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Environmental Consultants

Prepared for
METRO VANCOUVER

**Metrotower III
4515 Central Boulevard
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**Trace Organics Emission Report
Waste-to-Energy Facility**

July - August 2025 Survey

Operational Certificate 107051

Prepared by Mr. Carter Lanfranco

Report Issued: September 23, 2025

CERTIFICATION

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

The field crew consisted of:

Mr. D. Sampson (certified), Mr. J. Dennis.

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 September 23, 2025, by:



Mr. Mark Lanfranco
Principal

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TEST PROGRAM ORGANIZATION

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Sampling Crew:	Mr. D. Sampson – A. Lanfranco and Associates Inc. Mr. J. Dennis – A. Lanfranco and Associates Inc.

SUMMARY

The following table presents the average of triplicate emission test results from Unit 1 for various trace organics on July 30 - 31, and Aug 1, 2025.

Parameter		Unit 1	Limit
PCDD/PCDF	(TEQ ng/Sm ³ @ 11% O ₂)	0.0006	0.08
PCDD/PCDF Mass Emission	(TEQ g/day)	1.16E-06	
PAH	(µg/Sm ³ @ 11% O ₂)	0.1354	5.0
HCB*	(µg/Sm ³ @ 11% O ₂)	0.0046	
Total CB	(µg/Sm ³ @ 11% O ₂)	0.0333	1.0
Total CP*	(µg/Sm ³ @ 11% O ₂)	0.0023	1.0
Total PCB	(µg/Sm ³ @ 11% O ₂)	0.0077	1.0
Flowrate	(Sm ³ /min)	1154	
Temperature	(°C)	151	
O ₂	(vol % dry)	10.2	

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.

Last year represented an increase in PCDD/PCDF compared to 2022 and 2023. This year, the PCDD/PCDF congeners are lower, close to normal historical levels. Total PAH increased this year when compared to the most recent results from 2024. HCB and CP were both measured at the method detection limit and like most historical data. Total CB reduced this year; however, at these extremely low concentrations the difference year to year is not significant.

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 2025 was Unit 1. Unit 2 is scheduled for 2026.

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.

<u>Parameter</u>	<u>Reference Method</u>
Sample and Velocity traverse points	EPS 1/RM/8 A Determination of Sampling Site and Traverse Points
Velocity and flowrate	EPS 1/RM/8 B Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Gas molecular weight (O ₂ /CO ₂)	EPS 1/RM/8 C Determination of Molecular Weight by Gas Analysis
Flue gas Moisture	EPS 1/RM/8 D Determination of Moisture Content
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.

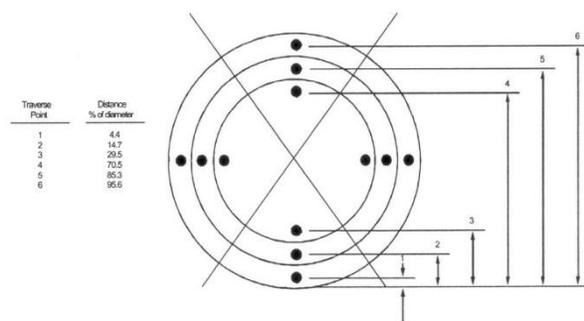


Figure 1. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

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.

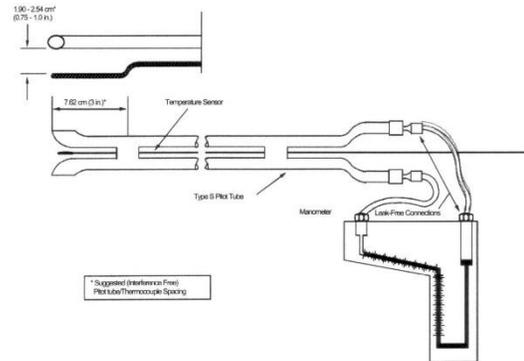


Figure 2. Type S Pitot Tube Manometer Assembly

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-pa-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.

