A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III

4515 Central Boulevard

Burnaby, BC V5H 0C6

Trace Organics Emission Report
Waste-to-Energy Facility

July 2024 Survey

Operational Certificate 107051

Prepared by Mr. Carter Lanfranco

Report Issued: September 4, 2024

CERTIFICATION

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

The field crew consisted of:

Mr. D. Sampson (certified), Mr. L. Forrer (certified) and Mr. C. De La O (certified).

The report was prepared by Mr. C. Lanfranco using reporting principles and guidelines generally acceptable to Metro Vancouver (MV) and the BC MOE.

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 August 28, 2024, by:

Mr. Mark Lanfranco, CST
Principal

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APPENDICES

TEST PROGRAM ORGANIZATION

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Sampling Crew:	Mr. D. Sampson – A. Lanfranco and Associates Inc. Mr. C. De La O – A. Lanfranco and Associates Inc.

SUMMARY

The following table presents the average of triplicate emission test results from Unit 3 for various trace organics on July 24-25-26, 2024.

Parameter		Unit 3	Limit
PCDD/PCDF	(TEQ ng/Sm^3 @ 11% O_2)	0.0042	0.08
PCDD/PCDF Mass Emission	(TEQ g/day)	7.78E-06	
PAH	(µg/Sm^3 @ 11% O_2)	0.0786	5.0
HCB*	(µg/Sm^3 @ 11% O_2)	0.0020	
Total CB	(µg/Sm^3 @ 11% O_2)	0.3069	1.0
Total CP*	(µg/Sm^3 @ 11% O_2)	0.0088	1.0
Total PCB	(µg/Sm^3 @ 11% O_2)	0.0239	1.0
Flowrate	(Sm^3/min)	1146	
Temperature	(°C)	157	
O_2	(vol % dry)	9.8	

Standard conditions (S) of 20 °C and 101.325 kPa (dry)

Note - for PCDD/PCDF if the results of all parameters for all three test runs are non-detect, the average result is reported as 'ND' rather than at one half detection limit

*Calculated using one half detection limit

Note: PCDD/PCDF results are in nanograms per cubic meter and grams/day, PAH/HCB/CB/CP are reported in micrograms per cubic meter.

Compared to previous surveys, more of the PCDD/PCDF congeners were detected; however, the total was well below the emission limits. The remaining parameters were emitting at historically normal levels, also well below the emission limits.

1 INTRODUCTION

Metro Vancouver (MV) commissioned an emissions (air) monitoring survey at the Waste-to-Energy Facility (WTEF) in Burnaby, B.C. This report documents the results of a semi-volatile organics survey for dioxin/furan (PCDD/PCDF), polychlorinated biphenyl (PCB), polycyclic aromatic hydrocarbons (PAH), hexachlorobenzenes (HCB), chlorobenzenes (CB), and chlorophenols (CP) during normal operations at the facility.

This report includes detailed emission results, a brief outline of methods employed, equipment used, and a discussion of the survey. Supporting data is presented in the appendices section of this report.

The individual emission source monitored for 2024 was Unit 3. Unit 2 is scheduled for 2025.

2 METHODOLOGY

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

- Metro Vancouver
- BC Ministry of Environment & Climate Change Strategy
- 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.

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
Dioxin/Furan (sampling)	EPS 1/RM/2 Reference Method for Source Testing - Measurement of Releases of Semi-Volatile Organic Compounds from Stationary Sources EPA Method 23 Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources supporting
Dioxin/Furan (analytical)	Methodology for Organic Analysis - A Method for the Analysis of Polychlorinated Dibenzopara-Dioxins (PCDD's), Polychlorinated Dibenzofurans (PCDF's) Environment Canada, December 1989

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.

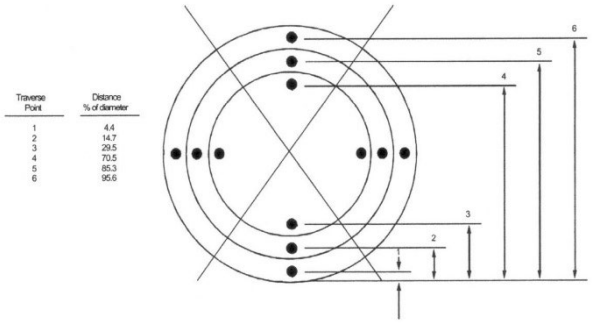


Figure 1. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

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. 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.

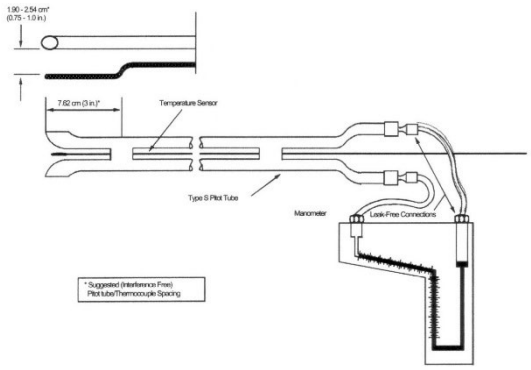


Figure 2. Type S Pitot Tube Manometer Assembly

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.

Dioxins / Furans	Primary:	EPS 1/RM/2, 1/RM/3, 1/RM/23
	Supporting:	EPA Method 23

This method is applicable to the determination of emissions of polychlorinated dibenzo-para-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and other semi-volatile organic compounds from stationary sources. An integrated gas sample is isokinetically withdrawn from the stack similar to Method 5. Semi-volatile organic compounds associated with particulate matter are collected in the front half components with remaining compounds not collected by the filter, being absorbed in an Amberlite XAD-2 resin trap.

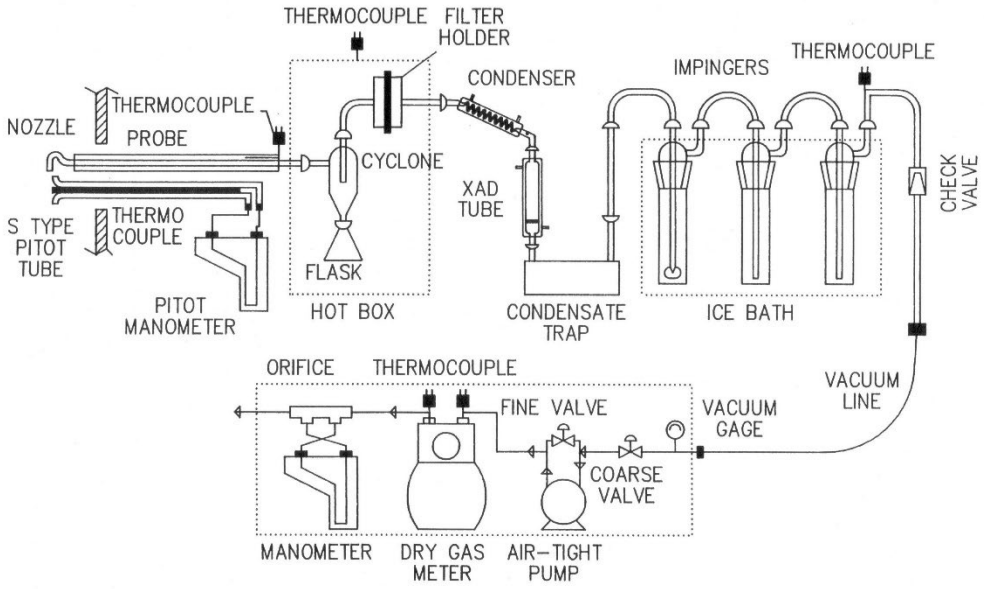


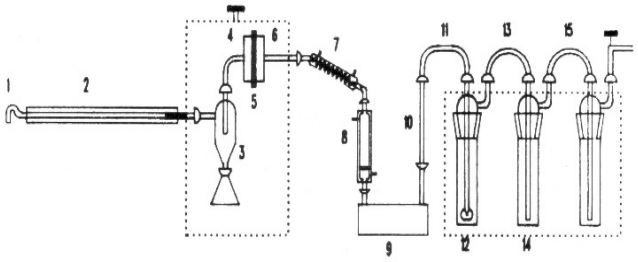
Figure 3 - Dioxin / Furan Sampling Train

Due to the sensitivity of this test method, extra care and precautions are used. All sample trains were cleaned professionally at an accredited laboratory. A solvent proof of the glassware and XAD was archived as suggested by the method.

The train was operated for duration of 240 minutes. Upon completion, it was removed to a clean area for recovery. The recovered sample consists of 6 individual components:

• Filter Rinses	• Front Half Rinses
• XAD Trap	• Soak
• Impingers	• Final Rinse

Complete sampling and recovery procedures can be supplied upon request.



Container or Sample	Component(s)	Recovery Procedure
1	1, 2, 3, 4	Wash and brush 3 times each with hexane (H) and acetone (A). Rinse 3 times each with H and A.
2	5	Remove carefully from holder. Place on pre-cleaned foil. Fold in half. Place in pre-cleaned glass petri dish.
3	6, 7	Soak 5 minutes each with H and A. Rinse 3 times each with H and A.
4	8	Cap ends and wrap in foil.
5	9, 12	Empty contents into container and rinse each 3 times with HPLC water.
6	6 to 15 except 8	Rinse 3 times each with H and A.

Mark liquid levels on all bottles.
All sample containers are pre-cleaned amber glass bottles with pre-cleaned Teflon lid liners.

Figure 4 Recovery Procedures for Semi-Volatile Organics

Samples are analyzed on a high-resolution GS/MS at Pacific Rim Laboratories Inc. of Surrey, BC. Following is a description, in very simplified terms, of the basic procedures used to process the sample train and blank train components.

Initially the sample components are separated into liquid (containers 1, 4, 5 and 6) or solid phases (containers 2 and 3) and surrogate compounds (for recovery calculations) are injected into the solid phases of the front and back half samples. Liquid and solid samples are extracted with various solvents (usually benzene), sometimes under acid conditions. Figure 5 and Figure 6 demonstrate the step by step procedures used to extract the components of interest into a solvent phase which

is ready for detailed splitting and clean-up. The concentrated extracts from Figure 5 are combined and are processed per procedures detailed in Figure 6.

When each target group has been isolated, as indicated in Figure 4, the extract volumes are dried, concentrated, and analysed by GC/MS analytical instrumentation. Prior to actual analysis, all samples were spiked with a performance standard for laboratory QA/QC purposes.

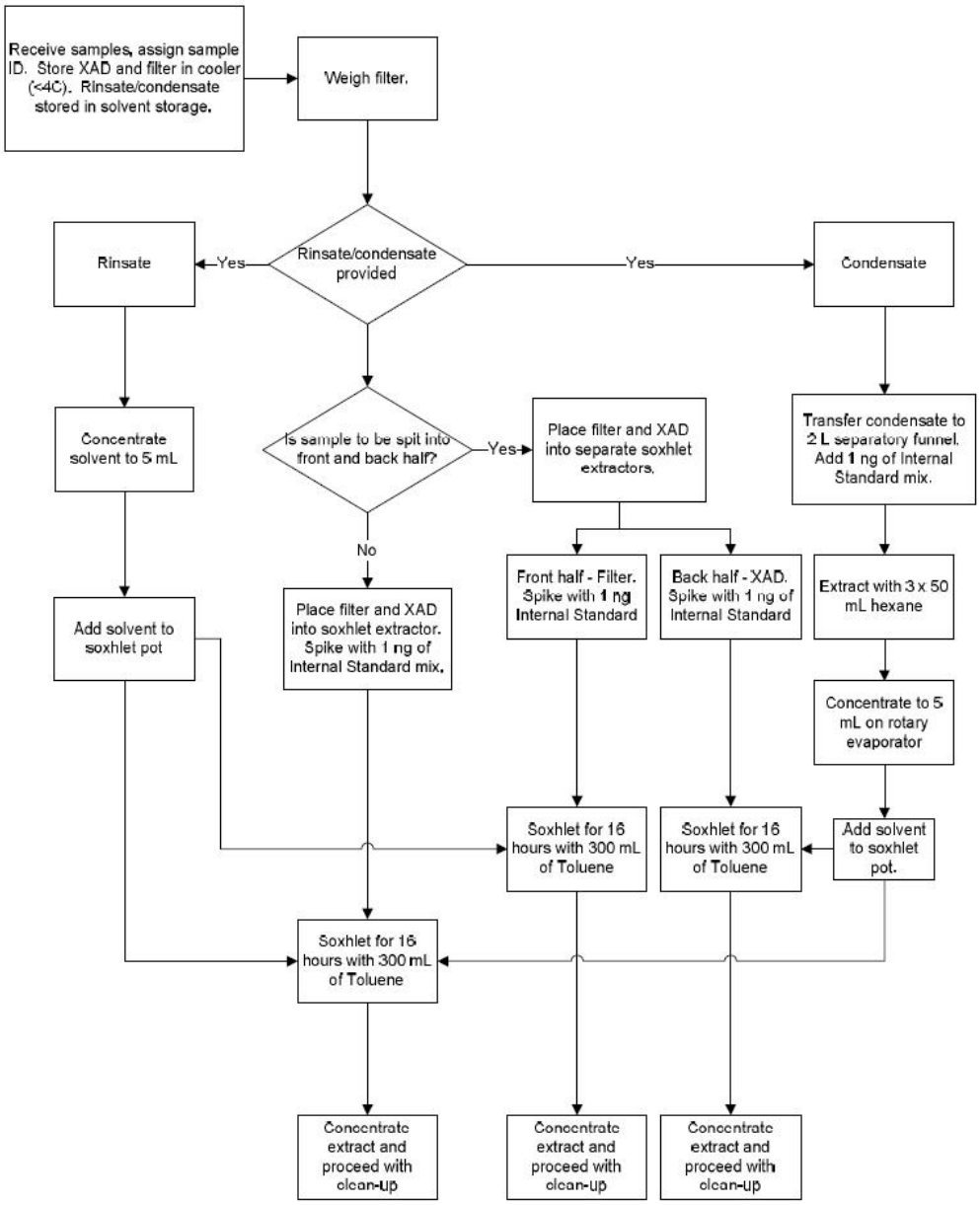


Figure 5 - Semi-Volatile Organics XAD and Filter Recovery Schematic

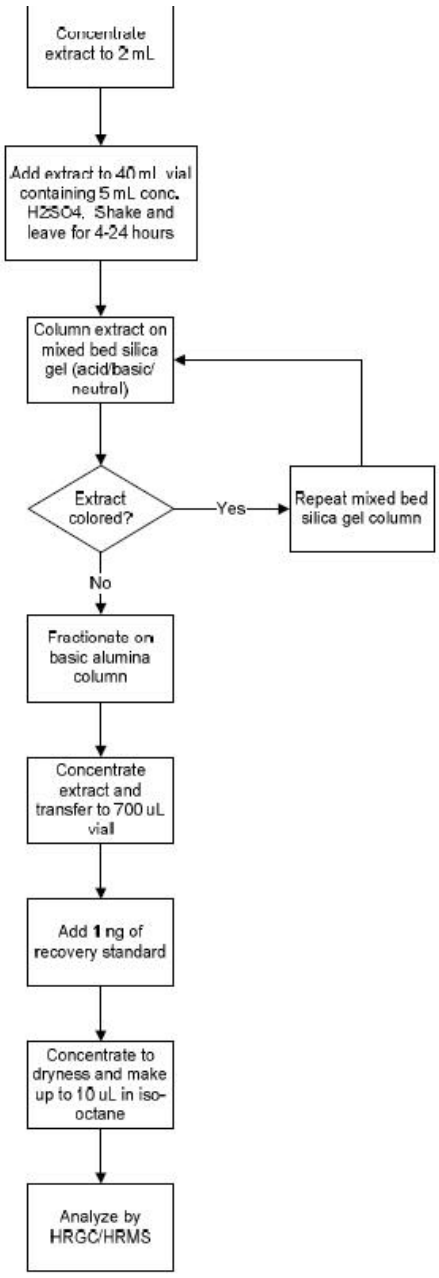


Figure 6 - Schematic of analytical methodology for dioxins and furans

2.2 Calculations

The following sections show the equations and define the variables that were used for this survey. The equations are organized in three sections. Equations 1-11 were used to calculate particulate concentration at standard conditions on a dry basis. Equations 12-26 were used to sample within the 100 ± 10% isokinetic variation and to confirm that sampling meets this isokinetic variation threshold. Equations 27-29 were used to calculate the volumetric flowrate of the stack flue gas.

