A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III 4730 Kingsway
Burnaby, BC V5H 0C6

WASTE TO ENERGY FACILITY

Emissions Testing Report
August 2020 3rd Quarter Survey
Operational Certificate 107051
Issued Sept.28, 2020

CERTIFICATION

The field monitoring for this survey was conducted by certified stack test technicians as required by the British Columbia Ministry of Environment (BC MOE) Field Sampling Manual.

The field crew consisted of:

Mr. S. Harrington (certified), Mr. S. Ferguson (certified), Mr. D. Sampson (certified), Mr. M. Goods (certified) and Mr. J. Ching.

The report was prepared by Mr. L. Agassiz using reporting principles and guidelines generally acceptable to Metro Vancouver (MV).

The field crew and A. Lanfranco and Associates Inc. certify that the test methods used were BC MOE/MV approved reference methods for the parameters investigated.

Report reviewed by:

Mark Lanfranco, CST
President | Owner

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SUMMARY

The following table shows the emission results from the three units located at Metro Vancouver's Waste-To-Energy Facility (WTEF) as well as the current emission limits as defined by the Operational Certificate (OC) issued by BC Ministry of Environment & Climate Change Strategy. This compliance survey represents the third quarter of 2020.

Table 1: Summary Comparison of Emissions Test Results with Limits

Parameter	Limit	Unit 1	Unit 2	Unit 3	Plant Average
Test Date		Aug. 12/14, 2020	Aug. 11/12, 2020	Aug.10/11, 2020	
Particulate (mg/m^3 @ 11% O_2)	**9.0**	0.58	0.48	0.55	**0.54**
Hydrogen Fluoride (mg/m^3 @ 11% O_2)	**1.0**	0.01	0.02	0.02	**0.02**
Trace Metals - OC Class (mg/m^3 @ 11% O_2)					
Lead (Pb)	**-**	0.0014	0.0016	0.0007	**0.0012**
Arsenic (As)	**-**	0.0006	0.0007	0.0017	**0.0010**
Chromium (Cr)	**-**	0.0004	0.0017	0.0009	**0.0010**
OC Class Sum (Pb, As and Cr)	**0.064**	0.0024	0.0040	0.0034	**0.0033**
Mercury (mg/m^3 @ 11% O_2)	**0.02**	0.0009	0.0005	0.0007	**0.0007**
Cadmium (mg/m^3 @ 11% O_2)	**0.007**	0.0001	0.0001	0.0001	**0.0001**

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

The testing did not differ significantly from the previous two surveys in 2020. The results for all parameters were near method detection limits.

Hexavalent Chromium and Volatile Organic Compounds (VOCs) were measured this survey and reported in Tables 9 and 12.

1.0 INTRODUCTION

Metro Vancouver (MV) commissioned an emission survey at the Waste-To-Energy Facility (WTEF) in Burnaby BC, as required by the provincially approved Operational Certificate (OC). This report documents the results of a survey on Units 1, 2 and 3 for the third survey of four for the year of 2020. This survey includes particulate matter, trace metals, mercury (Hg), volatile organic compounds (VOC), hydrogen fluoride (HF), nitrous oxide (N_2O) and hexavalent chromium (Cr^{+6}). A. Lanfranco and Associates Inc., of Surrey, B.C., conducted the sampling program on behalf of MV. The sampling program consisted of, but was not limited to, the planning, execution, analysis, and reporting of three emission sources located at the WTEF.

This report includes a comparison of emission results to limits established in the OC, detailed emission results, a brief outline of methods employed, equipment used, and a discussion of the survey. All supporting data and appendices are presented under separate cover.

The individual sources that were monitored for compliance are identified as Unit 1, Unit 2 and Unit 3 which represent the three distinct processing lines at the WTEF. The three boilers are identified as discharge E300670 in the operational certificate. Sampling was conducted on August 10-14, and Aug 20-21, 2020 (hexavalent chromium).

2.0 METHODOLOGY

All services provided by A. Lanfranco and Associates Inc. were conducted in accordance with approved reference methods as issued by:

- Metro Vancouver (MV)
- BC Ministry of Environment & Climate Change Strategy (BC MOE)
- Environment Canada (EC)
- US Environmental Protection Agency (EPA)

2.1 Sampling and Analytical Methods

The following table lists the test methods used for the different parameters measured. The subsequent paragraphs briefly describe each method.