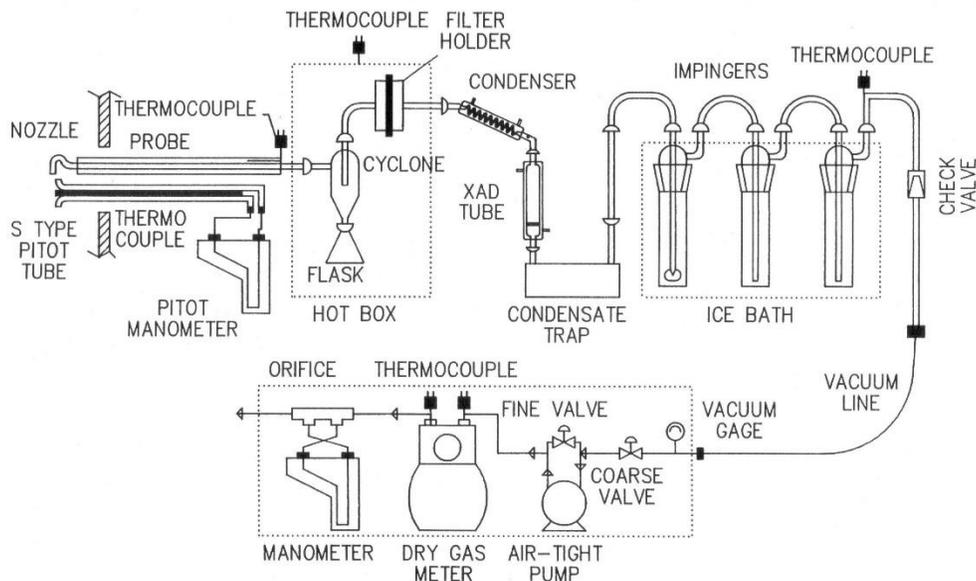
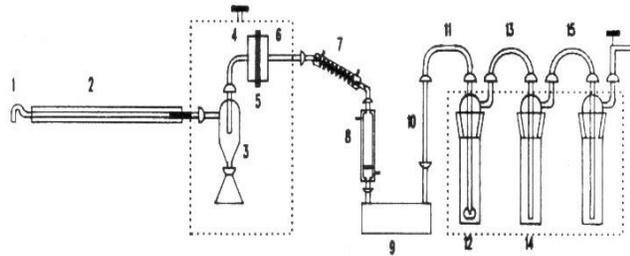


Figure 3 - Dioxin / Furan Sampling Train

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

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

Complete sampling and recovery procedures can be supplied upon request.

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.

