A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III
4515 Central Boulevard
Burnaby, BC V5H 0C6

Waste-to-Energy Facility

Emissions Test Report
Fourth Quarter 2024 Survey
Operational Certificate 107051

Prepared by Mr. Carter Lanfranco

Issued: January 24th, 2024

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. L. Agassiz (certified), Mr. J. Ching (certified), Mr. L. Forrer (certified), Mr. S. Verby (certified) and Mr B. Lester.

The report was prepared by Mr. C. Lanfranco 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 January 24th, 2024, by:

Mr. Mark Lanfranco, CST
President | Owner

TEST PROGRAM ORGANIZATION

Primary Stakeholders:	Mr. Brent Kirkpatrick Metro Vancouver Lead Senior Engineer Email: brent.kirkpatrick@metrovancouver.org Tel: (604) 451-6623 Ms. Nicole Victor Reworld Waste Facility Manager Email: nvictor@reworldwaste.com Tel: (604) 521-1025 ext.211
Project Manager:	Mr. Mark Lanfranco President | Owner A. Lanfranco and Associates Inc. 101 – 9488 189 St Surrey, BC Canada V4N 4W7 Tel: (604) 881-2582 Email: mark.lanfranco@alanfranco.com
Sampling Crew:	Mr. B. Lester – A. Lanfranco and Associates Inc. Mr. L. Agassiz - A. Lanfranco and Associates Inc. Mr. C. Lanfranco - A. Lanfranco and Associates Inc. Mr. L. Forrer - A. Lanfranco and Associates Inc. Mr. J. Ching – A. Lanfranco and Associates Inc. Mr. S. Verby – A. Lanfranco and Associates Inc.

Table of Contents

List of Tables

List of Figures

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 Fourth Quarter of 2024.

Table 1: Summary Comparison of Emissions Test Results with Limits

SUMMARY TABLE: COMPARISON OF EMISSION TEST RESULTS WITH LIMITS

Parameter	Limit	Unit 1	Unit 2	Unit 3	Facility Average
Test Date		12-13-Dec-24	19-20-Nov-24	18-19-Nov-24	
Particulate (mg/Sm^3 @ 11% O_2)	**9.0**	0.04	0.34	0.91	**0.43**
Hydrogen Fluoride (mg/Sm^3 @ 11% O_2)	**1.0**	0.077	0.077	0.064	**0.07**
Trace Metals - OC Class (mg/Sm^3 @ 11% O_2)					
Lead (Pb)	-	0.0024	0.0006	0.0027	**0.0019**
Arsenic (As)	-	0.0006	0.0008	0.0006	**0.0007**
Chromium (Cr)	-	0.0009	0.0016	0.0022	**0.0016**
OC Class Sum (Pb, As and Cr)	**0.064**	0.0039	0.0029	0.0055	**0.0041**
Mercury (mg/Sm^3 @ 11% O_2)	**0.02**	0.000106	0.000036	0.000230	**0.00012**
Cadmium (mg/Sm^3 @ 11% O_2)	**0.007**	0.000152	0.000094	0.000103	**0.00012**

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

The facility average for all parameters investigated is very similar to the findings from earlier this year. There is little variability from test to test and all results are well within the limits set by operational certificate 107051.

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). Stationary source monitoring is required Quarterly.

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.

During the initial mobilization the week of November 18th the facility experienced some maintenance down time which resulted in the postponement of Unit 1 monitoring. Unit 1 monitoring was completed the week of December 9th.

The survey included monitoring for: filterable particulate matter, trace metals, mercury (Hg), hydrogen fluoride (HF), ammonia (NH_3), nitrous oxide (N_2O) 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 appendices for this report, including computer outputs of calculated data, analytical data, field data sheets, calibrations, and professional certifications are issued separately.

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

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)	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

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.

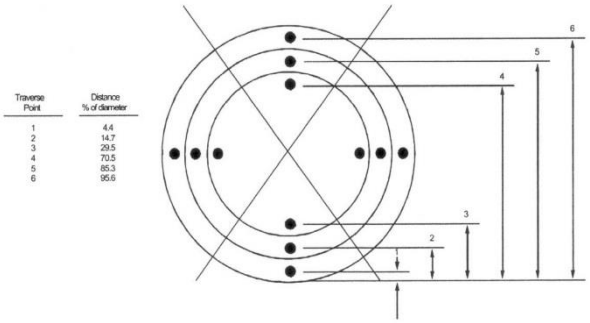

Figure 1: Example showing circular stack cross section divided

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. 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.