2.2.1 Contaminant Concentration Calculations

$$c = \frac{m}{V_{std}} \quad \textbf{Equation 1}$$

$$m_{part} = m_{filter} + m_{pw} \quad \textbf{Equation 2}$$

$$m_i = m_{ana,i} - m_{blank} \quad \textbf{Equation 3}$$

$$m_{HF} = \frac{20.006}{18.998}(m_F - m_{blank})/1000 \quad \textbf{Equation 4}$$

$$V_{std} = \frac{V_{std(imp)}}{35.315} \quad \textbf{Equation 5}$$

$$V_{std(imp)} = \frac{V_{samp} \times y \times P_m \times (T_{std} + 459.67)}{P_{std} \times (T_{m(ave)} + 459.67)} \quad \textbf{Equation 6}$$

$$V_{samp} = V_{final} - V_{init} \quad \textbf{Equation 7}$$

$$P_m = P_B + \frac{\Delta H_{ave}}{13.6} \quad \textbf{Equation 8}$$

$$\Delta H_{ave} = \frac{1}{n}\sum_{i=1}^{n} \Delta H_{i(act)}, where\ n = the\ number\ of\ points \quad \textbf{Equation 9}$$

$$OC = \frac{20.9 - \%O_{2c}}{20.9 - \%O_{2m}} \quad \textbf{Equation 10}$$

$$\%O_{2m} = \frac{1}{n}\sum_{i=1}^{n} \%O_{2i}, where\ n = the\ number\ of\ O_2\ measurements \quad \textbf{Equation 11}$$

Where,

c	= Contaminant concentration
m	= Contaminant mass
m_i	= Net analytical mass (mg, ng, or µg)
$m_{ana,i}$	= Analytical mass (mg, ng, or µg)
m_{blank}	= Blank analytical mass (mg, ng, or µg)
$V_{std(imp)}$	= Sample volume at standard conditions (ft^3)
V_{std}	= Sample volume at standard conditions (m^3)
V_{samp}	= Sample volume at actual conditions (ft^3)
V_{final}	= Final gas meter reading (ft^3)
V_{init}	= Initial gas meter reading (ft^3)
T_{std}	= Standard temperature (68 °F)
T_m	= Gas meter temperature (°F)
$T_{m(ave)}$	= Average gas meter temperature (°F)
P_m	= Absolute meter pressure (inches of Hg)
P_B	= Barometric pressure (inches of Hg)
ΔH_{ave}	= Average of individual point orifice pressures (inches of H_2O)
$\Delta H_{i(act)}$	= Individual recorded point orifice pressures (inches of H_2O)
OC	= Oxygen correction factor (dimensionless)
$\%O_{2c}$	= Oxygen concentration to correct to (% dry basis)
$\%O_{2m}$	= Average measured stack gas oxygen concentration (% dry basis)

Equation 1 is the general concentration calculation used for all contaminants. The contaminant mass, *m*, is the net analytic mass for the given contaminant.

The dioxins/furans and other semi-volatile organic compounds were treated slightly different. The blank results for all trace organic species are used as a Quality Assurance check and are not used to correct the analytic results. Also, according to the terms of the service agreement, individual trace organic species were reported as "non-detect" (ND) if all three tests for that species are below the detection limit. If one (or more) of the triplicate samples has a reportable value, the corresponding ND samples from the other test runs were reported at half the detection limit. For calculating of summarized results (PCDD/PCDF TEQ, Total PAHs, Total Chlorobenzenes, Total Chlorophenols, and Total PCBs) the substitution of half DL for each individual species, as detailed above, was performed prior to calculating the sums.

All results are reported in the units outlined in the service agreement. The following unit conversions were used throughout:

$$1 \text{ mg} = 10^{-3} \text{ g}$$

$$1 \text{ µg} = 10^{-6} \text{ g}$$

$$1 \text{ ng} = 10^{-9} \text{ g}$$

$$1 \text{ tonne} = 10^{6} \text{ g}$$

Oxygen corrections were applied by multiplying the result of Equation 1 by the result of Equation 10 for each individual result.

2.2.2 Isokinetic Variation Calculations

$$\Delta H_i = \frac{2.62 \times 10^7 \times c_p \times A_n \times (1 - B_{wo}) \times M_D \times (T_m + 459.67) \times \Delta p_i}{k_o \times M_w \times (T_{Stk} + 459.67)} \quad \textbf{Equation 12}$$

$$R_m = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{stk_i} + 459.67)}{M_w \times P_B}} \times 60 \times A_n \times \frac{(T_{m_i} + 459.67) \times (1 - B_{wo})}{(T_{stk_i} + 459.67) \times y} \quad \textbf{Equation 13}$$

$$A_n = \pi \left(\frac{d_n}{24}\right)^2 \quad \textbf{Equation 14}$$

$$M_w = M_D \times (1 - B_{wo}) + 18 \times B_{wo} \quad \textbf{Equation 15}$$

$$M_D = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + 0.28 \times (100 - \%CO_2 - \%O_2) \quad \textbf{Equation 16}$$

$$T_{Stk} = \frac{1}{n} \sum_{i=1}^{n} T_{Stk_i}, where\ n = the\ number\ of\ points \quad \textbf{Equation 17}$$

$$B_{wo} = \frac{V_{cond}}{V_{cond} + V_{std(imp)}} \quad \textbf{Equation 18}$$

$$V_{cond} = 0.04707 \times V_{gain} \quad \textbf{Equation 19}$$

$$Iso = \frac{1}{n} \sum_{i=1}^{n} Iso_i, where\ n = the\ number\ of\ points \quad \textbf{Equation 20}$$

$$Iso_i = \frac{v_{nzi}}{v_i}$$ **Equation 21**

$$v_i = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{Stk_i} + 459.67)}{(P_{Stk} \times M_W)}}$$ **Equation 22**

$$v_{nzi} = \frac{(V_i - V_{i-1}) \times y \times (T_{Stk_i} + 459.67) \times (P_B + \frac{\Delta H_{i(act)}}{13.6})}{A_n \times t_i \times 60 \times (T_{m(i)} + 459.67) \times P_{stk} \times (1 - B_{wo})}$$ **Equation 23**

$$P_{stk} = P_B + \frac{P_g}{13.6}$$ **Equation 24**

$$v_{stk} = \frac{1}{n}\sum_{i=1}^{n} v_i \, , where\ n = the\ number\ of\ points$$ **Equation 25**

$$v_{nz} = \frac{1}{n}\sum_{i=1}^{n} v_{nzi} \, , where\ n = the\ number\ of\ points$$ **Equation 26**

Where,

A_n = *Nozzle area (ft^2)*
d_n = *Diameter of nozzle (inches)*
c_p = *Pitot coefficient (dimensionless)*
Δp_i = *Individual point differential pressures (inches of H_2O)*
T_{Stk} = *Average flue gas temperature (°F), second subscript i, indicates individual point measurements*
$\Delta H_{i(act)}$ = *Calculated individual point orifice pressures (inches of H_2O)*
P_g = *Stack Static pressure (inches of H_2O)*
P_{stk} = *Absolute stack pressure (inches of Hg)*
M_w = *Wet gas molecular weight (g/gmol)*
M_D = *Dry gas molecular weight (g/gmol)*
$\%CO_2$ = *Stack gas carbon dioxide concentration (% dry basis)*
$\%O_2$ = *Stack gas oxygen concentration (% dry basis)*
B_{wo} = *Stack gas water vapour, proportion by volume*
V_{cond} = *Total volume of water vapor collected, corrected to standard conditions (ft^3)*
V_{gain} = *Condensate gain of impinger contents (mL)*
P_{std} = *Standard pressure (29.92 inches of Hg)*
v_{stk} = *Average flue gas velocity (ft/sec)*

v_i = *Individual point flue gas velocity (ft/sec)*
v_{nz} = *Average velocity at nozzle(ft/sec)*
v_{nzi} = *Individual point velocity at nozzle(ft/sec)*
Iso_i = *Individual point isokinetic variation (%)*
Iso = *Average isokinetic variation (%)*
R_m = *Isokinetic sampling rate (ft^3/min)*

2.2.3 Volumetric Flowrate Calculations

$$Q_S = Q_A \times \frac{(T_{Std} + 459.67)}{(T_{Stk} + 459.67)} \times \frac{P_{Stk}}{P_{Std}}$$ **Equation 27**

$$Q_A = \frac{v_{stk} \times 60 \times A_{stk}}{35.315}$$ **Equation 28**

$$A_{stk} = \pi \left(\frac{d}{24}\right)^2$$ **Equation 29**

Where,

Q_A = *Actual flowrate (Am^3/min)*
Q_S = *Flowrate (m^3/min) at standard conditions on a dry basis*
A_{stk} = *Area of stack (ft^2)*
d = *Diameter of stack (inches)*

2.3 Quality Assurance/Quality Control (QA/QC) Techniques

QA/QC of this survey was accomplished by the following mechanisms.

1. Pre and Post-test leak checks.
2. Calibration of volume measuring and monitoring instrumentation.
3. Proofing of organic glassware and supplies.
4. Analysis of all blank solutions and materials.
5. Surrogate spiking of XAD using EPA protocols
6. Internal standard spiking and recovery analysis of organic trains to Env. Canada specs
7. Blank train sampling of leak check average volume

3 TEST RESULTS

The results of stack emissions were calculated using a "STACK" computer program developed by A. Lanfranco and Associates to meet BC MOE/MV requirements.

Table 1 presents summarized trace organic results using the Hazardous Waste Regulation TEQ's, as well as additional organic species. Table 2 presents detailed PCDD/PCDF data and Table 3 presents trace organics results as a mass emission (not corrected for O_2). Detailed PAH and additional chlorinated organic species emission concentrations are presented in Table 4 and Appendix 2.

Trace organic results were recovery corrected according to surrogate recovery efficiencies determined for each organic analysis. Surrogates added and the recoveries determined are listed in the analytical data presented in the Appendices.

A stratification check was performed in 2018 and a cyclonic flow check was performed in 2006. Neither condition was present at the Unit 3 sampling location.

During the survey the weather was seasonally normal. There was no significant rainfall or wind. Some airborne dust was observed at the facility but there is no reason to believe the sampling was compromised as a result.

TABLE 1: UNIT 3 TRACE ORGANICS RESULTS TABLE

Parameter		Test 1	Test 2	Test 3	Average
Test Date		24-Jul-24	25-Jul-24	26-Jul-24	
Test Time		13:50 - 17:51	09:22 - 13:23	10:10 - 14:12	
Duration	(minutes)	240	240	240	240
PCDD & PCDF TEQ	(ng/Sm^3)	0.0026	0.0074	0.0043	0.0047
PCDD & PCDF TEQ	**(ng/Sm^3 @ 11% O_2)**	**0.0023**	**0.0065**	**0.0039**	**0.0042**
Total PAH	($\mu g/Sm^3$)	0.0999	0.0625	0.1001	0.0875
Total PAH	**($\mu g/Sm^3$ @ 11% O_2)**	**0.0910**	**0.0548**	**0.0899**	**0.0786**
Total HCB*	($\mu g/Sm^3$)	0.0026	0.0014	0.0029	0.0023
Total HCB*	**($\mu g/Sm^3$ @ 11% O_2)**	**0.0023**	**0.0012**	**0.0026**	**0.0020**
Total CB	($\mu g/Sm^3$)	0.3408	0.3150	0.3717	0.3425
Total CB	**($\mu g/Sm^3$ @ 11% O_2)**	**0.3102**	**0.2764**	**0.3339**	**0.3069**
Total CP*	($\mu g/Sm^3$)	0.0154	0.0068	0.0071	0.0098
Total CP*	**($\mu g/Sm^3$ @ 11% O_2)**	**0.0140**	**0.0060**	**0.0064**	**0.0088**
Total PCB	($\mu g/Sm^3$)	0.0033	0.0021	0.0743	0.0266
Total PCB	**($\mu g/Sm^3$ @ 11% O_2)**	**0.0030**	**0.0018**	**0.0668**	**0.0239**
Stack Temperature	(°C)	157	158	157	157
Flowrate	(Sm^3/min)	1208	1140	1091	1146
Oxygen (O_2)	(vol % dry)	10.0	9.6	9.9	9.8
Carbon Dioxide (CO_2)	(vol % dry)	9.9	10.3	9.7	10.0
Moisture	(vol %)	15.5	15.8	15.3	15.5
Isokinetic Variation	(%)	104	104	103	104

Standard conditions (S) of 20 °C and 101.325 kPa (dry)

*Calculated using half DL convention.

TABLE 2 Detailed PCDD/PCDF Emission Results

		Test 1		Test 2		Test 3	
Test Date:		24-Jul-24		25-Jul-24		26-Jul-24	
Test Time:		13:50 - 17:51		09:22 - 13:23		10:10 - 14:12	
Component	**TEF**	**Analyzed** (ng)	**TEQ** (ng)	**Analyzed** (ng)	**TEQ** (ng)	**Analyzed** (ng)	**TEQ** (ng)
2378 TCDD	1.0000	0.0000	ND	0.0000	ND	0.0000	ND
12378 PCDD	0.5000	0.0020	0.0010	0.0063	0.0032	0.0020	0.0010
123478 HxCDD	0.1000	0.0110	0.0011	0.0056	0.0006	0.0020	0.0002
123678 HxCDD	0.1000	0.0083	0.0008	0.0100	0.0010	0.0120	0.0012
123789 HxCDD	0.1000	0.0065	0.0007	0.0100	0.0010	0.0020	0.0002
1234678 HpCDD	0.0100	0.0480	0.0005	0.0770	0.0008	0.0670	0.00067
OCDD	0.0010	0.0610	0.00006	0.1000	0.00010	0.1300	0.00013
2378 TCDF	0.1000	0.0091	0.0009	0.0260	0.0026	0.0010	0.0001
12378 PCDF	0.0500	0.0130	0.0007	0.0200	0.0010	0.0170	0.0009
23478 PCDF	0.5000	0.0020	0.0010	0.0240	0.0120	0.0190	0.0095
123478 HxCDF	0.1000	0.0140	0.0014	0.0150	0.0015	0.0020	0.0002
123678 HxCDF	0.1000	0.0120	0.0012	0.0160	0.0016	0.0020	0.0002
234678 HxCDF	0.1000	0.0020	0.0002	0.0150	0.0015	0.0020	0.0002
123789 HxCDF	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
1234678 HpCDF	0.0100	0.0400	0.00040	0.0310	0.00031	0.0570	0.00057
1234789 HpCDF	0.0100	0.0084	0.0001	0.0067	0.000067	0.0020	0.00002
OCDF	0.0010	0.0190	0.000019	0.0075	7.5E-06	0.0300	3.00E-05
Summed PCDD & PCDF TEQ (ng)			**0.0100**		**0.0272**		**0.0151**
Sample Volume (dscm)			**3.9029**		**3.6825**		**3.4970**
PCDD & PCDF TEQ	**ng/dscm**		**0.00256**		**0.00738**		**0.00431**
PCDD & PCDF TEQ	**ng/dscm @ 11% O_2**		**0.00233**		**0.00647**		**0.00387**
PCDD & PCDF TEQ	**grams/day**		**0.000004**		**0.000012**		**0.000007**
Flowrate (dscm/min)			1208		1140		1091
Oxygen (Vol. %)			10.0		9.6		9.9
Carbon Dioxide (Vol. %)			9.88		10.29		9.68
Moisture (Vol. %)			15.5		15.8		15.3
Temperature (oC)			157		158		157
Isokinetic Variation (%)			104		104		103

TABLE 3 Detailed PCB/PAH/CB/CP Emission Results

		Test 1	Test 2	Test 3
Test Date:		24-Jul-24	25-Jul-24	26-Jul-24
Test Time:		13:50 - 17:51	09:22 - 13:23	10:10 - 14:12
Component		**Analyzed** (ug)	**Analyzed** (ug)	**Analyzed** (ug)
Benz(a)anthracene		ND	ND	ND
Benzo(a)pyrene		ND	ND	ND
Benzo(b) fluoranthene		ND	ND	ND
Benzo(e)pyrene		ND	ND	0.010
Benzo(g,h,i)perylene		0.020	0.010	0.030
Benzo(k)fluoranthene		ND	ND	ND
Chrysene		ND	ND	ND
Dibenz(a,j)acridine		ND	ND	ND
Dibenz(a,h)acridine		ND	ND	ND
Dibenz(a,h)anthracene		ND	ND	ND
Dibenzo(a,i)pyrene		ND	ND	ND
Fluoranthene		0.050	0.030	0.030
Indeno(1,2,3-c,d)pyrene		ND	ND	ND
Phenanthrene		0.220	0.140	0.130
Pyrene		0.060	0.030	0.040
7H-dibenzo(c,g)carbazole		ND	ND	ND
Acenaphthene		**ND**	**ND**	**ND**
Acenaphthylene		**ND**	**ND**	**ND**
Fluorene		**0.040**	**0.020**	**0.030**
Dibenzo(a,e) fluoranthene		**ND**	**ND**	**ND**
3-Methylcholanthrene		**ND**	**ND**	**ND**
5-Methylchrysene		**ND**	**ND**	**ND**
7,12-Dimethylbenz(a)anthracene		**ND**	**ND**	**ND**
Dibenzo(a,h)pyrene		**ND**	**ND**	**ND**
Dibenzo(a,e)pyrene		**ND**	**ND**	**ND**
Dibenzo(a,l)pyrene		**ND**	**ND**	**ND**
Quinoline		**ND**	**ND**	**0.080**
Total CP		**0.0600**	**0.0250**	**0.0250**
Total CB		**1.3300**	**1.1600**	**1.3000**
HCB		**0.0100**	**0.0050**	**0.0100**
* ND = Less than detection limit				
PCB Total (ng)		**12.7**	**7.74**	**260.0**
Total PAH (ug)		**0.390**	**0.230**	**0.350**
Sample Volume (dscm)		**3.90**	**3.68**	**3.50**
Oxygen		10.0	9.6	9.9
PAH	**ug/dscm**	**0.0999**	**0.0625**	**0.1001**
HCB	**ug/dscm**	**0.0026**	**0.0014**	**0.0029**
CB Total	**ug/dscm**	**0.3408**	**0.3150**	**0.3717**
CP Total	**ug/dscm**	**0.0154**	**0.0068**	**0.0071**
PCB Total	**ug/dscm**	**0.0033**	**0.0021**	**0.0743**
PAH	**ug/dscm @ 11% O_2**	**0.0910**	**0.0548**	**0.0899**
HCB	**ug/dscm @ 11% O_2**	**0.0023**	**0.0012**	**0.0026**
CB Total	**ug/dscm @ 11% O_2**	**0.3102**	**0.2764**	**0.3339**
CP Total	**ug/dscm @ 11% O_2**	**0.0140**	**0.0060**	**0.0064**
PCB Total	**ug/dscm @ 11% O_2**	**0.0030**	**0.0018**	**0.0668**

TABLE 4: UNIT 3 - SUMMARY OF OPERATING DATA

Parameter		Run 1	Run 2	Run 3	Normal
Test Date - PCDD/PCDF		24-Jul-24	25-Jul-24	26-Jul-24	
Test Time - PCDD/PCDF		13:50 - 17:51	09:22 - 13:23	10:10 - 14:12	
Boiler Steam Production	(kg/h)	37047	37258	36298	37297
Percentage of normal	(%)	99%	100%	97%	
Boiler Secondary Combustion Zone Temp	(°C)	901	912	891	922
Percentage of normal	(%)	98%	99%	97%	
Rate of refuse fired	(kg/hr)	10436	10495	10225	10506
Percentage of normal	(%)	99%	100%	97%	
Rate of aux. fuel fired (Natural Gas)	m^3/hr	0	0	0	82.5
Percentage of normal (%)	(%)	0%	0%	0%	

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

4 DISCUSSION

The emissions monitoring for this survey was performed during normal processing of municipal solid waste at the Waste-to-Energy facility. Three sample runs for each test parameter were conducted over three days to determine final results.