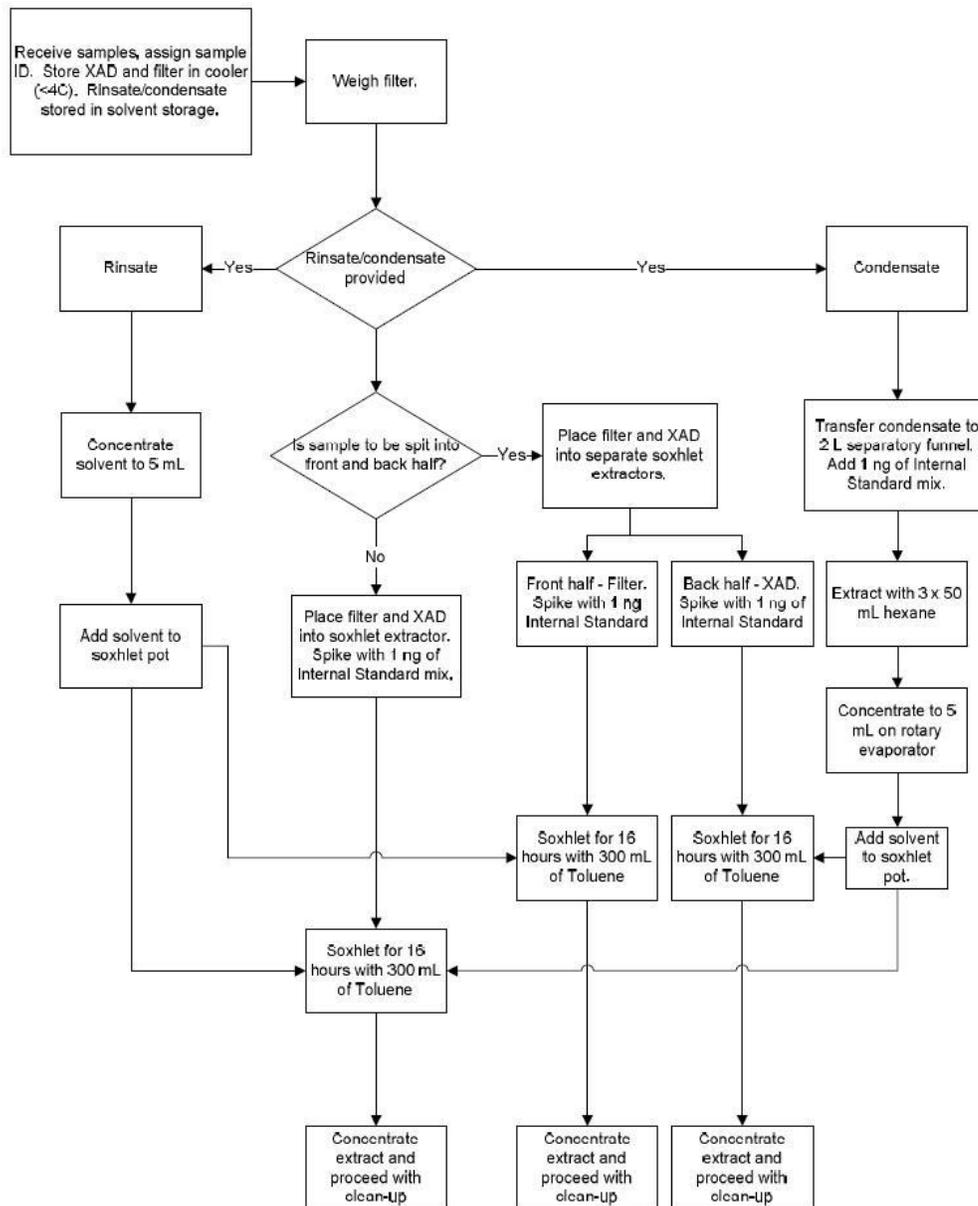


Figure 5 - Semi-Volatile Organics XAD and Filter Recovery Schematic

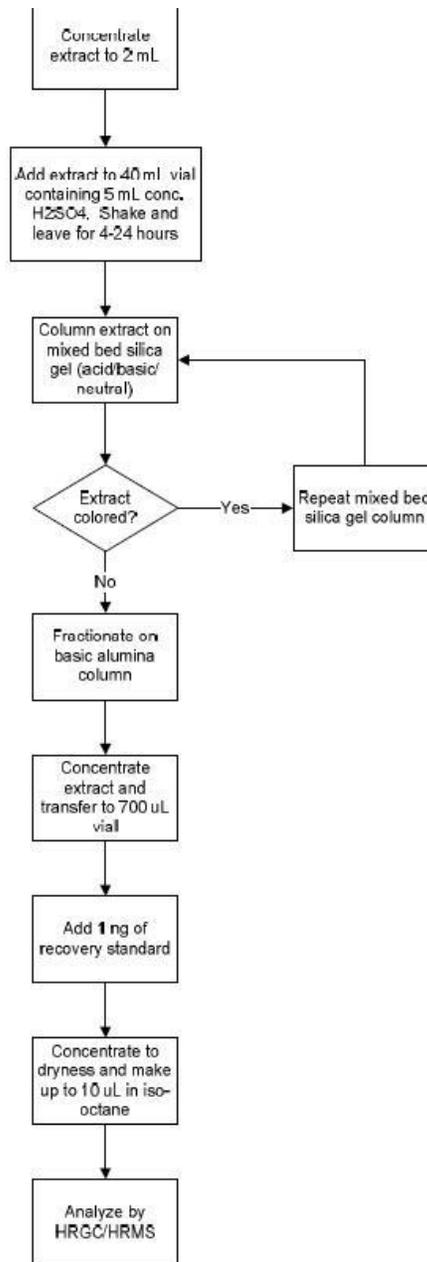


Figure 6 - Schematic of analytical methodology for dioxins and furans

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 $100 \pm 10\%$ 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

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

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

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

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

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

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

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

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

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

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

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

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:

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

$$1 \text{ } \mu\text{g} = 10^{-6} \text{ g}$$

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

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

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

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

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

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

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

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

$$T_{stk} = \frac{1}{n} \sum_{i=1}^n T_{stk_i}, \text{ where } n = \text{the number of points} \quad \text{Equation 17}$$

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

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

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

$$ISO_i = \frac{v_{nzi}}{v_i} \quad \text{Equation 21}$$

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

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

$$P_{Stk} = P_B + \frac{P_g}{13.6} \quad \text{Equation 24}$$

