



**A.Lanfranco
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Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III

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Waste-to-Energy Facility

Emissions Test Report

First Quarter 2023 Survey

Operational Certificate 107051

Prepared by Louis Agassiz

Issued: March 21, 2023

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.

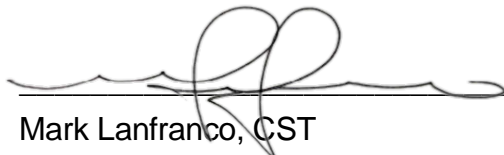
The field crew consisted of:

Mr. C. Lanfranco (certified), Mr. J. Gibbs (certified), Mr. D. Sampson (certified), Mr. L. Forrer, Mr. C. De La O, and Mr B. Lester.

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 on March 21, 2023, by:



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SUMMARY

The following table displays 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 first quarter of 2023.

Table 1: Summary Comparison of Emissions Test Results with Limits

Parameter	Limit	Unit 1	Unit 2	Unit 3	Facility Average
Test Date		16-Feb-23	15-Feb-23	14-Feb-23	
Particulate (mg/Sm ³ @ 11% O ₂)	9.0	0.56	1.17	4.98	2.24
Hydrogen Fluoride (mg/Sm ³ @ 11% O ₂)	1.0	0.008	0.007	0.007	0.008
Trace Metals - OC Class (mg/Sm ³ @ 11% O ₂)					
Lead (Pb)	-	0.0006	0.0005	0.0092	0.0034
Arsenic (As)	-	0.0004	0.0006	0.0007	0.0006
Chromium (Cr)	-	0.0004	0.0010	0.0011	0.0008
OC Class Sum (Pb, As and Cr)	0.064	0.0014	0.0021	0.0110	0.0048
Mercury (mg/Sm ³ @ 11% O ₂)	0.02	0.000042	0.000042	0.000063	0.00005
Cadmium (mg/Sm ³ @ 11% O ₂)	0.007	0.000106	0.000087	0.000544	0.0002

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

These are like previously measured results. The particulate is slightly elevated on all units during this survey. Unit 1 saw a negligible increase from November 2022 (0.08 to 0.56 mg/Sm³ @11%O₂). Unit 2 saw the particulate increase to 1.17 from 0.03 mg/Sm³ @11%O₂. Unit 3 was once again higher than the other units and the particulate concentration increased to 4.98 mg/Sm³ @11%O₂ from 2.42 mg/Sm³ @11%O₂ in November 2022. Despite this, the results are within the expected range based on normal operations and are well within permitted limits for all sources and all parameters.

1 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 first survey of four for the year 2023. This survey includes filterable particulate matter, trace metals, mercury (Hg), hydrogen fluoride (HF), ammonia (NH₃), volatile organic compounds (VOC), and nitrous oxide (N₂O). A. Lanfranco and Associates Inc. (ALAA), 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 February 14-16, 2023.

2 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

<u>Parameter</u>	<u>Reference Method</u>
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 ₂ O)	N/A
Ammonia	EPA Method CTM 027 Procedure For Collection and Analysis of Ammonia in Stationary Sources
Volatile Organic Compounds (VOC)	EPA Method TO-15 Determination of Volatile Organic Compounds in Air

Sampling Site and Traverse Points

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.

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

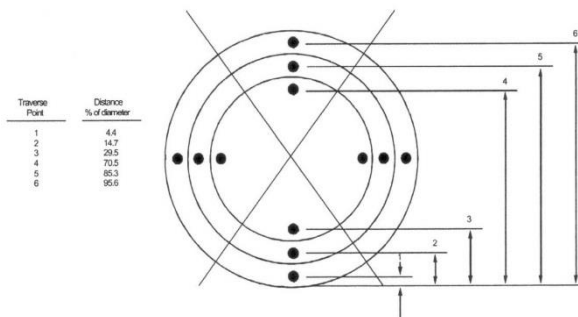


Figure 1: Example showing circular stack cross section divided

Stack Gas Velocity and Volumetric Flow Rate

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. A standard pitot tube may be used where plugging of the tube openings due to particulate matter and/or moisture is not likely to occur. Stack gas volumetric flow rate is determined from measurements of stack gas velocity, temperature, absolute pressure, dry gas composition, moisture content, and stack diameter.