Table 2: Reference Methods

Parameter	Reference Method
Sample and Velocity traverse points	EPS 1/RM/8 A Determination of Sampling Site and Traverse Points
Velocity and flowrate	EPS 1/RM/8 B Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Gas molecular weight (O_2/CO_2)	EPS 1/RM/8 C Determination of Molecular Weight by Gas Analysis
Flue gas Moisture	EPS 1/RM/8 D Determination of Moisture Content
Particulate Matter	EPS 1/RM/8 E Determination of Particulate Matter Emissions from Stationary Sources
Trace Metals with Mercury	EPA Method 29 Determination of Metals Emissions from Stationary Sources
Hydrogen Fluoride (HF)	EPS1/RM/1 Reference Method for Source Testing: Measurement of Releases of Gaseous Hydrogen Chloride from Stationary Sources
Nitrous Oxide (N_2O)	WCB Method 1101 / EPA Method 18
Total Hydrocarbons (THC/VOC)	EPA 203/ALS SOP VOA-TO3C1C6
Hexavalent Chromium (Cr^{+6})	EPA Method 0061 Determination of Hexavalent Chromium from Stationary Sources

The following section briefly details individual test methods used by the following five individual sampling trains:

- Train 1 – Particulate / Trace Metals
- Train 2 – Hydrogen Fluoride
- Train 3 – Total Hydrocarbons THC/VOC
- Train 4 – N_2O
- Train 5 – Hexavalent Chromium

Sampling Site and Traverse Points

Primary: EPS 1/RM/8 Method A
Supporting: EPA Method 1

This method is designed to aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source. A measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. Traverse points are then located within each of these equal areas.

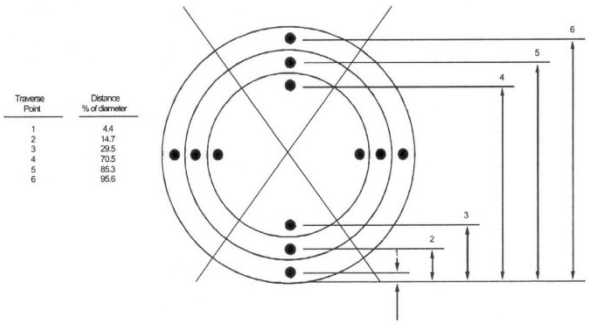

Figure 1. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

Stack Gas Velocity and Volumetric Flow Rate

Primary: EPS 1/RM/8 Method B
Supporting: EPA Method 2

The average gas velocity in a stack or duct is determined from the gas density and from the measurement of velocity pressure with an S-type pitot tube. Stack gas volumetric flow rate is determined from measurements of stack gas velocity, temperature, absolute pressure, dry gas composition, moisture content, and stack diameter.

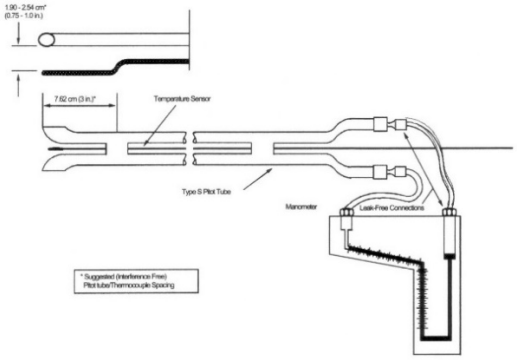

Figure 2. Type S Pitot Tube Manometer Assembly

Molecular Weight by Gas Analysis — Primary: EPS 1/RM/8 Method C; Supporting: EPA Method 3

An integrated or grab sample is extracted from a single point in the gas stream and analyzed for its components using a Fyrite analyzer, a gas chromatograph, or calibrated continuous analyzers.

Moisture Content — Primary: EPS 1/RM/8 Method D; Supporting: EPA Method 4

A gas sample is extracted from a single point in the enclosed gas stream being sampled. The moisture is condensed and its weight measured. This weight, together with the volume of gas sampled, enables the stack gas moisture content to be calculated.