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

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

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 ₂ O)
T_{Stk}	= Average flue gas temperature (°F), second subscript <i>i</i> , indicates individual point measurements
$\Delta H_{i(act)}$	= Calculated individual point orifice pressures (inches of H ₂ O)
P_g	= Stack Static pressure (inches of H ₂ O)
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

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

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

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

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 detailed PAH with additional chlorinated organic species emission concentrations. Production data is presented in Table 4 and supporting data in the Appendices.

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 1 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		30/Jul/25	31/Jul/25	1/Aug/25	
Test Time		07:59 - 12:05	08:25 - 12:26	08:41 - 12:45	
Duration	(minutes)	240	240	240	240
PCDD & PCDF TEQ	(ng/Sm ³)	0.0007	0.0005	0.0009	0.0007
PCDD & PCDF TEQ	(ng/Sm³ @ 11% O₂)	0.0006	0.0004	0.0009	0.0006
Total PAH	(µg/Sm ³)	0.1410	0.1747	0.1256	0.1471
Total PAH	(µg/Sm³ @ 11% O₂)	0.1302	0.1574	0.1185	0.1354
Total HCB*	(µg/Sm ³)	0.0050	0.0050	0.0050	0.0050
Total HCB*	(µg/Sm³ @ 11% O₂)	0.0046	0.0045	0.0047	0.0046
Total CB	(µg/Sm ³)	0.0264	0.0166	0.0642	0.0358
Total CB	(µg/Sm³ @ 11% O₂)	0.0244	0.0150	0.0606	0.0333
Total CP*	(µg/Sm ³)	0.0025	0.0025	0.0025	0.0025
Total CP*	(µg/Sm³ @ 11% O₂)	0.0023	0.0023	0.0024	0.0023
Total PCB	(µg/Sm ³)	0.0048	0.0041	0.0159	0.0082
Total PCB	(µg/Sm³ @ 11% O₂)	0.0044	0.0037	0.0150	0.0077
Stack Temperature	(°C)	148	151	152	151
Flowrate	(Sm ³ /min)	1116	1165	1181	1154
Oxygen (O ₂)	(vol % dry)	10.2	9.9	10.4	10.2
Carbon Dioxide (CO ₂)	(vol % dry)	9.7	10.1	9.6	9.8
Moisture	(vol %)	13.8	13.4	11.7	12.9
Isokinetic Variation	(%)	101	103	100	101

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

*Calculated using half DL convention.

