



**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
August 2019 Survey

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APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

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

Administration:

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

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

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

Analysis:

- Trace Metals and Mercury analysis conducted at Exova Labs, Surrey, B.C.
- Hexavalent Chromium (Cr⁺⁶) analysis conducted at ALS Labs, Burnaby, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N₂O) analysis conducted at Maxxam Analytics, Mississauga, Ont.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- THC/VOC analysis conducted at ALS Environmental in Simi Valley, California
- Ammonium (for ammonia NH₃) conducted at Elements Labs, Surrey, B.C.
- Chain of Custody protocols followed for all samples.
- Excellent blank values for all sample types. All samples blank corrected.

Sample Type	Blank Value		
Third Survey 2019	Unit 1	Unit 2	Unit 3
Filter	0.0 mg	0.0 mg	-0.1 mg
Front Half Washings	1.4 mg	1.6 mg	1 mg
Mercury Front	0.00 ug	0.00 ug	0.00 ug
Mercury Back	0.05 ug	0.04 ug	0.03 ug
Trace Metals Front *	<42.0 ug	<41.0 ug	<37.0 ug
Trace Metals Back*	<20.3 ug	<10.2 ug	<20.0 ug
Fluoride	<2.0 ug	<2.1 ug	<2.0 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Appendix B - Particulate Analysis

Filter Collection:

Test #	Initial (grams)	Final (grams)	Net Diference (grams)	Blank Adjusted (grams)
Unit 1 Blank	0.4571	0.4571	0.0000	
Unit 1 Run 1	0.4348	0.4346	-0.0002	ND
Unit 1 Run 2	0.4343	0.4339	-0.0004	ND
Unit 1 Run 3	0.4354	0.4357	0.0003	0.0003
Unit 2 Blank	0.4606	0.4606	0.0000	
Unit 2 Run 1	0.4563	0.4558	-0.0005	ND
Unit 2 Run 2	0.4568	0.4564	-0.0004	ND
Unit 2 Run 3	0.4582	0.4579	-0.0003	ND
Unit 3 Blank	0.4636	0.4635	-0.0001	
Unit 3 Run 1	0.4686	0.4725	0.0039	0.0040
Unit 3 Run 2	0.4608	0.4639	0.0031	0.0032
Unit 3 Run 3	0.4597	0.4638	0.0041	0.0042

Front Half Washings:

Test #	Initial (grams)	Final (grams)	Net Diference (grams)	Blank Adjusted (grams)
Unit 1 Blank	117.6337	117.6351	0.0014	
Unit 1 Run 1	119.1887	119.1916	0.0029	0.0015
Unit 1 Run 2	118.9335	118.9385	0.0050	0.0036
Unit 1 Run 3	117.7471	117.7490	0.0019	0.0005
Unit 2 Blank	117.7204	117.7220	0.0016	
Unit 2 Run 1	118.5740	118.5775	0.0035	0.0019
Unit 2 Run 2	118.6303	118.6324	0.0021	0.0005
Unit 2 Run 3	119.2608	119.2626	0.0018	0.0002
Unit 3 Blank	119.3329	119.3339	0.0010	
Unit 3 Run 1	119.6100	119.6135	0.0035	0.0025
Unit 3 Run 2	117.8801	117.8820	0.0019	0.0009
Unit 3 Run 3	118.6565	118.6646	0.0081	0.0071

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1372204
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Metals and Hg	Date Received: Aug 22, 2019
V4N 4W7	LSD:	Date Reported: Sep 12, 2019
Attn: Missy	P.O.:	Report Number: 2435140
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:
Project Name: Metro Vancouver WTE
Project Location: Metals and Hg
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

	Reference Number	1372204-1	1372204-2	1372204-3	
	Sample Date	Aug 12, 2019	Aug 13, 2019	Aug 13, 2019	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Unit 1 Run 1 (beaker (MV Unit 1 R-1) + 4 bottles)	Unit 1 Run 2 (beaker (MV Unit 1 R-2) + 4 bottles)	Unit 1 Run 3 (beaker (MV Unit 1 R-3) + 4 bottles)	
	Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	10	8	8	5
Antimony	µg	4	<2	<2	2.5
Arsenic	µg	1	<1	1	1
Cadmium	µg	0.3	2	<0.3	0.25
Chromium	µg	5.25	<0.2	5.73	0.2
Cobalt	µg	<0.3	0.4	<0.3	0.25
Copper	µg	2	<0.3	0.9	0.25
Lead	µg	<2	25.1	2	1.5
Manganese	µg	8.6	5.9	1	0.25
Nickel	µg	4.1	2.5	6.3	0.5
Phosphorus	µg	40	34	37	2.5
Selenium	µg	<2	2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2	2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	9.4	4.2	4.3	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	26	2	20	5
Antimony	µg	<2	<0.2	<2	2.5
Arsenic	µg	<0.9	<0.09	<0.9	1
Cadmium	µg	<0.2	<0.02	<0.2	0.25
Chromium	µg	1.4	0.14	1.0	0.2
Cobalt	µg	1	0.08	0.7	0.25
Copper	µg	<0.2	<0.02	3.0	0.25
Lead	µg	3.3	<0.1	<1	1.5
Manganese	µg	5.0	0.09	1	0.25
Nickel	µg	1	0.08	1	0.5
Phosphorus	µg	27	2.2	22	2.5
Selenium	µg	5.1	0.37	9.4	1.5
Tellurium	µg	<2	<0.2	<2	2
Thallium	µg	<1	<0.1	<1	1.5
Vanadium	µg	<0.9	<0.09	<0.9	1
Zinc	µg	12	0.40	6.5	0.5
Volume	Sample	mL	735	700	
Volume	aliquot volume	mL	685	700	
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05

Analytical Report

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

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

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

		Reference Number	1372204-1	1372204-2	1372204-3	Nominal Detection Limit
		Sample Date	Aug 12, 2019	Aug 13, 2019	Aug 13, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 1 Run 1 (beaker (MV Unit 1 R-1) + 4 bottles)	Unit 1 Run 2 (beaker (MV Unit 1 R-2) + 4 bottles)	Unit 1 Run 3 (beaker (MV Unit 1 R-3) + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
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	0.77	0.45	0.56	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	735	750	700	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	4.5	2.7	3.2	
Mercury	As Tested	µg/L	<0.05	0.20	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	180	175	180	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	0.057	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	500	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.08	<0.08	
Mercury	As Tested	µg/L	1.70	0.68	0.57	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	0.54	0.22	0.18	

Analytical Report

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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

		Reference Number	1372204-4	1372204-5	1372204-6
		Sample Date	Aug 14, 2019	Aug 15, 2019	Aug 15, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 2 Run 1 (beaker (MV Unit 2 R-1) + 4 bottles)	Unit 2 Run 2 (beaker (MV Unit 2 R-2) + 4 bottles)	Unit 2 Run 3 (beaker (MV Unit 2 R-3) + 4 bottles)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	20	6	10	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	1.5	1.6	1.1	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	0.9	3.1	2	0.25
Lead	µg	2	<2	<2	1.5
Manganese	µg	7.0	4.2	0.4	0.25
Nickel	µg	2	3.1	2	0.5
Phosphorus	µg	43	38	40	2.5
Selenium	µg	<2	2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	3.6	6.1	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	6.4	6.2	4.2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	10	6	20	5
Antimony	µg	<2	<2	3	2.5
Arsenic	µg	<0.8	<0.9	<0.8	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.27	0.56	0.61	0.2
Cobalt	µg	1.0	1	0.6	0.25
Copper	µg	0.2	<0.2	<0.2	0.25
Lead	µg	<1	<1	2	1.5
Manganese	µg	0.3	0.5	0.5	0.25
Nickel	µg	1	0.6	<0.4	0.5
Phosphorus	µg	20	10	20	2.5
Selenium	µg	3.0	4.0	<1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.8	<0.9	<0.8	1
Zinc	µg	2.8	2	2.6	0.5
Volume	Sample	mL	870	750	890
Volume	aliquot volume	mL	820	700	840
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05

Analytical Report

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

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

		Reference Number	1372204-4	1372204-5	1372204-6	
		Sample Date	Aug 14, 2019	Aug 15, 2019	Aug 15, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 2 Run 1 (beaker (MV Unit 2 R-1) + 4 bottles)	Unit 2 Run 2 (beaker (MV Unit 2 R-2) + 4 bottles)	Unit 2 Run 3 (beaker (MV Unit 2 R-3) + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	0.40	0.64	0.38	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	870	750	890	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	2.8	3.8	2.7	
Mercury	As Tested	µg/L	<0.05	0.17	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	170	215	160	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	0.058	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	1000	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.08	
Mercury	As Tested	µg/L	0.86	0.78	0.24	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	0.27	0.25	0.076	

Analytical Report

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#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

		Reference Number	1372204-7	1372204-8	1372204-9	Nominal Detection Limit
		Sample Date	Aug 14, 2019	Aug 14, 2019	Aug 14, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (beaker (MV Unit 3 R-1) + 4 bottles)	Unit 3 Run 2 (beaker (MV Unit 3 R-2) + 4 bottles)	Unit 3 Run 3 (beaker (MV Unit 3 R-3) + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	
Front Half Metals Fraction 1A						
Aluminum		µg	10	10	20	5
Antimony		µg	4	4	<2	2.5
Arsenic		µg	2	<1	2	1
Cadmium		µg	0.4	1	0.9	0.25
Chromium		µg	3.84	0.63	4.08	0.2
Cobalt		µg	<0.3	<0.3	0.3	0.25
Copper		µg	3.4	1.0	3.6	0.25
Lead		µg	5.9	3.0	7.0	1.5
Manganese		µg	67.3	2.5	1	0.25
Nickel		µg	2.8	2	4.0	0.5
Phosphorus		µg	41	39	40	2.5
Selenium		µg	3.0	<2	<2	1.5
Tellurium		µg	<2	<2	<2	2
Thallium		µg	<2	<2	2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	58.6	54.1	59.7	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	8	<4	20	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	<0.9	<0.9	<0.8	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	1.0	0.26	1.1	0.2
Cobalt		µg	0.8	0.6	0.6	0.25
Copper		µg	0.8	0.7	0.7	0.25
Lead		µg	2.4	<1	<1	1.5
Manganese		µg	0.9	<0.2	0.5	0.25
Nickel		µg	1	<0.4	0.4	0.5
Phosphorus		µg	20	5	20	2.5
Selenium		µg	<1	<1	<1	1.5
Tellurium		µg	<2	<2	<2	2
Thallium		µg	<1	<1	<1	1.5
Vanadium		µg	<0.9	<0.9	<0.8	1
Zinc		µg	3.3	<0.4	4.4	0.5
Volume	Sample	mL	850	820	880	
Volume	aliquot volume	mL	800	770	830	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.16	0.13	0.28	0.05

Analytical Report

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

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

Lot ID: **1372204**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435140

		Reference Number	1372204-7	1372204-8	1372204-9	Nominal Detection Limit
		Sample Date	Aug 14, 2019	Aug 14, 2019	Aug 14, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (beaker (MV Unit 3 R-1) + 4 bottles)	Unit 3 Run 2 (beaker (MV Unit 3 R-2) + 4 bottles)	Unit 3 Run 3 (beaker (MV Unit 3 R-3) + 4 bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.062	0.052	0.11	
Mercury	As Tested	µg/L	0.33	0.38	0.30	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	850	820	880	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	2.3	2.5	2.1	
Mercury	As Tested	µg/L	<0.05	0.17	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	165	200	175	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	0.054	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	1000	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.08	
Mercury	As Tested	µg/L	0.20	0.34	0.43	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	0.064	0.11	0.14	

Approved by:



Matthew Norman, BSc, PChem
Operations Chemist

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1372204 Control Number: Date Received: Aug 22, 2019 Date Reported: Sep 12, 2019 Report Number: 2435140
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	Sep 10, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 26, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 27, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Test Lot: 1372204 ^{COC}
Advisory
Assurance



Control Number

Information Sheet

In order to proceed with analysis

Billing Address:		Copy or Report To:		Copy of invoice:	
Company:	A. Lanfranco and Associates	Company:		Mail invoice to this	
Address:	Unit 101 9488 189 St Surrey, BC V4N 4W7	Address:		address for approval	
				AUG 22 '19 12:12	
Attention:	Mark Lanfranco	Report Result:		Report Result:	
Phone:	604-881-2582	Fax	☐	Fax	☐
Fax:	604-881-2581	Mail	☐	Mail	☐
Cell:		Courier	☐	Courier	☐
e-mail:	mark.lanfranco@alanfranco.com	e-mail	☐	e-mail	☐
		e-Service	☐	e-Service	☐

Information to be included on Report and Invoice	RUSH	Please contact the laboratory to confirm rush dates and times before submitting samples.	Sample Custody (Please Print)
	Upon filling out this section, client accepts that surcharges will be attached to this analysis		Sampled by:
	RUSH All Analysis As indicated		Company Signature
	required on: ☐ or ☐		I authorize Exova to proceed with the work work indicated on this form:
	Date Required: _____		Date: Initial:
	Signature: _____		Received by: <u>PLAD</u> Sample Temp. <u>25.7°C</u>
Exova Authorization: _____		Waybill #: _____	Date
		Company	Time

Special Instructions / Comments	FOR LAB USE ONLY	☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information)																				
	Condition of containers/coolers upon arrival at lab	☐ Check here if you are testing <u>POTABLE</u> <u>WATER</u> for <u>HUMAN CONSUMPTION</u>																				
Please indicate which regulations you are required to meet: _____		<table border="1" style="width:100%"><tr><td>Number of Containers</td><td>Front ICAP</td><td>Back ICAP</td><td>Front Hg</td><td>Back Hg</td><td>5A Hg</td><td>5B Hg</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg													
Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg																

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

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Field Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1372217 Control Number: Date Received: Aug 22, 2019 Date Reported: Sep 12, 2019 Report Number: 2435155
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

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

Lot ID: **1372217**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435155

	Reference Number	1372217-1	1372217-2	1372217-3	
	Sample Date	Aug 13, 2019	Aug 15, 2019	Aug 14, 2019	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Field Blank Unit 1 (Beaker (MV Unit 1 Blank) + 4 Bottles)	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)	
	Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	<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	0.5	<0.3	1	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	0.9	0.5
Phosphorus	µg	42	41	37	2.5
Selenium	µg	2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2	2	3.4	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	0.5	1	0.6	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	<5	<5	<5	5
Antimony	µg	<2	<2	2	2.5
Arsenic	µg	<1.0	<1.0	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.34	0.2	<0.2	0.2
Cobalt	µg	0.6	0.8	0.8	0.25
Copper	µg	<0.2	<0.2	<0.2	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.6	<0.2	<0.2	0.25
Nickel	µg	1	<0.5	<0.5	0.5
Phosphorus	µg	20	10	20	2.5
Selenium	µg	2.8	<1	<1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<1.0	<1.0	<0.9	1
Zinc	µg	<0.5	0.9	<0.5	0.5
Volume	Sample	mL	290	300	380
Volume	aliquot volume	mL	240	250	330
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05

Analytical Report

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

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

Lot ID: **1372217**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435155

		Reference Number	1372217-1	1372217-2	1372217-3	
		Sample Date	Aug 13, 2019	Aug 15, 2019	Aug 14, 2019	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Field Blank Unit 1 (Beaker (MV Unit 1 Blank) + 4 Bottles)	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	290	300	380	
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	<0.2	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	150	175	170	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.01	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	0.16	0.13	0.09	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	0.052	0.042	0.03	

Approved by:



Matthew Norman, BSc, PChem
Operations Chemist

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Field Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1372217 Control Number: Date Received: Aug 22, 2019 Date Reported: Sep 12, 2019 Report Number: 2435155
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	Sep 10, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 26, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 27, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advisi
Assuring

Lot: 1372217 COC



Number

ation Sheet

to proceed with analysis

Billing Address: Company: A. Lanfranco and Associates Address: Unit 101 9488 189 St Surrey, BC V4N 4W7 Attention: Mark Lanfranco Phone: 604-881-2582 Fax: 604-881-2581 Cell: e-mail: mark.lanfranco@alanfranco.com		Copy of Report To: Company: Address: Report Result: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐	Copy of invoice: Mail invoice to this address for approval ☐ AUG 22 '19 12:11 Report Result: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐
--	--	---	---

Information to be included on Report and Invoice Project ID: Project Name: Metro Vancouver WTE Project Location: Field Blanks Legal Location: PO#: Proj. Acct. Code: Agreement ID:	RUSH Please contact the laboratory to confirm rush dates and times before submitting samples. Upon filling out this section, client accepts that surcharges will be attached to this analysis RUSH All Analysis As indicated required on: ☐ or ☐ Date Required: _____ Signature: _____ Exova Authorization: _____	Sample Custody (Please Print) Sampled by: _____ Company _____ Signature _____ I authorize Exova to proceed with the work work indicated on this form: Date: _____ Initial: _____ Received by: <u>HAND</u> <u>RO</u> Sample Temp. <u>25-7°C</u> Waybill #: _____ Date _____ Company _____ Time _____
--	--	---

Special Instructions / Comments *Front and Back ICAP as per EPA Method 29 *Hg analysis as per EPA Method 29 * Please report ug/sample Please indicate which regulations you are required to meet: _____	FOR LAB USE ONLY Condition of containers/coolers upon arrival at lab	☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information) ☐ Check here if you are testing POTABLE WATER for HUMAN CONSUMPTION
--	--	---

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

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

Page ____ of ____

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1372225
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Filter Reagent Blanks	Date Received: Aug 22, 2019
V4N 4W7	LSD:	Date Reported: Sep 12, 2019
Attn: Missy	P.O.:	Report Number: 2435163
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:
Project Name: Metro Vancouver WTE
Project Location: Filter Reagent Blanks
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1372225**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435163

		Reference Number	1372225-1	1372225-2	1372225-3
		Sample Date	Aug 12, 2019	Aug 12, 2019	Aug 12, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1 Container 1 (filter)	Reagent Blank Unit 2 Container 1 (filter)	Reagent Blank Unit 3 Container 1 (filter)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	<5	<5	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<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	2	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.3	<0.3	<0.3	0.25
Nickel	µg	<0.5	0.8	<0.5	0.5
Phosphorus	µg	36	33	35	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	2	0.6	2	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:



Matthew Norman, BSc, PChem
Operations Chemist

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Filter Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1372225 Control Number: Date Received: Aug 22, 2019 Date Reported: Sep 12, 2019 Report Number: 2435163
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	Sep 10, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

Lot: 1372225 COC



Number

Information Sheet

Order to proceed with analysis

Billing Address:

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

QA/QC Report ☐

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

Report Result:

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

Copy of Report To:

Company:
Address:

Attention:
Phone:
Fax:
Cell:
e-mail:

Copy of invoice:

Mail invoice to this
address for approval ☐

AUG 22 '19 12:13

Report Result:

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

Information to be included on Report and Invoice

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

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

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

RUSH All Analysis As indicated

required on: ☐ or ☐

Date Required: _____

Signature: _____

Exova Authorization: _____

Sample Custody (Please Print)

Sampled by:

Company Signature

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

Date: Initial:

Received by: Hand Sample Temp. 25.7°C

Waybill #: Date

Company Time

Special Instructions / Comments

* Please report ug/sample

FOR LAB USE ONLY

Condition of containers/coolers
upon arrival at lab

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

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

Please indicate which regulations you are required to meet: _____

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

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

Page ____ of ____

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1372220
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Reagent Blanks	Date Received: Aug 22, 2019
V4N 4W7	LSD:	Date Reported: Sep 12, 2019
Attn: Missy	P.O.:	Report Number: 2435159
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:
Project Name: Metro Vancouver WTE
Project Location: Reagent Blanks
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1372220**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435159

		Reference Number	1372220-1	1372220-2	1372220-3
		Sample Date	Aug 12, 2019	Aug 12, 2019	Aug 12, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	<5	<5	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	2	2	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	0.5	<0.3	0.25
Copper	µg	<0.3	0.5	<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	3	6	7	2.5
Selenium	µg	<2	<2	2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2.8	2	2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	<0.5	<0.5	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	20	10	<5	5
Antimony	µg	<3	<3	<3	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	0.92	<0.2	0.2
Cobalt	µg	0.5	1.0	0.7	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	3	<2	1.5
Manganese	µg	2	<0.3	<0.3	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	30	20	20	2.5
Selenium	µg	<2	2	3.7	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	16	9.8	<0.5	0.5
Volume	Sample	mL	200	200	200
Volume	aliquot volume	mL	150	150	150
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250

Analytical Report

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

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

Lot ID: **1372220**
Control Number:
Date Received: Aug 22, 2019
Date Reported: Sep 12, 2019
Report Number: 2435159

		Reference Number	1372220-1	1372220-2	1372220-3
		Sample Date	Aug 12, 2019	Aug 12, 2019	Aug 12, 2019
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued					
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	200	200	200
Volume	aliquot volume	mL	5.0	5.0	5.0
Volume	Final	mL	45	45	50
Mercury	Fraction 2B	µg/sample	<0.09	<0.09	<0.1
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	105	100	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	0.08	0.07	0.16
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	200	200	200
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3C	µg/sample	0.03	0.02	0.051

Approved by:



Matthew Norman, BSc, PChem
Operations Chemist

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1372220 Control Number: Date Received: Aug 22, 2019 Date Reported: Sep 12, 2019 Report Number: 2435159
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	Sep 10, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 26, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 27, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Aug 28, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 23, 2019	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

Lot: 1372220 COC



Note: Proper comp...

Number

ation Sheet

er to proceed with analysis

Billing Address:

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

QA/QC Report ☐

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

Report Result:

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

Copy of Report To:

Company:
Address:

Attention:
Phone:
Fax:
Cell:
e-mail:

Copy of invoice:

Mail invoice to this
address for approval ☐

AUG 22 '19 12:10

Report Result:

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

Information to be included on Report and Invoice

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

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

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

RUSH All Analysis As indicated

required on: ☐ or ☐

Date Required: _____

Signature: _____

Exova Authorization: _____

Sample Custody (Please Print)

Sampled by:

Company Signature

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

Date: Initial:

Received by: HAND Sample Temp. 25.7°C

Waybill #: Date

Company Time

Special Instructions / Comments

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

FOR LAB USE ONLY

Condition of containers/coolers
upon arrival at lab

Please indicate which regulations you are required to meet: _____

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

☐ Check here if you are testing POTABLE

WATER for HUMAN CONSUMPTION

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

	Sample Identification	Location	Depth			Date/Time Sampled	Matrix	Sampling Method	↓	Enter tests above (✓ relevant samples below)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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1	Reagent Blank Unit 1					12-Aug-19			5	✓	✓	✓	✓	✓	✓																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</

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

Page ____ of ____



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

Date Received: 16-AUG-19
Report Date: 23-AUG-19 14:15 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2330480

Project P.O. #: HF

Job Reference: METRO VANCOUVER WTE

C of C Numbers:

Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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

		Sample ID	L2330480-1	L2330480-2	L2330480-3	L2330480-4	L2330480-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	13-AUG-19	13-AUG-19	13-AUG-19	15-AUG-19	15-AUG-19
		Sampled Time					
		Client ID	UNIT 1 HF RUN 1	UNIT 1 HF RUN 2	UNIT 1 HF RUN 3	UNIT 2 HF RUN 1	UNIT 2 HF RUN 2
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)	<18	<21	<21	<44	<41	
	Volume (Anions) (mL)	365	415	410	440	410	

		Sample ID Description Sampled Date Sampled Time Client ID	L2330480-6 Water 15-AUG-19 UNIT 2 HF RUN 3	L2330480-7 Water 14-AUG-19 UNIT 3 HF RUN 1	L2330480-8 Water 14-AUG-19 UNIT 3 HF RUN 2	L2330480-9 Water 14-AUG-19 UNIT 3 HF RUN 3	
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)	<88	<20	<3.4	<20		
	Volume (Anions) (mL)	440	390	340	405		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F-IMP-UG-VA	Stack	Fluoride in Water from Impinger	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

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

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

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

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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

mg/kg - milligrams per kilogram based on dry weight of sample.

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

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

mg/L - milligrams per litre.

< - Less than.

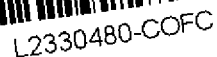
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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

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

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

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



GENF 20.00 Front



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

Date Received: 16-AUG-19
Report Date: 23-AUG-19 14:20 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2330481

Project P.O. #: HF

Job Reference: METRO VANCOUVER WTE

C of C Numbers:

Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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

		Sample ID Description Sampled Date Sampled Time Client ID	L2330481-1 Water 13-AUG-19 UNIT 1 HF BLANK	L2330481-2 Water 13-AUG-19 UNIT 2 HF BLANK	L2330481-3 Water 13-AUG-19 UNIT 3 HF BLANK		
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)	<2.0	<2.1	<2.0			
	Volume (Anions) (mL)	200	205	195			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F-IMP-UG-VA	Stack	Fluoride in Water from Impinger	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

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

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

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

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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

mg/kg - milligrams per kilogram based on dry weight of sample.

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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

[illegible]

Page 1 of 1

L2330481-COFC

GENF 20.00 Front



Attention: Customer Solutions

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

Your Project #: MV WTEF [B967115]
Site#: UNIT 3
Site Location: BURNABY
Your C.O.C. #: B967115-ONTV-01-01

Report Date: 2019/08/21
Report #: R5847516
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9M7189

Received: 2019/08/16, 09:42

Sample Matrix: Tedlar Bag
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Nitrous Oxide (1)	3	N/A	2019/08/16	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 WTEF [B967115]
Site#: UNIT 3
Site Location: BURNABY
Your C.O.C. #: B967115-ONTV-01-01

Attention: Customer Solutions

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

Report Date: 2019/08/21
Report #: R5847516
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9M7189

Received: 2019/08/16, 09:42

Encryption Key

Cristina Bacchus

Cristina (Maria) Bacchus
Project Manager
21 Aug 2019 07:47:04

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.

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BUREAU
VERITAS

BV Labs Job #: B9M7189
Report Date: 2019/08/21

Bureau Veritas Laboratories
Client Project #: MV WTEF [B967115]
Site Location: BURNABY
Sampler Initials: ML

COMPRESSED GAS PARAMETERS (TEDLAR BAG)

BV Labs ID		KNN993	KNN993	KNN994		
Sampling Date		2019/08/14 08:30	2019/08/14 08:30	2019/08/14 09:30		
COC Number		B967115-ONTV-01-01	B967115-ONTV-01-01	B967115-ONTV-01-01		
	UNITS	WH3416-UNIT 3-RUN 1	WH3416-UNIT 3-RUN 1 Lab-Dup	WH3417-UNIT 3-RUN 2	RDL	QC Batch
Gas						
Nitrous Oxide	ppmv	3.1	3.1	5.6	0.1	6287109
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						
Lab-Dup = Laboratory Initiated Duplicate						

BV Labs ID		KNN995		
Sampling Date		2019/08/14 10:30		
COC Number		B967115-ONTV-01-01		
	UNITS	WH3418-UNIT 3-RUN 3	RDL	QC Batch
Gas				
Nitrous Oxide	ppmv	5.2	0.1	6287109
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



BUREAU
VERITAS

BV Labs Job #: B9M7189
Report Date: 2019/08/21

Bureau Veritas Laboratories
Client Project #: MV WTEF [B967115]
Site Location: BURNABY
Sampler Initials: ML

TEST SUMMARY

BV Labs ID: KNN993
Sample ID: WH3416-UNIT 3-RUN 1
Matrix: Tedlar Bag

Collected: 2019/08/14
Shipped:
Received: 2019/08/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6287109	N/A	2019/08/16	Satvinder Bhathal

BV Labs ID: KNN993 Dup
Sample ID: WH3416-UNIT 3-RUN 1
Matrix: Tedlar Bag

Collected: 2019/08/14
Shipped:
Received: 2019/08/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6287109	N/A	2019/08/19	Satvinder Bhathal

BV Labs ID: KNN994
Sample ID: WH3417-UNIT 3-RUN 2
Matrix: Tedlar Bag

Collected: 2019/08/14
Shipped:
Received: 2019/08/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6287109	N/A	2019/08/16	Satvinder Bhathal

BV Labs ID: KNN995
Sample ID: WH3418-UNIT 3-RUN 3
Matrix: Tedlar Bag

Collected: 2019/08/14
Shipped:
Received: 2019/08/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6287109	N/A	2019/08/16	Satvinder Bhathal



BUREAU
VERITAS

BV Labs Job #: B9M7189
Report Date: 2019/08/21

Bureau Veritas Laboratories
Client Project #: MV WTEF [B967115]
Site Location: BURNABY
Sampler Initials: ML

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: B9M7189
Report Date: 2019/08/21

QUALITY ASSURANCE REPORT

Bureau Veritas Laboratories
Client Project #: MV WTEF [B967115]
Site Location: BURNABY
Sampler Initials: ML

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
6287109	Nitrous Oxide	2019/08/19	<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 #: B9M7189
Report Date: 2019/08/21

Bureau Veritas Laboratories
Client Project #: MV WTEF [B967115]
Site Location: BURNABY
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

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.



Your Project #: B966220
Site Location: BURNABY, BC
Your C.O.C. #: b966220-ontv-01-01

Attention: Customer Solutions

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

Report Date: 2019/08/23
Report #: R5851383
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9M4649

Received: 2019/08/14, 08:38

Sample Matrix: Tedlar Bag
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Nitrous Oxide (1)	6	N/A	2019/08/14	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 #: B966220
Site Location: BURNABY, BC
Your C.O.C. #: b966220-ontv-01-01

Attention: Customer Solutions

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

Report Date: 2019/08/23
Report #: R5851383
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9M4649

Received: 2019/08/14, 08:38

Encryption Key

Jade Browne
Project Manager Assistant - Air
23 Aug 2019 13:10:57

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

=====

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BUREAU
VERITAS

BV Labs Job #: B9M4649
Report Date: 2019/08/23

Bureau Veritas Laboratories
Client Project #: B966220
Site Location: BURNABY, BC

COMPRESSED GAS PARAMETERS (TEDLAR BAG)

BV Labs ID		KNA253	KNA254	KNA255	KNA256		
Sampling Date		2019/08/12 09:45	2019/08/12 10:46	2019/08/12 11:47	2019/08/12 10:00		
COC Number		b966220-ontv-01-01	b966220-ontv-01-01	b966220-ontv-01-01	b966220-ontv-01-01		
	UNITS	WG9462-UNIT-1 1	WG9463-UNIT-1 2	WG9464-UNIT-1 3	WG9465-UNIT-2 1	RDL	QC Batch

Gas

Nitrous Oxide	ppmv	4.0	4.6	4.8	3.8	0.1	6280376
---------------	------	-----	-----	-----	-----	-----	---------

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

BV Labs ID		KNA257	KNA258	KNA258		
Sampling Date		2019/08/12 11:05	2019/08/12 12:10	2019/08/12 12:10		
COC Number		b966220-ontv-01-01	b966220-ontv-01-01	b966220-ontv-01-01		
	UNITS	WG9466-UNIT-2 2	WG9467-UNIT-2 3	WG9467-UNIT-2 3 Lab-Dup	RDL	QC Batch

Gas

Nitrous Oxide	ppmv	4.9	5.1	4.2	0.1	6280376
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RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate



BUREAU
VERITAS

BV Labs Job #: B9M4649
Report Date: 2019/08/23

Bureau Veritas Laboratories
Client Project #: B966220
Site Location: BURNABY, BC

TEST SUMMARY

BV Labs ID: KNA253
Sample ID: WG9462-UNIT-1 1
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA254
Sample ID: WG9463-UNIT-1 2
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA255
Sample ID: WG9464-UNIT-1 3
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA256
Sample ID: WG9465-UNIT-2 1
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA257
Sample ID: WG9466-UNIT-2 2
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA258
Sample ID: WG9467-UNIT-2 3
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal

BV Labs ID: KNA258 Dup
Sample ID: WG9467-UNIT-2 3
Matrix: Tedlar Bag

Collected: 2019/08/12
Shipped:
Received: 2019/08/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6280376	N/A	2019/08/14	Satvinder Bhathal



**BUREAU
VERITAS**

BV Labs Job #: B9M4649
Report Date: 2019/08/23

Bureau Veritas Laboratories
Client Project #: B966220
Site Location: BURNABY, BC

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: B9M4649
Report Date: 2019/08/23

QUALITY ASSURANCE REPORT

Bureau Veritas Laboratories
Client Project #: B966220
Site Location: BURNABY, BC

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
6280376	Nitrous Oxide	2019/08/14	<0.1	ppmv	20	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.						



BUREAU
VERITAS

BV Labs Job #: B9M4649
Report Date: 2019/08/23

Bureau Veritas Laboratories
Client Project #: B966220
Site Location: BURNABY, BC

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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For Service Group specific validation please refer to the Validation Signature Page.



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

LABORATORY REPORT

September 4, 2019

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

RE: MV WTEF

Dear Mark:

Enclosed are the results of the samples submitted to our laboratory on August 20, 2019. For your reference, these analyses have been assigned our service request number P1904945.

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

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

Respectfully submitted,

ALS | Environmental

Kate Kaneko
By Kate Kaneko at 3:20 pm, 09/04/19

Kate Kaneko
Laboratory Director



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

Client: A. Lanfranco and Associates Inc.
Project: MV WTEF

Service Request No: P1904945

CASE NARRATIVE

The samples were received intact under chain of custody on August 20, 2019 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

C1 through C6 Hydrocarbon Analysis

The samples were analyzed per modified EPA Method TO-3 for C1 through >C6 hydrocarbons using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TO3C1C6. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

Manual integration of the chromatographic ranges in each sample with reported concentrations was required to correct the integration performed by the automated data processing program. The raw data states the rationale and specific ranges impacted by the manual integration.

Methane, Ethene, Ethane, Propene, and Propane Analysis

The samples were also analyzed for methane, ethene, ethane, propene, and propane per modified EPA Method TO-3 using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TO3C1C6. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

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

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



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 Simi Valley, CA 93065
 T: +1 805 526 7161
www.alsglobal.com

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Alaska DEC	http://dec.alaska.gov/eh/lab.aspx	17-019
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/page/la-lab-accreditation	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml	2018027
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1521096
New Jersey DEP (NELAP)	http://www.nj.gov/dep/enforcement/oqa.html	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-006
Pennsylvania DEP	http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html	T104704413-19-10
Utah DOH (NELAP)	http://health.utah.gov/lab/lab_cert_env	CA016272019-10
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946
Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.		