Particulate Matter — Primary: EPS 1/RM/8 Method E; Supporting: EPA Method 5

Particulate matter is withdrawn isokinetically from a number of sampling or traverse points in an enclosed gas stream. The particulate sample is collected in the nozzle, probe, and on a glass fibre filter, all maintained at a temperature of 120 $\pm$ 14^{o}C or such other temperature as is necessary to prevent blinding of the filter from condensation. The particulate weight is determined gravimetrically after removal of uncombined water. Simultaneous determinations of the gas stream moisture content, velocity, temperature, and molecular weight allow calculations of the particulate concentration and the particulate mass emission or release rate to be made.

Trace Metal — Primary: EPA Method 29 (modified)

This method is used in conjunction with the above Method 5. A stack sample is withdrawn isokinetically from the source. Particulate emissions are collected in the probe and on a heated filter, and gaseous emissions are then collected in an aqueous acidic solution of hydrogen peroxide (analyzed for all metals including Hg) and an aqueous acidic solution of potassium permanganate (analyzed only for Hg). The recovered samples are digested, and appropriate fractions are analyzed for Hg by cold vapour atomic absorption spectroscopy

(CVAAS). The remaining trace metals are analyzed with inductively coupled argon plasma emission spectroscopy (ICAP), atomic absorption spectroscopy (AAS) and graphite furnace atomic absorption spectroscopy (GFAAS).

Figure 3 displays the sample train and its configuration.