Results from this survey indicate that emissions are well below the operational certificate limits for each pollutant.

Several Dioxin and Furan congeners were detected this year, which represents an increase in PCDD/PCDF compared to 2022 and 2023. The majority of the emissions (in terms of TEQ) come from 12378 PCDD and 23478 PCDF.

Total PAH, HCB and CP were all measured at similar concentrations compared to 2023.

Dioxin/Furan results are expressed using the International Toxic Equivalents (I-TEQ). In this report, individual species that were measured below detection limits were reported as zero or "non-detect" if there was no detection in any of the three test runs.

The QA/QC program showed very low or non-detectable levels of target contaminants in the blank sample, which used the same solid sorbent resin and clean-up solvents as those used for samples. Additionally, the proof analysis of the glassware and XAD (prior recent blanks) showed no significant PCDD/PCDF.

For all tests and the blank test, internal standard recoveries ranged from 58 to 95%.

EPA Method 23 surrogate recoveries ranged from 84 to 124% for each Dioxin/Furan sample. The recovery QA/QC data is expected to meet EPA performance specifications (M23) of 70 to 130% for pre-test spiked surrogates. The M23 spiking protocol is not required in Canada and is included in the sampling/analytical protocol for additional QA/QC and information purposes only.

There were no problems associated with sample collection or analysis. Sampling was conducted in accordance with the respective reference methods and passed all appropriate quality assurance and quality control criteria. It is therefore stated that these results are reported with a high degree of confidence and are an accurate representation of emission characteristics for the operating conditions maintained on the test dates.

APPENDIX 1

ANALYTICAL DATA and

QA/QC RESULTS

SAMPLE RECEIPT FORM / CHEMICAL ANALYSIS FORM

FILE #: PR242017

CLIENT: A. Lanfranco & Associates
Unit 101 9488 – 189 St.
Surrey, BC
V4N 4W7

Phone: (604) 881-2582
Email: mark.lanfranco@alanfranco.com

RECEIVED BY: P. Pond
CONDITION: Okay, 24.3°C

DATE/TIME: July 29, 2024 (3:55 p.m.)

# of Containers	Sample Type	Sample (Client Codes)	Lab Codes	Test Requested
5	Stack	Blk Dioxin Unit – 3	PR242017	PCDD/F, PCB, PAH/HCB, CB, CP
5	Stack	Run 1 – Dioxin Unit – 3	PR242018	PCDD/F, PCB, PAH/HCB, CB, CP
5	Stack	Run 2 – Dioxin Unit – 3	PR242019	PCDD/F, PCB, PAH/HCB, CB, CP
5	Stack	Run 3 – Dioxin Unit – 3	PR242020	PCDD/F, PCB, PAH/HCB, CB, CP

STORAGE: XAD and filter stored at 4°C, rinses stored at ambient temperature.

ANALYTES: HRGC/HRMS analysis for polychlorinated dibenzo(p)dioxins and dibenzofurans (PCDD/F), polychlorinated biphenyls (PCB) and polycyclic aromatic hydrocarbons (PAH).

SPECIAL INSTRUCTIONS: None.

METHODOLOGY

Reference Method: PCDD/F: SOP LAB01; EPA Method 23, Environment Canada 1-RM-3
PCB: SOP LAB02; EPA Method 1668C
PAH/CB/CP: SOP LAB013; in house

Data summarized in Data Report attached.

Report sent to: Mark Lanfranco Date: August 22, 2024

Comments: Results relate only to items tested.

_____
David Hope, P.Chem, CEO

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	24-Jul-24
Client ID:	Blk Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242017	**Date Analysed:**	14-Aug-24
		Filter Wt.:	0.36g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	ND	2	0			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	ND	4	0			
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	0.4
Total HxCDD	ND	4	0			
1,2,3,4,6,7,8-HpCDD	ND	4		ND	0.02	0.04
Total HpCDD	ND	4	0			
OCDD	ND	15	0	ND	0.0075	0.015
		Total Dioxin TEQ		**0.0**	**2.6**	**5.3**

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	ND	2		ND	0.1	0.2
Total TCDF	46	2	0			
1,2,3,7,8-PeCDF	ND	4		ND	0.1	0.2
2,3,4,7,8-PeCDF	ND	4		ND	1	2
Total PeCDF	ND	4	0			
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	ND	4	0			
1,2,3,4,6,7,8-HpCDF	ND	4		ND	0.02	0.04
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	0.04
Total HpCDF	ND	4	0			
OCDF	ND	15	0	ND	0.0075	0.015
		Total Furan TEQ		**0.0**	**2.0**	**4.1**

Total PCDD/PCDF Toxic Equivalent (pg)	**0.0**	**4.7**	**9.4**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	93
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	108
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	105
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	119
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	120

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	66
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	79
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	70
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	82
$^{13}C_{12}$ -OCDD	62
$^{13}C_{12}$ -2,3,7,8-TCDF	54
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	65
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	65
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	70

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	24-Jul-24
Client ID:	Run 1 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242018	**Date Analysed:**	14-Aug-24
		Filter Wt.:	0.38g

DIOXINS

Congeners	pg	DL pg	# of peaks	I-TEQs (ND=0) pg	I-TEQs (ND=½DL) pg	I-TEQs (ND=DL) pg
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	47	2	6			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	93	4	3			
1,2,3,4,7,8-HxCDD	11	4		1.1	1.1	1.1
1,2,3,6,7,8-HxCDD	8.3	4		0.83	0.83	0.83
1,2,3,7,8,9-HxCDD	6.5	4		0.65	0.65	0.65
Total HxCDD	300	4	6			
1,2,3,4,6,7,8-HpCDD	48	4		0.48	0.48	0.48
Total HpCDD	120	4	2			
OCDD	61	15	1	0.061	0.061	0.061
		Total Dioxin TEQ		**3.1**	**5.1**	**7.1**

FURANS

Congeners	pg	DL pg	# of peaks	I-TEQs (ND=0) pg	I-TEQs (ND=½DL) pg	I-TEQs (ND=DL) pg
2,3,7,8-TCDF	9.1	2		0.91	0.91	0.91
Total TCDF	160	2	8			
1,2,3,7,8-PeCDF	13	4		0.65	0.65	0.65
2,3,4,7,8-PeCDF	ND	4		ND	1	2
Total PeCDF	55	4	3			
1,2,3,4,7,8-HxCDF	14	4		1.4	1.4	1.4
1,2,3,6,7,8-HxCDF	12	4		1.2	1.2	1.2
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	37	4	3			
1,2,3,4,6,7,8-HpCDF	40	4		0.4	0.4	0.4
1,2,3,4,7,8,9-HpCDF	8.4	4		0.084	0.084	0.084
Total HpCDF	79	4	4			
OCDF	19	15	1	0.019	0.019	0.019
		Total Furan TEQ		**4.7**	**6.1**	**7.5**

Total PCDD/PCDF Toxic Equivalent (pg)		**7.8**	**11.2**	**14.6**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	89
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	109
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	111
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	124
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	116

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	65
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	76
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	68
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	84
$^{13}C_{12}$ -OCDD	63
$^{13}C_{12}$ -2,3,7,8-TCDF	53
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	66
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	63
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	73

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	25-Jul-24
Client ID:	Run 2 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242019	**Date Analysed:**	14-Aug-24
		Filter Wt.:	0.38g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	47	2	5			
1,2,3,7,8-PeCDD	6.3	4		3.15	3.15	3.15
Total PeCDD	160	4	6			
1,2,3,4,7,8-HxCDD	5.6	4		0.56	0.56	0.56
1,2,3,6,7,8-HxCDD	10	4		1	1	1
1,2,3,7,8,9-HxCDD	10	4		1	1	1
Total HxCDD	310	4	6			
1,2,3,4,6,7,8-HpCDD	77	4		0.77	0.77	0.77
Total HpCDD	180	4	2			
OCDD	100	15	1	0.1	0.1	0.1
		Total Dioxin TEQ		**6.6**	**7.6**	**8.6**

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	26	2		2.6	2.6	2.6
Total TCDF	600	2	12			
1,2,3,7,8-PeCDF	20	4		1	1	1
2,3,4,7,8-PeCDF	24	4		12	12	12
Total PeCDF	310	4	8			
1,2,3,4,7,8-HxCDF	15	4		1.5	1.5	1.5
1,2,3,6,7,8-HxCDF	16	4		1.6	1.6	1.6
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	15	4		1.5	1.5	1.5
Total HxCDF	59	4	4			
1,2,3,4,6,7,8-HpCDF	31	4		0.31	0.31	0.31
1,2,3,4,7,8,9-HpCDF	6.7	4		0.067	0.067	0.067
Total HpCDF	68	4	4			
OCDF	ND	15	0	ND	0.0075	0.015
		Total Furan TEQ		**20.6**	**20.8**	**21.0**

Total PCDD/PCDF Toxic Equivalent (pg)	**27.2**	**28.4**	**29.6**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	84
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	103
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	102
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	114
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	104

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	66
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	76
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	68
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	87
$^{13}C_{12}$ -OCDD	65
$^{13}C_{12}$ -2,3,7,8-TCDF	53
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	63
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	63
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	74

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	26-Jul-24
Client ID:	Run 3 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242020	**Date Analysed:**	14-Aug-24
		Filter Wt.:	0.38g

DIOXINS

		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	9.6	2	1			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	110	4	3			
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDD	12	4		1.2	1.2	1.2
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	0.4
Total HxCDD	340	4	6			
1,2,3,4,6,7,8-HpCDD	67	4		0.67	0.67	0.67
Total HpCDD	140	4	2			
OCDD	130	15	1	0.13	0.13	0.13
		Total Dioxin TEQ		**2.0**	**4.4**	**6.8**

FURANS

		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	ND	2		ND	0.1	0.2
Total TCDF	130	2	8			
1,2,3,7,8-PeCDF	17	4		0.85	0.85	0.85
2,3,4,7,8-PeCDF	19	4		9.5	9.5	9.5
Total PeCDF	73	4	3			
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	38	4	2			
1,2,3,4,6,7,8-HpCDF	57	4		0.57	0.57	0.57
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	0.04
Total HpCDF	120	4	3			
OCDF	30	15	1	0.03	0.03	0.03
		Total Furan TEQ		**11.0**	**11.9**	**12.8**

Total PCDD/PCDF Toxic Equivalent (pg)	**13.0**	**16.3**	**19.6**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	88
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	112
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	101
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	110
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	111

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	52
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	63
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	45
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	58
$^{13}C_{12}$ -OCDD	46
$^{13}C_{12}$ -2,3,7,8-TCDF	41
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	50
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	43
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	49

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	BLANK	**Date Extracted:**	2-Aug-24
PRL ID:	DF240521B	**Date Analysed:**	14-Aug-24

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	ND	2	0			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	ND	4	0			
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	0.4
Total HxCDD	ND	4	0			
1,2,3,4,6,7,8-HpCDD	ND	4		ND	0.02	0.04
Total HpCDD	ND	4	0			
OCDD	ND	15	0	ND	0.0075	0.015
		Total Dioxin TEQ		**0.0**	**2.6**	**5.3**

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	ND	2		ND	0.1	0.2
Total TCDF	ND	2	0			
1,2,3,7,8-PeCDF	ND	4		ND	0.1	0.2
2,3,4,7,8-PeCDF	ND	4		ND	1	2
Total PeCDF	ND	4	0			
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	ND	4	0			
1,2,3,4,6,7,8-HpCDF	ND	4		ND	0.02	0.04
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	0.04
Total HpCDF	ND	4	0			
OCDF	ND	15	0	ND	0.0075	0.015
		Total Furan TEQ		**0.0**	**2.0**	**4.1**

Total PCDD/PCDF Toxic Equivalent (pg)	**0.0**	**4.7**	**9.4**

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	53
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	59
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	58
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	68
$^{13}C_{12}$ -OCDD	47
$^{13}C_{12}$ -2,3,7,8-TCDF	41
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	50
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	55
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	59

ND - none detected

QC REPORT - SPIKE

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	SPIKE	**Date Extracted:**	2-Aug-24
PRL ID:	DF240522S	**Date Analysed:**	14-Aug-24

DIOXINS			Acceptable Recovery		Pass/Fail	Int. Std Recoveries
	LOF	Recovery	Min	Max		
Congeners	pg	%	%	%		%
2,3,7,8-TCDD	200	92	80	120	Pass	74
1,2,3,7,8-PeCDD	200	113	80	120	Pass	86
1,2,3,4,7,8-HxCDD	400	118	80	120	Pass	-
1,2,3,6,7,8-HxCDD	400	101	80	120	Pass	75
1,2,3,7,8,9-HxCDD	400	112	80	120	Pass	-
1,2,3,4,6,7,8-HpCDD	400	100	80	120	Pass	95
OCDD	1000	101	80	120	Pass	73

FURANS			Acceptable Recovery		Pass/Fail	Int. Std Recoveries
	LOF	Recovery	Min	Max		
Congeners	pg	%	%	%		%
2,3,7,8-TCDF	200	98	80	120	Pass	58
1,2,3,7,8-PeCDF	200	111	80	120	Pass	72
2,3,4,7,8-PeCDF	200	118	80	120	Pass	-
1,2,3,4,7,8-HxCDF	400	118	80	120	Pass	-
1,2,3,6,7,8-HxCDF	400	110	80	120	Pass	69
1,2,3,7,8,9-HxCDF	400	108	80	120	Pass	-
2,3,4,6,7,8-HxCDF	400	109	80	120	Pass	-
1,2,3,4,6,7,8-HpCDF	400	104	80	120	Pass	81
1,2,3,4,7,8,9-HpCDF	400	108	80	120	Pass	-
OCDF	1000	101	80	120	Pass	-

LOF - Level of Fortification

DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	Blk Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242017	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs				Surrogate	WHO-TEQs (2005)	
			DL	Recoveries	(ND=0)	(ND=DL)
Chemical Name	**IUPAC #**	**ng**	**ng**	**%**	**ng**	**ng**
3,4,4',5-TeCB	PCB 81	ND	0.02	84	ND	6.00E-06
3,3',4,4'-TeCB	PCB 77	ND	0.02	96	ND	2.00E-06
2,3',4,4',5'-PeCB	PCB 123	ND	0.02	52	ND	6.00E-07
2,3',4,4',5-PeCB	PCB 118	0.11	0.02	52	3.39E-06	3.39E-06
2,3,4,4',5-PeCB	PCB 114	ND	0.02	52	ND	6.00E-07
2,3,3',4,4'-PeCB	PCB 105	0.03	0.02	56	8.47E-07	8.47E-07
3,3',4,4',5-PeCB	PCB 126	ND	0.02	72	ND	2.00E-03
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02	64	ND	6.00E-07
2,3,3',4,4',5-HxCB	PCB 156	0.02	0.02	68	7.45E-07	7.45E-07
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02	24	ND	6.00E-07
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02	68	ND	6.00E-04
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02	56	ND	6.00E-07
		Toxic Equivalent (WHO-TEQ)			4.98E-06	2.62E-03

