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& Associates Inc.**

Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III

**4515 Central Boulevard
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Waste-to-Energy Facility

Emissions Test Report

Second Quarter 2023 Survey

Operational Certificate 107051

Prepared by Louis Agassiz

Issued: June 23, 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. J. Ching, 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 June 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 second 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		15-16-May-23	16-17-May-23	17-18-May-23	
Particulate (mg/Sm ³ @ 11% O ₂)	9.0	0.52	0.22	2.60	1.11
Hydrogen Fluoride (mg/Sm ³ @ 11% O ₂)	1.0	0.008	0.008	0.008	0.008
Trace Metals - OC Class (mg/Sm ³ @ 11% O ₂)					
Lead (Pb)	-	0.0010	0.0009	0.0040	0.0019
Arsenic (As)	-	0.0010	0.0005	0.0012	0.0009
Chromium (Cr)	-	0.0022	0.0015	0.0005	0.0014
OC Class Sum (Pb, As and Cr)	0.064	0.0041	0.0029	0.0056	0.0042
Mercury (mg/Sm ³ @ 11% O ₂)	0.02	0.000035	0.000047	0.000041	0.00004
Cadmium (mg/Sm ³ @ 11% O ₂)	0.007	0.000100	0.000092	0.000538	0.0002

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

The test results are similar to those from Q1 2023. The largest change was a decrease in Unit 3 particulate matter from 4.98 mg/Sm³ @ 11% O₂ in February, to 2.60 mg/Sm³ @ 11% O₂ this survey. This is still within the normal range of outcomes and none of the variability this survey is considered significant.

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 second survey of four for the year 2023. This survey includes filterable particulate matter, trace metals, mercury (Hg), hydrogen fluoride (HF), ammonia (NH₃), nitrous oxide (N₂O) and volatile organic compounds (VOC). 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 May 15-18, 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

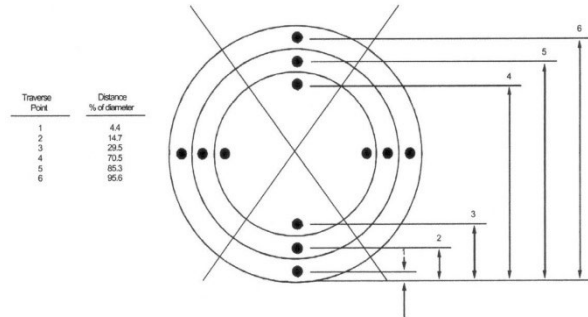


Figure 1: Example showing circular stack cross section divided

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

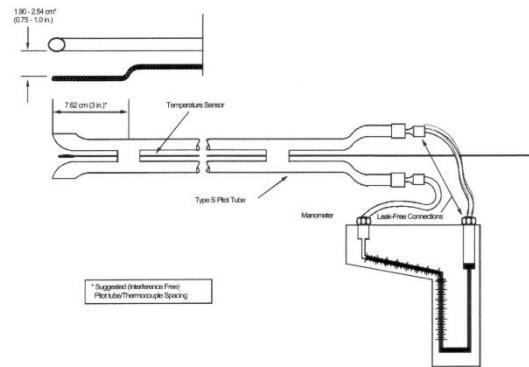


Figure 2: Type S Pitot Tube Manometer Assembly

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 presents the sample train and its configuration.