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: A. Lanfranco and Associates Inc.
Project ID: MV WTEF

Service Request: P1904945

Date Received: 8/20/2019

Time Received: 09:25

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	TO-3 Modified - C1C6+ Can	TO-3 Modified - MEEPP Can
MV WTEF UNIT 1 Run 1	P1904945-001	Air	8/13/2019	09:10	SC01645	-3.45	3.88	X	X
MV WTEF UNIT 1 Run 2	P1904945-002	Air	8/13/2019	10:14	SC01692	-3.14	4.31	X	X
MV WTEF UNIT 1 Run 3	P1904945-003	Air	8/13/2019	11:25	SC01741	-3.26	3.99	X	X
MV WTEF UNIT 2 Run 1	P1904945-004	Air	8/15/2019	09:07	SC00689	-3.07	3.84	X	X
MV WTEF UNIT 2 Run 2	P1904945-005	Air	8/15/2019	10:14	SC01537	-5.93	4.09	X	X
MV WTEF UNIT 2 Run 3	P1904945-006	Air	8/15/2019	11:27	SC01953	-8.01	3.52	X	X
MV WTEF UNIT 3 Run 1	P1904945-007	Air	8/14/2019	08:45	SSC00194	-2.80	3.79	X	X
MV WTEF UNIT 3 Run 2	P1904945-008	Air	8/14/2019	10:07	SC02169	-2.99	3.80	X	X
MV WTEF UNIT 3 Run 3	P1904945-009	Air	8/14/2019	11:23	SC00764	-4.04	3.50	X	X



Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

2655 Park Center Drive, Suite A
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Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

ALS Project No. P1904945

Company Name & Address (Reporting Information) <u>A Lanfranco + Associates Inc.</u>				Project Name <u>MV WTEF</u>				ALS Contact:		Comments e.g. Actual Preservative or specific instruction
								Analysis Method		
Project Manager <u>Mark Lanfranco</u>				Project Number				<u>To 3 (list on file)</u>		
Phone <u>604 881 2582</u>				P.O. # / Billing Information <u>Bill to account</u>						
Fax										
Email Address for Result Reporting <u>Mark.lanfranco@alanfranco.com</u>				Sampler (Print & Sign) <u>ML</u>						
Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume		
<u>MV WTEF Unit 1 Run 1</u>		<u>Aug 13</u>	<u>09:10</u>	<u>SC01645</u>	<u>0A61830</u>	<u>-28</u>	<u>-4.5</u>		<u>✓</u>	
<u>" Run 2</u>		<u>Aug 13</u>	<u>10:14</u>	<u>SC01692</u>	<u>0A00348</u>	<u>-30</u>	<u>-6</u>		<u>✓</u>	
<u>" Run 3</u>		<u>Aug 13</u>	<u>11:25</u>	<u>SC01741</u>	<u>0A00686</u>	<u>-30</u>	<u>-8</u>		<u>✓</u>	
<u>MV WTEF Unit 2 Run 1</u>		<u>Aug 15</u>	<u>09:07</u>	<u>SC00689</u>	<u>0A01421</u>	<u>-32</u>	<u>-7</u>		<u>✓</u>	
<u>" Run 2</u>		<u>Aug 15</u>	<u>10:14</u>	<u>SC01537</u>	<u>0A02131</u>	<u>-32</u>	<u>-14</u>		<u>✓</u>	
<u>" Run 3</u>		<u>Aug 15</u>	<u>11:27</u>	<u>SC01953</u>	<u>0A00760</u>	<u>-30</u>	<u>-17</u>		<u>✓</u>	
<u>MV WTEF Unit 3 Run 1</u>		<u>Aug 14</u>	<u>08:45</u>	<u>SC00194</u>	<u>0A02122</u>	<u>-30</u>	<u>-6</u>		<u>✓</u>	
<u>" Run 2</u>		<u>Aug 14</u>	<u>10:07</u>	<u>SC02169</u>	<u>0A00141</u>	<u>-32</u>	<u>-7</u>		<u>✓</u>	
<u>" Run 3</u>		<u>Aug 14</u>	<u>11:23</u>	<u>SC00764</u>	<u>0A00297</u>	<u>-33</u>	<u>-9</u>		<u>✓</u>	
Report Tier Levels - please select										
Tier I - Results (Default if not specified) _____			Tier III (Results + QC & Calibration Summaries) _____			EDD required Yes / No		Chain of Custody Seal: (Circle)		Project Requiremer (MRLs, QAPP)
Tier II (Results + QC Summaries) _____			Tier IV (Data Validation Package) 10% Surcharge _____			Type: _____ Units: _____		INTACT BROKEN ABSENT		
Relinquished by: (Signature) <u>[Signature]</u>		Date: <u>Aug 30</u>	Time: <u>945</u>	Received by: (Signature) <u>[Signature]</u>		Date: <u>8/20/19</u>	Time: <u>925</u>	Cooler / Blank Temperature _____		
Relinquished by: (Signature)		Date:	Time:	Received by: (Signature)		Date:	Time:			

ALS Environmental **Sample Acceptance Check Form**

Client: A. Lanfranco and Associates Inc. Work order: P1904945
 Project: MV WTEF
 Sample(s) received on: 8/20/2019 Date opened: 8/20/2019 by: DENISE.POSADA

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

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

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1904945-001.01	6.0 L Source Can					
P1904945-002.01	6.0 L Source Can					
P1904945-003.01	6.0 L Source Can					
P1904945-004.01	6.0 L Source Can					
P1904945-005.01	6.0 L Source Can					
P1904945-006.01	6.0 L Source Can					
P1904945-007.01	6.0 L Silonite Can					
P1904945-008.01	6.0 L Source Can					
P1904945-009.01	6.0 L Source Can					

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-001

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01645

Date Collected: 8/13/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.45 Final Pressure (psig): 3.88

Container Dilution Factor: 1.65

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.2	0.83	
C ₃ as Propane	3.3	0.83	
C ₄ as n-Butane	ND	0.83	
C ₅ as n-Pentane	ND	0.83	
C ₆ as n-Hexane	ND	0.83	
C ₆ + as n-Hexane	ND	1.7	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-002

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01692

Date Collected: 8/13/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.14 Final Pressure (psig): 4.31

Container Dilution Factor: 1.64

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.1	0.82	
C ₃ as Propane	20	0.82	
C ₄ as n-Butane	1.4	0.82	
C ₅ as n-Pentane	ND	0.82	
C ₆ as n-Hexane	ND	0.82	
C ₆ + as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-003

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01741

Date Collected: 8/13/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.26 Final Pressure (psig): 3.99

Container Dilution Factor: 1.63

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.1	0.82	
C ₃ as Propane	15	0.82	
C ₄ as n-Butane	1.3	0.82	
C ₅ as n-Pentane	ND	0.82	
C ₆ as n-Hexane	ND	0.82	
C ₆ + as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-004

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00689

Date Collected: 8/15/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.07 Final Pressure (psig): 3.84

Container Dilution Factor: 1.59

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.4	0.80	
C ₃ as Propane	5.2	0.80	
C ₄ as n-Butane	ND	0.80	
C ₅ as n-Pentane	ND	0.80	
C ₆ as n-Hexane	ND	0.80	
C ₆ + as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-005

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01537

Date Collected: 8/15/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -5.93

Final Pressure (psig): 4.09

Container Dilution Factor: 2.14

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.5	1.1	
C ₃ as Propane	6.9	1.1	
C ₄ as n-Butane	ND	1.1	
C ₅ as n-Pentane	ND	1.1	
C ₆ as n-Hexane	ND	1.1	
C ₆ + as n-Hexane	ND	2.1	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-006

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01953

Date Collected: 8/15/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -8.01 Final Pressure (psig): 3.52

Container Dilution Factor: 2.72

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.8	1.4	
C ₃ as Propane	ND	1.4	
C ₄ as n-Butane	ND	1.4	
C ₅ as n-Pentane	ND	1.4	
C ₆ as n-Hexane	ND	1.4	
C ₆ + as n-Hexane	ND	2.7	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-007

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00194

Date Collected: 8/14/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.80 Final Pressure (psig): 3.79

Container Dilution Factor: 1.55

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.2	0.78	
C ₃ as Propane	2.1	0.78	
C ₄ as n-Butane	ND	0.78	
C ₅ as n-Pentane	ND	0.78	
C ₆ as n-Hexane	ND	0.78	
C ₆ + as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-008

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02169

Date Collected: 8/14/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.99

Final Pressure (psig): 3.80

Container Dilution Factor: 1.58

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.2	0.79	
C ₃ as Propane	1.1	0.79	
C ₄ as n-Butane	ND	0.79	
C ₅ as n-Pentane	ND	0.79	
C ₆ as n-Hexane	ND	0.79	
C ₆ + as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-009

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00764

Date Collected: 8/14/19

Date Received: 8/20/19

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -4.04

Final Pressure (psig): 3.50

Container Dilution Factor: 1.71

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	1.4	0.86	
C ₃ as Propane	1.6	0.86	
C ₄ as n-Butane	ND	0.86	
C ₅ as n-Pentane	ND	0.86	
C ₆ as n-Hexane	ND	0.86	
C ₆ + as n-Hexane	ND	1.7	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Method Blank

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P190823-MB

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 8/23/19

Volume(s) Analyzed: 1.0 ml(s)

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

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P190823-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Donghao Li

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 8/23/19

Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
				Acceptance Limits	
Methane	1,000	957	96	94-110	
Propane	1,000	1,010	101	94-120	
n-Butane	1,000	1,000	100	91-121	
n-Pentane	1,000	981	98	86-118	
n-Hexane	1,000	1,030	103	87-126	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Project ID: MV WTEF

ALS Project ID: P1904945

Acetylene

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister(s)

Test Notes:

Date(s) Collected: 8/13 - 8/15/19

Date Received: 8/20/19

Date Analyzed: 9/3/19

Client Sample ID	ALS Sample ID	Injection Volume ml(s)	Container Dilution Factor	Result ppmV	MRL ppmV	Data Qualifier
MV WTEF UNIT 1 Run 1	P1904945-001	0.50	1.65	ND	0.41	
MV WTEF UNIT 1 Run 2	P1904945-002	0.50	1.64	ND	0.41	
MV WTEF UNIT 1 Run 3	P1904945-003	0.50	1.63	ND	0.41	
MV WTEF UNIT 2 Run 1	P1904945-004	0.50	1.59	ND	0.40	
MV WTEF UNIT 2 Run 2	P1904945-005	0.50	2.14	ND	0.54	
MV WTEF UNIT 2 Run 3	P1904945-006	0.50	2.72	ND	0.68	
MV WTEF UNIT 3 Run 1	P1904945-007	0.50	1.55	ND	0.39	
MV WTEF UNIT 3 Run 2	P1904945-008	0.50	1.58	ND	0.40	
MV WTEF UNIT 3 Run 3	P1904945-009	0.50	1.71	ND	0.43	
Method Blank	P190903-MB	0.50	1.00	ND	0.25	

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P190903-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 9/03/19

Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
74-86-2	Acetylene	100	102	102	70-130	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-001

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01645

Date Collected: 08/13/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.45 Final Pressure (psig): 3.88

Container Dilution Factor: 1.65

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.60	ND	0.50	
74-84-0	Ethane	ND	0.60	ND	0.50	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-002

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01692

Date Collected: 08/13/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.14 **Final Pressure (psig):** 4.31

Container Dilution Factor: 1.64

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.60	ND	0.49	
74-84-0	Ethane	ND	0.60	ND	0.49	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 1 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-003

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01741

Date Collected: 08/13/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.26 Final Pressure (psig): 3.99

Container Dilution Factor: 1.63

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.60	ND	0.49	
74-84-0	Ethane	ND	0.60	ND	0.49	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-004

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00689

Date Collected: 08/15/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.07 Final Pressure (psig): 3.84

Container Dilution Factor: 1.59

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.50	ND	0.48	
74-84-0	Ethane	ND	0.60	ND	0.48	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-005

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01537

Date Collected: 08/15/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -5.93 **Final Pressure (psig):** 4.09

Container Dilution Factor: 2.14

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.70	ND	0.64	
74-84-0	Ethane	ND	0.80	ND	0.64	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 2 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-006

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01953

Date Collected: 08/15/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -8.01 **Final Pressure (psig):** 3.52

Container Dilution Factor: 2.72

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.90	ND	0.82	
74-84-0	Ethane	ND	1.0	ND	0.82	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 1

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-007

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00194

Date Collected: 08/14/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.80 Final Pressure (psig): 3.79

Container Dilution Factor: 1.55

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.50	ND	0.47	
74-84-0	Ethane	ND	0.60	ND	0.47	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 2

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-008

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02169

Date Collected: 08/14/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.99 **Final Pressure (psig):** 3.80

Container Dilution Factor: 1.58

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.50	ND	0.47	
74-84-0	Ethane	ND	0.60	ND	0.47	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: MV WTEF UNIT 3 Run 3

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P1904945-009

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00764

Date Collected: 08/14/19

Date Received: 08/20/19

Date Analyzed: 09/03/19

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -4.04 **Final Pressure (psig):** 3.50

Container Dilution Factor: 1.71

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.60	ND	0.51	
74-84-0	Ethane	ND	0.60	ND	0.51	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Method Blank

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P190903-MB

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 9/03/19

Volume(s) Analyzed: 0.50 ml(s)

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-85-1	Ethene	ND	0.30	ND	0.30	
74-84-0	Ethane	ND	0.40	ND	0.30	

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: MV WTEF

ALS Project ID: P1904945

ALS Sample ID: P190903-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 9/03/19

Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
74-85-1	Ethene	101	96.6	96	70-130	
74-84-0	Ethane	101	96.2	95	70-130	



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

Date Received: 26-AUG-19
Report Date: 04-SEP-19 12:51 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2335809
Project P.O. #: NOT SUBMITTED
Job Reference: MV WTE UNIT 2
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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

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

		Sample ID Description Sampled Date Sampled Time Client ID	L2335809-1 23-AUG-19 MV WTE UNIT 2 - CR+6 BLANK	L2335809-2 23-AUG-19 MV WTE UNIT 2 - CR+6 RUN 1	L2335809-3 23-AUG-19 MV WTE UNIT 2 - CR+6 RUN 2	L2335809-4 23-AUG-19 MV WTE UNIT 2 - CR+6 RUN 3	
Grouping	Analyte						
WATER							
Physical Tests	Volume (L)		0.936	0.899	0.933	0.894	
Speciated Metals	Hexavalent Chromium (ug)		<0.46	<0.46	<0.46	<0.46	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CR-CR6-ED	Water	Chromium, Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)
This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Results are based on an un-filtered, field-preserved sample.			
VOLUME-ED	Water	Volume	-
Sample volume is measured prior to any sub-sampling.			

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

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

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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

mg/kg - milligrams per kilogram based on dry weight of sample.

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



Canada Toll Free: 1 800 668 9878

COC #

Page 1 of 1

GENF 20.00 Front

APPENDIX - C

COMPUTER GENERATED RESULTS

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

Date: 12-Aug-19
Run: 1 - Particulate / Metals
Run Time: 11:10 - 13:15

Concentrations:

Particulate	0.48 mg/dscm	0.00021 gr/dscf
	0.27 mg/Acm	0.00012 gr/Acf
	0.46 mg/dscm (@ 11% O2)	0.00020 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.037 Kg/hr	0.081 lb/hr
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Flue Gas Characteristics:

Flow	1268 dscm/min	44773 dscf/min
	21.13 dscm/sec	746 dscf/sec
	2227 Acfm/min	78651 Acf/min

Velocity	14.573 m/sec	47.81 f/sec
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Temperature	152.4 oC	306.4 oF
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Moisture	13.8 %
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Gas Analysis	10.5 % O2 9.5 % CO2
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29.940 Mol. Wt (g/gmole) Dry
28.296 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	3.2137 dscm	113.493 dscf
Sample Time	120.0 minutes	
Isokineticity	108.9 %	

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

Client:	Metro Vancouver	Date:	12-Aug-19
Jobsite:	WTE (Burnaby, BC)	Run:	1 - Particulate / Metals
Source:	Unit 1	Run Time:	11:10 - 13:15

Control Unit (Y)	0.9902	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3123	Filter (grams) 0.00005	CO2 O2	Impinger 1 254.0
Pitot Factor	0.8465	Washings (grams) 0.00150	10.00 10.00	Impinger 2 80.0
Baro. Press. (in. Hg)	30.11	Traverse 1	9.00 11.00	Impinger 3 22.0
Static Press. (in. H2O)	-19.50	Traverse 2		Impinger 4 12.0
Stack Height (ft)	30			Impinger 5 3.0
Stack Diameter (in.)	70.90			Impinger 6 2.0
Stack Area (sq.ft.)	27.417			Gel 12.2
Minutes Per Reading	5.0			
Minutes Per Point	5.0			

Total (grams) 0.00155	9.50 10.50	Gain (grams) 385.2
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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										
1	5.0	155.152								
2	10.0	159.320	0.34	2.22	80	80	5	307	1.5	109.7
3	15.0	163.610	0.36	2.35	81	81	5	306	4.7	109.5
4	20.0	167.900	0.36	2.35	81	81	5	305	8.4	109.4
5	25.0	172.420	0.40	2.61	82	82	5	305	12.5	109.2
6	30.0	176.940	0.40	2.61	82	82	5	304	17.7	109.1
7	35.0	181.570	0.42	2.74	82	82	5	303	25.2	109.1
8	40.0	186.420	0.46	3.00	83	83	6	304	45.6	109.1
9	45.0	191.580	0.52	3.40	83	83	6	305	53.2	109.3
10	50.0	196.740	0.52	3.40	83	83	6	306	58.3	109.4
11	55.0	202.050	0.55	3.59	84	84	6	307	62.5	109.4
12	60.0	207.450	0.57	3.72	84	84	8	314	66.1	109.8
		212.860	0.57	3.72	85	85	8	315	69.4	109.9
Traverse 2										
1	5.0	212.860								
2	10.0	216.900	0.32	2.09	85	85	6	308	1.5	108.6
3	15.0	220.940	0.32	2.09	86	86	6	307	4.7	108.3
4	20.0	224.870	0.30	1.96	86	86	6	303	8.4	108.5
5	25.0	228.790	0.30	1.96	86	86	6	303	12.5	108.2
6	30.0	232.960	0.34	2.22	87	87	6	302	17.7	108.0
7	35.0	237.270	0.36	2.35	88	88	6	302	25.2	108.3
8	40.0	243.180	0.68	4.44	88	88	6	305	45.6	108.8
9	45.0	249.160	0.70	4.57	89	89	6	307	53.2	108.5
10	50.0	255.230	0.72	4.70	90	90	10	308	58.3	108.5
11	55.0	261.040	0.66	4.31	90	90	10	309	62.5	108.4
12	60.0	266.580	0.60	3.92	90	90	8	309	66.1	108.3
		271.890	0.55	3.59	91	91	8	309	69.4	108.2
Average:										
			0.472	3.080	85.3	85.3	6.4	306.4		108.9

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

Date: 13-Aug-19
Run: 2 - Particulate / Metals
Run Time: 09:02 - 11:05

Concentrations:

Particulate	1.23 mg/dscm	0.00054 gr/dscf
	0.69 mg/Acm	0.00030 gr/Acf
	1.11 mg/dscm (@ 11% O2)	0.00049 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.092 Kg/hr	0.202 lb/hr
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Flue Gas Characteristics:

Flow	1245 dscm/min	43971 dscf/min
	20.75 dscm/sec	733 dscf/sec
	2201 Acm/min	77735 Acf/min

Velocity	14.403 m/sec	47.25 f/sec
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Temperature	151.1 oC	304.0 oF
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Moisture	14.5 %
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Gas Analysis	10.0 % O2
	10.0 % CO2

30.000 Mol. Wt (g/gmole) Dry
28.260 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.9747 dscm	105.053 dscf
Sample Time	120.0 minutes	
Isokineticity	102.6 %	