Total PCB		
		DL
Homologs	**ng**	**ng**
Monochlorobiphenyls	0.27	0.05
Dichlorobiphenyls	1.93	0.05
Trichlorobiphenyls	0.21	0.05
Tetrachlorobiphenyls	0.58	0.05
Pentachlorobiphenyls	0.39	0.05
Hexachlorobiphenyls	0.29	0.05
Heptachlorobiphenyls	0.08	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	3.74	

ND - none detected

Surrogate Recoveries		
Chemical Name	**IUPAC #**	**%**
13C12-2-MoCB	1L	28
13C12-4,4'-DiCB	15L	56
13C12-2,2',6'-TrCB	19L	48
13C12-3,4,4'-TrCB	37L	64
13C12-2,2',6,6'-TeCB	54L	48
13C12-2,2',4,6,6'-PeCB	104L	44
13C12-2,2',4,4',6,6'-HxCB	155L	52
13C12-2,2',3,4',5,6,6'-HpCB	188L	60
13C12-2,2',3,3',5,5',6,6'-OcCB	202L	76
13C12-2,3,3',4,4',5,5',6-OcCB	205L	60
13C12-2,2',3,3',4,4',5,5',6-NoCB	206L	60
13C12-DeCB	209L	64

DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	Run 1 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242018	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs				Surrogate	WHO-TEQs (2005)	
			DL	Recoveries	(ND=0)	(ND=DL)
Chemical Name	**IUPAC #**	**ng**	**ng**	**%**	**ng**	**ng**
3,4,4',5-TeCB	PCB 81	ND	0.02	68	ND	6.00E-06
3,3',4,4'-TeCB	PCB 77	0.04	0.02	72	3.63E-06	3.63E-06
2,3',4,4',5'-PeCB	PCB 123	ND	0.02	56	ND	6.00E-07
2,3',4,4',5-PeCB	PCB 118	0.12	0.02	56	3.51E-06	3.51E-06
2,3,4,4',5-PeCB	PCB 114	ND	0.02	56	ND	6.00E-07
2,3,3',4,4'-PeCB	PCB 105	0.08	0.02	60	2.45E-06	2.45E-06
3,3',4,4',5-PeCB	PCB 126	ND	0.02	84	ND	2.00E-03
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02	64	ND	6.00E-07
2,3,3',4,4',5-HxCB	PCB 156	0.03	0.02	72	8.42E-07	8.42E-07
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02	84	ND	6.00E-07
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02	76	ND	6.00E-04
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02	68	ND	6.00E-07
		Toxic Equivalent (WHO-TEQ)			1.04E-05	2.62E-03

Total PCB		
		DL
Homologs	**ng**	**ng**
Monochlorobiphenyls	0.95	0.05
Dichlorobiphenyls	14.4	0.05
Trichlorobiphenyls	1.89	0.05
Tetrachlorobiphenyls	1.54	0.05
Pentachlorobiphenyls	0.80	0.05
Hexachlorobiphenyls	0.45	0.05
Heptachlorobiphenyls	0.17	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	0.06	0.05
Total PCB	20.2	

ND - none detected

Surrogate Recoveries		
Chemical Name	**IUPAC #**	**%**
13C12-2-MoCB	1L	24
13C12-4,4'-DiCB	15L	40
13C12-2,2',6'-TrCB	19L	40
13C12-3,4,4'-TrCB	37L	48
13C12-2,2',6,6'-TeCB	54L	48
13C12-2,2',4,6,6'-PeCB	104L	44
13C12-2,2',4,4',6,6'-HxCB	155L	48
13C12-2,2',3,4',5,6,6'-HpCB	188L	60
13C12-2,2',3,3',5,5',6,6'-OcCB	202L	68
13C12-2,3,3',4,4',5,5',6-OcCB	205L	64
13C12-2,2',3,3',4,4',5,5',6-NoCB	206L	64
13C12-DeCB	209L	68

DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	Run 2 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242019	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs				Surrogate	WHO-TEQs (2005)	
			DL	Recoveries	(ND=0)	(ND=DL)
Chemical Name	**IUPAC #**	**ng**	**ng**	**%**	**ng**	**ng**
3,4,4',5-TeCB	PCB 81	ND	0.02	60	ND	6.00E-06
3,3',4,4'-TeCB	PCB 77	0.09	0.02	64	8.98E-06	8.98E-06
2,3',4,4',5'-PeCB	PCB 123	ND	0.02	56	ND	6.00E-07
2,3',4,4',5-PeCB	PCB 118	0.50	0.02	56	1.51E-05	1.51E-05
2,3,4,4',5-PeCB	PCB 114	ND	0.02	56	ND	6.00E-07
2,3,3',4,4'-PeCB	PCB 105	0.19	0.02	64	5.65E-06	5.65E-06
3,3',4,4',5-PeCB	PCB 126	ND	0.02	84	ND	2.00E-03
2,3',4,4',5,5'-HxCB	PCB 167	0.02	0.02	64	6.19E-07	6.19E-07
2,3,3',4,4',5-HxCB	PCB 156	0.07	0.02	76	2.21E-06	2.21E-06
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02	92	ND	6.00E-07
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02	96	ND	6.00E-04
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02	72	ND	6.00E-07
		Toxic Equivalent (WHO-TEQ)			3.25E-05	2.64E-03

Total PCB		
		DL
Homologs	**ng**	**ng**
Monochlorobiphenyls	1.79	0.05
Dichlorobiphenyls	6.45	0.05
Trichlorobiphenyls	1.45	0.05
Tetrachlorobiphenyls	1.85	0.05
Pentachlorobiphenyls	3.08	0.05
Hexachlorobiphenyls	1.89	0.05
Heptachlorobiphenyls	0.65	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	17.2	

ND - none detected

Surrogate Recoveries		
Chemical Name	**IUPAC #**	**%**
13C12-2-MoCB	1L	24
13C12-4,4'-DiCB	15L	36
13C12-2,2',6'-TrCB	19L	36
13C12-3,4,4'-TrCB	37L	56
13C12-2,2',6,6'-TeCB	54L	48
13C12-2,2',4,6,6'-PeCB	104L	48
13C12-2,2',4,4',6,6'-HxCB	155L	48
13C12-2,2',3,4',5,6,6'-HpCB	188L	56
13C12-2,2',3,3',5,5',6,6'-OcCB	202L	68
13C12-2,3,3',4,4',5,5',6-OcCB	205L	72
13C12-2,2',3,3',4,4',5,5',6-NoCB	206L	68
13C12-DeCB	209L	72

DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	Run 3 – Dioxin Unit – 3	**Date Extracted:**	2-Aug-24
PRL ID:	PR242020	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs				Surrogate	WHO-TEQs (2005)	
			DL	Recoveries	(ND=0)	(ND=DL)
Chemical Name	**IUPAC #**	**ng**	**ng**	**%**	**ng**	**ng**
3,4,4',5-TeCB	PCB 81	ND	0.02	64	ND	6.00E-06
3,3',4,4'-TeCB	PCB 77	ND	0.02	68	ND	2.00E-06
2,3',4,4',5'-PeCB	PCB 123	ND	0.02	44	ND	6.00E-07
2,3',4,4',5-PeCB	PCB 118	0.07	0.02	48	2.08E-06	2.08E-06
2,3,4,4',5-PeCB	PCB 114	ND	0.02	48	ND	6.00E-07
2,3,3',4,4'-PeCB	PCB 105	0.06	0.02	52	1.73E-06	1.73E-06
3,3',4,4',5-PeCB	PCB 126	ND	0.02	76	ND	2.00E-03
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02	56	ND	6.00E-07
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02	68	ND	6.00E-07
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02	84	ND	6.00E-07
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02	88	ND	6.00E-04
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02	60	ND	6.00E-07
		Toxic Equivalent (WHO-TEQ)			3.81E-06	2.62E-03

Total PCB		
		DL
Homologs	**ng**	**ng**
Monochlorobiphenyls	1.11	0.05
Dichlorobiphenyls	7.56	0.05
Trichlorobiphenyls	0.81	0.05
Tetrachlorobiphenyls	1.10	0.05
Pentachlorobiphenyls	0.48	0.05
Hexachlorobiphenyls	0.20	0.05
Heptachlorobiphenyls	0.06	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	0.06	0.05
Total PCB	11.4	

ND - none detected

Surrogate Recoveries		
Chemical Name	**IUPAC #**	**%**
13C12-2-MoCB	1L	20
13C12-4,4'-DiCB	15L	40
13C12-2,2',6'-TrCB	19L	48
13C12-3,4,4'-TrCB	37L	72
13C12-2,2',6,6'-TeCB	54L	40
13C12-2,2',4,6,6'-PeCB	104L	40
13C12-2,2',4,4',6,6'-HxCB	155L	44
13C12-2,2',3,4',5,6,6'-HpCB	188L	52
13C12-2,2',3,3',5,5',6,6'-OcCB	202L	60
13C12-2,3,3',4,4',5,5',6-OcCB	205L	60
13C12-2,2',3,3',4,4',5,5',6-NoCB	206L	64
13C12-DeCB	209L	64

DATA REPORT

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	BLANK	**Date Extracted:**	2-Aug-24
PRL ID:	PC240521B	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs				Surrogate	WHO-TEQs (2005)	
			DL	Recoveries	(ND=0)	(ND=DL)
Chemical Name	**IUPAC #**	**ng**	**ng**	**%**	**ng**	**ng**
3,4,4',5-TeCB	PCB 81	ND	0.02	40	ND	6.00E-06
3,3',4,4'-TeCB	PCB 77	ND	0.02	40	ND	2.00E-06
2,3',4,4',5'-PeCB	PCB 123	ND	0.02	40	ND	6.00E-07
2,3',4,4',5-PeCB	PCB 118	ND	0.02	36	ND	6.00E-07
2,3,4,4',5-PeCB	PCB 114	ND	0.02	40	ND	6.00E-07
2,3,3',4,4'-PeCB	PCB 105	ND	0.02	44	ND	6.00E-07
3,3',4,4',5-PeCB	PCB 126	ND	0.02	48	ND	2.00E-03
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02	48	ND	6.00E-07
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02	52	ND	6.00E-07
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02	68	ND	6.00E-07
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02	56	ND	6.00E-04
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02	60	ND	6.00E-07
		Toxic Equivalent (WHO-TEQ)			0.00E+00	2.61E-03

Total PCB		
		DL
Homologs	**ng**	**ng**
Monochlorobiphenyls	ND	0.05
Dichlorobiphenyls	0.25	0.05
Trichlorobiphenyls	ND	0.05
Tetrachlorobiphenyls	ND	0.05
Pentachlorobiphenyls	ND	0.05
Hexachlorobiphenyls	ND	0.05
Heptachlorobiphenyls	ND	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	0.25	

ND - none detected

Surrogate Recoveries		
Chemical Name	**IUPAC #**	**%**
13C12-2-MoCB	1L	12
13C12-4,4'-DiCB	15L	20
13C12-2,2',6'-TrCB	19L	20
13C12-3,4,4'-TrCB	37L	36
13C12-2,2',6,6'-TeCB	54L	24
13C12-2,2',4,6,6'-PeCB	104L	24
13C12-2,2',4,4',6,6'-HxCB	155L	28
13C12-2,2',3,4',5,6,6'-HpCB	188L	44
13C12-2,2',3,3',5,5',6,6'-OcCB	202L	56
13C12-2,3,3',4,4',5,5',6-OcCB	205L	60
13C12-2,2',3,3',4,4',5,5',6-NoCB	206L	64
13C12-DeCB	209L	64

QC REPORT - SPIKE

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	**SPIKE**	**Date Extracted:**	2-Aug-24
PRL ID:	PC240522S	**Date Analysed:**	15-Aug-24

Dioxin-like PCBs			**Acceptable Recovery**		**Pass/Fail**	**Surrogate Recoveries**
	LOF	**Recovery**	**Min**	**Max**		
Chemical Name	**ng**	**%**	**%**	**%**		**%**
3,4,4',5-TeCB (81)	1	109	60	135	Pass	108
3,3',4,4'-TeCB (77)	1	119	60	135	Pass	112
2,3',4,4',5'-PeCB (123)	1	123	60	135	Pass	52
2,3',4,4',5-PeCB (118)	1	115	60	135	Pass	56
2,3,4,4',5-PeCB (114)	1	124	60	135	Pass	56
2,3,3',4,4'-PeCB (105)	1	103	60	135	Pass	60
3,3',4,4',5-PeCB (126)	1	109	60	135	Pass	72
2,3',4,4',5,5'-HxCB (167)	1	110	60	135	Pass	76
2,3,3',4,4',5-HxCB (156)	1	109	60	135	Pass	76
2,3,3',4,4',5'-HxCB (157)	1	86	60	135	Pass	108
3,3',4,4',5,5'-HxCB (169)	1	115	60	135	Pass	80
2,3,3',4,4',5,5'-HpCB (189)	1	101	60	135	Pass	76

Total PCB			**Acceptable Recovery**		**Pass/Fail**
	LOF	**Recovery**	**Min**	**Max**	
Homologs	**ng**	**%**	**%**	**%**	
Monochlorobiphenyls	2	121			
Dichlorobiphenyls	4	109			
Trichlorobiphenyls	6	81			
Tetrachlorobiphenyls	12	119			
Pentachlorobiphenyls	13	120			
Hexachlorobiphenyls	15	94			
Heptachlorobiphenyls	11	120			
Octachlorobiphenyls	6	115			
Nonachlorobiphenyls	2	128			
Decachlorobiphenyl	1	98			
Total PCB	72	110	50	150	Pass

LOF - Level of Fortification

DATA REPORT

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco
Project:

Date Extracted: 2-Aug-24
Date Analysed: 19-Aug-24

	Client ID:	Blk Dioxin Unit – 3	Run 1 – Dioxin Unit – 3	Run 2 – Dioxin Unit – 3	Run 3 – Dioxin Unit – 3		BLANK
	PRL ID:	PR242017	PR242018	PR242019	PR242020		PH240521B
NPRI PAH	**DL**						
	µg	**µg**	**µg**	**µg**	**µg**		**µg**
Acenaphthylene	0.05	0.07	ND	ND	ND		ND
Acenaphthene	0.05	ND	ND	ND	ND		ND
Fluorene	0.02	ND	0.04	0.02	0.03		ND
Phenanthrene	0.02	0.27	0.22	0.14	0.13		ND
Fluoranthene	0.01	0.01	0.05	0.03	0.03		ND
Pyrene	0.01	0.02	0.06	0.03	0.04		ND
Benz(a)anthracene	0.02	ND	ND	ND	ND		ND
Chrysene	0.02	ND	ND	ND	ND		ND
Benzo(b)fluoranthene	0.01	ND	ND	ND	ND		ND
Benzo(k)fluoranthene	0.01	ND	ND	ND	ND		ND
Benzo(a)pyrene	0.01	ND	ND	ND	ND		ND
Indeno(1,2,3-cd)pyrene	0.01	ND	ND	ND	ND		ND
Dibenz(a,h)anthracene	0.01	ND	ND	ND	ND		ND
Benzo(ghi)perylene	0.01	0.01	0.02	0.01	0.03		ND
1-Nitropyrene	0.05	ND	ND	ND	ND		ND
5-Methylchrysene	0.05	ND	ND	ND	ND		ND
7,12-Dimethylbenz(a)anthr	0.05	ND	ND	ND	ND		ND
3-Methylcholanthrene	0.05	ND	ND	ND	ND		ND
Benzo(e)pyrene	0.01	ND	ND	ND	0.01		ND
Perylene	0.05	ND	ND	ND	ND		ND
Dibenz(a,h)acridine	0.05	ND	ND	ND	ND		ND
Dibenz(a,j)acridine	0.05	ND	ND	ND	ND		ND
7H-Dibenzo(c,g)carbazole	0.05	ND	ND	ND	ND		ND
Dibenzo(a,e)fluoranthene	0.05	ND	ND	ND	ND		ND
Dibenzo(a,e)pyrene	0.05	ND	ND	ND	ND		ND
Dibenzo(a,h)pyrene	0.05	ND	ND	ND	ND		ND
Dibenzo(a,l)pyrene	0.05	ND	ND	ND	ND		ND
Dibenzo(a,i)pyrene	0.05	ND	ND	ND	ND		ND
Quinoline	0.05	ND	ND	ND	0.08		ND
Other PAH							
Naphthalene	0.05	0.29	0.54	0.43	2.00		ND
Anthracene	0.05	ND	ND	ND	ND		ND

DATA REPORT

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco
Project:

Date Extracted: 2-Aug-24
Date Analysed: 19-Aug-24

	Client ID:	Blk Dioxin Unit – 3	Run 1 – Dioxin Unit – 3	Run 2 – Dioxin Unit – 3	Run 3 – Dioxin Unit – 3		BLANK
	PRL ID:	PR242017	PR242018	PR242019	PR242020		PH240521B
NPRI PAH	**DL**						
Surrogate Recoveries (%)							
d8-Naphthalene		21	23	22	8		31
d10-Acenaphthylene		48	69	76	73		54
d10-Acenaphthene		68	63	67	69		61
d10-Fluorene		83	76	76	74		66
d10-Phenanthrene		81	67	77	69		86
d10-Fluoranthene		89	82	91	85		94
d10-Pyrene		75	92	98	95		93
d12-Chrysene		88	97	110	97		120
d12-Benzo(b)fluoranthene		102	103	111	105		100
d12-Benzo(a)pyrene		96	102	102	104		68
d14-Dibenz(a,h)anthracene		125	116	105	120		84

