00%	1700	0.00%
Omega HH11A	4	200167	33	0.20%	101	0.18%	200	0.00%	301	0.13%	500	0.00%	801	0.08%	1699	-0.05%
Omega HH11A	6	600059	32	0.00%	100	0.00%	199	-0.15%	299	-0.13%	501	0.10%	799	-0.08%	1699	-0.05%
TPI 341K	7	2.0315E+10	29.8	-0.45%	97.4	-0.46%	197.2	-0.42%	297	-0.39%	496.4	-0.38%	795.8	-0.33%	1693	-0.32%
TPI 341K	8	2.0313E+10	31	-0.20%	98	-0.36%	200	0.00%	300	0.00%	500	0.00%	800	0.00%	1697	-0.14%
Cont Cmpny	10	102008464	31.3	-0.14%	98.8	-0.21%	198.9	-0.17%	298.9	-0.14%	498.6	-0.15%	796.3	-0.29%	1693.8	-0.29%
Omega HH11	14	409426	33.2	0.24%	100.2	0.04%	202	0.30%	302	0.26%	500	0.00%	799	-0.08%	1699	-0.05%
TPI 341K	16	400120029	32	0.00%	99	-0.18%	200	0.00%	301	0.13%	500	0.00%	800	0.00%	1700	0.00%
TPI 341K	18	2.0329E+10	32	0.00%	101	0.18%	200	0.00%	300	0.00%	501	0.10%	799	-0.08%	1699	-0.05%
TPI 341K	20	2.0329E+10	30.4	-0.33%	98.2	-0.32%	198.2	-0.27%	298	-0.26%	497.1	-0.30%	796.8	-0.25%	1695	-0.23%
Reference device is a NIST certified digital thermocouple calibrator																
Variation expressed as a percentage of the absolute temperature must be within 1.5 %																



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Carter Lanfranco

has successfully completed

Stack Sampling

May 2009

Date

Dean
Faculty of Continuing Education and Extension



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Daryl Sampson

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 2005

Date

Donna Spaulding

Dean
Faculty of Continuing Education and Extension

Walter Smith & Associates, Inc.

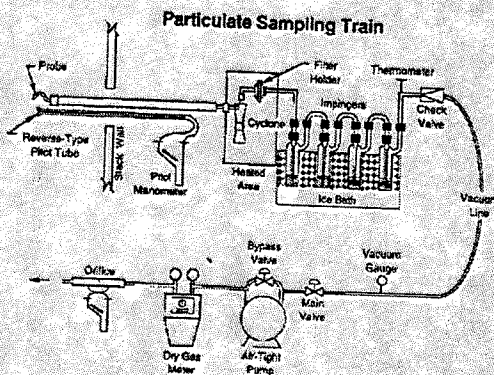
is hereby granted to:

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

MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Scott Ferguson

has successfully completed

Stack Sampling

2016

May 16, 2016

Date



Dean

Faculty of Continuing Education and Extension



Shawn Harrington

has met the requirements of

Stack Testing for Pollutants
(CHSC 7760)

School of Process, Energy and Natural Resources
Chemical Sciences Program

Endorsed by:

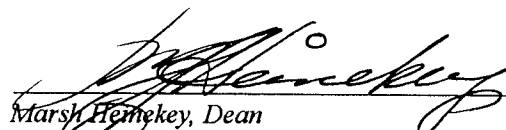


Environment
Canada

Environnement
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Province of
British Columbia
Ministry of
Environment,
Lands and Parks


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

JUNE 21, 2001
Dated