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

Client:	Metro Vancouver	Date:	13-Aug-19
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 1	Run Time:	09:02 - 11:05

Control Unit (Y)	0.9902	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3123	Filter (grams) 0.00005	CO2 O2	Impinger 1 145.0
Pitot Factor	0.8465	Washings (grams) 0.00360	10.00 10.00	Impinger 2 134.0
Baro. Press. (in. Hg)	30.08		10.00 10.00	Impinger 3 46.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.00365		Impinger 4 22.0
Stack Height (ft)	30			Impinger 5 6.0
Stack Diameter (in.)	70.90			Impinger 6 4.0
Stack Area (sq.ft.)	27.417			Gel 21.6
Minutes Per Reading	5.0		10.00 10.00	Gain (grams) 378.6
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	274.000								
1	5.0	277.780	0.32	1.82	76	76	4	304	1.5	103.7
2	10.0	281.560	0.32	1.82	76	76	4	304	4.7	103.7
3	15.0	285.340	0.32	1.82	77	77	4	305	8.4	103.6
4	20.0	288.880	0.28	1.59	77	77	4	303	12.5	103.5
5	25.0	292.540	0.30	1.71	78	78	4	302	17.7	103.2
6	30.0	296.200	0.30	1.71	78	78	4	302	25.2	103.2
7	35.0	301.290	0.58	3.30	79	79	4	304	45.6	103.6
8	40.0	306.270	0.55	3.13	80	80	4	304	53.2	103.8
9	45.0	311.450	0.60	3.41	81	81	4	305	58.3	103.3
10	50.0	316.410	0.55	3.13	82	82	4	303	62.5	102.9
11	55.0	321.230	0.52	2.96	82	82	4	303	66.1	102.8
12	60.0	325.970	0.50	2.85	84	84	4	302	69.4	102.7
Traverse 2	0.0	325.970								
1	5.0	330.040	0.37	2.11	84	84	4	300	1.5	102.2
2	10.0	334.270	0.40	2.28	85	85	4	300	4.7	102.0
3	15.0	338.500	0.40	2.28	87	87	4	299	8.4	101.5
4	20.0	343.320	0.52	2.96	87	87	4	300	12.5	101.7
5	25.0	348.240	0.54	3.07	88	88	4	300	17.7	101.7
6	30.0	353.050	0.52	2.96	88	88	4	303	25.2	101.5
7	35.0	357.980	0.54	3.07	88	88	4	309	45.6	102.5
8	40.0	363.160	0.60	3.41	89	89	4	309	53.2	102.1
9	45.0	368.090	0.54	3.07	89	89	4	308	58.3	102.3
10	50.0	372.820	0.50	2.85	90	90	4	309	62.5	101.8
11	55.0	377.450	0.48	2.73	89	89	4	308	66.1	101.8
12	60.0	381.940	0.45	2.56	90	90	4	309	69.4	101.8
Average:			0.458	2.608	83.5	83.5	4.0	304.0		102.6

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

Date: 13-Aug-19
Run: 3 - Particulate / Metals
Run Time: 11:25 - 13:27

Concentrations:

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

Emission Rates:

Particulate	0.020 Kg/hr	0.045 lb/hr
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Flue Gas Characteristics:

Flow	1297 dscm/min	45806 dscf/min
	21.62 dscm/sec	763 dscf/sec
	2307 Acm/min	81470 Acf/min

Velocity	15.095 m/sec	49.53 f/sec
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Temperature	156.1 oC	313.0 oF
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Moisture	14.0 %
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Gas Analysis	10.0 % O2
	10.0 % CO2

30.000 Mol. Wt (g/gmole) Dry
28.319 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	3.0811 dscm	108.809 dscf
Sample Time	120.0 minutes	
Isokineticity	102.0 %	

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

Client:	Metro Vancouver	Date:	13-Aug-19
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 1	Run Time:	11:25 - 13:27

Control Unit (Y)	0.9902	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3123	Filter (grams) 0.00030	CO2 O2	Impinger 1 212.0
Pitot Factor	0.8268	Washings (grams) 0.00050	10.00 10.00	Impinger 2 106.0
Baro. Press. (in. Hg)	30.08	Traverse 1	10.00 10.00	Impinger 3 30.0
Static Press. (in. H2O)	-19.50	Traverse 2		Impinger 4 6.0
Stack Height (ft)	30			Impinger 5 2.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 19.7
Minutes Per Reading	5.0			Gain (grams) 376.7
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	383.353								
1	5.0	387.220	0.35	1.90	86	86	5	313	1.5	102.1
2	10.0	391.200	0.37	2.01	87	87	5	312	4.7	102.0
3	15.0	395.340	0.40	2.17	87	87	6	314	8.4	102.2
4	20.0	399.480	0.40	2.17	88	88	6	314	12.5	102.0
5	25.0	403.460	0.37	2.01	87	87	6	316	17.7	102.3
6	30.0	407.600	0.40	2.17	87	87	6	314	25.2	102.2
7	35.0	412.750	0.62	3.37	87	87	6	314	45.6	102.4
8	40.0	418.020	0.65	3.53	88	88	6	315	53.2	102.3
9	45.0	423.170	0.62	3.37	88	88	6	314	58.3	102.3
10	50.0	428.640	0.70	3.80	88	88	6	313	62.5	102.3
11	55.0	434.190	0.72	3.91	88	88	5	314	66.1	102.4
12	60.0	439.350	0.62	3.37	88	88	6	310	69.4	102.2
Traverse 2	0.0	439.350								
1	5.0	444.420	0.60	3.26	88	88	6	315	1.5	102.4
2	10.0	449.810	0.68	3.69	88	88	6	318	4.7	102.5
3	15.0	454.880	0.60	3.26	89	89	6	318	8.4	102.4
4	20.0	459.600	0.52	2.82	89	89	6	316	12.5	102.1
5	25.0	464.220	0.50	2.72	89	89	7	316	17.7	101.9
6	30.0	468.940	0.52	2.82	89	89	7	314	25.2	102.0
7	35.0	473.660	0.52	2.82	89	89	7	312	45.6	101.9
8	40.0	478.280	0.50	2.72	89	89	7	310	53.2	101.5
9	45.0	482.900	0.50	2.72	90	90	7	310	58.3	101.4
10	50.0	487.430	0.48	2.61	89	89	7	308	62.5	101.5
11	55.0	491.820	0.45	2.44	89	89	7	307	66.1	101.4
12	60.0	496.060	0.42	2.28	90	90	7	305	69.4	101.1
Average:			0.521	2.831	88.2	88.2	6.2	313.0		102.0

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

Date: 13-Aug-19
Run: 1 - Particulate / Metals
Run Time: 13:30 - 15:33

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	0.049 Kg/hr	0.108 lb/hr
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Flue Gas Characteristics:

Flow	1139 dscm/min	40216 dscf/min
	18.98 dscm/sec	670 dscf/sec
	2132 Acm/min	75300 Acf/min

Velocity	13.952 m/sec	45.77 f/sec
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Temperature	160.8 oC	321.5 oF
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Moisture	17.5 %
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Gas Analysis	9.0 % O2
	10.5 % CO2

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

Sample Parameters:

Sample Volume	2.7244 dscm	96.211 dscf
Sample Time	120.0 minutes	
Isokineticity	107.9 %	

*** Standard Conditions:**

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

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

Date: 13-Aug-19
Run: 1 - Particulate / Metals
Run Time: 13:30 - 15:33

Control Unit (Y)	1.0021	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3048	Filter (grams)	0.00005	CO2	O2	Impinger 1	310.0
Pitot Factor	0.8465	Washings (grams)	0.00190	10.50	9.00	Impinger 2	82.0
Baro. Press. (in. Hg)	30.08			10.50	9.00	Impinger 3	18.0
Static Press. (in. H2O)	-19.00	Total (grams)	0.00195			Impinger 4	4.0
Stack Height (ft)	30					Impinger 5	2.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417					Cel	17.5
Minutes Per Reading	5.0			10.50	9.00	Gain (grams)	434.5
Minutes Per Point	5.0						

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	684.700								
1	5.0	689.230	0.50	2.61	81	81	10	319	1.5	109.1
2	10.0	693.800	0.51	2.66	82	82	10	320	4.7	108.9
3	15.0	698.420	0.52	2.70	83	83	9	320	8.4	108.8
4	20.0	702.950	0.50	2.61	83	83	9	321	12.5	108.8
5	25.0	707.340	0.47	2.45	84	84	9	321	17.7	108.5
6	30.0	711.680	0.46	2.39	84	84	9	321	25.2	108.4
7	35.0	715.410	0.34	1.77	85	85	7	320	45.6	108.0
8	40.0	719.030	0.32	1.67	85	85	7	319	53.2	107.9
9	45.0	722.480	0.29	1.51	86	86	7	319	58.3	107.8
10	50.0	725.680	0.25	1.30	86	86	7	319	62.5	107.6
11	55.0	728.820	0.24	1.25	87	87	7	319	66.1	107.6
12	60.0	731.420	0.16	0.84	87	87	7	319	69.4	109.0
Traverse 2	0.0	731.420								
1	5.0	735.210	0.35	1.80	87	87	8	320	1.5	107.8
2	10.0	738.940	0.34	1.77	88	88	8	322	4.7	107.5
3	15.0	742.560	0.32	1.67	89	89	8	322	8.4	107.3
4	20.0	746.070	0.30	1.56	89	89	8	321	12.5	107.4
5	25.0	749.460	0.28	1.46	90	90	8	323	17.7	107.3
6	30.0	753.080	0.32	1.67	90	90	8	323	25.2	107.2
7	35.0	757.990	0.59	3.07	91	91	8	324	45.6	107.3
8	40.0	763.070	0.63	3.28	91	91	8	324	53.2	107.5
9	45.0	768.280	0.66	3.44	92	92	12	324	58.3	107.6
10	50.0	773.320	0.62	3.23	91	91	12	325	62.5	107.6
11	55.0	778.290	0.60	3.13	92	92	12	325	66.1	107.6
12	60.0	783.160	0.58	3.02	92	92	12	325	69.4	107.2
Average:			0.423	2.203	87.3	87.3	8.8	321.5		107.9

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

Date: 15-Aug-19
Run: 2 - Particulate / Metals
Run Time: 08:30 - 10:32

Concentrations:

Particulate	0.21 mg/dscm	0.00009 gr/dscf
	0.11 mg/Acm	0.00005 gr/Acf
	0.19 mg/dscm (@ 11% O2)	0.00008 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.014 Kg/hr	0.030 lb/hr
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Flue Gas Characteristics:

Flow	1076 dscm/min	38006 dscf/min
	17.94 dscm/sec	633 dscf/sec
	2032 Acm/min	71766 Acf/min

Velocity	13.298 m/sec	43.63 f/sec
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Temperature	159.5 oC	319.0 oF
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Moisture	18.4 %
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Gas Analysis	9.6 % O2
	10.4 % CO2

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

Sample Parameters:

Sample Volume	2.6054 dscm	92.009 dscf
Sample Time	120.0 minutes	
Isokineticity	108.2 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	15-Aug-19
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 2	Run Time:	08:30 - 10:32

Control Unit (Y)	1.0021	Collection:	Filter (grams) 0.00005	Traverse 1	Gas Analysis (Vol. %):		Condensate Collection:		
Nozzle Diameter (in.)	0.3123				CO2	O2	Impinger 1	122.0	
Pitot Factor	0.8465				Traverse 2	10.25	9.75	Impinger 2	144.0
Baro. Press. (in. Hg)	30.10					10.50	9.50	Impinger 3	96.0
Static Press. (in. H2O)	-19.50					Total (grams) 0.00055		Impinger 4	35.0
Stack Height (ft)	30.1				Impinger 5	18.0			
Stack Diameter (in.)	70.90				Impinger 6	6.0			
Stack Area (sq.ft.)	27.417				Gel	20.7			
Minutes Per Reading	5.0				10.38	9.63	Gain (grams)	441.7	
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	783.850								
1	5.0	788.020	0.40	2.23	74	74	5	315	1.5	109.1
2	10.0	792.300	0.42	2.34	75	75	5	318	4.7	109.3
3	15.0	796.580	0.42	2.34	75	75	6	318	8.4	109.3
4	20.0	800.970	0.44	2.46	75	75	6	318	12.5	109.5
5	25.0	805.400	0.45	2.51	76	76	6	318	17.7	109.1
6	30.0	809.680	0.42	2.34	77	77	6	318	25.2	108.9
7	35.0	813.470	0.33	1.84	78	78	4	319	45.6	108.5
8	40.0	817.260	0.33	1.84	78	78	4	319	53.2	108.5
9	45.0	820.750	0.28	1.56	78	78	4	320	58.3	108.5
10	50.0	824.070	0.25	1.40	79	79	4	320	62.5	108.9
11	55.0	827.310	0.24	1.39	80	80	5	319	66.1	108.2
12	60.0	830.540	0.24	1.39	80	80	5	319	69.4	107.9
Traverse 2	0.0	830.540								
1	5.0	834.270	0.32	1.79	82	82	5	320	1.5	107.7
2	10.0	838.120	0.34	1.90	82	82	5	320	4.7	107.9
3	15.0	841.610	0.28	1.56	83	83	6	320	8.4	107.5
4	20.0	845.110	0.28	1.56	83	83	6	320	12.5	107.8
5	25.0	848.600	0.28	1.56	83	83	6	321	17.7	107.5
6	30.0	852.220	0.30	1.67	84	84	6	322	25.2	107.7
7	35.0	857.020	0.53	2.96	84	84	6	321	45.6	107.7
8	40.0	861.780	0.52	2.90	85	85	6	320	53.2	107.5
9	45.0	866.540	0.52	2.90	85	85	6	320	58.3	107.5
10	50.0	871.300	0.52	2.90	86	86	6	318	62.5	107.2
11	55.0	875.970	0.50	2.79	86	86	8	318	66.1	107.2
12	60.0	880.550	0.48	2.68	87	87	8	316	69.4	106.9
Average:			0.379	2.117	80.6	80.6	5.6	319.0		108.2

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

Date: 15-Aug-19
Run: 3 - Particulate / Metals
Run Time: 10:45 - 12:47

Concentrations:

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

Emission Rates:

Particulate	0.01 Kg/hr	0.013 lb/hr
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Flue Gas Characteristics:

Flow	1119 dscm/min	39529 dscf/min
	18.66 dscm/sec	659 dscf/sec
	2125 Acm/min	75050 Acf/min

Velocity	13.906 m/sec	45.62 f/sec
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Temperature	162.0 oC	323.7 oF
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Moisture	18.4 %
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Gas Analysis	9.3 % O2
	10.8 % CO2

30.090 Mol. Wt (g/gmole) Dry
27.867 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7908 dscm	98.556 dscf
Sample Time	120.0 minutes	
Isokineticity	106.5 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	15-Aug-19
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 2	Run Time:	10:45 - 12:47

Control Unit (Y)	1.0021	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3132	Filter (grams) 0.00005		CO2	O2	Impinger 1	300.0
Pitot Factor	0.8465	Washings (grams) 0.00020	Traverse 1	10.50	9.50	Impinger 2	110.0
Baro. Press. (in. Hg)	30.10		Traverse 2	11.00	9.00	Impinger 3	26.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.0003				Impinger 4	8.0
Stack Height (ft)	30					Impinger 5	4.0
Stack Diameter (in.)	70.90					Impinger 6	2.0
Stack Area (sq.ft.)	27.417					Gel	21.9
Minutes Per Reading	5.0			10.75	9.25	Gain (grams)	471.9
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	881.100								
1	5.0	884.890	0.33	1.84	85	85	6	320	1.5	106.6
2	10.0	888.780	0.35	1.95	87	87	6	321	4.7	105.9
3	15.0	892.570	0.33	1.84	85	85	5	326	8.4	107.0
4	20.0	896.300	0.32	1.79	86	86	5	326	12.5	106.7
5	25.0	899.920	0.30	1.67	85	85	6	326	17.7	107.1
6	30.0	903.540	0.30	1.67	86	86	6	327	25.2	107.0
7	35.0	908.900	0.66	3.68	86	86	6	329	45.6	107.5
8	40.0	914.190	0.64	3.57	87	87	6	329	53.2	107.5
9	45.0	919.470	0.64	3.57	87	87	6	330	58.3	107.4
10	50.0	924.660	0.62	3.46	87	87	6	330	62.5	107.2
11	55.0	929.730	0.59	3.29	88	88	8	330	66.1	107.1
12	60.0	934.670	0.56	3.12	88	88	8	328	69.4	106.9
Traverse 2	0.0	934.670								
1	5.0	939.240	0.48	2.68	88	88	8	328	1.5	106.7
2	10.0	943.910	0.50	2.79	89	89	8	329	4.7	106.8
3	15.0	948.580	0.50	2.79	89	89	8	329	8.4	106.8
4	20.0	953.010	0.45	2.51	87	87	8	327	12.5	106.9
5	25.0	957.290	0.42	2.34	88	88	8	325	17.7	106.6
6	30.0	961.470	0.40	2.23	89	89	8	325	25.2	106.4
7	35.0	965.210	0.32	1.79	88	88	8	320	45.6	106.2
8	40.0	968.700	0.28	1.56	88	88	8	317	53.2	105.7
9	45.0	971.930	0.24	1.34	89	89	6	315	58.3	105.3
10	50.0	975.300	0.26	1.45	89	89	6	315	62.5	105.6
11	55.0	978.670	0.26	1.45	90	90	4	311	66.1	105.1
12	60.0	981.910	0.24	1.34	90	90	5	305	69.4	104.7
Average:			0.416	2.322	87.5	87.5	3.0	323.7		106.5

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

Date: 14-Aug-19
Run: 1 - Particulate / Metals
Run Time: 09:40 - 11:42

Concentrations:

Particulate	2.35 mg/dscm	0.00103 gr/dscf
	1.32 mg/Acm	0.00058 gr/Acf
	2.19 mg/dscm (@ 11% O2)	0.00096 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.162 Kg/hr	0.356 lb/hr
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Flue Gas Characteristics:

Flow	1145 dscm/min	40435 dscf/min
	19.08 dscm/sec	674 dscf/sec
	2044 Acm/min	72190 Acf/min