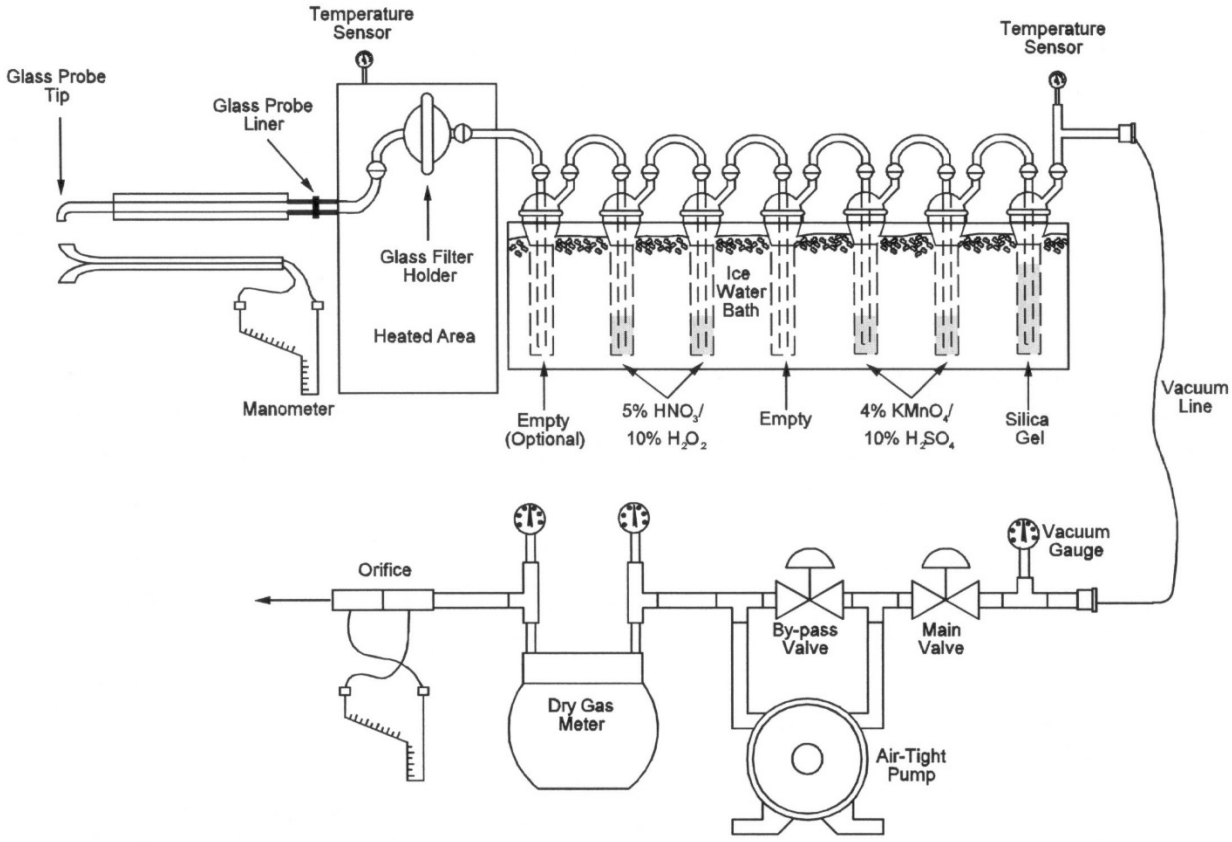

Figure 3. Particulate / Trace Metals Sampling Train

Hydrogen Fluoride

Primary: EPS 1/RM/1
Supporting: BC Method 7176106 & 7066101

HF is sampled in a four-impinger train consisting of two impingers containing distilled/deionized H_2O, one empty impinger, and fourth containing silica gel. A sample of the stack gas is extracted from a single point near the centre of the stack over the sample duration at a constant rate. The collected samples are measured for F by ion chromatography at ALS Environmental in Burnaby, BC.

THC/VOC

THC/VOC samples were collected with evacuated SUMMA canisters. The canisters extract stack samples via a teflon line and are operated for 60 minutes, at which time the initial vacuum of about 28" Hg reduces to about 4" Hg. The samples were analysed by GC FID at ALS specialty lab in Simi Valley, California.

N_2O Primary: WCB Method 1101

Three N_2O samples were collected from each source using evacuated tedlar bag sampling procedures. Each bag was purged and evacuated on-site with small amounts of stack gas, prior to final stack gas collection. Each bag sample was an integrated type sample where stack gases were collected over sixty minute periods. The bag sampling was conducted over about a four hour period.

The samples were analysed at Bureau Veritas Laboratory, Burnaby B.C. N_2O analysis was conducted within 24 hours of sample collection using BV Labs CAM SOP-00203.

Chromium $^{+6}$ Primary: EPA Method 0061

The Method 0061 sampling train (see Fig. 4) was used to collect samples, where all train components were Teflon or borosilicate glass. A small amount of 0.1 N KOH is re-circulated through the probe and first impinger via peristaltic pump. The impinger components were:

Stack Impingers
150 ml 0.1 N KOH
75 ml 0.1 N KOH
75 ml 0.1 N KOH
Empty
200 silica gel

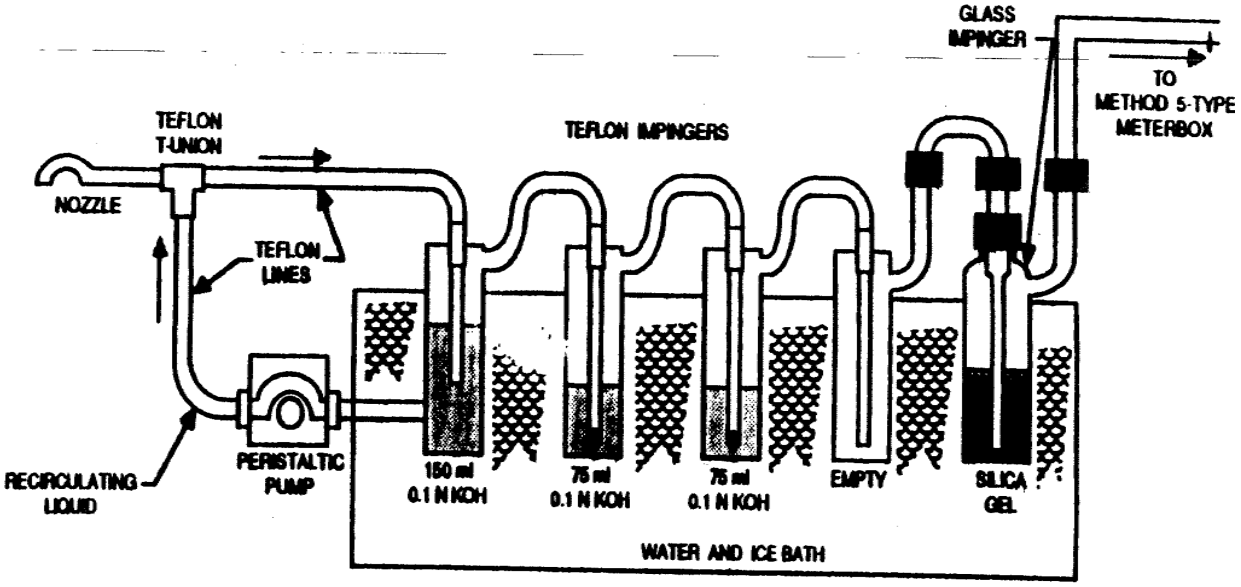

Figure 4. Hexavalent Chromium Sampling Train

2.1 Method Modifications

Three minor method modifications were instituted for this work.