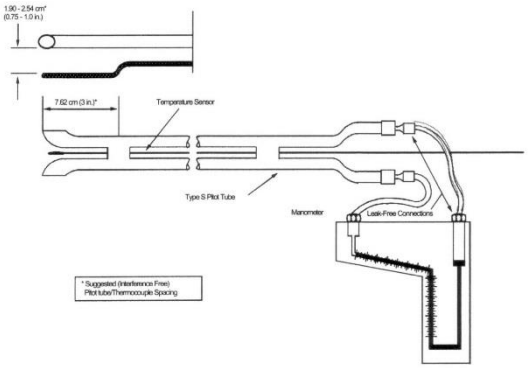

Figure 2: Type S Pitot Tube Manometer Assembly

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 ± 14°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.

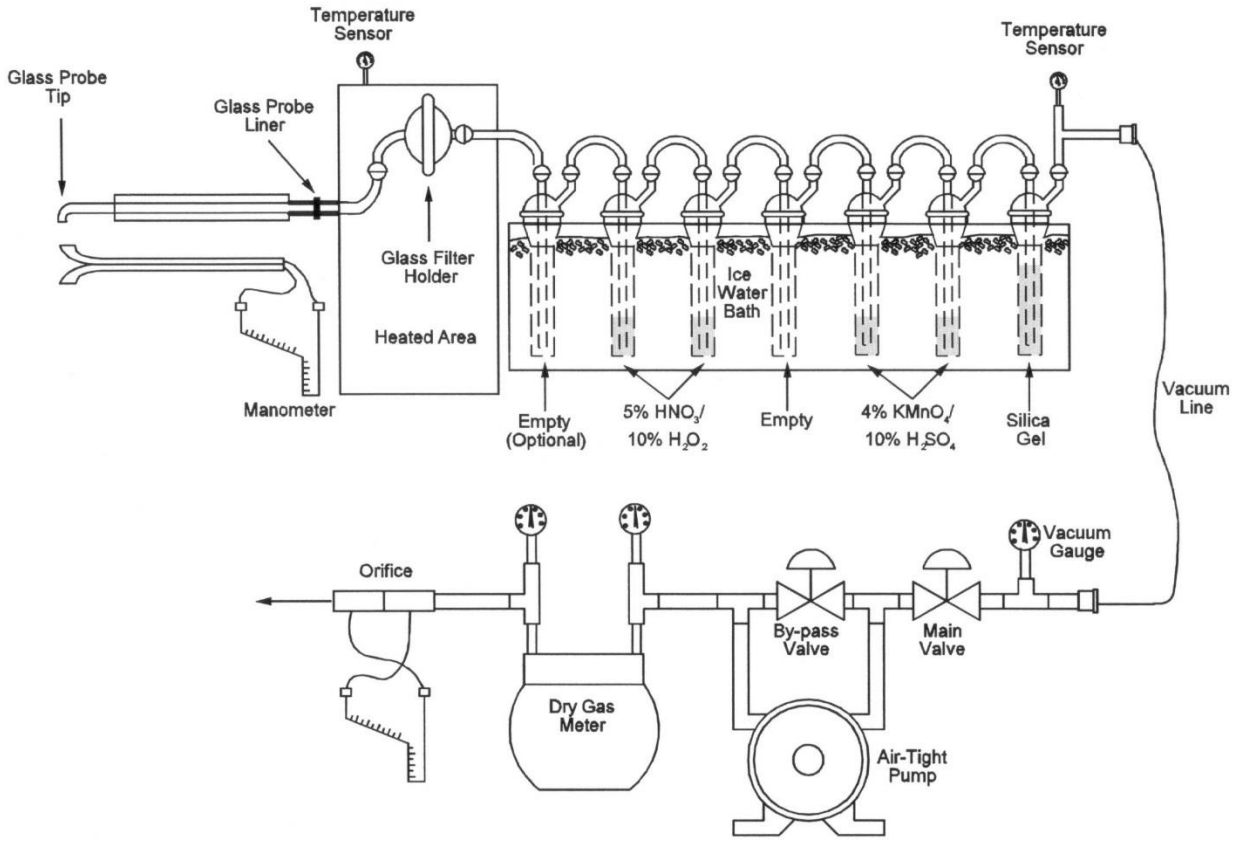

Figure 3: Particulate / Trace Metals Sampling Train

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 H_2O, 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.

N_2O — Primary: N/A

Three N_2O grab samples were collected into 10L tedlar bags from each source. The samples were transported to Bureau Veritas in Mississauga, ON where they were measured by GC/MS.