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

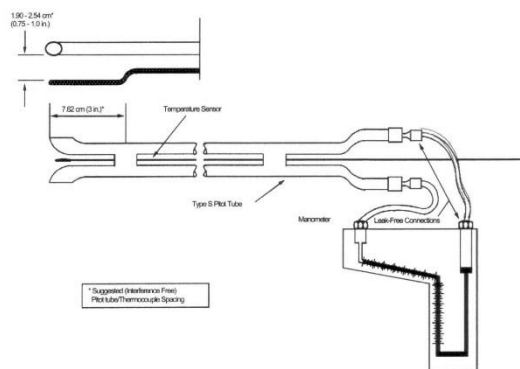


Figure 2: Type S Pitot Tube Manometer Assembly

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 $120 \pm 14^{\circ}\text{C}$ 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.

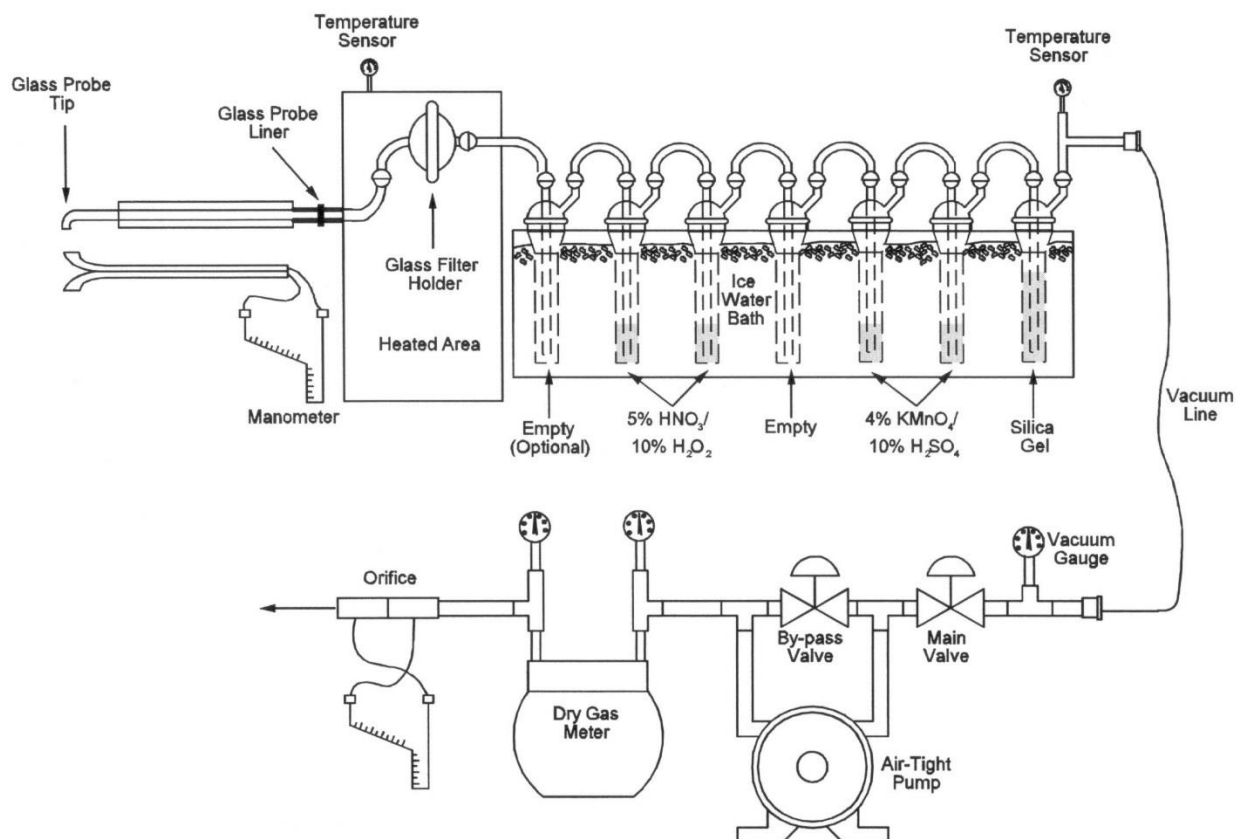


Figure 3: Particulate / Trace Metals Sampling Train

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 H₂O, one empty impinger, and a 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.

N₂O

Primary: N/A

Three N₂O samples were collected from each source using Viasensor G200 Medical Grade gas analyser, factory calibrated to Nitrous Oxide. The flue gas was introduced to the G200 after passing through a soda lime filter to remove CO₂. Multiple readings were taken over a one hour period, these readings were averaged on the analyzer and recorded on the data sheet.

Ammonia

Primary: EPA Method CTM-027

The absorbing solution in the first two impingers is 0.1 N H₂SO₄ and the triplicate samples were extracted at a constant rate for 60-minute durations. The collected samples are analyzed at Element Laboratories in Surrey, BC.