TABLE 2 Detailed PCDD/PCDF Emission Results

Component	TEF	Test 1		Test 2		Test 3	
		Analyzed (ng)	TEQ (ng)	Analyzed (ng)	TEQ (ng)	Analyzed (ng)	TEQ (ng)
Test Date:		30-Jul-25		31-Jul-25		1-Aug-25	
Test Time:		07:59 - 12:05		08:25 - 12:26		08:41 - 12:45	
2378 TCDD	1.0000	0.0000	ND	0.0000	ND	0.0000	ND
12378 PCDD	0.5000	0.0000	ND	0.0000	ND	0.0000	ND
123478 HxCDD	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
123678 HxCDD	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
123789 HxCDD	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
1234678 HpCDD	0.0100	0.0180	0.0002	0.0100	0.0001	0.0200	0.0002
OCDD	0.0010	0.0340	0.00003	0.0300	0.00003	0.0370	0.00004
2378 TCDF	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
12378 PCDF	0.0500	0.0000	ND	0.0000	ND	0.0000	ND
23478 PCDF	0.5000	0.0020	0.0010	0.0020	0.0010	0.0048	0.0024
123478 HxCDF	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
123678 HxCDF	0.1000	0.0048	0.0005	0.0020	0.0002	0.0020	0.0002
234678 HxCDF	0.1000	0.0044	0.0004	0.0020	0.0002	0.0020	0.0002
123789 HxCDF	0.1000	0.0000	ND	0.0000	ND	0.0000	ND
1234678 HpCDF	0.0100	0.0220	0.00022	0.0180	0.00018	0.0240	0.00024
1234789 HpCDF	0.0100	0.0000	ND	0.0000	ND	0.0000	ND
OCDF	0.0010	0.0075	7.5E-06	0.0075	7.5E-06	0.0200	2.00E-05
Summed PCDD & PCDF TEQ (ng)			0.0024		0.0017		0.0033
Sample Volume (dscm)			3.4047		3.6056		3.5823
PCDD & PCDF TEQ ng/dscm			0.00069		0.00048		0.00092
PCDD & PCDF TEQ ng/dscm @ 11% O₂			0.00064		0.00043		0.00087
PCDD & PCDF TEQ grams/day			0.000001		0.000001		0.000002
Flowrate (dscm/min)			1116		1165		1181
Oxygen (Vol. %)			10.2		9.9		10.4
Carbon Dioxide (Vol. %)			9.69		10.06		9.60
Moisture (Vol. %)			13.8		13.4		11.7
Temperature (oC)			148		151		152
Isokinetic Variation (%)			101		103		100

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

	Test 1	Test 2	Test 3
Test Date:	30/Jul/25	31/Jul/25	1/Aug/25
Test Time:	07:59 - 12:05	08:25 - 12:26	08:41 - 12:45
Component	Analyzed	Analyzed	Analyzed
	(ug)	(ug)	(ug)
Benz(a)anthracene	ND	0.100	ND
Benzo(a)pyrene	0.010	ND	ND
Benzo(b) fluoranthene	0.010	0.040	ND
Benzo(e)pyrene	0.040	0.030	0.030
Benzo(g,h,i)perylene	0.060	0.100	0.080
Benzo(k)fluoranthene	0.030	0.040	0.040
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	0.070	0.040	0.050
Indeno(1,2,3-c,d)pyrene	0.010	ND	0.010
Phenanthrene	0.130	0.160	0.120
Pyrene	0.120	0.040	0.050
7H-dibenzo(c,g)carbazole	ND	ND	ND
Acenaphthene	ND	ND	ND
Acenaphthylene	ND	ND	0.070
Fluorene	ND	0.080	ND
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	ND
Total CP	ND	ND	ND
Total CB	0.0900	0.0600	0.2300
HCB	ND	ND	ND
* ND = Less than detection limit			
PCB Total (ng)	16.2	14.70	56.9
Total PAH (ug)	0.480	0.630	0.450
Sample Volume (ds cm)	3.40	3.61	3.58
Oxygen	10.2	9.9	10.4
PAH ug/ds cm	0.1410	0.1747	0.1256
HCB ug/ds cm	0.0050	0.0050	0.0050
CB Total ug/ds cm	0.0264	0.0166	0.0642
CP Total ug/ds cm	0.0025	0.0025	0.0025
PCB Total ug/ds cm	0.0048	0.0041	0.0159
PAH ug/ds cm @ 11% O₂	0.1302	0.1574	0.1185
HCB ug/ds cm @ 11% O₂	0.0046	0.0045	0.0047
CB Total ug/ds cm @ 11% O₂	0.0244	0.0150	0.0606
CP Total ug/ds cm @ 11% O₂	0.0023	0.0023	0.0024
PCB Total ug/ds cm @ 11% O₂	0.0044	0.0037	0.0150