Ammonia — Primary: EPA Method CTM-027

The absorbing solution in the first two impingers is 0.1 N H_2SO_4 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 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 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

TABLE 3: UNIT 1 - SUMMARY OF EMISSION TEST RESULTS

Parameter	Run 1	Run 2	Run 3	Average
Test Date - Particulate/Metals	12-Dec-24	13-Dec-24	13-Dec-24	
Test Time - Particulate/Metals	11:20 - 13:22	8:21 - 10:24	10:46 - 12:48	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	13-Dec-24	13-Dec-24	13-Dec-24	
Test Time - Acid Gases	09:15 - 10:15	10:53 - 11:53	12:10 - 13:10	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	153	154	152	153
Average Gas Velocity (m/s)	13.7	13.8	13.8	13.8
Dry Flow Rate (Sm^3/min)	1196	1185	1182	1187
Moisture (Vol. %)	13.3	13.5	14.5	13.8
Oxygen (Vol. %)(dry basis)	9.7	9.8	10.1	9.9
Carbon Dioxide (Vol. %)(dry basis)	10.6	10.0	9.4	10.0
Particulate (mg/Sm^3 @ 11% O_2)	0.04	0.04	0.03	**0.04**
Hydrogen Fluoride (mg/Sm^3 @ 11% O_2)	0.081	0.073	0.078	**0.077**
Ammonia (mg/Sm^3 @ 11% O_2)	1.63	3.96	6.84	**4.15**
Nitrous Oxide (mg/Sm^3 @ 11% O_2)*	8.93	10.15	8.86	**9.31**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)	7.64	2.56	2.52	**4.24**
Trace Metals - Operational Certificate List (mg/Sm^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00339	0.00504	0.00328	**0.00390**
Aluminum (mg/Sm^3 @ 11% O_2)	0.01938	0.02011	0.01182	0.01710
Cadmium (mg/Sm^3 @ 11% O_2)	0.00010	0.00028	0.00008	0.00015
Lead (mg/Sm^3 @ 11% O_2)	0.00279	0.00270	0.00162	0.00237
Mercury (mg/Sm^3 @ 11% O_2)	0.00024	0.00006	0.00002	0.000106
Phosphorus (mg/Sm^3 @ 11% O_2)	0.00388	0.00158	0.00304	0.00283
Isokinetic Variation (%)	101	101	102	102

***N_2O was sampled on December 13, 2024**

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	0.00279	0.00270	0.00162	0.00237
As	0.00019	0.00087	0.00088	0.00065
Cr	0.00040	0.00147	0.00078	0.00089
Sum of OC Class	0.00339	0.00504	0.00328	0.00390
Other				
Al	0.01938	0.02011	0.01182	0.01710
Cd	0.00010	0.00028	0.00008	0.00015
P	0.00388	0.00158	0.00304	0.00283
Hg	0.00024	0.00006	0.00002	0.00011

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	0.00279	0.00270	0.00162	0.00237
Sb	0.00397	0.00099	0.00372	0.00289
Cu	0.00070	0.00044	0.00051	0.00055
Mn	0.00116	0.00118	0.00101	0.00112
V	0.00039	0.00039	0.00034	0.00037
Zn	0.00880	0.00741	0.00645	0.00755
As	0.00019	0.00087	0.00088	0.00065
Cr	0.00040	0.00147	0.00078	0.00089
Co	0.00010	0.00010	0.00017	0.00012
Ni	0.00019	0.00020	0.00017	0.00019
Se	0.00058	0.00059	0.00051	0.00056
Te	0.00078	0.00079	0.00216	0.00124
Tl	0.00058	0.00120	0.00051	0.00076
Cd	0.00010	0.00028	0.00008	0.00015
Hg	0.00024	0.00006	0.00002	0.00011