ND - none detected

DATA REPORT

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco
Project:

Date Extracted: 2-Aug-24
Date Analysed: 19-Aug-24

Client ID: SPIKE
PRL ID: PH240522S

NPRI PAH

	µg/g	LOF	Recovery	Acceptable	Pass/Fail
Acenaphthene	0.91	1.00	91%	50-150%	pass
Acenaphthylene	0.96	1.00	96%	50-150%	pass
Benz(a)anthracene	0.70	1.00	70%	50-150%	pass
Benzo(a)pyrene	0.91	1.00	91%	50-150%	pass
Benzo(b)fluoranthene	1.00	1.00	100%	50-150%	pass
Benzo(ghi)perylene	0.89	1.00	89%	50-150%	pass
Benzo(k)fluoranthene	0.96	1.00	96%	50-150%	pass
Chrysene	0.87	1.00	87%	50-150%	pass
Dibenz(a,h)anthracene	0.83	1.00	83%	50-150%	pass
Fluoranthene	1.09	1.00	109%	50-150%	pass
Fluorene	1.03	1.00	103%	50-150%	pass
Indeno(1,2,3-cd)pyrene	0.93	1.00	93%	50-150%	pass
Phenanthrene	1.05	1.00	105%	50-150%	pass
Pyrene	0.97	1.00	97%	50-150%	pass
Dibenz(a,h)acridine	0.93	1.00	93%		
Dibenz(a,j)acridine	1.19	1.00	119%		
7H-Dibenzo(c,g)carbazole	0.74	1.00	74%		
Dibenzo(a,e)fluoranthene	0.91	1.00	91%		
Dibenzo(a,h)pyrene	0.92	1.00	92%		
Dibenzo(a,e)pyrene	0.74	1.00	74%		
Dibenzo(a,i)pyrene	0.73	1.00	73%		
Dibenzo(a,l)pyrene	0.84	1.00	84%		
7,12-Dimethylbenz(a)anthracene	0.73	1.00	73%		
3-Methylcholanthrene	0.68	1.00	68%		
5-Methylchrysene	0.89	1.00	89%		
1-Nitropyrene	0.91	1.00	91%		
Other PAH					
Naphthalene	0.74	1.00	74%	50-150%	pass

DATA REPORT

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco

Date Extracted: 2-Aug-24
Date Analysed: 20-Aug-24

	Client ID:	Blk Dioxin Unit – 3	Run 1 – Dioxin Unit – 3	Run 2 – Dioxin Unit – 3	Run 3 – Dioxin Unit – 3		BLANK
	PRL ID:	PR242017	PR242018	PR242019	PR242020		CP240521B
Compound	**DL µg**	**µg**	**µg**	**µg**	**µg**		**µg**
Trichlorobenzenes	0.05	ND	0.72	0.75	0.75		ND
Tetrachlorobenzenes	0.05	ND	0.52	0.36	0.47		ND
Pentachlorobenzene	0.05	ND	0.08	0.05	0.07		ND
Hexachlorobenzene	0.01	ND	0.01	ND	0.01		ND
Surrogate Recoveries (%)							
13C6-Hexachlorobenzene		119	114	126	117		123

Compound	**DL µg**	**µg**	**µg**	**µg**	**µg**		**µg**
Trichlorophenols	0.05	ND	ND	ND	ND		ND
Tetrachlorophenols	0.05	ND	ND	ND	ND		ND
Pentachlorophenol	0.05	ND	0.06	ND	ND		ND
Surrogate Recoveries (%)							
13C6-Trichlorophenol		68	92	64	120		72
13C6-Tetrachlorophenol		100	72	72	104		52
13C6-Pentachlorophenol		36	40	44	72		40

ND - none detected

QC REPORT - SPIKE

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco

Date Extracted: 2-Aug-24
Date Analysed: 20-Aug-24

Client ID: SPIKE
PRL ID: CP240522S

Compound	LOF µg	µg	Recovery
Trichlorobenzenes	2.00	1.84	92%
Tetrachlorobenzenes	3.00	3.16	105%
Pentachlorobenzene	1.00	1.01	101%
Hexachlorobenzene	1.00	0.98	98%
Trichlorophenols	1.00	1.08	108%
Tetrachlorophenols	1.00	1.03	103%
Pentachlorophenol	1.00	1.15	115%

LOF - level of fortification

Acronyms used in reporting dioxins and furans:

TCDD = Tetrachlorodibenzo-*p*-dioxin
PeCDD = Pentachlorodibenzo-*p*-dioxin
HxCDD = Hexachlorodibenzo-*p*-dioxin
HpCDD = Heptachlorodibenzo-*p*-dioxin
OCDD = Octachlorodibenzo-*p*-dioxin

TCDF = Tetrachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran
HxCDF = Hexachlorodibenzofuran
HpCDF = Heptachlorodibenzofuran
OCDF = Octachlorodibenzofuran

Acceptable recoveries for surrogates	**EPA Method 23**	
	Min (%)	**Max (%)**
$^{37}Cl_4$ -2,3,7,8-TCDD	70	130
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	70	130
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	70	130
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	70	130
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	70	130

Acceptable recoveries for Internal Standards

	EPA Method 23		**Env. Can. 1-RM-3**	
	Min (%)	**Max (%)**	**Min (%)**	**Max (%)**
$^{13}C_{12}$ -2,3,7,8-TCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	25	130	40	130
$^{13}C_{12}$ -OCDD	25	130	40	130
$^{13}C_{12}$ -2,3,7,8-TCDF	40	130	40	130
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	40	130		
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	40	130		
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	25	130		

Acronyms used in reporting Polychlorinated Biphenyls (PCBs)

MoCB = Monochlorobiphenyl
DiCB = Dichlorobiphenyl
TrCB = Trichlorobiphenyl
TeCB = Tetrachlorobiphenyl
PeCB = Pentachlorobiphenyl
HxCB = Hexachlorobiphenyl
HpCB = Heptachlorobiphenyl
OcCB = Octachlorobiphenyl
NoCB = Nonachlorobiphenyl
DeCB = Decachlorobiphenyl

Acceptable recoveries for PCB Internal Standards - EPA 1668C

Chemical Name	IUPAC #	Min	Max
$^{13}C_{12}$-2-MoCB	1L	5	145
$^{13}C_{12}$-4-MoCB	3L	5	145
$^{13}C_{12}$-2,2'-DiCB	4L	5	145
$^{13}C_{12}$-4,4'-DiCB	15L	5	145
$^{13}C_{12}$-2,2',6'-TrCB	19L	5	145
$^{13}C_{12}$-3,4,4'-TrCB	37L	5	145
$^{13}C_{12}$-2,2',6,6'-TeCB	54L	5	145
$^{13}C_{12}$-3,4,4',5-TeCB	81L	10	145
$^{13}C_{12}$-3,3',4,4'-TeCB	77L	10	145
$^{13}C_{12}$-2,2',4,6,6'-PeCB	104L	10	145
$^{13}C_{12}$-2',3,4,4',5-PeCB	123L	10	145
$^{13}C_{12}$-2,3',4,4',5-PeCB	118L	10	145
$^{13}C_{12}$-2,3,4,4',5-PeCB	114L	10	145
$^{13}C_{12}$-2,3,3',4,4'-PeCB	105L	10	145
$^{13}C_{12}$-3,3',4,4',5-PeCB	126L	10	145
$^{13}C_{12}$-2,2',4,4',6,6'-HxCB	155L	10	145
$^{13}C_{12}$-2,3',4,4',5,5'-HxCB	167L	10	145
$^{13}C_{12}$-2,3,3',4,4',5-HxCB	156L	10	145
$^{13}C_{12}$-2,3,3',4,4',5'-HxCB	157L	10	145
$^{13}C_{12}$-3,3',4,4',5,5'-HxCB	169L	10	145
$^{13}C_{12}$-2,2',3,4',5,6,6'-HpCB	188L	10	145
$^{13}C_{12}$-2,3,3',4,4',5,5'-HpCB	189L	10	145
$^{13}C_{12}$-2,2',3,3',5,5',6,6'-OcCB	202L	10	145
$^{13}C_{12}$-2,3,3',4,4',5,5',6-OcCB	205L	10	145
$^{13}C_{12}$-2,2',3,3',4',5,5',6,6'-NoCB	208L	10	145
$^{13}C_{12}$-2,2',3,3',4,4',5,5',6-NoCB	206L	10	145
$^{13}C_{12}$-DeCB	209L	10	145
$^{13}C_{12}$-2,4,4'-TrCB	28L	5	145
$^{13}C_{12}$-2,3,3',5,5'-PeCB	111L	10	145
$^{13}C_{12}$-2,2',3,3',5,5',6-HpCB	178L	10	145

Acceptable recoveries for Polycyclic Aromatic Hydrocarbon Standards in Environmental Samples

	Surrogate Recovery	
	Min (%)	**Max (%)**
Naphthalene-d8	0	135
Biphenyl-d10	15	135
Acenapthylene-d10	15	135
Acenaphthene-d10	15	135
Fluorene-d10	30	135
Phenanthrene-d10	30	135
Fluoranthene-d10	30	135
Pyrene-d10	30	135
Chrysene-d12	30	150
Benzo(b)fluoranthene-d12	30	150
Benzo(a)pyrene-d12	15	150
Dibenz(a,h)anthracene-d14	30	150

PACIFIC RIM LABORATORIES INC

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Pacific Rim Laboratories Inc. #103, 19575 - 55A Avenue, Surrey, BC V3S 8P8 Tel: 604-532-8711 Fax: 604-532-8712

COMPANY: A. Lanfranco & Associates Inc.
101-9488 189 Street
Surrey, BC Canada V4N 4W7

CONTACT: Mark Lanfranco

PHONE: *604-881-2582*

DATE: 29-Jul-24

EMAIL: mark.lanfranco@alanfranco.com

CLIENT: Metro Vancouver WTE

SOURCE: Unit 3

SAMPLE ID	PRL ID	DATE SAMPLED	SAMPLE MATRIX	NUMBER OF CONTAINERS	DIOXIN/FURAN	PCB - dioxin-like (12)	PCB - 209 congener	PAH	HCB	TBT	Nonylphenol	PBDE	CB, CP	COMMENTS
Blk Dioxin Unit - 3	PR24 2017	24-Jul-24		5	X	X		X	X				X	✓
Run 1 - Dioxin Unit - 3	PR24 2018	24-Jul-24		5	X	X		X	X				X	✓
Run 2 - Dioxin Unit - 3	PR24 2019	25-Jul-24		5	X	X		X	X				X	✓
Run 3 - Dioxin Unit - 3	PR24 2020	26-Jul-24		5	X	X		X	X				X	✓
	PR24 2021												→	4 BOXES MAIN SETS FOR CLEANING

Sampler's Signature	Relinquished by:	Company	Date	Time	Received by:	
Comments:	Method of Shipment	Waybill No.:	Rec'd for PRL: PP	Date: 29/July/24	Time: 3:55 pm	
	Shipment Condition	Temp.: 24.3°C	Cooler Opened By: PP			

APPENDIX 2

COMPUTER OUTPUTS OF MEASURED and CALCULATED DATA

Client:	Metro Vancouver	**Date:**	24-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	2 PCDD-PCDF
Source:	Unit 3	**Run Time:**	13:50 - 17:51

Dioxin Concentration:	**2.6**	**pg/dscm**	0.0011	gr/dscf
	1.4	**pg/dscm**	0.0006	gr/Acf
	2.3	pg/dscm (@ 11% O2)	0.0010	gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.9029	dscm	137.830 dscf
Total Sample Time:	240.0	minutes	
Average Isokineticity:	104.0	%	

Flue Gas Characteristics

Moisture:	15.52	%		
Temperature	157.1	oC	314.8	oF
Flow	1208.2	dscm/min	42669	dscf/min
	20.14	dscm/sec	711.2	dscf/sec
	2194.1	Acm/min	77485	Acf/min
Velocity	14.357	m/sec	47.10	f/sec
Gas Analysis	10.03	% O2	9.88	% CO2
	29.981	Mol. Wt (g/gmole) Dry	28.122	Mol. Wt (g/gmole) Wet

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

Client:	Metro Vancouver	**Date:**	24-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	2 PCDD-PCDF
Source:	Unit 3	**Run Time:**	13:50 - 17:51

Control Unit (Y)	0.9899
Nozzle Diameter (in.)	0.2550
Pitot Factor	0.8493
Baro. Press. (in. Hg)	30.02
Static Press. (in. H2O)	-19.00
Stack Height (ft)	30
Stack Diameter (in.)	70.9
Stack Area (sq.ft.)	27.417
Minutes Per Reading	5.0
Minutes Per Point	10.0

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	9.75	10.13
Trav 2	10.00	9.92
Average =	**9.88**	**10.03**

Condensate Collection:

Impinger 1 (grams)	502.0
Impinger 2 (grams)	17.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	18.9
Total Gain (grams)	**537.9**

Collection:

D/F TEQ (ng)	**0.0100**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	128.285							
1	1	5.0	131.860	0.650	1.67	80	80	313	1.5	103.5
		10.0	135.230	0.580	1.48	80	80	317	1.5	103.5
	2	15.0	138.690	0.610	1.56	80	80	315	4.7	103.5
		20.0	142.140	0.600	1.54	80	80	315	4.7	104.1
	3	25.0	145.440	0.550	1.42	81	81	312	8.4	103.5
		30.0	148.770	0.560	1.44	81	81	313	8.4	103.6
	4	35.0	151.970	0.520	1.34	82	82	312	12.5	103.1
		40.0	155.250	0.540	1.39	82	82	313	12.5	103.7
	5	45.0	158.680	0.590	1.52	82	82	314	17.7	103.9
		50.0	162.140	0.600	1.55	83	83	316	17.7	103.9
	6	55.0	165.420	0.540	1.39	84	84	316	25.2	103.6
		60.0	168.640	0.520	1.34	84	84	315	25.2	103.5
	7	65.0	171.650	0.450	1.17	85	85	314	45.6	103.7
		70.0	174.630	0.440	1.14	86	86	315	45.6	103.7
	8	75.0	177.180	0.320	0.83	86	86	317	53.2	104.1
		80.0	179.600	0.290	0.75	86	86	316	53.2	103.7
	9	85.0	181.890	0.260	0.68	87	87	315	58.3	103.4
		90.0	184.150	0.250	0.65	87	87	314	58.3	104.0
	10	95.0	186.490	0.270	0.70	88	88	315	62.5	103.5
		100.0	188.690	0.240	0.62	87	87	315	62.5	103.3
	11	105.0	191.040	0.270	0.70	88	88	315	66.1	103.9
		110.0	193.440	0.280	0.73	89	89	316	66.1	104.1
	12	115.0	195.700	0.250	0.65	89	89	316	69.4	103.7
		120.0	197.880	0.230	0.60	89	89	310	69.4	103.9
		0.0	197.880							
2	1	5.0	200.730	0.400	1.04	90	90	317	1.5	103.4
		10.0	203.620	0.410	1.07	90	90	318	1.5	103.6
	2	15.0	206.290	0.350	0.91	90	90	317	4.7	103.5
		20.0	208.980	0.360	0.94	90	90	316	4.7	102.8
	3	25.0	211.660	0.350	0.92	91	91	315	8.4	103.6
		30.0	214.320	0.340	0.89	92	92	314	8.4	104.0
	4	35.0	216.810	0.320	0.84	91	91	315	12.5	100.6
		40.0	219.490	0.330	0.86	91	91	315	12.5	106.6
	5	45.0	222.050	0.320	0.84	91	91	314	17.7	103.4
		50.0	224.660	0.330	0.87	91	91	313	17.7	103.7
	6	55.0	227.320	0.350	0.92	91	91	314	25.2	102.7
		60.0	229.980	0.340	0.89	91	91	312	25.2	104.1
	7	65.0	233.850	0.520	1.61	92	92	313	45.6	122.5
		70.0	237.220	0.550	1.44	92	92	314	45.6	103.8
	8	75.0	240.650	0.570	1.50	92	92	314	53.2	103.8
		80.0	244.100	0.580	1.52	92	92	315	53.2	103.5
	9	85.0	247.620	0.600	1.57	92	92	315	58.3	103.9
		90.0	251.170	0.610	1.60	93	93	316	58.3	103.8
	10	95.0	254.850	0.660	1.73	92	92	315	62.5	103.6
		100.0	258.480	0.640	1.68	92	92	315	62.5	103.7
	11	105.0	261.980	0.590	1.55	93	93	315	66.1	104.0
		110.0	265.470	0.570	1.49	93	93	316	66.1	105.5
	12	115.0	268.690	0.520	1.36	92	92	315	69.4	102.0
		120.0	271.900	0.500	1.31	93	93	316	69.4	103.6
			Average:	0.448	1.171	88.0	88.0	314.8		104.0

Client:	Metro Vancouver	**Date:**	25-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	2 PCDD-PCDF
Source:	Unit 3	**Run Time:**	09:22 - 13:23