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 $\frac{1}{2}$ 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 DETAILED TEST RESULTS

The results of stack emissions were calculated using a “STACK” computer program developed by A. Lanfranco and Associates for BC MOE requirements.

Tables 3-14 present the detailed results of all emissions parameters tested and operational conditions 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	16-Feb-23	16-Feb-23	16-Feb-23	
Test Time - Particulate/Metals	09:00 - 11:08	11:22 - 13:26	13:43 - 15:44	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	16-Feb-23	16-Feb-23	16-Feb-23	
Test Time - Acid Gases	09:47 - 10:47	10:56 - 11:56	12:05 - 13:05	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	155	156	155	155
Average Gas Velocity (m/s)	13.5	13.6	14.5	13.9
Dry Flow Rate (Sm ³ /min)	1199	1196	1261	1219
Moisture (Vol. %)	11.4	12.3	13.1	12.3
Oxygen (Vol. %)(dry basis)	10.5	10.6	10.3	10.42
Carbon Dioxide (Vol. %)(dry basis)	9.5	9.7	9.6	9.6
Particulate (mg/Sm ³ @ 11% O ₂)	0.75	0.65	0.27	0.56
Hydrogen Fluoride (mg/Sm ³ @ 11% O ₂)	0.008	0.008	0.008	0.008
Ammonia (mg/Sm ³ @ 11% O ₂)	4.06	3.45	7.10	4.87
Nitrous Oxide (mg/Sm ³ @ 11% O ₂)*	1.74	0.18	0.17	0.69
Total Hydrocarbons (mg/Sm ³ @ 11% O ₂)	2.31	2.32	2.67	2.43
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00176	0.00128	0.00120	0.00141
Aluminum (mg/Sm ³ @ 11% O ₂)	0.01262	0.01369	0.01507	0.01379
Cadmium (mg/Sm ³ @ 11% O ₂)	0.00009	0.00015	0.00008	0.00011
Lead (mg/Sm ³ @ 11% O ₂)	0.00075	0.00053	0.00048	0.00059
Mercury (mg/Sm ³ @ 11% O ₂)	0.00006	0.00004	0.00003	0.00004
Phosphorus (mg/Sm ³ @ 11% O ₂)	0.00140	0.00070	0.00192	0.00134
Isokinetic Variation (%)	99.3	100	101	100

*N₂O was sampled on February 16, 2023

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	0.00075	0.00053	0.00048	0.00059
As	0.00053	0.00035	0.00032	0.00040
Cr	0.00048	0.00040	0.00040	0.00043
Sum of OC Class	0.00176	0.00128	0.00120	0.00141
Other				
Al	0.01262	0.01369	0.01507	0.01379
Cd	0.00009	0.00015	0.00008	0.00011
P	0.00140	0.00070	0.00192	0.00134
Hg	0.00006	0.00004	0.00003	0.00004

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	0.00075	0.00053	0.00048	0.00059
Sb	0.00088	0.00184	0.00080	0.00117
Cu	0.00091	0.00060	0.00029	0.00060
Mn	0.00046	0.00084	0.00042	0.00057
V	0.00035	0.00035	0.00032	0.00034
Zn	0.00473	0.00460	0.00266	0.00400
As	0.00053	0.00035	0.00032	0.00040
Cr	0.00048	0.00040	0.00040	0.00043
Co	0.00009	0.00022	0.00008	0.00013
Ni	0.00130	0.00151	0.00099	0.00127
Se	0.00053	0.00053	0.00048	0.00051
Te	0.00070	0.00035	0.00090	0.00065
Tl	0.00002	0.00047	0.00048	0.00032
Cd	0.00009	0.00015	0.00008	0.00011
Hg	0.00006	0.00004	0.00003	0.00004

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

Table 6: Unit 1 - Summary of Operating Data

Parameter		Run 1	Run 2	Run 3	Normal
Test Date - Particulate/Metals		16-Feb-23	16-Feb-23	16-Feb-23	
Test Time - Particulate/Metals		09:00 - 11:08	11:22 - 13:26	13:43 - 15:44	
Boiler Steam Production	(kg/h)	33995	33999	34028	36750
Percentage of normal	(%)	93%	93%	93%	
Boiler Secondary Combustion Zone Temp	(°C)	910	935	938	936
Percentage of normal	(%)	97%	100%	100%	
Rate of refuse fired	(kg/hr)	3.5	3.5	3.5	3.7
Percentage of normal	(%)	95%	95%	95%	
Rate of aux. fuel fired (Natural Gas)	m³/hr	170	0	0	257
Percentage of normal (%)	(%)	66%	0%	0%	