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		12-Dec-24	13-Dec-24	13-Dec-24	
Test Time - Particulate/Metals		11:20 - 13:22	8:21 - 10:24	10:46 - 12:48	
Boiler Steam Production	(kg/h)	38223	37670	37347	34000
Percentage of normal	(%)	112%	110%	109%	
Boiler Secondary Combustion Zone Temp	(°C)	939	912	914	900
Percentage of normal	(%)	104%	101%	101%	
Rate of refuse fired	(kg/hr)	10610	10110	10255	10000
Percentage of normal	(%)	106%	101%	102%	
Rate of aux. fuel fired (Natural Gas)	m^3/hr	0	0	0	100
Percentage of normal (%)	(%)	0%	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	19-Nov-24	20-Nov-24	20-Nov-24	
Test Time - Particulate/Metals	10:38 - 12:42	09:07 - 11:11	11:27 - 13:30	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	20-Nov-24	20-Nov-24	20-Nov-24	
Test Time - Acid Gases	09:39 - 10:39	10:55 - 11:55	12:10 - 13:10	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	148	145	149	147
Average Gas Velocity (m/s)	14.0	14.4	13.4	13.9
Dry Flow Rate (Sm^3/min)	1192	1207	1123	1174
Moisture (Vol. %)	15.8	16.7	16.2	16.2
Oxygen (Vol. %)(dry basis)	10.8	9.7	9.5	10.0
Carbon Dioxide (Vol. %)(dry basis)	9.8	10.5	11.0	10.4
Particulate (mg/Sm^3 @ 11% O_2)	0.12	0.44	0.45	**0.34**
Hydrogen Fluoride (mg/Sm^3 @ 11% O_2)	0.081	0.073	0.075	**0.077**
Ammonia (mg/Sm^3 @ 11% O_2)	1.03	0.45	0.12	**0.53**
Nitrous Oxide (mg/Sm^3 @ 11% O_2)*	8.58	5.36	5.25	**6.39**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)	2.44	2.44	3.09	**2.65**
Trace Metals - Operational Certificate List (mg/Sm^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00239	0.00195	0.00451	**0.00295**
Aluminum (mg/Sm^3 @ 11% O_2)	0.00178	0.00655	0.00155	0.00329
Cadmium (mg/Sm^3 @ 11% O_2)	0.00009	0.00010	0.00010	0.00009
Lead (mg/Sm^3 @ 11% O_2)	0.00053	0.00058	0.00058	0.00056
Mercury (mg/Sm^3 @ 11% O_2)	0.00004	0.00004	0.00004	0.00004
Phosphorus (mg/Sm^3 @ 11% O_2)	0.00142	0.00501	0.00097	0.00247
Isokinetic Variation (%)	104	106	105	105

***N_2O was sampled on November 20, 2024**

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	0.0006	0.0006	0.0006
As	0.0009	0.0004	0.0012	0.0008
Cr	0.0010	0.0010	0.0028	0.0016
Sum of OC Class	0.0024	0.0019	0.0045	0.0029
Other				
Al	0.00178	0.00655	0.00155	0.0033
Cd	0.00009	0.00010	0.00010	0.0001
P	0.00142	0.00501	0.00097	0.0025
Hg	0.00004	0.00004	0.00004	0.00004

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	0.00053	0.00058	0.00058	0.00056
Sb	0.00294	0.00241	0.00387	0.00307
Cu	0.00026	0.00032	0.00028	0.00029
Mn	0.00153	0.00069	0.00085	0.00103
V	0.00036	0.00039	0.00039	0.00038
Zn	0.00004	0.00019	0.00112	0.00045
As	0.00089	0.00039	0.00116	0.00081
Cr	0.00096	0.00099	0.00277	0.00157
Co	0.00009	0.00010	0.00005	0.00008
Ni	0.00137	0.00106	0.00244	0.00162
Se	0.00385	0.00058	0.00058	0.00167
Te	0.00157	0.00077	0.00221	0.00151
Tl	0.00230	0.00144	0.00058	0.00144
Cd	0.00009	0.00010	0.00010	0.00009
Hg	0.00004	0.00004	0.00004	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		19-Nov-24	20-Nov-24	20-Nov-24	
Test Time - Particulate/Metals		10:38 - 12:42	09:07 - 11:11	11:27 - 13:30	
Boiler Steam Production	(kg/h)	37524	38230	38278	34000
Percentage of normal	(%)	110%	112%	112%	
Boiler Secondary Combustion Zone Temp	(°C)	933	952	953	900
Percentage of normal	(%)	103%	105%	105%	
Rate of refuse fired	(kg/hr)	10598	10189	10170	10000
Percentage of normal	(%)	105%	101%	102%	
Rate of aux. fuel fired (Natural Gas)	m^3/hr	0	0	0	100
Percentage of normal (%)	(%)	0%	0%	0%	