Dioxin Concentration:	**7.38**	**pg/dscm**	0.0032	gr/dscf
	4.0	**pg/dscm**	0.0018	gr/Acf
	6.47	pg/dscm (@ 11% O2)	0.0028	gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.6825	dscm	130.046 dscf
Total Sample Time:	240.0	minutes	
Average Isokineticity:	104.1	%	

Flue Gas Characteristics

Moisture:	15.83	%		
Temperature	157.6	oC	315.7	oF
Flow	1140.0	dscm/min	40258	dscf/min
	19.00	dscm/sec	671.0	dscf/sec
	2077.1	Acm/min	73353	Acf/min
Velocity	13.591	m/sec	44.59	f/sec
Gas Analysis	9.62	% O2	10.29	% CO2
	30.031	Mol. Wt (g/gmole) Dry	28.127	Mol. Wt (g/gmole) Wet

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

Client:	Metro Vancouver	**Date:**	25-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	2 PCDD-PCDF
Source:	Unit 3	**Run Time:**	09:22 - 13:23

Control Unit (Y)	0.9899
Nozzle Diameter (in.)	0.2550
Pitot Factor	0.8493
Baro. Press. (in. Hg)	30.10
Static Press. (in. H2O)	-19.50
Stack Height (ft)	30
Stack Diameter (in.)	70.9
Stack Area (sq.ft.)	27.417
Minutes Per Reading	5.0
Minutes Per Point	10.0

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	10.33	9.57
Trav 2	10.25	9.67
Average =	**10.29**	**9.62**

Condensate Collection:

Impinger 1 (grams)	492.0
Impinger 2 (grams)	8.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	19.5
Total Gain (grams)	**519.5**

Collection:

D/F TEQ (ng)	**0.0272**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	272.142							
1	1	5.0	274.720	0.350	0.88	71	71	315	1.5	104.0
		10.0	277.340	0.360	0.91	71	71	317	1.5	104.3
	2	15.0	279.980	0.370	0.93	72	72	318	4.7	103.6
		20.0	282.600	0.360	0.90	72	72	319	4.7	104.3
	3	25.0	285.040	0.310	0.78	73	73	317	8.4	104.3
		30.0	287.440	0.300	0.76	74	74	317	8.4	104.1
	4	35.0	289.850	0.300	0.76	75	75	316	12.5	104.2
		40.0	292.220	0.290	0.75	75	75	316	12.5	104.2
	5	45.0	294.750	0.330	0.84	75	75	316	17.7	104.3
		50.0	297.320	0.340	0.86	75	75	315	17.7	104.4
	6	55.0	299.930	0.350	0.89	76	76	316	25.2	104.3
		60.0	302.580	0.360	0.92	77	77	316	25.2	104.3
	7	65.0	305.670	0.490	1.25	77	77	316	45.6	104.3
		70.0	308.790	0.500	1.27	78	78	317	45.6	104.1
	8	75.0	312.180	0.590	1.50	77	77	317	53.2	104.4
		80.0	315.590	0.600	1.53	77	77	317	53.2	104.2
	9	85.0	318.950	0.580	1.48	78	78	316	58.3	104.1
		90.0	322.350	0.590	1.51	79	79	317	58.3	104.3
	10	95.0	325.720	0.580	1.48	80	80	317	62.5	104.1
		100.0	329.060	0.570	1.46	80	80	318	62.5	104.1
	11	105.0	332.440	0.580	1.49	81	81	316	66.1	104.1
		110.0	335.760	0.560	1.43	80	80	317	66.1	104.4
	12	115.0	339.020	0.530	1.37	81	81	310	69.4	104.6
		120.0	342.200	0.510	1.32	82	82	308	69.4	103.7
								.		
		0.0	342.200							
2	1	5.0	345.400	0.520	1.34	81	81	315	1.5	104.0
		10.0	348.580	0.510	1.31	82	82	316	1.5	104.3
	2	15.0	351.730	0.500	1.29	82	82	315	4.7	104.2
		20.0	354.820	0.480	1.24	83	83	315	4.7	104.1
	3	25.0	357.850	0.460	1.18	83	83	316	8.4	104.4
		30.0	360.850	0.450	1.16	83	83	316	8.4	104.5
	4	35.0	363.980	0.500	1.29	83	83	317	12.5	103.5
		40.0	367.100	0.490	1.26	84	84	317	12.5	104.0
	5	45.0	370.290	0.510	1.31	84	84	317	17.7	104.3
		50.0	373.450	0.500	1.29	84	84	317	17.7	104.3
	6	55.0	376.440	0.450	1.16	84	84	318	25.2	104.1
		60.0	379.400	0.440	1.13	85	85	319	25.2	104.1
	7	65.0	381.680	0.260	0.67	84	84	316	45.6	104.1
		70.0	383.920	0.250	0.65	85	85	315	45.6	104.1
	8	75.0	386.160	0.250	0.65	84	84	315	53.2	104.3
		80.0	388.350	0.240	0.62	84	84	316	53.2	104.1
	9	85.0	390.460	0.220	0.57	84	84	307	58.3	104.1
		90.0	392.560	0.220	0.57	85	85	317	58.3	104.1
	10	95.0	394.750	0.240	0.62	85	85	318	62.5	104.0
		100.0	396.990	0.250	0.65	85	85	317	62.5	104.2
	11	105.0	399.100	0.240	0.62	85	85	316	66.1	100.1
		110.0	401.250	0.230	0.59	85	85	318	66.1	104.3
	12	115.0	403.360	0.220	0.56	85	85	310	69.4	104.1
		120.0	405.420	0.210	0.55	86	86	306	69.4	103.6
			Average:	0.403	1.032	80.2	80.2	315.7		104.1

Client:	Metro Vancouver	**Date:**	26-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	3 - PCDD-PCDF
Source:	Unit 3	**Run Time:**	10:10 - 14:12

Dioxin Concentration:	**4.3**	**pg/dscm**	0.0019	gr/dscf
	2.4	pg/Acm	0.0010	gr/Acf
	3.9	pg/dscm (@ 11% O2)	0.0017	gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.4970	dscm	123.496	dscf
Total Sample Time:	240.0	minutes		
Average Isokineticity:	103.3	%		

Flue Gas Characteristics

Moisture:	15.27	%		
Temperature	157.0	oC	314.6	oF
Flow	1090.6	dscm/min	38515	dscf/min
	18.18	dscm/sec	641.9	dscf/sec
	1974.3	Acm/min	69721	Acf/min
Velocity	12.919	m/sec	42.38	f/sec
Gas Analysis	9.88	% O2	9.68	% CO2
	29.945	Mol. Wt (g/gmole) Dry	28.120	Mol. Wt (g/gmole) Wet

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

Client:	Metro Vancouver	**Date:**	26-Jul-24
Jobsite:	WTE (Burnaby, BC)	**Run:**	3 - PCDD-PCDF
Source:	Unit 3	**Run Time:**	10:10 - 14:12

Control Unit (Y)	0.9899
Nozzle Diameter (in.)	0.2550
Pitot Factor	0.8483
Baro. Press. (in. Hg)	30.06
Static Press. (in. H2O)	-19.50
Stack Height (ft)	30
Stack Diameter (in.)	70.9
Stack Area (sq.ft.)	27.417
Minutes Per Reading	5.0
Minutes Per Point	10.0

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	9.51	9.82
Trav 2	9.86	9.94
Average =	**9.68**	**9.88**

Condensate Collection:

Impinger 1 (grams)	440.0
Impinger 2 (grams)	12.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	21.0
Total Gain (grams)	**473.0**

Collection:

D/F TEQ (ng)	**0.0151**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	405.950							
1	1	5.0	408.490	0.340	0.86	71	71	312	1.5	103.1
		10.0	411.020	0.350	0.89	71	71	310	1.5	101.1
	2	15.0	413.600	0.300	0.76	72	72	313	4.7	111.3
		20.0	416.070	0.290	0.73	72	72	312	4.7	108.3
	3	25.0	418.350	0.250	0.63	73	73	315	8.4	107.7
		30.0	420.530	0.250	0.63	73	73	316	8.4	103.0
	4	35.0	422.790	0.270	0.68	73	73	316	12.5	102.8
		40.0	425.090	0.280	0.71	73	73	316	12.5	102.7
	5	45.0	427.320	0.260	0.66	74	74	315	17.7	103.1
		50.0	429.590	0.270	0.68	74	74	315	17.7	103.0
	6	55.0	431.940	0.290	0.74	74	74	313	25.2	102.7
		60.0	434.340	0.300	0.76	74	74	312	25.2	103.1
	7	65.0	436.950	0.350	0.90	75	75	301	45.6	102.9
		70.0	439.560	0.350	0.90	75	75	300	45.6	102.8
	8	75.0	442.050	0.320	0.82	76	76	308	53.2	102.9
		80.0	444.500	0.310	0.79	76	76	310	53.2	103.0
	9	85.0	447.350	0.420	1.08	76	76	308	58.3	102.9
		90.0	450.230	0.430	1.10	76	76	311	58.3	103.0
	10	95.0	453.340	0.500	1.27	76	76	312	62.5	103.2
		100.0	456.470	0.510	1.30	76	76	313	62.5	102.9
	11	105.0	459.700	0.540	1.37	77	77	315	66.1	103.2
		110.0	462.950	0.550	1.40	77	77	317	66.1	103.0
	12	115.0	466.140	0.530	1.34	77	77	317	69.4	103.0
		120.0	469.300	0.520	1.32	77	77	316	69.4	102.9
		0.0	469.300							
2	1	5.0	472.510	0.530	1.35	78	78	313	1.5	103.2
		10.0	475.680	0.520	1.33	78	78	315	1.5	103.0
	2	15.0	478.790	0.500	1.27	79	79	318	4.7	103.0
		20.0	481.900	0.500	1.27	79	79	318	4.7	103.0
	3	25.0	484.920	0.470	1.20	79	79	318	8.4	103.2
		30.0	487.910	0.460	1.17	79	79	317	8.4	103.2
	4	35.0	490.960	0.480	1.22	79	79	319	12.5	103.2
		40.0	494.000	0.480	1.22	79	79	320	12.5	102.9
	5	45.0	497.180	0.520	1.32	80	80	319	17.7	103.2
		50.0	500.330	0.510	1.30	80	80	319	17.7	103.2
	6	55.0	503.320	0.460	1.17	80	80	319	25.2	103.1
		60.0	506.280	0.450	1.15	80	80	318	25.2	103.2
	7	65.0	508.530	0.260	0.66	80	80	316	45.6	102.9
		70.0	510.740	0.250	0.64	80	80	316	45.6	103.1
	8	75.0	512.950	0.250	0.64	81	81	317	53.2	102.9
		80.0	515.120	0.240	0.61	81	81	316	53.2	103.1
	9	85.0	517.090	0.200	0.51	81	81	318	58.3	102.6
		90.0	519.120	0.210	0.54	82	82	318	58.3	103.0
	10	95.0	521.200	0.220	0.56	82	82	317	62.5	103.1
		100.0	523.370	0.240	0.62	82	82	316	62.5	102.9
	11	105.0	525.630	0.260	0.67	81	81	314	66.1	103.0
		110.0	527.840	0.250	0.64	81	81	315	66.1	102.8
	12	115.0	529.960	0.230	0.59	81	81	317	69.4	102.9
		120.0	532.030	0.220	0.56	81	81	316	69.4	102.7
			Average:	0.364	0.928	77.3	77.3	314.6		103.3

APPENDIX 3

FIELD DATA SHEETS

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.

SOURCE	Unit #3	NOZZLE	P-256 DIAMETER, IN. 0.2550
PARAMETER / RUN No	PCDD/PCDF / R-1	PROBE	7'C Cp 0.8493
DATE	July. 24. 2024	PORT LENGTH	
OPERATOR:	DS + CD	STATIC PRESSURE, IN. H2O	-19.0"
CONTROL UNIT	FE 18 Y 0.9899 ΔH@ 1.854	STACK DIAMETER	70.9"
BAROMETRIC PRESSURE, IN. Hg	30.02	STACK HEIGHT	30.0'
ASSUMED MOISTURE, Bw	15%	INITIAL LEAK TEST	0.008 @ 15"
		FINAL LEAK TEST	0.005 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	502	502
Imp. #2	100	117	17
Imp. #3	0	0	0
Imp. #4	200 g		
Imp. #5			
Imp. #6			
Imp. #7			
Imp. #8			

10 Point MDN	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	XAD	
1	1350	128.785												
1		131.86	0.65	1.67	80	313	249	258	63	6			59	
2	10	135.23	0.58	1.48	80	314					10.0	10.0		
3		138.69	0.61	1.56	80	315	251	251	56	7			58	
4	20	142.14	0.60	1.54	80	315								
5		145.44	0.55	1.41	81	312	250	253	55	8			65	
6	30	148.77	0.56	1.44	81	313								
7		151.97	0.52	1.34	82	312	249	258	54	7	9.5	10.5	45	
8	40	155.25	0.54	1.39	82	313								
9		158.68	0.59	1.52	82	314	253	249	57	7			44	
10	50	162.14	0.60	1.55	83	313								
11		165.47	0.54	1.39	84	316	253	252	55	7	9.5	10.3		
12	60	168.64	0.52	1.34	84	315							52	
1		171.65	0.45	1.17	85	314	249	250	54	7				
2	10	174.63	0.44	1.14	86	315								
3		177.18	0.32	0.83	86	317	245	252	53	7	9.50	10.25	54	
4	20	179.60	0.29	0.75	86	316								
5		181.89	0.26	0.68	87	315	250	253	55	6			56	
6	30	184.15	0.25	0.65	87	314								
7		186.49	0.27	0.70	88	315	250	247	56	6	10.5	9.25	57	
8	40	188.69	0.24	0.62	87	315								
9		191.04	0.27	0.70	88	315	249	251	55	6			58	
10	50	193.44	0.28	0.73	89	316								
11		195.70	0.25	0.65	89	316	249	250	56	5	9.5	10.5	59	
12		197.88	0.23	0.60	89	310								

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.	NOZZLE DIAMETER, IN.	IMPINGER	INITIAL	FINAL	TOTAL GAIN
	PROBE Cp	VOLUMES	(mL)	(mL)	(mL)
SOURCE Unit #3		Imp. #1			
PARAMETER / RUN No PCDD / PCDF / R-1 Cont.	PORT LENGTH	Imp. #2			
DATE	STATIC PRESSURE, IN. H2O	Imp. #3			
OPERATOR:	STACK DIAMETER	Imp. #4			
CONTROL UNIT Y	STACK HEIGHT	Imp. #5			
ΔH@		Imp. #6			
BAROMETRIC PRESSURE, IN. Hg	INITIAL LEAK TEST	Imp. #7			
ASSUMED MOISTURE, Bw	FINAL LEAK TEST	Imp. #8			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F					Pump Vac. IN. Hg	Fyrites		XAD
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO_2 Vol. %	O_2 Vol. %	
		197.88											
1		200.73	0.40	1.04	90	317	249	249	52	5			54
2	10	203.62	0.41	1.07	90	318					9.5	10.25	
3		206.29	0.35	0.91	90	317	248	244	62	5			52
4	20	208.98	0.36	0.94	90	318							
5		211.66	0.35	0.92	91	315	252	252	58	5			49
6	30	214.32	0.34	0.89	92	314					10.0	10.0	
7		216.89	0.32	0.84	91	315	252	250	59	4			54
8	40	219.49	0.33	0.86	91	315							
9		222.05	0.32	0.84	91	314	251	255	58	5			56
10	50	224.66	0.33	0.87	91	313					10.0	9.75	
11		227.32	0.35	0.92	91	314	251	256	54	5			52
12	60	229.98	0.34	0.89	91	312							
1		233.85	0.52	1.61	92	313	250	251	56	6			
2	10	237.22	0.55	1.44	92	314					10.0	10.0	55
3		240.65	0.57	1.50	92	314	250	251	54	7			
4	20	244.10	0.58	1.52	92	315							58
5		247.62	0.60	1.57	92	315	250	251	54	8			
6	30	251.17	0.61	1.60	93	316					11.0	9.0	57
7		254.85	0.66	1.73	92	315	253	250	56	9			
8	40	258.48	0.64	1.68	92	315							54
9		261.98	0.59	1.55	93	313	253	250	57	9			
10	50	265.47	0.57	1.49	93	316					9.5	10.5	50
11		268.69	0.52	1.36	92	315	251	251	58	8			
12	17:51	271.90	0.50	1.31	93	316							48

A. Lanfranco and Associates Inc.

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METRO VANCOUVER WTE - BURNABY B.C.		NOZZLE	P-256 ~~C-2~~	DIAMETER, IN.	0.2550 ~~0.2~~	IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
SOURCE	Unit #3	PROBE	7' ~~7'AL GUID~~	Cp	0.8403	Imp. #1	0	492	492
PARAMETER / RUN No	PCDD / PCDF / R-2	PORT LENGTH				Imp. #2	100	108	8
DATE	July 25, 2024	STATIC PRESSURE, IN. H2O	-19.5"			Imp. #3	0	0	0
OPERATOR:	DS + CD	STACK DIAMETER	70.9'			Imp. #4	200 g		
CONTROL UNIT	EE18 Y 0.9899	STACK HEIGHT	30.0'			Imp. #5			
	ΔH@ 1.854					Imp. #6			
BAROMETRIC PRESSURE, IN. Hg	30.10	INITIAL LEAK TEST	0.007 @ 15"			Imp. #7			
ASSUMED MOISTURE, Bw	15%	FINAL LEAK TEST	0.001 @ 15"			Imp. #8			