1. Reagent blanks for metals trains were made to the same volumes as all samples. In other words, exactly 100 ml of the various reagents used to recover samples was NOT done, as some sample components (probe washing for example) required more than 100 ml to adequately clean and rinse the probe. Instead, sample recovery was conducted with however much rinsing was deemed adequate. In the laboratory, the blanks and samples were made up with the appropriate reagent so that all samples and blanks were the same volume.

2. Filter and residue weighing were not conducted with the six-hour interval technique. Instead the sample filters and beakers were conditioned with cooling and desiccation and then weighed on two separate laboratory scales after 24 hours. Duplicate or triplicate Blank samples were carried through the gravimetric analysis, and the sample results were adjusted with the Blank data to determine the net filter and probe wash residue weight gain. This is the Environment Canada approved modified approach for weighing probe wash residue.

3. For the purposes of calculating a result, all parameters were given the value of ½ the detection limit when the analysis yielded 'non-detect' results.

All results are expressed using the metric system and corrected to standard conditions of 20°C and 101.325 kPa, dry gas (unless otherwise noted).

3.0 DETAILED TEST RESULTS

Most of the results of stack emissions were calculated using a "STACK" computer program developed by A. Lanfranco and Associates for BC MOE requirements.

Tables 3-12 present the detailed results of all emissions parameters tested for each of the units. Additional data and the computer outputs can be found in the accompanying Appendices.

Table 3: Unit 1 Summary of Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	12-Aug-20	14-Aug-20	14-Aug-20	
Test Time - Particulate/Metals	11:00 - 13:11	8:43 - 10:47	11:02 - 13:09	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	14-Aug-20	14-Aug-20	14-Aug-20	
Test Time - Acid Gases	09:15 - 10:15	10:30 - 11:30	11:39 -12:39	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	160	154	154	156
Average Gas Velocity (m/s)	14.0	12.6	13.3	13
Dry Flow Rate (m^3/min)	1183	1062	1147	1130
Moisture (Vol. %)	14.4	15.9	14.4	14.9
Oxygen (Vol. %)(dry basis)	9.5	9.1	9.9	9.5
Carbon Dioxide (Vol. %)(dry basis)	10.3	10.1	9.9	10.1
Particulate (mg/m^3 @ 11% O_2)	1.19	0.43	0.13	**0.58**
Hydrogen Fluoride (mg/m^3 @ 11% O_2)	0.013	0.013	0.014	**0.013**
Nitrous Oxide (mg/m^3 @ 11% O_2)*	7.0	6.4	1.6	**5.0**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)	1.9	2.3	0.0	**1.4**
Trace Metals - Operational Certificate List (mg/m^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00169	0.00225	0.00326	**0.00240**
Aluminum (mg/m^3 @ 11% O_2)	0.00443	0.00301	0.00304	0.00349
Cadmium (mg/m^3 @ 11% O_2)	0.00008	0.00009	0.00020	0.00012
Lead (mg/m^3 @ 11% O_2)	0.00112	0.00126	0.00179	0.00139
Mercury (mg/m^3 @ 11% O_2)	0.00067	0.00113	0.00076	0.00085
Phosphorus (mg/m^3 @ 11% O_2)	0.00095	0.00150	0.00114	0.00120
Isokinetic Variation (%)	102	103	102	102

*N_2O was sampled on Aug 10, 2020

THC test times can be found in the accompanying Appendices

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 4: Unit 1 Trace Metals Emissions (OC Class)

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
OC Class				
Pb	0.00112	0.00126	0.00179	0.00139
As	0.00032	0.00038	0.00122	0.00064
Cr	0.00025	0.00062	0.00026	0.00038
Sum of OC Class	0.00169	0.00225	0.00326	0.00240
Other				
Al	0.00443	0.00301	0.00304	0.00349
Cd	0.00008	0.00009	0.00020	0.00012
P	0.00095	0.00150	0.00114	0.00120
Hg	0.00067	0.00113	0.00076	0.00085

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 5: Unit 1 Detailed Trace Metals Emissions