*Normal refers to the average operating rate from the previous 30 days

Table 7: Unit 2 Summary of Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	14-Feb-23	14-Feb-23	14-Feb-23	
Test Time - Particulate/Metals	09:54 - 11:55	12:07 - 14:08	14:17 - 16:18	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	14-Feb-23	14-Feb-23	14-Feb-23	
Test Time - Acid Gases	10:40 - 11:40	12:06 - 13:06	13:15 - 14:15	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	146	142	149	146
Average Gas Velocity (m/s)	12.6	12.5	12.3	12.5
Dry Flow Rate (Sm ³ /min)	1106	1112	1068	1095
Moisture (Vol. %)	13.9	14.1	14.6	14.2
Oxygen (Vol. %)(dry basis)	9.55	9.63	9.83	9.67
Carbon Dioxide (Vol. %)(dry basis)	10.2	10.1	10.3	10.2
Particulate (mg/Sm ³ @ 11% O ₂)	0.66	0.66	2.19	1.17
Hydrogen Fluoride (mg/Sm ³ @ 11% O ₂)	0.007	0.007	0.007	0.007
Ammonia (mg/Sm ³ @ 11% O ₂)	1.467	1.318	1.555	1.447
Nitrous Oxide (mg/Sm ³ @ 11% O ₂)*	0.16	1.61	1.64	1.14
Total Hydrocarbons (mg/Sm ³ @ 11% O ₂)	3.51	2.67	2.88	3.02
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00122	0.00301	0.00212	0.00212
Aluminum (mg/Sm ³ @ 11% O ₂)	0.02263	0.01493	0.03668	0.02475
Cadmium (mg/Sm ³ @ 11% O ₂)	0.00008	0.00009	0.00009	0.00009
Lead (mg/Sm ³ @ 11% O ₂)	0.00051	0.00053	0.00053	0.00052
Mercury (mg/Sm ³ @ 11% O ₂)	0.00004	0.00004	0.00005	0.00004
Phosphorus (mg/Sm ³ @ 11% O ₂)	0.00034	0.00213	0.00176	0.00141
Isokinetic Variation (%)	103	102	105	103

*N₂O was sampled on February 14, 2023

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

Table 8: 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	0.0005	0.0005	0.0005	0.0005
As	0.0003	0.0004	0.0012	0.0006
Cr	0.0004	0.0021	0.0004	0.0010
Sum of OC Class	0.0012	0.0030	0.0021	0.0021
Other				
Al	0.02263	0.01493	0.03668	0.0247
Cd	0.00008	0.00009	0.00009	0.0001
P	0.00034	0.00213	0.00176	0.0014
Hg	0.00004	0.00004	0.00005	0.0000

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

Table 9: 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	0.00051	0.00053	0.00053	0.00052
Sb	0.00084	0.00089	0.00106	0.00093
Cu	0.00193	0.00196	0.00310	0.00233
Mn	0.00196	0.01301	0.00286	0.00594
V	0.00034	0.00036	0.00035	0.00035
Zn	0.00203	0.00530	0.00317	0.00350
As	0.00034	0.00036	0.00120	0.00063
Cr	0.00038	0.00212	0.00040	0.00097
Co	0.00008	0.00009	0.00009	0.00009
Ni	0.00017	0.00092	0.00078	0.00062
Se	0.00140	0.00158	0.00053	0.00117
Te	0.00068	0.00146	0.00106	0.00106
Tl	0.00093	0.00053	0.00097	0.00081
Cd	0.00008	0.00009	0.00009	0.00009
Hg	0.00004	0.00004	0.00005	0.00004

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

Table 10: Unit 2 - Summary of Operating Data

Parameter		Run 1	Run 2	Run 3	Normal
Test Date - Particulate/Metals		14-Feb-23	14-Feb-23	14-Feb-23	
Test Time - Particulate/Metals		09:54 - 11:55	12:07 - 14:08	14:17 - 16:18	
Boiler Steam Production	(kg/h)	32000	32000	32000	34160
Percentage of normal	(%)	94%	94%	94%	
Boiler Secondary Combustion Zone Temp	(°C)	919	914	918	935
Percentage of normal	(%)	98%	98%	98%	
Rate of refuse fired	(kg/hr)	3.5	3.5	3.5	3.7
Percentage of normal	(%)	95%	95%	95%	
Rate of aux. fuel fired (Natural Gas)	m³/hr	80	80	2.1	84
Percentage of normal (%)	(%)	95%	95%	3%	