Point	Clock Time	Dry Gas Meter ft^3	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	O_2 Vol. %	XAD
	272.142	09:22											
1		274.77	0.35	0.88	71	315	265	232	59	4			69
2	10	277.34	0.36	0.91	71	317					10.5	9.25	
3		279.98	0.37	0.93	72	318	267	231	59	3			54
4	20	282.60	0.36	0.90	72	319							
5		285.04	0.31	0.78	73	317	264	250	60	4			52
6	30	287.44	0.30	0.76	74	317					10.5	9.50	
7		289.85	0.30	0.76	75	316	250	250	62	4			50
8	40	292.27	0.29	0.75	75	316							
9		294.75	0.33	0.84	75	316	250	249	60	4			48
10	50	297.32	0.34	0.86	75	315					10.0	9.75	
11		299.93	0.35	0.89	76	316	249	251	52	5			53
12	60	302.58	0.36	0.92	77	316							
1		305.67	0.49	1.25	77	316	250	253	54	5.5			56
2	10	308.79	0.50	1.27	78	317					10.0	9.9	
3		312.18	0.59	1.50	77	317	251	248	56	6			59
4	20	315.59	0.60	1.53	77	317							
5		318.95	0.58	1.48	78	316	250	249	57	6			54
6	30	322.35	0.59	1.51	79	317					10.5	9.5	
7		325.72	0.58	1.48	80	317	249	246	56	6			48
8	40	329.06	0.57	1.46	80	318							
9		332.44	0.58	1.49	81	316	249	246	55	6			45
10	50	335.76	0.56	1.43	80	317					10.5	9.5	
11		339.02	0.53	1.37	81	310	250	251	54	6			47
12		342.20	0.51	1.32	82	308							
													50

METRO VANCOUVER WTE - BURNABY B.C.		NOZZLE DIAMETER, IN.		IMPINGER	INITIAL	FINAL	TOTAL GAIN
		PROBE Cp		VOLUMES	(mL)	(mL)	(mL)
SOURCE	Unit #3			Imp. #1			
PARAMETER / RUN No	PCDD/PCDF / R-2 cont	PORT LENGTH		Imp. #2			
DATE		STATIC PRESSURE, IN. H2O		Imp. #3			
OPERATOR:		STACK DIAMETER		Imp. #4			
CONTROL UNIT	Y	STACK HEIGHT		Imp. #5			
	ΔH@			Imp. #6			
BAROMETRIC PRESSURE, IN. Hg		INITIAL LEAK TEST		Imp. #7			
ASSUMED MOISTURE, Bw		FINAL LEAK TEST		Imp. #8			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F					Pump Vac. IN. Hg	Fyrites		
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO_2 Vol. %	O_2 Vol. %	XAD
		342.20											
1		345.40	0.52	1.34	81	315	249	247	53	6			95
2	10	348.58	0.51	1.31	82	316					11.0	9.0	
3		351.73	0.50	1.29	82	315	251	248	55	7			52
4	20	354.82	0.48	1.24	83	315							
5		357.85	0.46	1.18	83	316	251	249	56	7			54
6	30	360.85	0.45	1.16	83	316							
7		363.98	0.50	1.29	83	317	250	248	59	6	10.0	9.75	55
8	40	367.10	0.49	1.26	84	317							
9		370.29	0.51	1.31	84	317	247	250	58	6			58
10	50	373.45	0.50	1.29	84	317							
11		376.44	0.45	1.16	84	318	250	249	56	6	10.0	9.75	58
12	60	379.40	0.44	1.13	85	319							
													52
1		381.68	0.26	0.67	84	316	249	250	58	5			
2	10	383.97	0.25	0.65	84	315					10.0	10.0	54
3		386.16	0.25	0.65	84	315	250	251	56	5			
4	20	388.35	0.24	0.62	84	316							56
5		390.45	0.22	0.57	84	317	250	251	57	4			
6	30	392.56	0.22	0.57	85	317							47
7		394.75	0.24	0.62	85	318	249	250	58	4	10.0	10.0	
8	40	396.99	0.25	0.65	85	317							45
9		399.10	0.24	0.62	85	316	246	248	59	4			
10	50	401.25	0.23	0.59	85	318							50
11		403.36	0.22	0.56	85	310	248	249	60	4	10.5	9.5	
12	13:23	405.42	0.21	0.55	86	306							52

4A

A. Lanfranco and Associates Inc.

CLIENT Metro Vancouver WTE	NOZZLE P-256 DIAMETER, IN. 0.2550	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
SOURCE Unit 3	PROBE ~~7C~~ 7 AL GVRD Cp ~~0.8493~~ 0.8483	Imp. #1	0 / 428 /
PARAMETER / RUN No DF Run3	PORT LENGTH	Imp. #2	100 / 112 /
DATE July 26, 2024	STATIC PRESSURE, IN. H2O -19.5"	Imp. #3	0 / 0 /
OPERATOR: LF / CD	STACK DIAMETER	Imp. #4	Gel / /
CONTROL UNIT FE-18 Y 0.9899	STACK HEIGHT	Imp. #5	
ΔH@ 1.854		Imp. #6	
BAROMETRIC PRESSURE, IN. Hg 30.06	INITIAL LEAK TEST 0.00 @15"	Upstream Diameters	
ASSUMED MOISTURE, Bw 15%	FINAL LEAK TEST 0.001 @15"	Downstream Diameters	
		Testo-3	

Point	Clock Time	Dry Gas Meter ft^3	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	O_2 Vol. %	XAD
	10:10	405.~~810~~ 950											
1		408.49	0.34	0.86	71	312	261	251	54	5			55
1	10	411.02	0.35	0.89	71	310					9.5	10.1	
2		413.60	0.30	0.76	72	313	250	249	54	6			54
2	20	416.07	0.29	0.73	72	312							
3		418.[illegible]	0.25	0.63	73	315	249	250	54	6			56
3	30	420.[illegible]	0.25	0.63	73	316					10.0	8.9	
4		422.79	0.27	0.68	73	316	245	255	54	6			55
4	40	425.09	0.28	0.71	73	316							
5		427.32	0.26	0.66	74	315	244	251	55	5			56
5	50	429.59	0.27	0.68	74	315					9.3	10.5	
6		431.94	0.29	0.74	74	313	252	251	56	6			56
6	60	434.34	0.30	0.76	74	312							
7		436.75	0.35	0.90	75	301	250	250	54	6			53
7	70	439.56	0.35	0.90	75	309					9.75	10.0	
8		442.05	0.32	0.82	76	308	249	252	54	7			52
8	80	444.50	0.31	0.79	76	310							
9		447.35	0.42	1.08	76	308	250	254	54	7			52
9	90	450.23	0.43	1.10	76	311					9.0	9.8	
10		453.34	0.50	1.27	76	312	250	249	54	7			54
10	100	456.47	0.51	1.30	76	313							
11		459.70	0.54	1.37	77	315	251	255	55	7			53
11	110	462.95	0.55	1.40	77	317					9.5	9.6	
12		466.14	0.53	1.34	77	317	249	251	55	7			53
12	120	469.30	0.52	1.32	77	316							

A. Lanfranco and Associates Inc.

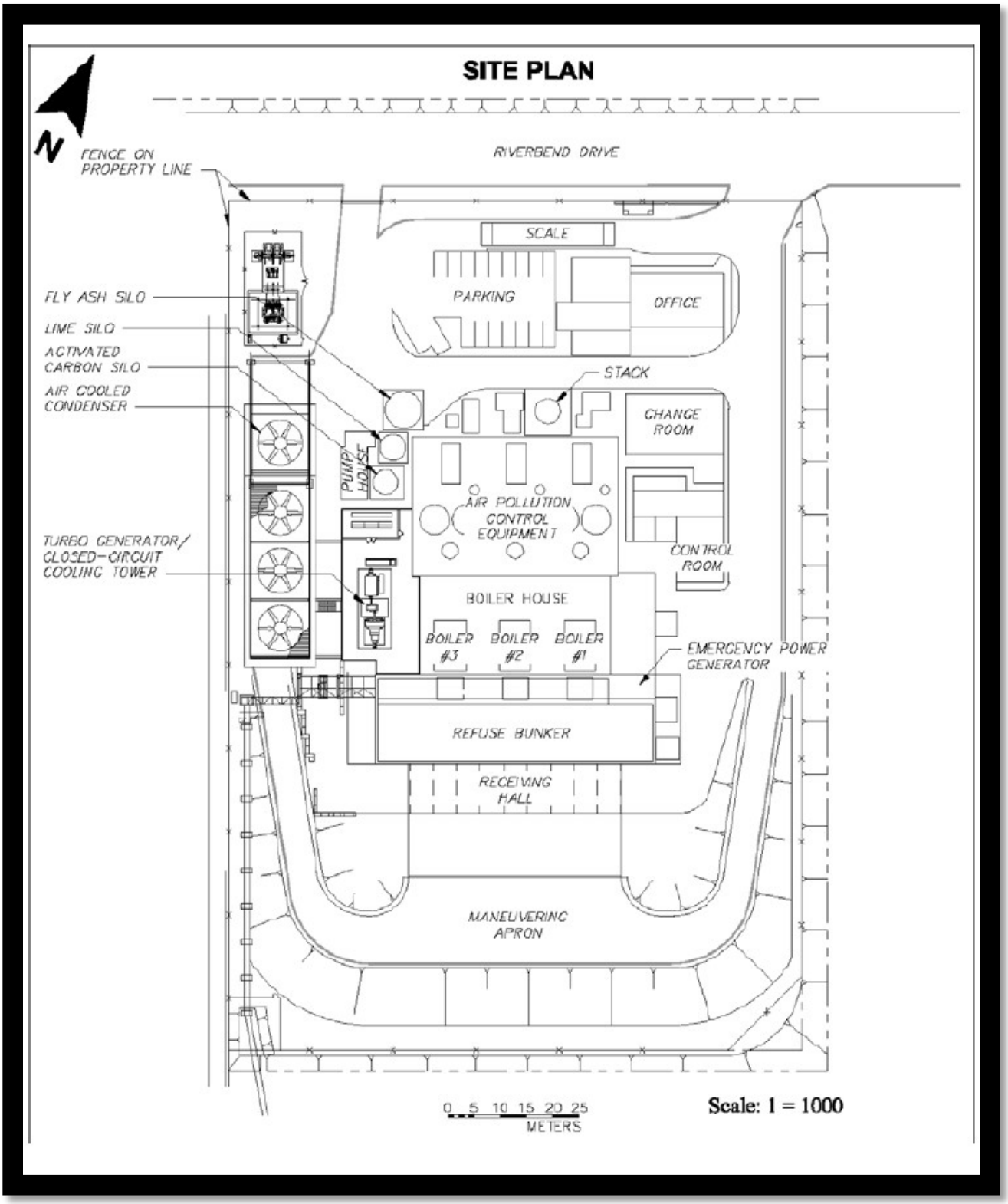
4A

CLIENT Metro Vancouver WTE					NOZZLE DIAMETER, IN.					IMPINGER	INITIAL	FINAL	TOTAL GAIN				
SOURCE Unit 3					PROBE Cp					VOLUMES	(mL)	(mL)	(mL)				
PARAMETER / RUN No DF Run-3 Cont.										Imp. #1							
DATE					PORT LENGTH					Imp. #2							
OPERATOR:					STATIC PRESSURE, IN. H2O					Imp. #3							
CONTROL UNIT Y					STACK DIAMETER					Imp. #4							
ΔH@					STACK HEIGHT					Imp. #5							
BAROMETRIC PRESSURE, IN. Hg										Imp. #6							
ASSUMED MOISTURE, Bw					INITIAL LEAK TEST					Upstream Diameters							
					FINAL LEAK TEST					Downstream Diameters							

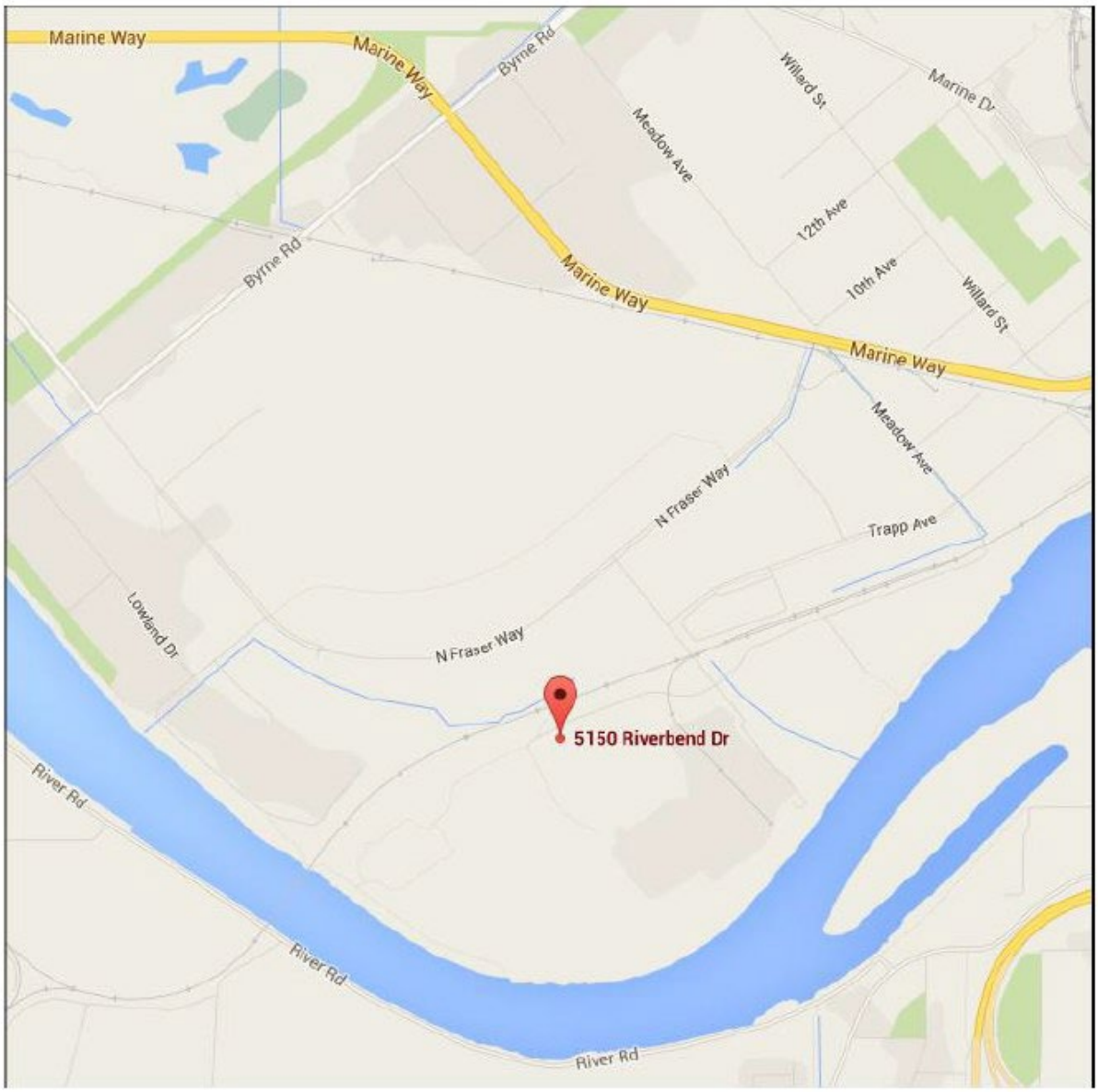
Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F					Pump Vac. IN. Hg	Fyrites		XAD				
		469.30			Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO_2 Vol. %	O_2 Vol. %					
1		472.51	0.53	1.35	78	313	250	249	54	7			51				
1	10	475.68	0.52	1.33	78	315					9.6	10.1					
2		478.79	0.50	1.27	79	318	250	247	55	7			51				
2	20	481.90	0.50	1.27	79	318											
3		484.92	0.47	1.20	79	318	251	248	55	7			50				
3	30	487.91	0.46	1.17	79	317					9.3	10.5					
4		490.96	0.48	1.22	79	319	251	250	57	7			52				
4	40	494.00	0.48	1.22	79	320											
5		497.18	0.52	1.32	80	319	250	252	56	7			56				
5	50	500.33	0.51	1.30	80	319					10.0	9.75					
6		503.32	0.46	1.17	80	319	248	249	56	7			51				
6	60	506.28	0.45	1.15	80	318											
7		508.53	0.26	0.66	80	316	249	252	58	6			52				
7	70	510.74	0.25	0.64	80	316					10	9.5					
8		512.95	0.25	0.64	81	317	250	250	59	6			50				
8	80	515.12	0.24	0.61	81	316											
9		517.09	0.20	0.51	81	318	252	250	58	6			50				
9	90	519.12	0.21	0.54	82	318					10.5	9.5					
10		521.20	0.22	0.56	82	317	250	250	58	6			51				
10	100	523.37	0.24	0.62	82	316											
11		525.63	0.26	0.67	81	314	250	252	58	6			49				
11	110	527.84	0.25	0.64	81	315					9.75	10.3					
12		529.96	0.23	0.59	81	317	250	248	57	6			49				
12	120	532.03	0.22	0.56	81	316											
End	14:12																