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
Pb	0.00112	0.00126	0.00179	0.00139
Sb	0.00071	0.00160	0.00095	0.00109
Cu	0.00004	0.00009	0.00009	0.00008
Mn	0.00016	0.00019	0.00012	0.00016
V	0.00032	0.00038	0.00038	0.00036
Zn	0.00253	0.00352	0.00059	0.00221
As	0.00032	0.00038	0.00122	0.00064
Cr	0.00025	0.00062	0.00026	0.00038
Co	0.00008	0.00009	0.00009	0.00009
Ni	0.00063	0.00107	0.00047	0.00073
Se	0.00047	0.00056	0.00057	0.00054
Te	0.00063	0.00128	0.00076	0.00089
Tl	0.00024	0.00056	0.00057	0.00046
Cd	0.00008	0.00009	0.00020	0.00012
Hg	0.00067	0.00113	0.00076	0.00085

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 6: Unit 2 Summary of Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	11-Aug-20	12-Aug-20	12-Aug-20	
Test Time - Particulate/Metals	10:40 - 12:42	09:00 - 11:02	11:44 - 13:45	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	12-Aug-20	12-Aug-20	12-Aug-20	
Test Time - Acid Gases	9:15 -10:15	10:26-11:26	11:45 -12:45	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	157	152	153	154
Average Gas Velocity (m/s)	14.4	13.1	13.0	14
Dry Flow Rate (m^3/min)	1191	1105	1101	1132
Moisture (Vol. %)	16.4	16.7	16.3	16.5
Oxygen (Vol. %)(dry basis)	9.9	9.2	9.5	9.5
Carbon Dioxide (Vol. %)(dry basis)	9.6	11.3	11.4	10.8
Particulate (mg/m^3 @ 11% O_2)	0.51	0.28	0.66	**0.48**
Hydrogen Fluoride (mg/m^3 @ 11% O_2)	0.016	0.015	0.016	**0.016**
Nitrous Oxide (mg/m^3 @ 11% O_2)*	0.0	0.8	12.4	**4.4**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)**	1.9	2.3	2.8	**2.3**
Trace Metals - Operational Certificate List (mg/m^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00592	0.00179	0.00424	**0.00399**
Aluminum (mg/m^3 @ 11% O_2)	0.01217	0.00526	0.00493	0.00745
Cadmium (mg/m^3 @ 11% O_2)	0.00010	0.00009	0.00009	0.00010
Lead (mg/m^3 @ 11% O_2)	0.00231	0.00103	0.00150	0.00161
Mercury (mg/m^3 @ 11% O_2)	0.00053	0.00023	0.00064	0.00046
Phosphorus (mg/m^3 @ 11% O_2)	0.00568	0.00489	0.00568	0.00542
Isokinetic Variation (%)	103	104	102	103

*N_2O was sampled on Aug 10, 2020.

THC test times can be found in the accompanying Appendices

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 7: Unit 2 Trace Metals Emissions (OC Class)

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
OC Class				
Pb	0.0023	0.0010	0.0015	0.0016
As	0.0011	0.0004	0.0005	0.0007
Cr	0.0025	0.0004	0.0022	0.0017
Sum of OC Class	0.0059	0.0018	0.0042	0.0040
Other				
Al	0.01217	0.00526	0.00493	0.0075
Cd	0.00010	0.00009	0.00009	0.0001
P	0.00568	0.00489	0.00568	0.0054
Hg	0.00053	0.00023	0.00064	0.0005

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 8: Unit 2 Detailed Trace Metals Emissions

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
Pb	0.00231	0.00103	0.00150	0.00161
Sb	0.00101	0.00094	0.00095	0.00097
Cu	0.00094	0.00009	0.00016	0.00040
Mn	0.00094	0.00042	0.00030	0.00056
V	0.00041	0.00038	0.00038	0.00039
Zn	0.00576	0.00440	0.00182	0.00399
As	0.00109	0.00038	0.00053	0.00067
Cr	0.00252	0.00038	0.00221	0.00170
Co	0.00010	0.00009	0.00009	0.00010
Ni	0.00191	0.00094	0.00210	0.00165
Se	0.00061	0.00103	0.00036	0.00067
Te	0.00081	0.00075	0.00076	0.00077
Tl	0.00061	0.00111	0.00057	0.00076
Cd	0.00010	0.00009	0.00009	0.00010
Hg	0.00053	0.00023	0.00064	0.00046