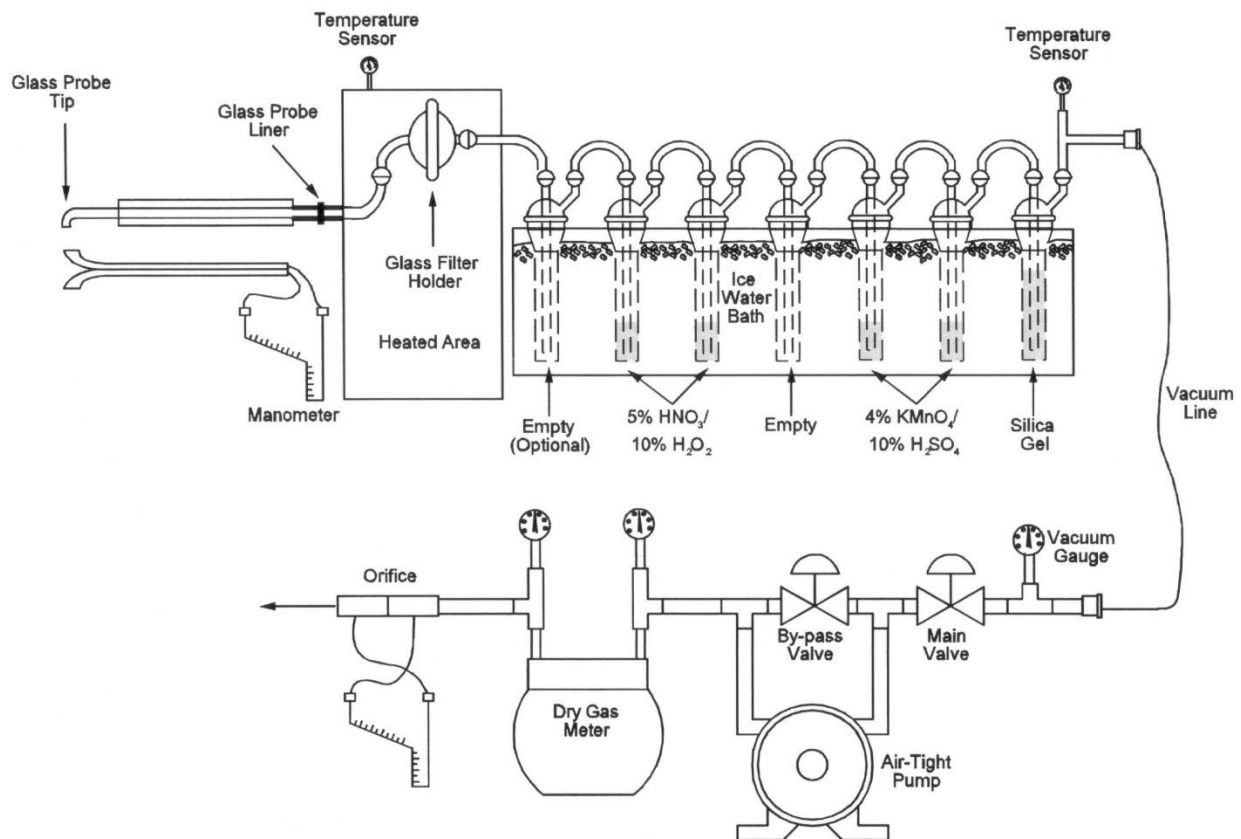


Figure 3: Particulate / Trace Metals Sampling Train

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 Element laboratory in Surrey, 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 laboratory 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	15-May-23	16-May-23	16-May-23	
Test Time - Particulate/Metals	11:42 - 13:44	09:11 - 11:13	11:29 - 13:31	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	16-May-23	16-May-23	16-May-23	
Test Time - Acid Gases	09:54 - 10:54	11:10 - 12:10	12:23 - 13:23	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	144	143	146	144
Average Gas Velocity (m/s)	12.6	12.9	13.4	13.0
Dry Flow Rate (Sm ³ /min)	1087	1147	1184	1139
Moisture (Vol. %)	15.8	13.8	13.7	14.4
Oxygen (Vol. %)(dry basis)	8.7	9.3	10.1	9.4
Carbon Dioxide (Vol. %)(dry basis)	11.1	10.9	10.2	10.7
Particulate (mg/Sm³ @ 11% O₂)	0.72	0.55	0.29	0.52
Hydrogen Fluoride (mg/Sm³ @ 11% O₂)	0.009	0.008	0.007	0.008
Ammonia (mg/Sm³ @ 11% O₂)	0.72	1.17	2.80	1.56
Nitrous Oxide (mg/Sm³ @ 11% O₂)*	0.15	0.16	0.17	0.16
Total Hydrocarbons (mg/Sm³ @ 11% O₂)	2.82	2.26	2.32	2.47
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00432	0.00179	0.00618	0.00410
Aluminum (mg/Sm³ @ 11% O₂)	0.01887	0.01709	0.01107	0.01568
Cadmium (mg/Sm³ @ 11% O₂)	0.00008	0.00014	0.00008	0.00010
Lead (mg/Sm³ @ 11% O₂)	0.00187	0.00048	0.00050	0.00095
Mercury (mg/Sm³ @ 11% O₂)	0.00004	0.00003	0.00003	0.00003
Phosphorus (mg/Sm³ @ 11% O₂)	0.00288	0.00290	0.00235	0.00271
Isokinetic Variation (%)	105	103	103	104

*N₂O was sampled on May 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	0.00187	0.00048	0.00050	0.00095
As	0.00122	0.00045	0.00121	0.00096
Cr	0.00124	0.00086	0.00446	0.00219
Sum of OC Class	0.00432	0.00179	0.00618	0.00410
Other				
Al	0.01887	0.01709	0.01107	0.01568
Cd	0.00008	0.00014	0.00008	0.00010
P	0.00288	0.00290	0.00235	0.00271
Hg	0.00004	0.00003	0.00003	0.00003

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	0.00187	0.00048	0.00050	0.00095
Sb	0.00080	0.00081	0.00210	0.00123
Cu	0.00131	0.00152	0.00038	0.00107
Mn	0.00086	0.00087	0.00114	0.00096
V	0.00032	0.00032	0.00034	0.00033
Zn	0.00429	0.00803	0.00628	0.00620