*Normal refers to the average operating rate from the previous 30 days

Table 11: Unit 3 Summary of Emission Test Results

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	15-Feb-23	15-Feb-23	15-Feb-23	
Test Time - Particulate/Metals	09:09 - 11:11	11:27 - 13:42	13:55 - 15:56	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	15-Feb-23	15-Feb-23	15-Feb-23	
Test Time - Acid Gases	09:41 - 10:41	10:51 - 11:51	12:03 - 13:03	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	154	156	157	156
Average Gas Velocity (m/s)	12.4	12.2	12.2	12.2
Dry Flow Rate (Sm ³ /min)	1072	1071	1058	1067
Moisture (Vol. %)	14.3	12.6	13.7	13.5
Oxygen (Vol. %)(dry basis)	10.1	10.2	10.1	10.1
Carbon Dioxide (Vol. %)(dry basis)	10.1	10.0	10.1	10.1
Particulate (mg/Sm ³ @ 11% O ₂)	5.66	6.40	2.90	4.98
Hydrogen Fluoride (mg/Sm ³ @ 11% O ₂)	0.008	0.007	0.007	0.007
Ammonia (mg/Sm ³ @ 11% O ₂)	3.89	3.62	2.71	3.41
Nitrous Oxide (mg/Sm ³ @ 11% O ₂)*	1.67	1.69	0.17	1.18
Total Hydrocarbons (mg/Sm ³ @ 11% O ₂)	3.01	3.35	3.05	3.14
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00688	0.01592	0.01013	0.01098
Aluminum (mg/Sm ³ @ 11% O ₂)	0.00624	0.02020	0.00414	0.01019
Cadmium (mg/Sm ³ @ 11% O ₂)	0.00078	0.00043	0.00042	0.00054
Lead (mg/Sm ³ @ 11% O ₂)	0.00468	0.01362	0.00931	0.00920
Mercury (mg/Sm ³ @ 11% O ₂)	0.00007	0.00006	0.00006	0.00006
Phosphorus (mg/Sm ³ @ 11% O ₂)	0.00092	0.00686	0.00113	0.00297
Isokinetic Variation (%)	102	100	102	101

*N₂O was sampled on February 15, 2023

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

Table 12: 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	0.00468	0.01362	0.00931	0.00920
As	0.00140	0.00038	0.00038	0.00072
Cr	0.00080	0.00192	0.00045	0.00106
Sum of OC Class	0.00688	0.01592	0.01013	0.01098
Other				
Al	0.00624	0.02020	0.00414	0.0102
Cd	0.00078	0.00043	0.00042	0.0005
P	0.00092	0.00686	0.00113	0.0030
Hg	0.00007	0.00006	0.00006	0.0001

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

Table 13: 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	0.00468	0.01362	0.00931	0.00920
Sb	0.00092	0.00267	0.00338	0.00232
Cu	0.00253	0.00526	0.00271	0.00350
Mn	0.00095	0.00290	0.00060	0.00148
V	0.00037	0.00038	0.00038	0.00037
Zn	0.03731	0.08080	0.07137	0.06316
As	0.00140	0.00038	0.00038	0.00072
Cr	0.00080	0.00192	0.00045	0.00106
Co	0.00009	0.00010	0.00009	0.00009
Ni	0.00073	0.00221	0.00098	0.00131
Se	0.00241	0.00057	0.00118	0.00139
Te	0.00073	0.00076	0.00147	0.00099
Tl	0.00055	0.00151	0.00056	0.00087
Cd	0.00078	0.00043	0.00042	0.00054
Hg	0.00007	0.00006	0.00006	0.00006

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

Table 14: Unit 3 - Summary of Operating Data

Parameter		Run 1	Run 2	Run 3	Normal
Test Date - Particulate/Metals		15-Feb-23	15-Feb-23	15-Feb-23	
Test Time - Particulate/Metals		09:09 - 11:11	11:27 - 13:42	13:55 - 15:56	
Boiler Steam Production	(kg/h)	35000	35000	34115	36580
Percentage of normal	(%)	96%	96%	93%	
Boiler Secondary Combustion Zone Temp	(°C)	910	910	890	919
Percentage of normal	(%)	99%	99%	97%	
Rate of refuse fired	(kg/hr)	3.5	3.5	3.5	3.7
Percentage of normal	(%)	95%	95%	95%	
Rate of aux. fuel fired (Natural Gas)	m³/hr	80	84	85	88
Percentage of normal (%)	(%)	91%	95%	97%	

*Normal refers to the average operating rate from the previous 30 days

4 DISCUSSION

All Units are in compliance with limits as set out in the OC.

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. None of the sample points on any of the three units were outside of the allowable +/- 10% for isokinetic rate.

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 first survey in 2023.