*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	18-Nov-24	19-Nov-24	19-Nov-24	
Test Time - Particulate/Metals	12:17 - 14:22	09:13 - 11:17	11:51 - 13:55	
Duration - Minutes	120	120	120	
Test Date - Acid Gases	19-Nov-24	19-Nov-24	19-Nov-24	
Test Time - Acid Gases	10:05 - 11:05	11:51 - 12:51	13:11 - 14:11	
Duration - Minutes	60	60	60	
Stack Temperature (°C)	155	156	156	156
Average Gas Velocity (m/s)	13.2	13.7	13.7	13.6
Dry Flow Rate (Sm^3/min)	1132	1145	1159	1146
Moisture (Vol. %)	13.8	16.1	14.7	14.9
Oxygen (Vol. %)(dry basis)	10.1	10.0	10.2	10.1
Carbon Dioxide (Vol. %)(dry basis)	10.0	10.3	10.0	10.1
Particulate (mg/Sm^3 @ 11% O_2)	0.93	1.09	0.70	**0.91**
Hydrogen Fluoride (mg/Sm^3 @ 11% O_2)	0.065	0.059	0.067	**0.064**
Ammonia (mg/Sm^3 @ 11% O_2)	4.98	0.48	0.19	**1.89**
Nitrous Oxide (mg/Sm^3 @ 11% O_2)*	7.20	6.13	6.93	**6.76**
Total Hydrocarbons (mg/Sm^3 @ 11% O_2)	3.06	1.85	3.04	**2.65**
Trace Metals - Operational Certificate List (mg/Sm^3 @ 11% O_2)				
OC Class (Pb, As and Cr)	0.00468	0.00435	0.00746	**0.00550**
Aluminum (mg/Sm^3 @ 11% O_2)	0.00678	0.00686	0.00869	0.00745
Cadmium (mg/Sm^3 @ 11% O_2)	0.00011	0.00010	0.00010	0.00010
Lead (mg/Sm^3 @ 11% O_2)	0.0023	0.0020	0.0038	0.0027
Mercury (mg/Sm^3 @ 11% O_2)	0.00054	0.00009	0.00006	0.00023
Phosphorus (mg/Sm^3 @ 11% O_2)	0.00721	0.00727	0.00373	0.00607
Isokinetic Variation (%)	100	103	101	102

***N_2O was sampled on November 19, 2024**

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	0.00231	0.00196	0.00383	0.00270
As	0.00042	0.00061	0.00062	0.00055
Cr	0.00194	0.00178	0.00301	0.00225
Sum of OC Class	0.00468	0.00435	0.00746	0.00550
Other				
Al	0.00678	0.00686	0.00869	0.0074
Cd	0.00011	0.00010	0.00010	0.0001
P	0.00721	0.00727	0.00373	0.0061
Hg	0.00054	0.00009	0.00006	0.0002

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	0.00231	0.00196	0.00383	0.00270
Sb	0.00106	0.00101	0.00103	0.00103
Cu	0.00128	0.00125	0.00120	0.00124
Mn	0.00208	0.00109	0.00112	0.00143
V	0.00042	0.00040	0.00041	0.00041
Zn	0.01624	0.01595	0.01941	0.01720
As	0.00042	0.00061	0.00062	0.00055
Cr	0.00194	0.00178	0.00301	0.00225
Co	0.00011	0.00010	0.00010	0.00010
Ni	0.00293	0.00281	0.00153	0.00242
Se	0.00064	0.00061	0.00062	0.00062
Te	0.00085	0.00081	0.00083	0.00083
Tl	0.00064	0.00061	0.00062	0.00062
Cd	0.00011	0.00010	0.00010	0.00010
Hg	0.00054	0.00009	0.00006	0.00023

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		18-Nov-24	19-Nov-24	19-Nov-24	
Test Time - Particulate/Metals		12:17 - 14:22	09:13 - 11:17	11:51 - 13:55	
Boiler Steam Production	(kg/h)	36725	37754	37390	34000
Percentage of normal	(%)	108%	111%	109%	
Boiler Secondary Combustion Zone Temp	(°C)	898	917	908	900
Percentage of normal	(%)	99%	102%	101%	
Rate of refuse fired	(kg/hr)	10105	10280	10580	10000
Percentage of normal	(%)	101%	103%	106%	
Rate of aux. fuel fired (Natural Gas)	m^3/hr	0	0	0	100
Percentage of normal (%)	(%)	0%	0%	0%	0

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

DISCUSSION

All Units sampled are following the allowable limits as set out in the OC for the fourth quarter of 2024. Due to facility maintenance, Unit 1 was completed approximately 3 weeks after Units 2 and 3.

This survey concludes the annual test program for 2024. All parameters sampled throughout the year demonstrated compliance with Operational Certificate 107051. There was very little variability found from the first quarter of sampling to the fourth.

The annual facility average (all three units) for filterable particulate was 0.91 mg/Sm^3 @ 11% O_2. Hydrogen Fluoride yielded an annual facility average result of 0.04 mg/Sm^3 @ 11% O_2. The OC class of lead, arsenic and chromium produced an annual concentration of 0.005 mg/Sm^3 @ 11% O_2 on average. Mercury and cadmium were consistently found at very low levels, mostly at method detection limits throughout the entirety of 2024.

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 C, 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 MV's WTEF compliance testing requirements for the fourth survey in 2024.