Velocity	13.376 m/sec	43.88 f/sec
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Temperature	151.4 oC	304.5 oF
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Moisture	15.4 %
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Gas Analysis	10.3 % O2
	9.8 % CO2

29.970 Mol. Wt (g/gmole) Dry
28.121 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7614 dscm	97.520 dscf
Sample Time	120.0 minutes	
Isokineticity	103.6 %	

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

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

Date: 14-Aug-19
Run: 1 - Particulate / Metals
Run Time: 09:40 - 11:42

Control Unit (Y) 0.9902
Nozzle Diameter (in.) 0.3123
Pitot Factor 0.8465
Baro. Press. (in. Hg) 30.10
Static Press. (in. H2O) -19.00
Stack Height (ft) 30
Stack Diameter (in.) 70.90
Stack Area (sq.ft.) 27.417
Minutes Per Reading 5.0
Minutes Per Point 5.0

Collection:
Filter (grams) 0.00400
Washings (grams) 0.00250
Total (grams) 0.00650

Gas Analysis (Vol. %):
CO2 O2
Traverse 1 10.00 10.00
Traverse 2 9.50 10.50
9.75 10.25

Condensate Collection:
Impinger 1 268.0
Impinger 2 78.0
Impinger 3 8.0
Impinger 4 5.0
Impinger 5 3.0
Impinger 6 1.0
Gel 15.5
Gain (grams) 378.5

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	537.449								
1	5.0	541.690	0.40	2.28	77	77	5	307	1.5	105.1
2	10.0	546.030	0.42	2.39	77	77	5	308	4.7	105.1
3	15.0	550.270	0.40	2.28	78	78	6	308	8.4	105.0
4	20.0	554.860	0.47	2.67	78	78	6	308	12.5	104.9
5	25.0	559.600	0.50	2.86	78	78	6	308	17.7	105.1
6	30.0	563.620	0.40	2.28	79	79	6	309	25.2	99.4
7	35.0	567.410	0.32	1.82	79	79	6	305	45.6	104.4
8	40.0	571.080	0.30	1.71	80	80	6	303	53.2	104.0
9	45.0	574.750	0.30	1.71	81	81	6	303	58.3	103.8
10	50.0	578.100	0.25	1.42	81	81	6	300	62.5	103.5
11	55.0	581.240	0.22	1.25	82	82	4	296	66.1	103.0
12	60.0	584.380	0.22	1.25	82	82	4	296	69.4	103.0
Traverse 2	0.0	584.380								
1	5.0	588.170	0.32	1.82	82	82	5	304	1.5	103.7
2	10.0	591.960	0.32	1.82	83	83	5	305	4.7	103.6
3	15.0	595.750	0.32	1.82	83	83	5	308	8.4	103.8
4	20.0	599.660	0.34	1.93	84	84	5	309	12.5	103.8
5	25.0	603.450	0.32	1.82	85	85	6	309	17.7	103.5
6	30.0	607.240	0.32	1.82	85	85	6	310	25.2	103.6
7	35.0	612.030	0.51	2.90	86	86	6	310	45.6	103.8
8	40.0	616.990	0.55	3.13	86	86	6	300	53.2	102.8
9	45.0	622.050	0.57	3.24	87	87	8	298	58.3	102.8
10	50.0	627.240	0.60	3.41	87	87	8	299	62.5	102.8
11	55.0	632.430	0.60	3.41	88	88	10	302	66.1	102.9
12	60.0	637.460	0.56	3.19	89	89	10	303	69.4	103.0
Average:			0.397	2.260	82.4	82.4	6.1	304.5		103.6

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

Date: 14-Aug-19
Run: 2 - Particulate / Metals
Run Time: 11:56 - 13:58

Concentrations:

Particulate	1.40 mg/dscm	0.00061 gr/dscf
	0.76 mg/Acm	0.00033 gr/Acf
	1.19 mg/dscm (@ 11% O2)	0.00052 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.100 Kg/hr	0.221 lb/hr
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Flue Gas Characteristics:

Flow	1191 dscm/min	42078 dscf/min
	19.86 dscm/sec	701 dscf/sec
	2213 Acm/min	78151 Acf/min

Velocity	14.480 m/sec	47.51 f/sec
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Temperature	161.5 oC	322.8 oF
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Moisture	16.8 %
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Gas Analysis	9.3 % O2
	10.5 % CO2

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

Sample Parameters:

Sample Volume	2.9192 dscm	103.093 dscf
Sample Time	120.0 minutes	
Isokineticity	105.2 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	14-Aug-19
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 3	Run Time:	11:56 - 13:58

Control Unit (Y)	0.9902	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3123	Filter (grams) 0.00320	CO2 O2	Impinger 1 254.0
Pitot Factor	0.8268	Washings (grams) 0.00090	10.50 9.50	Impinger 2 135.0
Baro. Press. (in. Hg)	30.10	Traverse 1	10.50 9.00	Impinger 3 22.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 10.0
Stack Height (ft)	30			Impinger 5 3.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 16.7
Minutes Per Reading	5.0			Gain (grams) 441.7
Minutes Per Point	5.0			
			10.50 9.25	

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	637.901								
1	5.0	641.720	0.34	1.85	86	86	6	320	1.5	105.6
2	10.0	645.750	0.38	2.06	86	86	6	321	4.7	105.6
3	15.0	649.890	0.40	2.17	87	87	6	320	8.4	105.5
4	20.0	653.700	0.34	1.85	87	87	6	322	12.5	105.3
5	25.0	657.390	0.32	1.74	88	88	6	322	17.7	104.9
6	30.0	661.070	0.32	1.74	87	87	6	322	25.2	104.8
7	35.0	665.790	0.52	2.82	88	88	6	322	45.6	105.6
8	40.0	670.730	0.57	3.10	89	89	6	323	53.2	105.2
9	45.0	675.960	0.64	3.48	89	89	8	323	58.3	105.5
10	50.0	681.440	0.70	3.80	90	90	8	323	62.5	105.6
11	55.0	686.910	0.70	3.80	89	89	8	324	66.1	105.6
12	60.0	692.270	0.67	3.64	90	90	8	324	69.4	105.6
Traverse 2	0.0	692.270								
1	5.0	697.420	0.62	3.37	90	90	8	325	1.5	105.4
2	10.0	702.650	0.64	3.48	91	91	8	323	4.7	105.1
3	15.0	707.800	0.62	3.37	90	90	10	323	8.4	105.3
4	20.0	712.870	0.60	3.26	91	91	10	324	12.5	105.2
5	25.0	717.940	0.60	3.26	91	91	10	324	17.7	105.2
6	30.0	722.930	0.58	3.15	91	91	10	323	25.2	105.2
7	35.0	727.070	0.40	2.17	90	90	10	323	45.6	105.1
8	40.0	731.050	0.37	2.01	91	91	10	322	53.2	104.7
9	45.0	734.760	0.32	1.74	90	90	6	322	58.3	105.1
10	50.0	738.340	0.30	1.63	91	91	6	323	62.5	104.6
11	55.0	741.680	0.26	1.41	90	90	6	324	66.1	105.0
12	60.0	744.890	0.24	1.30	91	91	6	324	69.4	104.8
Average:			0.477	2.592	89.3	89.3	7.5	322.8		105.2

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

Date: 14-Aug-19
Run: 3 - Particulate / Metals
Run Time: 14:13 - 16:15

Concentrations:

Particulate	4.11 mg/dscm	0.00180 gr/dscf
	2.22 mg/Acm	0.00097 gr/Acf
	3.32 mg/dscm (@ 11% O2)	0.00145 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.277 Kg/hr	0.612 lb/hr
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Flue Gas Characteristics:

Flow	1125 dscm/min	39723 dscf/min
	18.75 dscm/sec	662 dscf/sec
	2083 Acf/min	73573 Acf/min

Velocity	13.632 m/sec	44.72 f/sec
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Temperature	159.1 oC	318.4 oF
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Moisture	17.0 %
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Gas Analysis	8.6 % O2
	10.9 % CO2

30.085 Mol. Wt (g/gmole) Dry
28.029 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7491 dscm	97.083 dscf
Sample Time	120.0 minutes	
Isokineticity	105.1 %	

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

Client:	Metro Vancouver	Date:	14-Aug-19
Jobsite:	WTE(Burnaby,B.C)	Run:	3 - Particulate / Metals
Source:	Unit 3	Run Time:	14:13 - 16:15

Control Unit (Y)	0.9902	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3123	Filter (grams) 0.00420	CO2 O2	Impinger 1 302.0
Pitot Factor	0.8268	Washings (grams) 0.00710	Traverse 1 10.75 8.75	Impinger 2 88.0
Baro. Press. (in. Hg)	30.10		Traverse 2 11.00 8.50	Impinger 3 10.0
Static Press. (in. H2O)	-19.00	Total (grams) 0.01130		Impinger 4 4.0
Stack Height (ft)	30			Impinger 5 1.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 17.0
Minutes Per Reading	5.0		10.88 8.63	Gain (grams) 423.0
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	745.500								
1	5.0	750.030	0.48	2.61	88	88	6	323	1.5	105.8
2	10.0	754.660	0.50	2.72	89	89	6	322	4.7	105.7
3	15.0	759.290	0.50	2.72	89	89	7	323	8.4	105.7
4	20.0	764.020	0.52	2.82	89	89	7	327	12.5	106.2
5	25.0	768.880	0.55	2.99	89	89	8	327	17.7	106.2
6	30.0	773.970	0.60	3.26	90	90	8	328	25.2	106.4
7	35.0	777.680	0.32	1.74	89	89	8	320	45.6	105.5
8	40.0	781.390	0.32	1.74	90	90	8	318	53.2	105.1
9	45.0	784.970	0.30	1.63	90	90	5	318	58.3	104.8
10	50.0	788.180	0.24	1.30	89	89	5	300	62.5	103.9
11	55.0	791.250	0.22	1.19	90	90	5	298	66.1	103.4
12	60.0	794.170	0.20	1.09	90	90	5	296	69.4	103.0
Traverse 2	0.0	794.170								
1	5.0	798.890	0.52	2.82	90	90	7	324	1.5	105.6
2	10.0	803.520	0.50	2.72	90	90	7	322	4.7	105.5
3	15.0	808.140	0.50	2.72	91	91	7	320	8.4	104.9
4	20.0	812.960	0.54	2.93	91	91	7	323	12.5	105.6
5	25.0	818.110	0.62	3.37	91	91	9	325	17.7	105.5
6	30.0	823.340	0.64	3.48	92	92	9	328	25.2	105.5
7	35.0	827.580	0.42	2.28	92	92	7	322	45.6	104.9
8	40.0	831.720	0.40	2.17	92	92	7	320	53.2	104.8
9	45.0	835.540	0.34	1.85	93	93	6	320	58.3	104.6
10	50.0	839.260	0.32	1.74	93	93	6	315	62.5	104.6
11	55.0	842.990	0.32	1.74	93	93	6	312	66.1	104.7
12	60.0	846.560	0.30	1.63	94	94	6	310	69.4	103.2
Average:			0.424	2.303	90.6	90.6	6.8	318.4		105.1

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		13-Aug-19	13-Aug-19	13-Aug-19
Test Time		09:15 - 10:15	10:30 - 11:30	11:45 - 12:45
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.08	30.08	30.08
DGM Factor	(Y)	1.1182	1.1182	1.1182
Initial Reading	(m ³)	150.944	151.529	152.089
Final Reading	(m ³)	151.512	152.072	152.647
Temp. Outlet	(Avg. oF)	87.1	91.8	91.6
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.62	0.59	0.60
HF	(mg)	0.009	0.011	0.011
Oxygen	(Vol. %)	10.0	10.0	10.0
HF	(mg/Sm ³)	0.015	0.019	0.018
HF	(mg/Sm ³ @ 11% O2)	0.014	0.017	0.017
Moisture	(Vol. %)	14.5	14.5	14.0

Tstd. (oF) 68

Pstd. (in. Hg) 29.92

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

Sample Type: HF		Test 1	Test 2	Test 3
Parameter				
Test Date		15-Aug-19	15-Aug-19	15-Aug-19
Test Time		08:45 - 09:45	10:00 - 11:00	11:18 - 12:18
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.10	30.10	30.10
DGM Factor	(Y)	1.1182	1.1182	1.1182
Initial Reading	(m ³)	154.618	155.190	155.768
Final Reading	(m ³)	155.181	155.760	156.333
Temp. Outlet	(Avg. oF)	83.6	91.5	91.8
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.61546	0.61462	0.60890
HF	(mg)	0.023	0.021	0.046
Oxygen	(Vol. %)	9.6	9.3	9.3
HF	(mg/Sm ³)	0.038	0.034	0.076
HF	(mg/Sm ³ @ 11% O ₂)	0.033	0.029	0.065
Moisture (isokinetic)	(Vol. %)	18.4	18.4	18.4

*Wet Basis Calculated on moisture from isokinetic tests

Tstd. (oF) 68

Pstd. (in. Hg) 29.92

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

Sample Type: HF		Test 1	Test 2	Test 3
Parameter				
Test Date		14-Aug-19	14-Aug-19	14-Aug-19
Test Time		08:58 - 09:58	10:43 - 11:43	11:56 - 12:56
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.09	30.09	30.09
DGM Factor	(Y)	1.1182	1.1182	1.1182
Initial Reading	(m ³)	152.666	153.294	154.024
Final Reading	(m ³)	153.251	153.991	154.599
Temp. Outlet	(Avg. oF)	88.2	96.2	99.8
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.63427	0.74481	0.61061
HF	(mg)	0.010	0.002	0.010
Oxygen	(Vol. %)	9.3	9.3	8.6
HF	(mg/Sm ³)	0.016	0.002	0.017
HF	(mg/Sm ³ @ 11% O ₂)	0.014	0.002	0.014
Moisture (isokinetic)	(Vol. %)	16.8	16.8	17.0

*Wet Basis Calculated on moisture from isokinetic tests

Tstd. (oF) 68

Pstd. (in. Hg) 29.92

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

Parameter: N₂O

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

Sample ID	Date	Time	N ₂ O	N ₂ O	N ₂ O
			ppm	mg/Sm ³	mg/Sm ³ @ 11% O ₂
Unit 1 Run 1	12-Aug-19	09:45 - 10:45	4.0	7.3	6.9
Unit 1 Run 2	12-Aug-19	10:46 - 11:46	4.6	8.4	8.3
Unit 1 Run 3	12-Aug-19	11:47 - 12:47	4.8	8.8	8.7
Average					8.0
Unit 2 Run 1	12-Aug-19	10:00 - 11:00	3.8	7.0	7.7
Unit 2 Run 2	12-Aug-19	11:05 - 12:05	4.9	9.0	9.2
Unit 2 Run 3	12-Aug-19	12:10 - 13:10	4.7	8.6	9.2
Average					8.7
Unit 3 Run 1	14-Aug-19	08:30 - 09:30	3.1	5.7	5.5
Unit 3 Run 2	14-Aug-19	09:30 - 10:30	5.6	10.2	11.0
Unit 3 Run 3	14-Aug-19	10:30 - 11:30	5.2	9.5	10.9
Average					9.1

Date:

13-Aug-19

15-Aug-19

14-Aug-19

	Unit 1			Unit 2			Unit 3		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Test Times:	09:10 - 10:10	10:14 - 11:14	11:25 - 12:25	09:07 - 10:07	10:14 - 11:14	11:27 - 12:27	08:45 - 09:45	10:07 - 11:07	11:23 - 12:23
Acetylene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methane	1.20	1.10	1.10	1.4	1.5	1.8	1.20	1.20	1.4
Ethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
C3 as Propane	3.3	20	15	5.2	6.9	ND	2.1	1.1	1.6
C4 as n-Butane	ND	1.4	1.3	ND	ND	ND	ND	ND	ND
C5 as n-Pentane	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6 as n-Hexane	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6+ as n-Hexane	ND	ND	ND	ND	ND	ND	ND	ND	ND

Detection Limits:

Acetylene	0.41	0.41	0.41	0.4	0.54	0.68	0.39	0.4	0.43
Methane	0.83	0.82	0.82	0.8	1.1	1.4	0.78	0.79	0.9
Ethane	0.50	0.49	0.49	0.48	0.64	0.82	0.47	0.47	0.51
Ethene	0.50	0.49	0.49	0.48	0.64	0.82	0.47	0.47	0.51
C3 as Propane	0.83	0.82	0.82	0.8	1.1	1.4	0.78	0.79	0.86
C4 as n-Butane	0.83	0.82	0.82	0.8	1.1	1.4	0.78	0.79	0.86
C5 as n-Pentane	0.83	0.82	0.82	0.8	1.1	1.4	0.78	0.79	0.86
C6 as n-Hexane	0.83	0.82	0.82	0.8	1.1	1.4	0.78	0.79	0.86
C6+	1.7	1.6	1.6	1.6	2.1	2.7	1.6	1.6	1.7

Using 1/2 DL Convention

Sample Date:

	13-Aug-19 Unit 1			15-Aug-19 Unit 2			14-Aug-19 Unit 3		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Test Times:	09:10 - 10:10	10:14 - 11:14	11:25 - 12:25	09:07 - 10:07	10:14 - 11:14	11:27 - 12:27	08:45 - 09:45	10:07 - 11:07	11:23 - 12:23
Acetylene (ppm)	0.21	0.21	0.21	0.20	0.27	0.34	0.20	0.20	0.22
Methane (ppm)	1.20	1.10	1.10	1.40	1.50	1.80	1.20	1.20	1.40
Ethane (ppm)	0.25	0.25	0.25	0.24	0.32	0.41	0.24	0.24	0.26
Ethene (ppm)	0.25	0.25	0.25	0.24	0.32	0.41	0.24	0.24	0.26
C3 as Propane (ppm)	3.30	20.00	15.00	5.20	6.90	0.70	2.10	1.10	1.60
C4 as n-Butane (ppm)	0.42	1.40	1.30	0.40	0.55	0.70	0.39	0.40	0.43
C5 as n-Pentane (ppm)	0.42	0.41	0.41	0.40	0.55	0.70	0.39	0.40	0.43
C6 as n-Hexane (ppm)	0.42	0.41	0.41	0.40	0.55	0.70	0.39	0.40	0.43
C6+ as n-Hexane (ppm)	0.85	0.80	0.80	0.80	1.05	1.35	0.80	0.80	0.85
Acetylene (mg/m ³ as CH ₄)	0.14	0.14	0.14	0.13	0.18	0.23	0.13	0.13	0.14
Methane (mg/m ³ as CH ₄)	0.80	0.73	0.73	0.93	1.00	1.20	0.80	0.80	0.93
Ethane (mg/m ³ as CH ₄)	0.17	0.16	0.16	0.16	0.21	0.27	0.16	0.16	0.17
Ethene (mg/m ³ as CH ₄)	0.17	0.16	0.16	0.16	0.21	0.27	0.16	0.16	0.17
C3 as Propane (mg/m ³ as CH ₄)	2.20	13.34	10.01	3.47	4.60	0.47	1.40	0.73	1.07
C4 as n-Butane (mg/m ³ as CH ₄)	0.28	0.93	0.87	0.27	0.37	0.47	0.26	0.26	0.29
C5 as n-Pentane (mg/m ³ as CH ₄)	0.28	0.27	0.27	0.27	0.37	0.47	0.26	0.26	0.29
C6 as n-Hexane (mg/m ³ as CH ₄)	0.28	0.27	0.27	0.27	0.37	0.47	0.26	0.26	0.29
C6+ as n-Hexane (mg/m ³ as CH ₄)	0.57	0.53	0.53	0.53	0.70	0.90	0.53	0.53	0.57
Total mg/Sm ³ @11% O ₂ as CH ₄	3.41	12.16	9.52	4.97	6.09	3.72	2.56	2.60	3.24

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

Date: 22-Aug-19
Run: 1 - Cr⁺⁶
Run Time: 08:55 - 10:57

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
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Flue Gas Characteristics:

Flow	1132 dscm/min	39993 dscf/min
	18.87 dscm/sec	667 dscf/sec
	1974 Acf/min	69729 Acf/min

Velocity	12.920 m/sec	42.39 f/sec
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Temperature	155.6 oC	312.0 oF
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Moisture	12.1 %
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Gas Analysis	9.5 % O2
	10.1 % CO2

29.994 Mol. Wt (g/gmole) Dry
28.540 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3232 dscm	82.042 dscf
Sample Time	120.0 minutes	
Isokineticity	100.6 %	

*** Standard Conditions:**

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

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

Date: 22-Aug-19
Run: 1 - Cr+6
Run Time: 08:55 - 10:57

Control Unit (V)	1.0021	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.2923	Cr+6 (grams) 0.00000023	CO2 O2	Impinger 1 -10.0
Pitot Factor	0.8268		Traverse 1 10.00 9.67	Impinger 2 179.0
Baro. Press. (in. Hg)	30.03		Traverse 2 10.17 9.37	Impinger 3 27.0
Static Press. (in. H2O)	-20.00	Total (grams) 0.0000002		Impinger 4 21.0
Stack Height (ft)	30			
Stack Diameter (in.)	70.90			
Stack Area (sq.ft.)	27.417			
Minutes Per Reading	5.0		10.08 9.52	Gel 23.5
Minutes Per Point	5.0			Gain (grams) 240.5

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	362.300								
1	5.0	365.360	0.31	1.21	71	71	5	320	1.5	100.5
2	10.0	368.580	0.34	1.35	71	71	5	310	4.7	100.3
3	15.0	371.900	0.36	1.43	71	71	6	310	8.4	100.6
4	20.0	375.600	0.45	1.78	71	71	6	312	12.5	100.5
5	25.0	379.280	0.44	1.74	72	72	7	312	17.7	100.8
6	30.0	382.780	0.40	1.58	72	72	7	312	25.2	100.6
7	35.0	385.820	0.30	1.19	72	72	8	310	45.6	100.6
8	40.0	388.780	0.28	1.12	73	73	8	305	53.2	100.9
9	45.0	391.740	0.28	1.12	73	73	8	306	58.3	100.9
10	50.0	394.880	0.32	1.28	74	74	8	310	62.5	100.3
11	55.0	397.980	0.31	1.24	75	75	7	310	66.1	100.4
12	60.0	400.980	0.29	1.16	75	75	7	311	69.4	100.5
Traverse 2	0.0	400.980								
1	5.0	404.020	0.30	1.20	76	76	7	313	1.5	100.1
2	10.0	407.120	0.31	1.23	76	76	7	314	4.7	100.5
3	15.0	409.980	0.26	1.04	77	77	6	313	8.4	100.9
4	20.0	412.940	0.28	1.12	77	77	6	312	12.5	100.6
5	25.0	415.900	0.28	1.12	78	78	6	313	17.7	100.5
6	30.0	418.960	0.30	1.20	78	78	6	314	25.2	100.4
7	35.0	422.790	0.47	1.88	78	78	6	314	45.6	100.6
8	40.0	427.050	0.58	2.32	79	79	6	313	53.2	100.6
9	45.0	431.420	0.61	2.44	79	79	6	313	58.3	100.6
10	50.0	435.880	0.63	2.53	80	80	6	313	62.5	100.9
11	55.0	440.400	0.65	2.61	81	81	6	315	66.1	100.6
12	60.0	444.710	0.59	2.37	82	82	6	314	69.4	100.4
Average:			0.389	1.553	75.5	75.5	6.5	312.0		100.6

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

Date: 22-Aug-19
Run: 2 - Cr⁺⁶
Run Time: 11:53 - 13:55

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
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Flue Gas Characteristics:

Flow	1141 dscm/min	40303 dscf/min
	19.02 dscm/sec	672 dscf/sec
	2048 Acf/min	72342 Acf/min

Velocity	13.404 m/sec	43.98 f/sec
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Temperature	163.4 oC	326.1 oF
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Moisture	13.1 %
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Gas Analysis	9.8 % O2
	9.8 % CO2

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

Sample Parameters:

Sample Volume	2.4435 dscm	86.290 dscf
Sample Time	120.0 minutes	
Isokineticity	104.9 %	

*** Standard Conditions:**

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

Date: 22-Aug-19
Run: 2 - Cr+6
Run Time: 11:53 - 13:55

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
					Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	451.300								
1	5.0	454.400	0.31	1.23	78	78	5.5	322	1.5	101.5
2	10.0	457.590	0.33	1.30	78	78	5.5	322	4.7	101.2
3	15.0	460.640	0.30	1.19	78	78	6	322	8.4	101.5
4	20.0	463.920	0.32	1.37	78	78	6	323	12.5	105.8
5	25.0	467.140	0.31	1.32	78	78	7	324	17.7	105.5
6	30.0	470.300	0.30	1.28	78	78	7	325	25.2	105.3
7	35.0	474.580	0.55	2.34	79	79	8	327	45.6	105.6
8	40.0	478.940	0.57	2.42	79	79	8	327	53.2	105.7
9	45.0	483.620	0.66	2.81	80	80	9	327	58.3	105.3
10	50.0	488.480	0.70	3.01	80	80	9	320	62.5	105.8
11	55.0	493.350	0.71	3.02	80	80	10	327	66.1	105.7
12	60.0	498.060	0.67	2.86	80	80	10	325	69.4	105.1
Traverse 2	0.0	498.060								
1	5.0	501.430	0.34	1.45	81	81	6	327	1.5	105.1
2	10.0	504.850	0.35	1.49	81	81	6	328	4.7	105.2
3	15.0	508.140	0.32	1.37	81	81	6	327	8.4	105.8
4	20.0	511.200	0.28	1.19	81	81	6	327	12.5	105.1
5	25.0	514.200	0.27	1.15	81	81	6	328	17.7	105.0
6	30.0	517.260	0.28	1.19	81	81	6	329	25.2	105.3
7	35.0	520.640	0.34	1.45	81	81	7	329	45.6	105.6
8	40.0	524.120	0.36	1.54	82	82	7	327	53.2	105.3
9	45.0	527.780	0.40	1.70	81	81	8	329	58.3	105.5
10	50.0	531.540	0.42	1.79	81	81	8	330	62.5	105.8
11	55.0	535.190	0.40	1.70	80	80	8	329	66.1	105.4
12	60.0	538.660	0.36	1.54	81	81	8	326	69.4	105.2
Average:			0.410	1.738	79.9	79.9	7.2	326.1		104.9

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

Date: 23-Aug-19
Run: 3 - Cr⁺⁶
Run Time: 09:08 - 11:12

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
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Flue Gas Characteristics:

Flow	1089 dscm/min	38472 dscf/min
	18.16 dscm/sec	641 dscf/sec
	1930 Acm/min	68153 Acf/min

Velocity	12.628 m/sec	41.43 f/sec
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Temperature	154.5 oC	310.1 oF
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Moisture	13.6 %
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Gas Analysis	9.8 % O2
	9.8 % CO2

29.953 Mol. Wt (g/gmole) Dry
28.330 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3511 dscm	83.027 dscf
Sample Time	120.0 minutes	
Isokineticity	105.8 %	

*** 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 2

Date: 23-Aug-19
Run: 3 - Cr+6
Run Time: 09:08 - 11:12

Control Unit (Y)	1.0021	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.2923	Cr+6 (grams) 0.00000023	CO2 O2	Impinger 1 -5.0
Pitot Factor	0.8268		Traverse 1 10.17 9.23	Impinger 2 215.0
Baro. Press. (in. Hg)	29.98		Traverse 2 9.33 10.40	Impinger 3 23.0
Static Press. (in. H2O)	-20.00	Total (grams) 0.0000002		Impinger 4 22.0
Stack Height (ft)	30			
Stack Diameter (in.)	70.90			
Stack Area (sq.ft.)	27.417			
Minutes Per Reading	5.0		9.75 9.82	Gel 22.2
Minutes Per Point	5.0			Gain (grams) 277.2

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	540.150								
1	5.0	543.250	0.29	1.25	68	68	6	301	1.5	105.8
2	10.0	546.580	0.34	1.45	68	68	6	310	4.7	105.7
3	15.0	549.500	0.26	1.11	68	68	7	311	8.4	105.9
4	20.0	552.300	0.24	1.02	68	68	7	312	12.5	105.8
5	25.0	555.280	0.27	1.15	69	69	7	312	17.7	106.0
6	30.0	558.250	0.27	1.15	69	69	7	311	25.2	105.6
7	35.0	562.180	0.47	2.01	70	70	8	310	45.6	105.8
8	40.0	566.020	0.45	1.92	70	70	8	311	53.2	105.7
9	45.0	570.080	0.50	2.14	71	71	8	309	58.3	105.8
10	50.0	574.300	0.54	2.31	71	71	8	310	62.5	105.9
11	55.0	578.690	0.58	2.50	72	72	9	306	66.1	105.9
12	60.0	583.180	0.60	2.60	73	73	9	305	69.4	106.2
Traverse 2	0.0	583.180								
1	5.0	586.350	0.30	1.30	73	73	7	303	1.5	105.6
2	10.0	589.620	0.32	1.38	73	73	7	308	4.7	105.8
3	15.0	593.090	0.36	1.55	74	74	8	308	8.4	105.7
4	20.0	596.850	0.42	1.81	74	74	8	309	12.5	106.2
5	25.0	600.680	0.44	1.89	74	74	8	310	17.7	105.8
6	30.0	604.280	0.39	1.67	74	74	8	312	25.2	105.7
7	35.0	607.540	0.32	1.37	74	74	8	314	45.6	105.7
8	40.0	610.700	0.30	1.28	75	75	8	316	53.2	105.7
9	45.0	613.750	0.28	1.20	75	75	7	315	58.3	105.5
10	50.0	616.920	0.30	1.29	75	75	7	313	62.5	105.9
11	55.0	620.150	0.31	1.33	75	75	7	314	66.1	106.2
12	60.0	623.150	0.27	1.16	76	76	7	312	69.4	105.3
Average:			0.368	1.577	72.0	72.0	7.5	310.1		105.8

APPENDIX - D

FIELD DATA SHEETS

CLIENT MURD				NOZZLE Q 312 DIAMETER, IN. 3120		IMPINGER		INITIAL	FINAL	TOTAL GAIN
SOURCE Unit #1				PROBE 7C Cp 8465		VOLUMES		(mL)	(mL)	(mL)
PARAMETER / RUN No 1 Metals / Plastic				PORT LENGTH		Imp. #1		0	234	234
DATE Aug. 12/19				STATIC PRESSURE, IN. H2O -19.50		Imp. #2		100	180	80
OPERATOR: J.L.				STACK DIAMETER 30.90"		Imp. #3		100	122	22
CONTROL UNIT 5099 Y 9902				STACK HEIGHT 30'		Imp. #4		0	12	12
						Imp. #5		100	103	3
						Imp. #6		100	102	2
BAROMETRIC PRESSURE, IN. Hg 30.11				INITIAL LEAK TEST 0.005 @ 15"		Upstream Diameters				
ASSUMED MOISTURE, Bw 15.8				FINAL LEAK TEST 0.004 @ 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			
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %		
	11:10	155.152												
1		159.32	.34	2.22	80	307	250	250	62	5				
2		163.61	.36	2.35	81	306								
3		167.90	.36	2.35	81	305	250	250	60	5	10.0	10.0		
4		172.42	.40	2.61	82	305								
5		176.94	.40	2.61	82	304	250	250	55	5				
6		181.57	.42	2.74	82	303								
7		186.42	.46	3.00	83	304	250	250	50	6				
8		191.58	.52	3.40	83	305								
9		196.74	.52	3.40	83	306	250	250	52	6	10.0	10.0		
10		202.06	.57	3.59	84	307								
11		207.45	.57	3.72	84	314	250	250	52	8				
12		212.86	.57	3.72	85	315								
1		216.90	.32	2.09	85	308	250	250	52	6				
2		220.94	.32	2.09	86	307								
3		224.87	.30	1.96	86	303	250	250	52	6	9.0	11.0		
4		228.79	.30	1.96	86	303								
5		232.96	.34	2.22	87	302	250	250	53	6				
6		237.27	.36	2.35	88	302								
7		243.18	.68	4.44	88	305	250	250	52	6				
8		249.16	.70	4.57	89	307					9.0	11.0		
9		255.25	.72	4.70	90	308	250	250	53	10				
10		261.07	.66	4.51	90	309								
11		266.58	.60	3.92	90	309	250	250	54	8				
12	13:15	271.89	.55	3.59	91	309					9.0	11.0		

S.H.

$$\begin{array}{r} \sqrt{7.15} \\ -6.69 \\ \hline 6.53 \end{array} \Delta H$$

CLIENT MVRD					NOZZLE Q312		DIAMETER, IN. 3123		IMPINGER		INITIAL		FINAL		TOTAL GAIN				
SOURCE Unit #1					PROBE 7C		Cp .8465		VOLUMES		(mL)		(mL)		(mL)				
PARAMETER / RUN No 2 Metals/Partic					PORT LENGTH					Imp. #1		0		145		145			
DATE Aug. 13/19					STATIC PRESSURE, IN. H2O =19.50					Imp. #2		100		134		134			
OPERATOR: C.L					STACK DIAMETER 70.90"					Imp. #3		100		146		46			
CONTROL UNIT 5099 Y .9902					STACK HEIGHT 30'					Imp. #4		0		22		22			
					ΔH@					Imp. #5		100		106		6			
BAROMETRIC PRESSURE, IN. Hg 30.08					INITIAL LEAK TEST 0.002 @ 15"					Upstream Diameters		Imp. #6		100		104		4	
ASSUMED MOISTURE, Bw 15.8					FINAL LEAK TEST 0.001 @ 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								
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %							
1		277.78	.32	1.82	76	304	250	250	60	4									
2		281.56	.32	1.82	76	304	250	250	60	4									
3		285.34	.32	1.82	77	305	250	250	58	4									
4		288.88	.28	1.50	77	305	250	250	58	4	10.0	10.0							
5		292.54	.30	.7	78	302	250	250	58	4									
6		296.20	.30	.7	78	302	250	250	58	4									
7		301.29	.58	3.30	79	304	250	250	54	4									
8		306.27	.55	3.13	80	304	250	250	54	4									
9		311.45	.60	3.41	81	305	250	250	56	4	10.0	10.0							
10		316.41	.55	3.13	82	303	250	250	60	4									
11		321.23	.52	2.96	82	303	250	250	60	4									
12		325.97	.50	2.85	84	302													
1		330.04	.37	2.11	84	300	250	250	64	4									
2		334.27	.40	2.28	85	300	250	250	64	4	10.0	10.0							
3		338.50	.40	2.28	87	299	250	250	66	4									
4		343.30	.52	2.96	87	300	250	250	58	4									
5		348.24	.54	3.07	88	300	250	250	58	4									
6		353.06	.50	2.96	88	303	250	250	58	4									
7		357.98	.54	3.07	88	309	250	250	58	4									
8		363.16	.60	3.41	89	309	250	250	62	4	10.0	10.0							
9		368.09	.54	3.07	89	308	250	250	62	4									
10		372.82	.50	2.85	90	309	250	250	62	4									
11		377.45	.48	2.73	89	308	250	250	62	4									
12	11:05	381.94	.45	2.56	90	309													
+60																			

CLIENT					NOZZLE		DIAMETER, IN.		IMPINGER		INITIAL		FINAL		TOTAL GAIN		
SOURCE					PROBE		Cp		VOLUMES		(mL)		(mL)		(mL)		
PARAMETER / RUN No					PORT LENGTH				Imp. #1								
DATE					STATIC PRESSURE, IN. H2O				Imp. #2								
OPERATOR					STACK DIAMETER				Imp. #3								
CONTROL UNIT					STACK HEIGHT				Imp. #4								
BAROMETRIC PRESSURE, IN. Hg					INITIAL LEAK TEST				Imp. #5								
ASSUMED MOISTURE, Bw					FINAL LEAK TEST				Imp. #6								
					Upstream Diameters												
					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						
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %					
1	11:25	383.353															
2		387.22	.35	1.90	86	313	250	253	68	5							
3		391.26	.37	2.01	87	312											
4		395.34	.40	2.17	87	314	250	250	66	6							
5		399.48	.40	2.17	88	314											
6		403.46	.37	2.01	87	316	250	250	68	6	10.0	10.0					
7		407.60	.40	2.17	87	314											
8		411.75	.62	3.37	87	314	250	250	68	6							
9		415.02	.65	3.53	88	315											
10		418.14	.62	3.37	88	314	250	250	64	6	10.0	10.0					
11		421.64	.70	3.80	88	313											
12		424.19	.72	3.91	88	314	250	250	62	6							
1		427.35	.62	3.37	88	310											
2		431.42	.60	3.26	88	315	250	250	60	6							
3		434.81	.68	3.69	88	318											
4		438.88	.68	3.26	88	318	250	250	56	6	10.0	10.0					
5		442.60	.52	2.82	89	316											
6		446.31	.50	2.72	89	316	250	250	54	7							
7		450.04	.52	2.82	89	314											
8		453.66	.52	2.82	89	312	250	250	56	7							
9		457.28	.50	2.72	89	310											
10		460.90	.50	2.72	89	310	250	250	55	7	10.0	10.0					
11		464.43	.48	2.61	89	308											
12	13:27	467.82	.45	2.44	89	307	250										