TABLE 4: UNIT 3 - SUMMARY OF OPERATING DATA

Parameter		Run 1	Run 2	Run 3	Normal
Test Date - PCDD/PCDF		30-Jul-25	31-Jul-25	1-Aug-25	
Test Time - PCDD/PCDF		07:59 - 12:05	08:25 - 12:26	08:41 - 12:45	
Boiler Steam Production	(kg/h)	38996	38,641	37,670	36,945
Percentage of normal	(%)	106%	105%	102%	
Boiler Secondary Combustion Zone Temp	(°C)	863	890	871	877
Percentage of normal	(%)	98%	101%	99%	
Rate of refuse fired	(kg/hr)	11,641	11534	11244	11028
Percentage of normal	(%)	106%	105%	102%	
Rate of aux. fuel fired (Natural Gas)	m ³ /hr	270	68	148	171
Percentage of normal (%)	(%)	158%	40%	87%	

*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.

Last year, several Dioxin and Furan congeners were detected, which represented an increase compared to 2022 and 2023. This year, most congeners are back to what we would consider normal levels, and more in-line with results from 2022 and 2023. Most of the emissions (in terms of TEQ) come from 1234678 HpCDF and 1234678 HpCDD.

Total PAH increased this year from $0.0786 \mu\text{g}/\text{Sm}^3 @ 11\% \text{O}_2$ in 2024 to $0.1354 \mu\text{g}/\text{Sm}^3 @ 11\% \text{O}_2$ in 2025. The majority of the PAH came from Phenanthrene. HCB and CP were both measured at the method detection limit and like most historical data. Total CB showed the largest decrease compared to last year's data. This year's result is about ten times lower than the findings from 2024.

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 40 to 68%.

EPA Method 23 surrogate recoveries ranged from 81 to 106% 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 / TEST REPORT

FILE #: PR253122

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

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

RECEIVED BY: R. Jonker
 CONDITION: Okay, 24.0°C

DATE/TIME: August 5, 2025 (3:00 p.m.)

# of Containers	Sample Type	Sample (Client Codes)	Lab Codes	Test Requested
4	Stack	Blk Dioxin Unit – 1	PR253122	PCDD/F, PCB, PAH/HCB, CB, CP
4	Stack	Run 1 – Dioxin Unit – 1	PR253123	PCDD/F, PCB, PAH/HCB, CB, CP
4	Stack	Run 2 – Dioxin Unit – 1	PR253124	PCDD/F, PCB, PAH/HCB, CB, CP
4	Stack	Run 3 – Dioxin Unit – 1	PR253125	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 26, 2025

Comments: Results relate only to items tested.