As	0.00122	0.00045	0.00121	0.00096
Cr	0.00124	0.00086	0.00446	0.00219
Co	0.00026	0.00008	0.00018	0.00017
Ni	0.00064	0.00422	0.00373	0.00286
Se	0.00280	0.00379	0.00772	0.00477
Te	0.00086	0.00081	0.00067	0.00078
Tl	0.00088	0.00279	0.00050	0.00139
Cd	0.00008	0.00014	0.00008	0.00010
Hg	0.00004	0.00003	0.00003	0.00003

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		15-May-23	16-May-23	16-May-23	
Test Time - Particulate/Metals		11:42 - 13:44	09:11 - 11:13	11:29 - 13:31	
Boiler Steam Production	(kg/h)	38535	37999	38050	37818
Percentage of normal	(%)	102%	100%	101%	
Boiler Secondary Combustion Zone Temp	(°C)	961	948	951	936
Percentage of normal	(%)	103%	101%	102%	
Rate of refuse fired	(tonnes/hr)	10.15	9.98	9.87	10
Percentage of normal	(%)	102%	100%	99%	
Rate of aux. fuel fired (Natural Gas)	m³/hr	0	0	0	40
Percentage of normal (%)	(%)	0%	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	16-May-23	17-May-23	17-May-23	
Test Time - Particulate/Metals	12:15 - 14:17	09:11 - 11:12	11:35 - 13:39	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	17-May-23	17-May-23	17-May-23	
Test Time - Acid Gases	09:58 - 10:58	11:10 - 12:10	12:22 - 13:22	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	156	147	148	150
Average Gas Velocity (m/s)	12.6	12.7	12.5	12.6
Dry Flow Rate (Sm ³ /min)	1072	1087	1076	1078
Moisture (Vol. %)	14.9	15.8	15.5	15.4
Oxygen (Vol. %)(dry basis)	11.0	10.0	10.0	10.3
Carbon Dioxide (Vol. %)(dry basis)	9.9	10.0	9.8	9.9
Particulate (mg/Sm³ @ 11% O₂)	0.04	0.57	0.05	0.22
Hydrogen Fluoride (mg/Sm³ @ 11% O₂)	0.009	0.008	0.008	0.008
Ammonia (mg/Sm³ @ 11% O₂)	1.01	2.54	0.08	1.21
Nitrous Oxide (mg/Sm³ @ 11% O₂)*	0.18	0.17	0.17	0.17
Total Hydrocarbons (mg/Sm³ @ 11% O₂)	1.88	2.54	2.56	2.33
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00323	0.00295	0.00261	0.00293
Aluminum (mg/Sm³ @ 11% O₂)	0.00622	0.00583	0.00673	0.00626
Cadmium (mg/Sm³ @ 11% O₂)	0.00010	0.00009	0.00009	0.00009
Lead (mg/Sm³ @ 11% O₂)	0.00155	0.00055	0.00053	0.00088
Mercury (mg/Sm³ @ 11% O₂)	0.00005	0.00005	0.00004	0.00005
Phosphorus (mg/Sm³ @ 11% O₂)	0.00272	0.00109	0.00089	0.00157
Isokinetic Variation (%)	106	105	105	105