14.02 5.69 ΔH
-66- -558-

CLIENT	MVRD	NOZZLE	Q312	DIAMETER, IN.	3/23	IMPINGER	INITIAL	FINAL	TOTAL GAIN
SOURCE	Unit #2	PROBE	7C	Cp	8465	VOLUMES	(mL)	(mL)	(mL)
PARAMETER / RUN No	2 Metals/Partic	PORT LENGTH				Imp. #1	0	122	122
DATE	Aug. 15/19	STATIC PRESSURE, IN. H2O	-19.50			Imp. #2	100	144	144
OPERATOR	CL	STACK DIAMETER	20.40"			Imp. #3	100	196	96
CONTROL UNIT	AV 15	STACK HEIGHT	30			Imp. #4	0	35	35
	Y 1.0021					Imp. #5	100	118	18
	ΔH@					Imp. #6	100	106	6
BAROMETRIC PRESSURE, IN. Hg	30.10	INITIAL LEAK TEST	0.002 @ 15"			Upstream Diameters			
ASSUMED MOISTURE, Bw	158	FINAL LEAK TEST	0.002 @ 15"			Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites			
					Dry Gas Outlet	Stack	Probe	Box STACK	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %		
1	08:30	783.856												
2		788.02	.40	2.23	74	250	250	315	58	5				
3		792.36	.42	2.34	75	250	250	318						
4		796.58	.42	2.34	75	250	250	318	58	6	10.0	10.0		
5		800.97	.44	2.46	75			318						
6		805.40	.45	2.51	76	250	250	318	60	6				
7		809.68	.42	2.34	77			318						
8		813.47	.33	1.84	78	250	250	319	64	4				
9		817.26	.33	1.84	78			319						
10		820.75	.28	1.56	78	250	250	320	68	4				
11		824.07	.25	1.40	79			320			10.5	9.5		
12		827.31	.24	1.39	80	250	250	319	66	5				
13		830.51	.24	1.39	80			319						
14		834.27	.32	1.79	82	250	250	320	63	5				
15		838.12	.31	1.60	82			320						
16		841.61	.28	1.56	83	250	250	320	62	6	10.5	9.5		
17		845.11	.28	1.56	83			320						
18		848.60	.28	1.56	83	250	250	321	64	6				
19		852.22	.30	1.67	84			322						
20		857.02	.53	2.96	84	250	250	321	64	6				
21		861.78	.52	2.90	85			320						
22		866.54	.52	2.90	85	250	250	320	65	6	10.5	9.5		
23		871.30	.52	2.90	86			318						
24		875.97	.50	2.79	86	250	250	318	66	8				
25	10:32	880.55	.48	2.68	87			316						

CLIENT MVRD				NOZZLE Q312		DIAMETER, IN. 3.123		IMPINGER		INITIAL	FINAL	TOTAL GAIN
SOURCE Unit #3				PROBE 7C		Cp .8465		VOLUMES	(mL)	(mL)	(mL)	
PARAMETER / RUN No 1 Metals/Partic				PORT LENGTH				Imp. #1	0	268	268	
DATE Aug 14/19				STATIC PRESSURE, IN. H2O -19.00				Imp. #2	100	178	78	
OPERATOR CIL				STACK DIAMETER 30.90				Imp. #3	100	108	8	
CONTROL UNIT 5049				STACK HEIGHT 30				Imp. #4	0	3	3	
								Imp. #5	100	103	3	
								Imp. #6	100	101	1	
BAROMETRIC PRESSURE, IN. Hg 30.10				INITIAL LEAK TEST 0.002 @ 15"				Upstream Diameters				
ASSUMED MOISTURE, Bw 152				FINAL LEAK TEST 0.001 @ 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			
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		O ₂ Vol. %	CO ₂ Vol. %		
	09:40	537.449												
1		541.69	.40	2.38	77	307	250	250	54	5				
2		546.03	.42	2.39	77	308	250	250	54	5				
3	5	550.37	.40	2.38	78	308	250	250	56	6	9.0	11.0		
4		554.86	.47	2.67	78	308	250	250	54	6				
5		559.60	.50	2.85	78	308	250	250	54	6				
6		563.62	.50	2.88	78	309	250	250	54	6				
7		567.41	.32	1.82	79	305	250	250	52	6				
8		571.08	.30	1.71	80	303	250	250	54	6				
9	30	574.75	.30	1.71	80	303	250	250	54	6	11.0	9.0		
10		578.10	.25	1.42	80	303	250	250	54	6				
11		581.24	.22	1.25	82	296	250	250	53	4				
12		584.38	.22	1.25	82	296	250	250	53	4				
1		588.17	.32	1.82	82	304	250	250	58	5				
2		591.96	.32	1.82	82	305	250	250	58	5				
3		595.75	.32	1.82	83	308	250	250	58	5				
4		599.66	.34	1.93	83	309	250	250	56	6	11.0	9.0		
5		603.45	.32	1.82	83	310	250	250	54	6				
6		607.24	.32	1.82	83	310	250	250	54	6				
7		612.03	.51	2.90	83	310	250	250	54	6				
8		616.99	.55	3.13	83	308	250	250	53	8				
9		622.05	.57	3.24	83	298	250	250	53	8				
10		627.24	.60	3.41	83	299	250	250	54	10	10.0	10.0		
11		632.43	.60	3.41	83	302	250	250	54	10				
12	11:42	637.46	.56	3.19	84	303	250	250	54	10				

$\sqrt{6.54}$ 5.43 ΔH

SH

CLIENT MVRD				NOZZLE Q312		DIAMETER, IN. 3/32		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE Unit #3				PROBE 7A-1		Cp .8268		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN No 2 Metals/partic				PORT LENGTH				Imp. #1		0		254		254	
DATE Aug. 14/19				STATIC PRESSURE, IN. H2O		-19.00		Imp. #2		100		233		135	
OPERATOR: J. J.				STACK DIAMETER		10.90"		Imp. #3		100		122		22	
CONTROL UNIT 5099				STACK HEIGHT		30'		Imp. #4		0		10		10	
								Imp. #5		100		103		3	
								Imp. #6		100		101		1	
BAROMETRIC PRESSURE, IN. Hg 30.10				INITIAL LEAK TEST 0.002 @ 15"				Upstream Diameters							
ASSUMED MOISTURE, Bw 15%				FINAL LEAK TEST 0.002 @ 15"				Downstream Diameters							
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites				
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %			
1	11:56	637.9005													
2		641.32	.34	1.85	86	320	250	250	66	6					
3		645.75	.38	2.06	86	321									
4		649.89	.40	2.12	87	320	250	250	62	6	11.0	9.0			
5		653.70	.34	1.85	87	320									
6		657.31	.32	1.74	87	320	250	250	56	6					
7		661.05	.32	1.74	87	322									
8		665.79	.52	2.82	88	323	250	250	54	6					
9		670.73	.57	3.10	89	323									
10		675.90	.64	3.48	89	323	250	250	58	8	10.0	10.0			
11		681.44	.70	3.80	90	323									
12		686.91	.70	3.80	89	324	250	250	58	8					
1		692.27	.67	3.64	90	324									
1		697.42	.62	3.37	90	325	250	250	54	8					
2		702.65	.64	3.48	91	323									
3		707.80	.62	3.37	90	323	250	250	53	10	10.5	9.0			
4		712.87	.60	3.26	91	324									
5		717.94	.60	3.26	91	324	250	250	52	10					
6		722.93	.58	3.16	91	323									
7		727.07	.40	2.17	90	323	250	250	50	10					
8		731.25	.37	2.01	91	322									
9		734.76	.32	1.74	90	322	250	250	50	6	10.5	9.0			
10		738.34	.30	1.63	91	323									
11		741.68	.26	1.51	90	324	250	250	50	6					
12	13:58	744.89	.24	1.30	91	324									

$\sqrt{654}$ 5.43 ΔH

DH

CLIENT MVRD				NOZZLE Q312		DIAMETER, IN. 3123		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE Unit #3				PROBE 7A-1		Cp .8268		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN No 3 Metals/Partic				PORT LENGTH				Imp. #1		0		302		302	
DATE Aug. 14/19				STATIC PRESSURE, IN. H2O -19.00"				Imp. #2		100		188		88	
OPERATOR: CL				STACK DIAMETER 30.90"				Imp. #3		100		110		10	
CONTROL UNIT 3099 Y 9402				STACK HEIGHT 30'				Imp. #4		0		4		4	
								Imp. #5		100		101		1	
								Imp. #6		100		101		1	
BAROMETRIC PRESSURE, IN. Hg 30.10				INITIAL LEAK TEST 0.002 @ 15"				Upstream Diameters							
ASSUMED MOISTURE, Bw 152				FINAL LEAK TEST 0.002 @ 15"				Downstream Diameters							
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites				
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %			
1		750.03	.48	2.61	88	323	250	250	58	6					
2		754.66	.50	2.72	89	322									
3		759.29	.50	2.72	89	323	250	250	60	7	10.5	9.0			
4		764.02	.52	2.82	89	321									
5		768.88	.53	2.89	89	327	250	250	53	8					
6		773.97	.60	3.26	90	328									
7		777.68	.32	1.74	89	320	250	250	53	8					
8	40	781.39	.32	1.74	90	318									
9		781.97	.30	1.63	90	318	250	250	52	5	11.0	8.5			
10		788.18	.24	1.30	89	300									
11		791.25	.22	1.19	90	298	250	250	52	5					
12		794.97	.20	1.09	90	296									
1		798.89	.52	2.82	90	324	250	250	52	7					
2		803.52	.50	2.72	90	322									
3		808.14	.50	2.72	91	320	250	250	53	7	11.0	8.5			
4		812.96	.54	2.93	91	323									
5		818.11	.62	3.37	91	325	250	250	54	9					
6		823.31	.64	3.48	92	328									
7		827.58	.42	2.28	92	322	250	250	53	7					
8		831.72	.40	2.17	92	320									
9		835.51	.34	1.85	93	320	250	250	53	6	11.0	8.5			
10		839.26	.32	1.74	93	315									
11		842.99	.32	1.74	93	312	250	250	55	6					
12	16:15	846.56	.30	1.63	94	312									

Client	MWJE	Y	AA/LMU-C 1/11
Source	UNIT 1	Cp	N/A
Parameter	HF	Pbar	30.08 Static
Date	Aug. 13, 2019	Operator	Justin Ching

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

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

Leak Check	Run 1	Run 2	Run 3
Initial			
Final			

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	9:15	150.9440	72.2					
	9:25	151.6308	80.5					
	9:35	151.1212	84.6					
	9:45	151.2135	90.1					
	9:55	151.3223	93.4					
	10:05	151.4178	94.4					
	10:15	151.5120	94.5					
2	10:30	151.5290	86.8					
	10:40	151.6363	90.5					
	10:50	151.7101	93.0					
	11:00	151.7987	93.0					
	11:10	151.8815	93.0					
	11:20	151.9779	93.0					
	11:30	152.0872	93.0					
3	11:45	152.0890	86.2					
	11:55	152.1808	89.5					
	12:05	152.2754	90.8					
	12:15	152.3681	91.7					
	12:25	152.4572	92.8					
	12:35	152.5488	94.9					
	12:45	152.6472	95.1					

[illegible]

A. Lanfranco & Associates Inc.

Client	MURD	Operator	CL
Source	Unit #2	Control Unit / γ	2MURC1.118
Date	Aug. 15/19	Cp	Pbar 30.10
Dia.	Up	Dwn	Static

Leak Check	Run 1	Run 2	Run 3
Initial	0.00025	0.0001	0.0001
Final	0.0001	0.0001	0.0002

Test No.	Time (hhmm)	DGM Vol. (m ³)	DGM Temp. Out (°F)	Stack Temp. Ts (°F)	ΔP IN. H ₂ O		
					R1	R2	R3
1	08:45	154.6184	71.3				
	08:55	154.7179	75.9				
	09:05	154.8092	81.0				
	09:15	154.9002	85.1				
	09:25	154.9985	88.8				
	09:35	155.0752	90.8				
	09:45	155.1810	92.0				
2	10:00	155.1900	87.7				
	10:10	155.2830	89.3				
	10:20	155.3788	90.8				
	10:30	155.3692	91.7				
	10:40	155.3588	92.8				
	10:50	155.6508	93.7				
	11:00	155.7600	94.2				
3		7680					
	11:18	155.7644	87.0				
	11:28	155.8635	88.9				
	11:38	155.9540	90.6				
	11:48	156.0595	92.8				
	11:58	156.1553	94.2				
	12:08	156.2547	94.7				
	12:18	156.3330	95.2				

Client		Operator	
Source		Control Unit / γ	
Date		Cp	Pbar
Dia	Up	Dwn	Static

Leak Check	Run 1	Run 2	Run 3
Initial			
Final			

Test No.	Time (hhmm)	DGM Vol. (m ³)	DGM Temp. Out (°F)	Stack Temp. Ts (°F)	ΔP IN. H ₂ O		
					R1	R2	R3
1							
2							
3							

CLIENT MV WTEF				NOZZLE DIAMETER, IN.		IMPINGER		INITIAL	FINAL	TOTAL GAIN
SOURCE Unit 3				PROBE Cp		VOLUMES		(mL)	(mL)	(mL)
PARAMETER / RUN No Run 1-3 HF				PORT LENGTH		Imp. #1		100		
DATE Aug 14/19				STATIC PRESSURE, IN. H2O		Imp. #2		100		
OPERATOR ML				STACK DIAMETER		Imp. #3				
CONTROL UNIT LMU C				STACK HEIGHT		Imp. #4				
Y 1.1182						Imp. #5				
ΔH@						Imp. #6				
BAROMETRIC PRESSURE, IN. Hg 30.09				INITIAL LEAK TEST 0.0001 0.0001 0.0001		Upstream Diameters				
ASSUMED MOISTURE, Bw				FINAL LEAK TEST 0.0001 0.0001 0.0001		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			
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %		
1	858	152.6657			73.5									
2					86									
3					90									
4					95.5									
5					96									
6	958	153.2506												
1	1008	153.2940			93.7									
2														
3					98.6									
4														
5														
6	1108	153.9908												
1	1121	154.0240			97.2									
2					99.5									
3														
4														
5														
6	1221	154.5990			102.7									

Bag 1 0830-0930

Bag 2 0930-1030

Bag 3 1030-1130

UK

METRO VANCOUVER WTE - BURNABY B.C.				NOZZLE	DIAMETER, IN.	IMPINGER	INITIAL	FINAL	TOTAL GAIN
SOURCE <i>Unit #2</i>				PROBE	Cp	VOLUMES	(mL)	(mL)	(mL)
PARAMETER / RUN No <i>CP6 - Run #1</i>				PORT LENGTH		Imp. #1	150	146	-10
DATE <i>Aug. 22, 2019</i>				STATIC PRESSURE, IN. H2O		Imp. #2	75	254	179
OPERATOR: <i>DST MG</i>				STACK DIAMETER		Imp. #3	75	102	27
CONTROL UNIT <i>AV 15</i>				STACK HEIGHT		Imp. #4	6	21	21
Y <i>1.0021</i>						Imp. #5	200g		
ΔH@ <i>1.770</i>						Imp. #6			
BAROMETRIC PRESSURE, IN. Hg <i>30.03</i>				INITIAL LEAK TEST		Imp. #7			
ASSUMED MOISTURE, Bw <i>15%</i>				FINAL LEAK TEST		Imp. #8			

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. %		
1	8:55	362.300												
2	10	365.36	0.31	1.21	71	320	N/A	N/A	60	5				
3		368.58	0.34	1.35	71	310					9.5	10.1		
4	20	371.90	0.36	1.43	71	310			61	6				
5		375.60	0.45	1.78	71	312								
6	30	379.78	0.44	1.74	72	312			60	7				
7		382.78	0.40	1.58	72	312					10.0	9.6		
8	40	385.82	0.30	1.19	72	310			62	8				
9		388.78	0.28	1.12	73	305								
10	50	391.74	0.28	1.12	73	306			62	8				
11		394.88	0.32	1.28	74	310					10.5	9.3		
12	60	397.78	0.31	1.24	75	310			64	7				
		400.98	0.29	1.16	75	311								
1		404.02	0.30	1.20	76	313	N/A	N/A	61	7				
2	10	407.12	0.31	1.23	76	314					10.5	8.8		
3		409.98	0.26	1.04	77	313			60	6				
4	20	412.94	0.28	1.12	77	312								
5		415.90	0.28	1.12	78	313			61	6				
6	30	418.96	0.30	1.20	78	314					9.5	10.1		
7		422.79	0.47	1.88	78	314			62	6				
8	40	427.05	0.58	2.32	79	313								
9		431.42	0.61	2.44	79	313			63	6				
10	50	435.88	0.63	2.53	80	313					10.5	9.2		
11		440.40	0.65	2.61	81	315								
12	10:57	444.71	0.59	2.37	82	314								