David Hope, P.Chem, CEO



METHOD 23/1-RM-3 DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Blk Dioxin Unit – 1
 PRL ID: PR253122

Sample Date: 28-Jul-25
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25
 Filter Wt.: 0.37g

DIOXINS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDD	ND	2	
Total TCDD	ND	2	0
1,2,3,7,8-PeCDD	ND	4	
Total PeCDD	ND	4	0
1,2,3,4,7,8-HxCDD	ND	4	
1,2,3,6,7,8-HxCDD	ND	4	
1,2,3,7,8,9-HxCDD	ND	4	
Total HxCDD	ND	4	0
1,2,3,4,6,7,8-HpCDD	ND	4	
Total HpCDD	ND	4	0
OCDD	ND	15	0
Total Dioxin TEQ			

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	1	2
ND	1	2
ND	0.2	0.4
ND	0.2	0.4
ND	0.2	0.4
ND	0.02	0.04
ND	0.0075	0.015
0.0	2.6	5.3

FURANS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDF	ND	2	
Total TCDF	ND	2	0
1,2,3,7,8-PeCDF	ND	4	
2,3,4,7,8-PeCDF	ND	4	
Total PeCDF	ND	4	0
1,2,3,4,7,8-HxCDF	ND	4	
1,2,3,6,7,8-HxCDF	ND	4	
1,2,3,7,8,9-HxCDF	ND	4	
2,3,4,6,7,8-HxCDF	ND	4	
Total HxCDF	ND	4	0
1,2,3,4,6,7,8-HpCDF	ND	4	
1,2,3,4,7,8,9-HpCDF	ND	4	
Total HpCDF	ND	4	0
OCDF	ND	15	0
Total Furan TEQ			

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	0.1	0.2
ND	0.1	0.2
ND	1	2
ND	0.2	0.4
ND	0.02	0.04
ND	0.02	0.04
ND	0.0075	0.015
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	87
¹³ C ₁₂ -2,3,4,7,8-PeCDF	99
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	83
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	88
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	49
¹³ C ₁₂ -1,2,3,7,8-PeCDD	62
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	59
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	57
¹³ C ₁₂ -OCDD	47
¹³ C ₁₂ -2,3,7,8-TCDF	41
¹³ C ₁₂ -1,2,3,7,8-PeCDF	59
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	57
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	56

METHOD 23/1-RM-3 DATA REPORT

Client: A. Lanfranco & Associates
Client ID: Run 1 – Dioxin Unit – 1
PRL ID: PR253123

Sample Date: 28-Jul-25
Date Extracted: 11-Aug-25
Date Analysed: 25-Aug-25
Filter Wt.: 0.37g

DIOXINS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDD	ND	2	
Total TCDD	ND	2	0
1,2,3,7,8-PeCDD	ND	4	
Total PeCDD	ND	4	0
1,2,3,4,7,8-HxCDD	ND	4	
1,2,3,6,7,8-HxCDD	ND	4	
1,2,3,7,8,9-HxCDD	ND	4	
Total HxCDD	33	4	2
1,2,3,4,6,7,8-HpCDD	18	4	
Total HpCDD	31	4	2
OCDD	34	15	1
			Total Dioxin TEQ

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	1	2
ND	1	2
ND	0.2	0.4
ND	0.2	0.4
ND	0.2	0.4
0.18	0.18	0.18
0.034	0.034	0.034
0.2	2.8	5.4

FURANS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDF	ND	2	
Total TCDF	3.1	2	1
1,2,3,7,8-PeCDF	ND	4	
2,3,4,7,8-PeCDF	ND	4	
Total PeCDF	31	4	4
1,2,3,4,7,8-HxCDF	ND	4	
1,2,3,6,7,8-HxCDF	4.8	4	
1,2,3,7,8,9-HxCDF	ND	4	
2,3,4,6,7,8-HxCDF	4.4	4	
Total HxCDF	9.2	4	2
1,2,3,4,6,7,8-HpCDF	22	4	
1,2,3,4,7,8,9-HpCDF	ND	4	
Total HpCDF	34	4	3
OCDF	ND	15	0
			Total Furan TEQ