*N₂O was sampled on May 17, 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	0.0016	0.0005	0.0005	0.0009
As	0.0004	0.0007	0.0005	0.0005
Cr	0.0013	0.0017	0.0015	0.0015
Sum of OC Class	0.0032	0.0030	0.0026	0.0029
Other				
Al	0.00622	0.00583	0.00673	0.0063
Cd	0.00010	0.00009	0.00009	0.0001
P	0.00272	0.00109	0.00089	0.0016
Hg	0.00005	0.00005	0.00004	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	0.00155	0.00055	0.00053	0.00088
Sb	0.00097	0.00091	0.00292	0.00160
Cu	0.00071	0.00041	0.00040	0.00051
Mn	0.00058	0.00109	0.00060	0.00076
V	0.00039	0.00036	0.00035	0.00037
Zn	0.00330	0.00190	0.00287	0.00269
As	0.00039	0.00069	0.00053	0.00054
Cr	0.00128	0.00171	0.00155	0.00152
Co	0.00010	0.00026	0.00009	0.00015
Ni	0.00016	0.00401	0.00319	0.00245
Se	0.00496	0.00055	0.00218	0.00256
Te	0.00078	0.00073	0.00071	0.00074
Tl	0.00058	0.00055	0.00053	0.00055
Cd	0.00010	0.00009	0.00009	0.00009
Hg	0.00005	0.00005	0.00004	0.00005

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		16-May-23	17-May-23	17-May-23	
Test Time - Particulate/Metals		12:15 - 14:17	09:11 - 11:12	11:35 - 13:39	
Boiler Steam Production	(kg/h)	37245	35005	35003	34673
Percentage of normal	(%)	107%	101%	101%	
Boiler Secondary Combustion Zone Temp	(°C)	970	937	940	939
Percentage of normal	(%)	103%	100%	100%	
Rate of refuse fired	(tonnes/hr)	8.87	9.88	10.02	10
Percentage of normal	(%)	89%	99%	100%	
Rate of aux. fuel fired (Natural Gas)	m ³ /hr	87.3	84.8	84.5	170
Percentage of normal (%)	(%)	51%	50%	50%	