4A

METRO VANCOUVER WTE - BURNABY B.C.					NOZZLE	DIAMETER, IN.		IMPINGER	INITIAL	FINAL	TOTAL GAIN			
					PROBE	Cp		VOLUMES	(mL)	(mL)	(mL)			
SOURCE <u>Unit #2</u>								Imp. #1	<u>150</u>	<u>145</u>	<u>-5</u>			
PARAMETER / RUN No <u>Cr 6 / Run #3</u>					PORT LENGTH			Imp. #2	<u>75</u>	<u>285</u>	<u>215</u>			
DATE <u>Aug. 23, 2019</u>					STATIC PRESSURE, IN. H2O <u>-20.0"</u>			Imp. #3	<u>75</u>	<u>98</u>	<u>23</u>			
OPERATOR: <u>DC+MG</u>					STACK DIAMETER <u>70.9'</u>			Imp. #4	<u>0</u>	<u>22</u>	<u>22</u>			
CONTROL UNIT <u>AV 15</u>					STACK HEIGHT <u>30.0'</u>			Imp. #5	<u>200</u>					
Y <u>1.0021</u>								Imp. #6						
ΔH@ <u>1.770</u>								Imp. #7						
BAROMETRIC PRESSURE, IN. Hg <u>29.98</u>					INITIAL LEAK TEST <u>0.012 @ 15"</u>			Imp. #8						
ASSUMED MOISTURE, Bw <u>12%</u>					FINAL LEAK TEST <u>0.006 @ 15"</u>									
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>9:08</u>	<u>540.150</u>												
1		<u>543.25</u>	<u>0.29</u>	<u>1.25</u>	<u>68</u>	<u>301</u>	<u>N/A</u>	<u>N/A</u>	<u>67</u>	<u>6</u>				
2	10	<u>546.58</u>	<u>0.34</u>	<u>1.45</u>	<u>68</u>	<u>310</u>					<u>10.0</u>	<u>9.4</u>		
3		<u>549.50</u>	<u>0.26</u>	<u>1.11</u>	<u>68</u>	<u>311</u>	↓	↓	<u>63</u>	<u>7</u>				
4	20	<u>552.30</u>	<u>0.24</u>	<u>1.02</u>	<u>68</u>	<u>312</u>								
5		<u>555.28</u>	<u>0.27</u>	<u>1.15</u>	<u>69</u>	<u>312</u>	↓	↓	<u>63</u>	<u>7</u>				
6	30	<u>558.25</u>	<u>0.27</u>	<u>1.15</u>	<u>69</u>	<u>311</u>					<u>10.5</u>	<u>8.8</u>		
7		<u>562.18</u>	<u>0.47</u>	<u>2.01</u>	<u>70</u>	<u>310</u>			<u>58</u>	<u>8</u>				
8	40	<u>566.07</u>	<u>0.45</u>	<u>1.92</u>	<u>70</u>	<u>311</u>								
9		<u>570.08</u>	<u>0.50</u>	<u>2.14</u>	<u>71</u>	<u>309</u>			<u>58</u>	<u>8</u>				
10	50	<u>574.30</u>	<u>0.54</u>	<u>2.31</u>	<u>71</u>	<u>310</u>					<u>10.0</u>	<u>9.5</u>		
11		<u>578.69</u>	<u>0.58</u>	<u>2.50</u>	<u>72</u>	<u>306</u>			<u>58</u>	<u>9</u>				
12	60	<u>583.18</u>	<u>0.60</u>	<u>2.60</u>	<u>73</u>	<u>305</u>								
1		<u>586.35</u>	<u>0.30</u>	<u>1.30</u>	<u>73</u>	<u>303</u>	<u>N/A</u>	<u>N/A</u>	<u>58</u>	<u>7</u>				
2	10	<u>589.62</u>	<u>0.32</u>	<u>1.38</u>	<u>73</u>	<u>308</u>					<u>9.0</u>	<u>10.6</u>		
3		<u>593.09</u>	<u>0.36</u>	<u>1.55</u>	<u>74</u>	<u>308</u>	↓	↓	<u>58</u>	<u>8</u>				
4	20	<u>596.85</u>	<u>0.42</u>	<u>1.81</u>	<u>74</u>	<u>309</u>								
5		<u>600.68</u>	<u>0.44</u>	<u>1.89</u>	<u>74</u>	<u>310</u>			<u>59</u>	<u>8</u>				
6	30	<u>604.28</u>	<u>0.39</u>	<u>1.67</u>	<u>74</u>	<u>312</u>					<u>9.0</u>	<u>10.9</u>		
7		<u>607.54</u>	<u>0.32</u>	<u>1.37</u>	<u>74</u>	<u>314</u>	↓	↓	<u>60</u>	<u>8</u>				
8	40	<u>610.70</u>	<u>0.30</u>	<u>1.28</u>	<u>75</u>	<u>315</u>								
9		<u>613.75</u>	<u>0.28</u>	<u>1.20</u>	<u>75</u>	<u>315</u>			<u>61</u>	<u>7</u>				
10	50	<u>616.92</u>	<u>0.30</u>	<u>1.29</u>	<u>75</u>	<u>313</u>								
11		<u>620.15</u>	<u>0.31</u>	<u>1.33</u>	<u>75</u>	<u>314</u>			<u>62</u>	<u>7</u>	<u>10.0</u>	<u>9.7</u>		
12	<u>11:12</u>	<u>623.15</u>	<u>0.27</u>	<u>1.16</u>	<u>76</u>	<u>312</u>								

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

A.Lanfranco & Associates inc.

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

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

Date: **26-Jun-19**
Barometric Pressure: **30.00** (in. Hg)
Theoretical Critical Vacuum: **14.15** (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 --		Average
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	
3.60	21.00	609.800	632.250	22.450	76.0	76.0	79.0	79.0	73	0.8185	15.0	78.0	77.0	77.5
1.95	23.00	632.900	650.860	17.960	79.0	79.0	80.0	80.0	63	0.5956	17.5	78.0	79.0	78.5
1.15	19.00	651.100	662.630	11.530	80.0	80.0	80.0	80.0	55	0.4606	18.5	80.0	83.0	81.5
0.64	16.00	663.000	670.385	7.385	80.0	80.0	80.0	80.0	48	0.3560	20.0	81.0	82.0	81.5
0.31	23.00	670.500	677.735	7.235	80.0	80.0	79.0	79.0	40	0.2408	21.0	82.0	84.0	83.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR			CALIBRATION FACTOR					
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)	Y	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	dH@ Ko (value)		
22.298	631.5		22.242	629.9	22.591	0.997	-0.005		1.778	45.16	0.008	0.721		
17.701	501.3		17.710	501.5	18.021	1.000	-0.002		1.815	46.11	0.046	0.713		
11.331	320.9		11.282	319.5	11.545	0.996	-0.006		1.799	45.68	0.029	0.720		
7.249	205.3		7.343	208.0	7.514	1.013	0.011		1.676	42.56	-0.094	0.734		
7.102	201.1		7.130	201.9	7.316	1.004	0.002		1.780	45.22	0.011	0.719		
Average Y----->						1.0021	Average dH@----->		1.770	44.9	Average Ko---->		0.721	

TEMPERATURE CALIBRATION			
Calibration Standard ----->		Omega Model CL23A S/N:T-218768	
Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results	
		Variation (degF)	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: June 26, 2019

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: **25-Jun-19**
Barometric Pressure: **29.80** (in. Hg)
Theoretical Critical Vacuum: **14.06** (in. Hg)

!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)³/(deg R)^{0.5}((in.Hg)^{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)
3.55	35.00	753.705	791.250	37.545	71.0	71.0	74.0	74.0	73	0.8185	15.5	81.0	81.0	81.0
1.90	19.00	791.500	806.325	14.825	74.0	74.0	75.0	75.0	63	0.5956	18.5	82.0	82.0	82.0
1.15	16.00	806.500	816.205	9.705	75.0	75.0	76.0	76.0	55	0.4606	20.0	82.0	82.0	82.0
0.66	17.00	816.500	824.345	7.845	76.0	76.0	76.0	76.0	48	0.3560	21.5	86.0	89.0	87.5
0.31	16.00	824.800	829.837	5.037	76.0	76.0	77.0	77.0	40	0.2408	22.5	86.0	90.0	88.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)		CALIBRATION FACTOR Y Value (number)	Variation (number)		CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)		Ko (value)	
37.388	1058.8	36.703	1039.4	37.773		0.9817	-0.009		1.793	45.55	-0.011		0.721	
14.648	414.8	14.485	410.2	14.935		0.9889	-0.001		1.809	45.95	0.005		0.714	
9.554	270.6	9.433	267.1	9.726		0.9874	-0.003		1.828	46.42	0.023		0.712	
7.706	218.2	7.708	218.3	8.028		1.0002	0.010		1.772	45.01	-0.032		0.714	
4.939	139.9	4.905	138.9	5.113		0.9930	0.003		1.819	46.20	0.015		0.710	
Average Y----->						0.9902		Average dH@----->	1.804	45.8		Average Ko----->	0.714	

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: June 25, 2019

A. Lanfranco & Associates inc.

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

Model #: **LMU-C**
Serial #: **Wizit 6274**

Date: **26-Jul-19**
Barometric Pressure: **29.96** (in. Hg)
Theoretical Critical Vacuum: **14.13** (in. Hg)

!!!!!!!

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

----- DRY GAS METER READINGS -----									-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	18.00	146.0720	146.2864	7.571	83.0	83.0	84.0	84.0	48	0.3560	18.0	81.0	82.0	81.5
0.00	26.00	145.5740	145.8870	11.054	83.0	83.0	91.0	91.0	48	0.3560	18.0	80.0	80.0	80.0
0.00	15.00	145.8910	146.0703	6.332	83.0	83.0	83.0	83.0	48	0.3560	18.0	80.0	81.0	80.5

***** 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)
7.362	208.5		8.250	233.6	8.453	1.121	0.002		0.000	0.00	0.000
10.680	302.4		11.934	338.0	12.193	1.117	-0.001		0.000	0.00	0.000
6.163	174.5		6.882	194.9	7.038	1.117	-0.002		0.000	0.00	0.000
Average Y----->						1.1182		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: July 26, 2019

Pitot Tube Calibration

Date: 15-Jul-19
Pbar (in.Hg): 29.69

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

Pitot ID: **7A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.355	0.495	39.6	0.8384	0.0116
0.455	0.660	44.8	0.8220	0.0048
0.525	0.760	48.2	0.8228	0.0040
0.630	0.900	52.8	0.8283	0.0015
0.680	0.985	54.8	0.8226	0.0042
Average :			0.8268	0.0052

Pitot ID:

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

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.345	0.465	39.0	0.8527	0.0045
0.490	0.650	46.5	0.8596	0.0023
0.565	0.770	50.0	0.8480	0.0092
0.655	0.865	53.8	0.8615	0.0042
0.770	1.010	58.3	0.8644	0.0072
Average :			0.8572	0.0055

Pitot ID:

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

Pitot ID: **AL GVRD 1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.115	0.155	22.5	0.8527	0.0020
0.205	0.280	30.1	0.8471	0.0077
0.360	0.480	39.9	0.8574	0.0026
0.550	0.730	49.3	0.8593	0.0045
0.750	1.000	57.6	0.8574	0.0026
Average :			0.8548	0.0039

Pitot ID:

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

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.025	0.034	10.5	0.8489	0.0024
0.150	0.205	25.7	0.8468	0.0003
0.285	0.399	35.5	0.8367	0.0098
0.500	0.685	47.0	0.8458	0.0007
0.730	0.980	56.8	0.8544	0.0079
Average :			0.8465	0.0042

Pitot ID:

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

* Average absolute deviation must not exceed 0.01.

Calibrated by: Jeremy Gibbs

Signature: 

Date: July 15, 2019

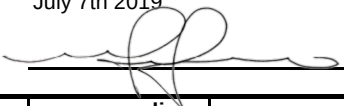
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ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Michael Goods

Date: July 7th 2019

Signature: 

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft ²)
A	0.1250	0.1240	0.1245	0.0010	0.1245	0.0000845
G-165	0.1640	0.1655	0.1660	0.0020	0.1652	0.0001488
P-20	0.1855	0.1865	0.1835	0.0030	0.1852	0.0001870
J	0.1880	0.1880	0.1880	0.0000	0.1880	0.0001928
E	0.1880	0.1895	0.1882	0.0015	0.1886	0.0001939
L	0.2112	0.2120	0.2105	0.0015	0.2112	0.0002434
G-215	0.2160	0.2150	0.2130	0.0030	0.2147	0.0002513
Q	0.2190	0.2170	0.2185	0.0020	0.2182	0.0002596
G-222	0.2215	0.2220	0.2215	0.0005	0.2217	0.0002680
G-225	0.2245	0.2250	0.2240	0.0010	0.2245	0.0002749
P-18	0.2375	0.2370	0.2380	0.0010	0.2375	0.0003076
V-07	0.2447	0.2450	0.2445	0.0005	0.2447	0.0003267
G-250	0.2500	0.2505	0.2510	0.0010	0.2505	0.0003422
G-252	0.2525	0.2520	0.2530	0.0010	0.2525	0.0003477
P	0.2580	0.2570	0.2575	0.0010	0.2575	0.0003616
G-278	0.2775	0.2785	0.2790	0.0015	0.2783	0.0004225
P-2	0.2787	0.2790	0.2785	0.0005	0.2787	0.0004237
G-292	0.2922	0.2920	0.2926	0.0006	0.2923	0.0004659
MV-02	0.3050	0.3040	0.3055	0.0015	0.3048	0.0005068
MV-01	0.3060	0.3065	0.3055	0.0010	0.3060	0.0005107
G-309	0.3095	0.3095	0.3085	0.0010	0.3092	0.0005213
V-06	0.3200	0.3210	0.3210	0.0010	0.3207	0.0005608
G-330	0.3295	0.3300	0.3305	0.0010	0.3300	0.0005940
G-337	0.3380	0.3355	0.3365	0.0025	0.3367	0.0006182
P-27	0.3387	0.3385	0.3390	0.0005	0.3387	0.0006258
G-343	0.3435	0.3430	0.3435	0.0005	0.3433	0.0006429
G-349	0.3490	0.3495	0.3495	0.0005	0.3493	0.0006656
P-9	0.3648	0.3650	0.3645	0.0005	0.3648	0.0007257
G-372	0.3710	0.3730	0.3740	0.0030	0.3727	0.0007575
I	0.3785	0.3785	0.3785	0.0000	0.3785	0.0007814
P-14	0.3910	0.3935	0.3920	0.0025	0.3922	0.0008388
P-17	0.4070	0.4075	0.4065	0.0010	0.4070	0.0009035
C	0.4255	0.4225	0.4235	0.0030	0.4238	0.0009798
G-437	0.4350	0.4345	0.4355	0.0010	0.4350	0.0010321
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
G-468	0.4677	0.4670	0.4670	0.0007	0.4672	0.0011907
P-7	0.4965	0.4940	0.4930	0.0035	0.4945	0.0013337
B	0.5015	0.5030	0.5025	0.0015	0.5023	0.0013763
G-540	0.5405	0.5400	0.5405	0.0005	0.5403	0.0015924

Where:

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

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

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

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	January 17, 2019	99.9	29.51	29.43	29.50	0.00
DS	July 8, 2019	102.1	30.16	30.03	30.10	0.05
CL	July 8, 2019	102.1	30.16	30.04	30.11	0.04
ML	July 8, 2019	102.1	30.16	30.01	30.08	0.07
SB	January 17, 2019	99.9	29.51	29.43	29.50	0.00
SH	January 17, 2019	99.9	29.51	29.40	29.47	0.03
MG	January 7, 2019	101.2	29.89	29.80	29.87	0.02
JB	January 17, 2019	99.9	29.51	29.42	29.49	0.01
SF	July 8, 2019	102.1	30.16	30.07	30.14	0.01
JG	January 17, 2019	99.9	29.51	29.4	29.47	0.03

Calibrated by: Daryl Sampson

Signature: 

Date: July 8, 2019

Performance Specification is

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

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

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

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

QUARTZ NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Michael Goods
Date: January 7th 2019

Signature: _____

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft ²)
Q-218	0.2180	0.2185	0.2180	0.0005	0.2182	0.0002596
Q-280	0.2800	0.2810	0.2805	0.0010	0.2805	0.0004291
Q-312	0.3125	0.3125	0.3120	0.0005	0.3123	0.0005321
Q-377	0.3760	0.3760	0.3775	0.0015	0.3765	0.0007731
Q-379	0.3800	0.3795	0.3795	0.0005	0.3797	0.0007862
Q-408	0.4070	0.4095	0.4090	0.0025	0.4085	0.0009101
Q-409	0.4105	0.4090	0.4095	0.0015	0.4097	0.0009154
Q-438	0.4385	0.4380	0.4385	0.0005	0.4383	0.0010479
Q-440	0.4395	0.4400	0.4400	0.0005	0.4398	0.0010551
Q500	0.5000	0.5005	0.5005	0.0005	0.5003	0.0013654

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

TEMPERATURE CALIBRATION FORM

Signature:

Rev. A. J. [Signature]

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	ALA #	Serial #	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation
Omega HH11A	3	300132	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	32	0.00%	100	0.00%	200	0.00%	299	-0.13%	500	0.00%	798	-0.16%	1698	-0.09%
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	-0.20%	100	0.00%	201	0.15%	300	0.00%	499	-0.10%	799	-0.08%	1699	-0.05%
Omega HH11	14	409426	33	0.20%	101	0.18%	201	0.15%	300	0.00%	499	-0.10%	801	0.08%	1698	-0.09%
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	33	0.20%	100	0.00%	201	0.15%	299	-0.13%	499	-0.10%	798	-0.16%	1698	-0.09%

Reference device is a NIST certified digital thermocouple calibrator

Variation expressed as a percentage of the absolute temperature must be within 1.5 %

A. LANFRANCO and ASSOCIATES INC.
ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Daryl Sampson
Date: July 9, 2019

Signature:



K-TYPE THERMOCOUPLE CALIBRATIONS

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

* n/a denotes not in service

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:

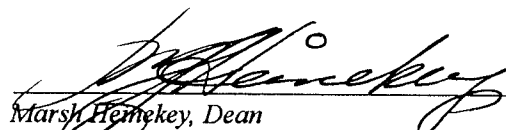


Environment
Canada

Environnement
Canada



Province of
British Columbia
Ministry of
Environment,
Lands and Parks


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

JUNE 21, 2001
Dated



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Faculty of Continuing Education and Extension

Mark Lanfranco

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May 2005

Date

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May 2005

Date

Donna Spaulding

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Faculty of Continuing Education and Extension



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May 2009

Date

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