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 9: Unit 3 Summary of Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	10-Aug-20	11-Aug-20	11-Aug-20	
Test Time - Particulate/Metals	12:10 - 14:13	08:57 - 11:00	11:36 - 13:34	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	11-Aug-20	11-Aug-20	11-Aug-20	
Test Time - Acid Gases	10:02-11:02	11:20 - 12:20	12:31 - 1:31	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	153	149	148	150
Average Gas Velocity (m/s)	13.7	13.4	13.3	13.5
Dry Flow Rate (m^3/min)	1155	1144	1106	1135
Moisture (Vol. %)	16.3	15.6	17.8	16.6
Oxygen (Vol. %)(dry basis)	10.3	10.9	10.4	10.5
Carbon Dioxide (Vol. %)(dry basis)	10.2	10.0	10.1	10.1
Particulate (mg/m^3 @ 11% O_2)	0.63	0.69	0.33	**0.55**
Hydrogen Fluoride (mg/m^3 @ 11% O_2)	0.039	0.019	0.013	**0.023**
Nitrous Oxide (mg/m^3 @ 11% O_2)*	8.1	15.5	10.9	**11.5**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)	1.6	1.9	1.6	**1.7**
Trace Metals - Operational Certificate List (mg/m^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00375	0.00408	0.00227	**0.00337**
Aluminum (mg/m^3 @ 11% O_2)	0.01341	0.00596	0.00192	0.00710
Cadmium (mg/m^3 @ 11% O_2)	0.00010	0.00010	0.00010	0.00010
Lead (mg/m^3 @ 11% O_2)	0.00057	0.00060	0.00106	0.00074
Mercury (mg/m^3 @ 11% O_2)	0.00051	0.00124	0.00046	0.00074
Phosphorus (mg/m^3 @ 11% O_2)	0.00575	0.00318	0.00539	0.00477
Hexavalent Chromium (mg/Sm^3 @ 11% O_2)*	0.00009	0.00009	0.00009	**0.00009**
Isokinetic Variation (%)	103	102	105	**103**

*N_2O was sampled on Aug 10, 2020. Hexavalent Chromium was sampled on Aug.20-21, 2020.

THC test times can be found in the accompanying Appendices

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 10: Unit 3 Trace Metals Emissions (OC Class)

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
OC Class				
Pb	0.00057	0.00060	0.00106	0.00074
As	0.00176	0.00226	0.00115	0.00173
Cr	0.00141	0.00122	0.00006	0.00090
Sum of OC Class	0.00375	0.00408	0.00227	0.00337
Other				
Al	0.01341	0.00596	0.00192	0.0071
Cd	0.00010	0.00010	0.00010	0.0001
P	0.00575	0.00318	0.00539	0.0048
Hg	0.00051	0.00124	0.00046	0.0007

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 11: Unit 3 Detailed Trace Metals Emissions

Metal	Test 1 (mg/m^3 @ 11% O_2)	Test 2 (mg/m^3 @ 11% O_2)	Test 3 (mg/m^3 @ 11% O_2)	Average (mg/m^3 @ 11% O_2)
Pb	0.00057	0.00060	0.00106	0.00074
Sb	0.00163	0.00099	0.00096	0.00119
Cu	0.00020	0.00203	0.00077	0.00100
Mn	0.00054	0.00234	0.00032	0.00107
V	0.00038	0.00040	0.00038	0.00039
Zn	0.00215	0.00500	0.00192	0.00302
As	0.00176	0.00226	0.00115	0.00173
Cr	0.00141	0.00122	0.00006	0.00090
Co	0.00010	0.00010	0.00010	0.00010
Ni	0.00088	0.00135	0.00038	0.00087
Se	0.00209	0.00058	0.00058	0.00108
Te	0.00023	0.00016	0.00031	0.00023
Tl	0.00057	0.00060	0.00167	0.00095
Cd	0.00010	0.00010	0.00010	0.00010
Hg	0.00051	0.00124	0.00046	0.00074