*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	17-May-23	18-May-23	18-May-23	
Test Time - Particulate/Metals	11:40 - 13:42	08:29 - 10:31	10:41 - 12:43	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	18-May-23	18-May-23	18-May-23	
Test Time - Acid Gases	09:09 - 10:09	10:26 - 11:26	11:40 - 12:40	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	153	154	155	154
Average Gas Velocity (m/s)	12.4	12.4	12.6	12.5
Dry Flow Rate (Sm ³ /min)	1048	1087	1048	1061
Moisture (Vol. %)	15.9	12.6	16.8	15.1
Oxygen (Vol. %)(dry basis)	10.1	8.6	8.8	9.2
Carbon Dioxide (Vol. %)(dry basis)	10.0	9.6	10.6	10.1
Particulate (mg/Sm³ @ 11% O₂)	2.08	3.15	2.57	2.60
Hydrogen Fluoride (mg/Sm³ @ 11% O₂)	0.008	0.007	0.008	0.008
Ammonia (mg/Sm³ @ 11% O₂)	0.95	0.08	1.64	0.89
Nitrous Oxide (mg/Sm³ @ 11% O₂)*	0.17	0.15	0.15	0.16
Total Hydrocarbons (mg/Sm³ @ 11% O₂)	2.50	3.41	2.65	2.85
Trace Metals - Operational Certificate List (mg/Sm³ @ 11% O₂)				
OC Class (Pb, As and Cr)	0.00431	0.00601	0.00658	0.00563
Aluminum (mg/Sm³ @ 11% O₂)	0.01097	0.01179	0.01300	0.01192
Cadmium (mg/Sm³ @ 11% O₂)	0.00034	0.00036	0.00092	0.00054
Lead (mg/Sm³ @ 11% O₂)	0.00311	0.00406	0.00475	0.00397
Mercury (mg/Sm³ @ 11% O₂)	0.00002	0.00005	0.00005	0.00004
Phosphorus (mg/Sm³ @ 11% O₂)	0.00146	0.00351	0.00390	0.00296
Isokinetic Variation (%)	106	102	106	105

*N₂O was sampled on May 18, 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	0.00311	0.00406	0.00475	0.00397
As	0.00055	0.00194	0.00114	0.00121
Cr	0.00065	0.00000	0.00070	0.00045
Sum of OC Class	0.00431	0.00601	0.00658	0.00563
Other				
Al	0.01097	0.01179	0.01300	0.0119
Cd	0.00034	0.00036	0.00092	0.0005
P	0.00146	0.00351	0.00390	0.0030
Hg	0.00002	0.00005	0.00005	0.0000

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	0.00311	0.00406	0.00475	0.00397
Sb	0.00009	0.00080	0.00236	0.00108
Cu	0.00183	0.00140	0.00140	0.00154
Mn	0.00077	0.00092	0.00101	0.00090
V	0.00037	0.00032	0.00033	0.00034
Zn	0.02420	0.03034	0.04405	0.03286
As	0.00055	0.00194	0.00114	0.00121
Cr	0.00065	0.00000	0.00070	0.00045
Co	0.00009	0.00017	0.00008	0.00011
Ni	0.00073	0.00198	0.00117	0.00129
Se	0.00133	0.00048	0.00177	0.00119
Te	0.00073	0.00035	0.00065	0.00058
Tl	0.00152	0.00048	0.00089	0.00096
Cd	0.00034	0.00036	0.00092	0.00054
Hg	0.00002	0.00005	0.00005	0.00004

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		17-May-23	18-May-23	18-May-23	
Test Time - Particulate/Metals		11:40 - 13:42	08:29 - 10:31	10:41 - 12:43	
Boiler Steam Production	(kg/h)	38040	40369	40035	37648
Percentage of normal	(%)	101%	107%	106%	
Boiler Secondary Combustion Zone Temp	(°C)	933	908	911	908
Percentage of normal	(%)	103%	100%	100%	
Rate of refuse fired	(tonnes/hr)	9.58	10	9.79	10
Percentage of normal	(%)	96%	100%	98%	
Rate of aux. fuel fired (Natural Gas)	m³/hr	157	163	165	162
Percentage of normal (%)	(%)	97%	101%	102%	

*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.

During the monitoring, there were no environmental observations made that would impact the validity of the test program. The weather was normal with light rain and wind on one day, but otherwise dry.

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 second survey in 2023.