APPENDIX 4

SITE AND LOCATION MAPS


SITE PLAN
N
FENCE ON PROPERTY LINE
RIVERBEND DRIVE
SCALE
PARKING
OFFICE
FLY ASH SILO
LIME SILO
ACTIVATED CARBON SILO
AIR COOLED CONDENSER
STACK
CHANGE ROOM
PUMP HOUSE
AIR POLLUTION CONTROL EQUIPMENT
CONTROL ROOM
TURBO GENERATOR/ CLOSED-CIRCUIT COOLING TOWER
BOILER HOUSE
BOILER #3
BOILER #2
BOILER #1
EMERGENCY POWER GENERATOR
REFUSE BUNKER
RECEIVING HALL
MANEUVERING APRON
0 5 10 15 20 25
METERS
Scale: 1 = 1000

LOCATION MAP



APPENDIX 5

CALIBRATION DATA and

CERTIFICATION

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: FE 18

Serial #: 0028-020118-1

Date: 05-Jul-24

Barometric Pressure: 30.05 (in. Hg)

Theoretical Critical Vacuum: 14.17 (in. Hg)

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

---------- DRY GAS METER READINGS ----------									-CRITICAL ORIFICE READINGS-					
		Volume	Volume	Volume	Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual	-- Ambient Temperature --		
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
3.50	17.00	495.355	514.226	18.871	79.0	79.0	79.0	79.0	73	0.8185	14.0	80.0	80.0	80.0
2.00	15.00	516.055	528.580	12.525	80.0	80.0	80.0	80.0	63	0.5956	17.0	80.0	80.0	80.0
1.20	17.00	528.580	538.799	10.219	81.0	81.0	82.0	82.0	55	0.4606	18.5	80.0	80.0	80.0
0.70	15.00	538.799	545.714	6.915	81.0	81.0	82.0	82.0	48	0.3560	19.5	81.0	81.0	81.0
0.35	15.00	545.714	550.356	4.642	82.0	82.0	82.0	82.0	40	0.2408	21.0	81.0	82.0	81.5

********** RESULTS **********

--- DRY GAS METER ---		--------- ORIFICE ---------			-- DRY GAS METER --		--------- ORIFICE ---------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
18.718	530.1	17.993	509.6	18.330	0.961	-0.029	1.729	43.91	-0.125	0.749
12.355	349.9	11.553	327.2	11.769	0.935	-0.055	1.862	47.30	0.008	0.744
10.033	284.1	10.126	286.8	10.315	1.009	0.019	1.863	47.33	0.009	0.690
6.781	192.0	6.899	195.4	7.041	1.017	0.028	1.823	46.30	-0.031	0.692
4.544	128.7	4.664	132.1	4.765	1.027	0.037	1.992	50.60	0.138	0.656
				Average Y---------->	**0.9899**		**Average dH@-----> 1.854**	**47.1**		**Average Ko----> 0.706**

TEMPERATURE CALIBRATION

Calibration Standard -------> Omega Model CL23A S/N:T-218768

Reference Set-Point	Temperature Device Reading: Stack		Hot Box		Probe		Imp Out		Aux	
(deg F)	(deg F)	(% diff)	(deg F)	(% diff)	(deg F)	(% diff)	(deg F)	(% diff)	(deg F)	(% diff)
32	32	0.00%	31	-0.20%	35	0.61%	31	-0.20%	32	0.00%
100	99	-0.18%	99	-0.18%	100	0.00%	99	-0.18%	99	-0.18%
300	299	-0.13%	299	-0.13%	301	0.13%	299	-0.13%	299	-0.13%
500	498	-0.21%	499	-0.10%	500	0.00%	499	-0.10%	499	-0.10%
1000	998	-0.14%	1000	0.00%	1008	0.55%	1000	0.00%	998	-0.14%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Ben Lester Signature:  Date: July 5, 2024

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Louis Agassiz

Date: 12-Jul-24

Signature: 

TEMPERATURE DEVICE CALIBRATIONS

Reference Device			Temperature Settings (degrees F)													
Model CL23A Calibrator			32		100		200		300		500		800		1700	
Device	**ALA #**	**Serial #**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**
Omega HH11A	3	300132	32	0.00%	99	-0.18%	201	0.15%	301	0.13%	500	0.00%	800	0.00%	1699	-0.05%
Omega HH11A	4	200167	32	0.00%	99	-0.18%	200	0.00%	303	0.39%	499	-0.10%	799	-0.08%	1697	-0.14%
Omega HH11A	6	600059	33	0.20%	100	0.00%	201	0.15%	300	0.00%	499.2	-0.08%	798	-0.16%	1696	-0.19%
TPI 341K	7	2.0315E+10	31	-0.20%	99.6	-0.07%	199	-0.15%	301	0.13%	499.1	-0.09%	799.1	-0.07%	1695	-0.23%
TPI 341K	8	2.0313E+10	32	0.00%	99.7	-0.05%	200.4	0.06%	301	0.13%	498.5	-0.16%	799.2	-0.06%	1696	-0.19%
Cont Cmpny	10	102008464	31	-0.20%	99.2	-0.14%	199.5	-0.08%	299	-0.13%	499	-0.10%	799.1	-0.07%	1699	-0.05%
Omega HH11	14	409426	32.5	0.10%	99.1	-0.16%	199	-0.15%	298	-0.26%	501	0.10%	799.1	-0.07%	1698	-0.09%
TPI 341K	16	400120029	31	-0.20%	100	0.00%	199.2	-0.12%	299.3	-0.09%	501	0.10%	799.1	-0.07%	1700	0.00%
TPI 341K	18	2.0329E+10	31	-0.20%	99.8	-0.04%	199.2	-0.12%	299.8	-0.03%	500	0.00%	799.5	-0.04%	1701	0.05%
TPI 341K	20	2.0329E+10	31	-0.20%	99.2	-0.14%	199.1	-0.14%	299	-0.13%	499.2	-0.08%	799.2	-0.06%	1699	-0.05%
TPI 341K	22	2.0329E+10	32	0.00%	99.6	-0.07%	199.2	-0.12%	298.4	-0.21%	499.1	-0.09%	798.5	-0.12%	1698	-0.09%
Reference device is a NIST certified digital thermocouple calibrator																
Variation expressed as a percentage of the absolute temperature must be within 1.5 %																

Pitot Tube Calibration

Date: 02-Jul-24 Temp (R): 539
Pbar (in.Hg): 29.88 Dn (in.): 0.25

Pitot ID: **7A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.240	0.330	32.7	0.8443	0.0007
0.360	0.495	40.1	0.8443	0.0007
0.440	0.610	44.3	0.8408	0.0028
0.560	0.770	50.0	0.8443	0.0007
0.640	0.880	53.4	0.8443	0.0007
		Average :	0.8436	0.0011

Pitot ID: **ST 8A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.220	0.300	31.3	0.8478	0.0020
0.335	0.455	38.7	0.8495	0.0003
0.420	0.570	43.3	0.8498	0.0001
0.530	0.720	48.6	0.8494	0.0004
0.630	0.850	53.0	0.8523	0.0026
		Average :	0.8498	0.0010

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.230	0.320	32.0	0.8393	0.0045
0.370	0.510	40.6	0.8432	0.0006
0.450	0.620	44.8	0.8434	0.0004
0.540	0.740	49.1	0.8457	0.0019
0.630	0.860	53.0	0.8473	0.0035
		Average :	0.8438	0.0022

Pitot ID: **ST 8B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.230	0.310	32.0	0.8527	0.0013
0.340	0.460	39.0	0.8511	0.0003
0.440	0.600	44.3	0.8478	0.0036
0.525	0.710	48.4	0.8513	0.0001
0.640	0.860	53.4	0.8540	0.0026
		Average :	0.8514	0.0016

Pitot ID: **7 AL GVRD-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.220	0.300	16.3	0.8478	0.0006
0.340	0.460	19.9	0.8511	0.0028
0.430	0.590	25.3	0.8452	0.0032
0.560	0.760	35.8	0.8498	0.0015
0.660	0.900	48.4	0.8478	0.0006
		Average :	0.8483	0.0017

Pitot ID: **ST 8C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.210	0.290	14.9	0.8425	0.0061
0.350	0.490	19.4	0.8367	0.0004
0.475	0.660	29.0	0.8399	0.0036
0.590	0.835	43.1	0.8322	0.0041
0.700	0.995	52.8	0.8304	0.0059
		Average :	0.8363	0.0040

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.240	0.330	32.7	0.8443	0.0050
0.340	0.460	16.3	0.8511	0.0019
0.430	0.590	43.8	0.8452	0.0041
0.550	0.740	30.5	0.8535	0.0042
0.630	0.850	47.0	0.8523	0.0030
		Average :	0.8493	0.0036

Pitot ID:

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

* Average absolute deviation must not exceed 0.01.

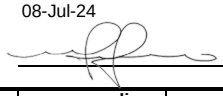
Calibrated by: Christian De La C Signature: _____ Date: July 2, 2024

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Christian De La O
Date: 08-Jul-24

Signature: 

Nozzle I.D.	d1	d2	d3	difference	average dia.	average area
	(inch)	(inch)	(inch)	(inch)	(inch)	(ft^2)
A	0.1270	0.1270	0.1255	0.0015	0.1265	0.0000873
G-165	0.1650	0.1660	0.1645	0.0015	0.1652	0.0001488
G-170	0.1700	0.1710	0.1695	0.0015	0.1702	0.0001579
G-178	0.1760	0.1770	0.1790	0.0030	0.1773	0.0001715
J	0.1890	0.1889	0.1891	0.0002	0.1890	0.0001948
E	0.1950	0.1930	0.1960	0.0030	0.1947	0.0002067
Q	0.2030	0.2040	0.2050	0.0020	0.2040	0.0002270
L	0.2100	0.2070	0.2090	0.0030	0.2087	0.0002375
P-2240	0.2160	0.2155	0.2170	0.0015	0.2162	0.0002549
P-224	0.2160	0.2170	0.2150	0.0020	0.2160	0.0002545
G-221	0.2160	0.2185	0.2190	0.0030	0.2178	0.0002588
G-225	0.2190	0.2175	0.2180	0.0015	0.2182	0.0002596
G-218	0.2180	0.2200	0.2210	0.0030	0.2197	0.0002632
G-2232	0.2210	0.2200	0.2215	0.0015	0.2208	0.0002660
P-223	0.2297	0.2296	0.2298	0.0002	0.2297	0.0002878
P-250	0.2500	0.2495	0.2505	0.0010	0.2500	0.0003409
C-250	0.2500	0.2500	0.2500	0.0000	0.2500	0.0003409
P-251	0.2545	0.2530	0.2540	0.0015	0.2538	0.0003514
P-254	0.2484	0.2489	0.2482	0.0007	0.2485	0.0003368
P-256	0.2540	0.2550	0.2560	0.0020	0.2550	0.0003547
P-280	0.2810	0.2805	0.2815	0.0010	0.2810	0.0004307
C-280	0.2800	0.2800	0.2800	0.0000	0.2800	0.0004276
G-282	0.2820	0.2800	0.2825	0.0025	0.2815	0.0004322
P-281	0.2820	0.2820	0.2815	0.0005	0.2818	0.0004332
G-304	0.3030	0.3040	0.3050	0.0020	0.3040	0.0005041
G-3121	0.3055	0.3063	0.3070	0.0015	0.3063	0.0005116
G-3085	0.3085	0.3080	0.3090	0.0010	0.3085	0.0005191
G-309	0.3045	0.3065	0.3065	0.0020	0.3058	0.0005101
G-3092	0.3100	0.3085	0.3090	0.0015	0.3092	0.0005213
P-311	0.3115	0.3120	0.3120	0.0005	0.3118	0.0005304
P-312	0.3120	0.3110	0.3105	0.0015	0.3112	0.0005281
P-343	0.3420	0.3430	0.3440	0.0020	0.3430	0.0006417
P-313	0.3140	0.3130	0.3130	0.0010	0.3133	0.0005355
P-314	0.3135	0.3135	0.3140	0.0005	0.3137	0.0005366
P-315	0.3145	0.3145	0.3145	0.0000	0.3145	0.0005395
V-06	0.3220	0.3215	0.3200	0.0020	0.3212	0.0005626
G-345	0.3470	0.3475	0.3475	0.0005	0.3473	0.0006580
P-346	0.3457	0.3456	0.3458	0.0002	0.3457	0.0006518
G-349	0.3490	0.3490	0.3490	0.0000	0.3490	0.0006643
P27	0.3490	0.3480	0.3500	0.0020	0.3490	0.0006643
G-367	0.3680	0.3660	0.3658	0.0022	0.3666	0.0007330
G-372	0.3669	0.3700	0.3668	0.0032	0.3679	0.0007382
P-374	0.3740	0.3720	0.3730	0.0020	0.3730	0.0007588
C-375	0.3730	0.3750	0.3745	0.0020	0.3742	0.0007636
P-375	0.3705	0.3710	0.3709	0.0005	0.3708	0.0007499
P-401	0.3980	0.3990	0.4000	0.0020	0.3990	0.0008683
G-433	0.4360	0.4360	0.4355	0.0005	0.4358	0.0010360
P-29	0.4681	0.4683	0.4685	0.0004	0.4683	0.0011961
G-437	0.4690	0.4690	0.4700	0.0010	0.4693	0.0012014
G-468	0.4700	0.4685	0.4720	0.0035	0.4702	0.0012057
P-7	0.4965	0.4945	0.4975	0.0030	0.4962	0.0013427
B	0.4981	0.4984	0.4989	0.0008	0.4985	0.0013552
G-540	0.5400	0.5410	0.5400	0.0010	0.5403	0.0015924

Where:

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

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

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

BAROMETER CALIBRATION FORM						
		Pbar Env Canada		Device (inches of Hg)		Difference
Device	Cal Date	(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	15-Jul-24	99.8	29.46	29.37	29.44	0.02
DS	15-Jul-24	99.8	29.46	29.36	29.43	0.03
CL	15-Jul-24	99.8	29.46	29.37	29.44	0.02
JC	15-Jul-24	99.8	29.46	29.34	29.41	0.05
LF	15-Jul-24	99.8	29.46	29.36	29.43	0.03
SH	15-Jul-24	99.8	29.46	29.35	29.42	0.04
CDO	15-Jul-24	99.8	29.46	29.34	29.41	0.05
JG	15-Jul-24	99.8	29.46	29.32	29.39	0.07
ML	15-Jul-24	99.8	29.46	29.34	29.41	0.05
BL	15-Jul-24	99.8	29.46	29.36	29.43	0.03

Calibrated by: Louis Agassiz Signature:  Date: 15-Jul-24

Performance Specification is

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

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

https://weather.gc.ca/city/pages/bc-74_metric_e.html

MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Daryl Sampson

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 2005
Date

Donna Spaulding
Dean
Faculty of Continuing Education and Extension

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act,* the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

Declaration

I Daryl Sampson, as a member of **Air and Waste Management Association** declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this **project**. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to **Mr. Sajid Barlas**, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

_____

_____

_____

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

This conflict of interest disclosure statement is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Signature:

X Daryl Sampson

Print name: Daryl Sampson

Witnessed by:

X _____

Print name: Mark Lanfranco

Date: Dec.18, 2020

[1]*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals[1], under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional Daryl Sampson

   Title Senior Environmental Technician/Project Manager

2. Are you a registered member of a professional association in B.C.? ☐ Yes ☒ No

   Name of Association: _____ Registration # _____

3. Brief description of professional services:

   Environmental consulting, specializing in air and atmospheric sciences

This declaration of competency is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: Witnessed by:

X Daryl Sampson **X** _____

Print Name: Daryl Sampson Print Name: Louis Agassiz

Date signed: November 23, 2020

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1. Name of Qualified Professional Liam Forrer

Title Environmental Technician

2. Are you a registered member of a professional association in B.C.? ☐ Yes ☒ No

Name of Association: _____ Registration # _____

3. Brief description of professional services:

Environmental consulting, specializing in air and atmospheric sciences

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Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature:

x Liam Forrer

Print Name: Liam Forrer

Witnessed by:

x Daryl Sampson

Print Name: Daryl Sampson

Date signed: July 12, 2023

[1] *Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

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MOUNT ROYAL UNIVERSITY
Faculty of Continuing Education

MOUNT ROYAL
UNIVERSITY
1910
CALGARY, ALBERTA

Liam Forrer

has successfully completed

Stack Sampling

The Faculty of Continuing Education
Mount Royal University

30 hours | May 26, 2023

Dimitra Fotopoulos, Vice Dean
Professional and Continuing Education

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

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Declaration

I Liam Forrer, as a member of **Air and Waste Management Association** declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this **project**. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to **Mr. Sajid Barlas**, erring on the side of caution.

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Description and nature of conflict(s):

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Signature:

X Liam Forrer

Print name: Liam Forrer

Date: July 12, 2023

Witnessed by:

X _____

Print name: Mark Lanfranco

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