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

Table 12: Units 1, 2, 3 Summary of Speciated VOC Results

Using 1/2 DL Convention

Sample Date:	**Aug.14, 2020**			**Aug.12, 2020**			**Aug.11, 2020**		
	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:	09:18-10:18	10:19-11:19		09:15-10:15	10:18-11:18	11:56-12:56	09:40-10:40	10:41-11:41	11:44-12:44
Acetylene (ppm)	0.10	0.13		0.10	0.09	0.10	0.10	0.13	0.13
Methane (ppm)	0.80	1.00		0.80	0.70	0.80	0.80	1.00	0.50
Ethane (ppm)	0.24	0.31		0.24	0.22	0.24	0.24	0.31	0.15
Ethene (ppm)	0.24	0.31		0.24	0.22	0.24	0.24	0.31	0.15
C3 as Propane (ppm)	0.40	0.50		0.40	0.55	0.70	0.39	0.40	0.43
C4 as n-Butane (ppm)	0.40	0.50		0.40	0.55	0.70	0.39	0.40	0.43
C5 as n-Pentane (ppm)	0.40	0.50		0.40	0.55	0.70	0.39	0.40	0.43
C6 as n-Hexane (ppm)	0.40	0.50		0.40	0.55	0.70	0.39	0.40	0.43
C6+ as n-Hexane (ppm)	0.80	1.00		0.80	1.05	1.35	0.80	0.80	0.85
Acetylene (mg/m^3 as CH_4)	0.07	0.08		0.07	0.06	0.07	0.07	0.08	0.08
Methane (mg/m^3 as CH_4)	0.53	0.67		0.53	0.47	0.53	0.53	0.67	0.33
Ethane (mg/m^3 as CH_4)	0.16	0.20		0.16	0.14	0.16	0.16	0.20	0.10
Ethene (mg/m^3 as CH_4)	0.16	0.20		0.16	0.14	0.16	0.16	0.20	0.10
C3 as Propane (mg/m^3 as CH_4)	0.26	0.33		0.27	0.37	0.47	0.26	0.26	0.29
C4 as n-Butane (mg/m^3 as CH_4)	0.26	0.33		0.27	0.37	0.47	0.26	0.26	0.29
C5 as n-Pentane (mg/m^3 as CH_4)	0.26	0.33		0.27	0.37	0.47	0.26	0.26	0.29
C6 as n-Hexane (mg/m^3 as CH_4)	0.26	0.33		0.27	0.37	0.47	0.26	0.26	0.29
C6+ as n-Hexane (mg/m^3 as CH_4)	0.53	0.67		0.53	0.70	0.90	0.53	0.53	0.57
Total mg/Sm^3 @11% O_2 as CH_4	1.92	2.34		1.87	2.35	2.83	1.61	1.85	1.65

All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

4.0 DISCUSSION

All emissions from all Units were within limits as set out in the OC.

The testing of Unit 1 for particulate and trace metals began the afternoon of August 12; however, due to an operational issue overnight, the testing did not continue on Unit 1 until August 14. The results show negligible difference in emissions between the two days.

In 2019 the manual measurement of total hydrocarbons was reduced to once annually. This survey represents that annual test and also includes the annual test for hexavalent chromium. This year, Unit 3 was chosen for the hexavalent chromium testing.

One of the canisters used for VOC was delivered from the commercial laboratory with no vacuum pressure. With no pressure the sample cannot be drawn. This sample is identified as Unit 1 Run 3 only because it was the last test run scheduled chronologically.

As stated in Section 2.1, EPA Method 5/29 was modified slightly to accommodate performance based analytical protocols utilized in B.C. for trace metals sampling and analysis. The analytical modification consists of using volumes of recovery reagents different than the method stipulates. In order to validate (ie performance-based QA) the modification, sample Blanks and all samples were made up to the same volume, so that subtraction of the Blank data, was done on equivalent sample sizes. In addition, special Hg spiking of blank filters and peroxide solutions was conducted. This spiking is referred to as a “matrix spike” and is reported in Appendix B, Quality Control for mercury, where the recovery of spiked mercury was calculated to be an acceptable 85 to 115%. It should be noted that independent front half/back half analysis of all trace metals was conducted for this survey. In addition, individual quartz filter blanks were analyzed for each unit. Sampling was conducted in accordance with their respective reference methods (EPA 29 except as discussed) and passed all appropriate quality assurance and quality control criteria.

All sampling was conducted/supervised by certified emission testing personnel, using calibrated source sampling equipment and quality controlled reagents. It is therefore stated that the survey and this report complies with the MV's WTEF compliance testing requirements for this third survey in 2020.