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	0.1	0.2
ND	0.1	0.2
ND	1	2
ND	0.2	0.4
0.48	0.48	0.48
ND	0.2	0.4
0.44	0.44	0.44
0.22	0.22	0.22
ND	0.02	0.04
ND	0.0075	0.015
1.1	2.8	4.4

Total PCDD/PCDF Toxic Equivalent (pg)

1.4 5.6 9.8

Surrogate Recoveries (%)
³⁷Cl₄ -2,3,7,8-TCDD 91
¹³C₁₂ -2,3,4,7,8-PeCDF 106
¹³C₁₂ -1,2,3,4,7,8-HxCDD 90
¹³C₁₂ -1,2,3,4,7,8-HxCDF 92
¹³C₁₂ -1,2,3,4,7,8,9-HpCDF 106

ND - none detected

Internal Standards (%)
¹³C₁₂ -2,3,7,8-TCDD 53
¹³C₁₂ -1,2,3,7,8-PeCDD 67
¹³C₁₂ -1,2,3,6,7,8-HxCDD 56
¹³C₁₂ -1,2,3,4,6,7,8-HpCDD 57
¹³C₁₂ -OCDD 40
¹³C₁₂ -2,3,7,8-TCDF 41
¹³C₁₂ -1,2,3,7,8-PeCDF 61
¹³C₁₂ -1,2,3,6,7,8-HxCDF 55
¹³C₁₂ -1,2,3,4,6,7,8-HpCDF 54

METHOD 23/1-RM-3 DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Run 2 – Dioxin Unit – 1
 PRL ID: PR253124

Sample Date: 31-Jul-25
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25
 Filter Wt.: 0.38g

DIOXINS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDD	ND	2	
Total TCDD	ND	2	0
1,2,3,7,8-PeCDD	ND	4	
Total PeCDD	ND	4	0
1,2,3,4,7,8-HxCDD	ND	4	
1,2,3,6,7,8-HxCDD	ND	4	
1,2,3,7,8,9-HxCDD	ND	4	
Total HxCDD	19	4	1
1,2,3,4,6,7,8-HpCDD	10	4	
Total HpCDD	26	4	2
OCDD	30	15	1
Total Dioxin TEQ			

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	1	2
ND	1	2
ND	0.2	0.4
ND	0.2	0.4
ND	0.2	0.4
0.1	0.1	0.1
0.03	0.03	0.03
0.1	2.7	5.3

FURANS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDF	ND	2	
Total TCDF	ND	2	0
1,2,3,7,8-PeCDF	ND	4	
2,3,4,7,8-PeCDF	ND	4	
Total PeCDF	ND	4	0
1,2,3,4,7,8-HxCDF	ND	4	
1,2,3,6,7,8-HxCDF	ND	4	
1,2,3,7,8,9-HxCDF	ND	4	
2,3,4,6,7,8-HxCDF	ND	4	
Total HxCDF	4.3	4	1
1,2,3,4,6,7,8-HpCDF	18	4	
1,2,3,4,7,8,9-HpCDF	ND	4	
Total HpCDF	18	4	1
OCDF	ND	15	0
Total Furan TEQ			

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	0.1	0.2
ND	0.1	0.2
ND	1	2
ND	0.2	0.4
0.18	0.18	0.18
ND	0.02	0.04
ND	0.0075	0.015
0.2	2.2	4.2

Total PCDD/PCDF Toxic Equivalent (pg)

0.3 4.9 9.6

Surrogate Recoveries (%)

³⁷ Cl ₄ -2,3,7,8-TCDD	84
¹³ C ₁₂ -2,3,4,7,8-PeCDF	98
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	81
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	86
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	87

ND - none detected

Internal Standards (%)

¹³ C ₁₂ -2,3,7,8-TCDD	49
¹³ C ₁₂ -1,2,3,7,8-PeCDD	56
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	57
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	53
¹³ C ₁₂ -OCDD	40
¹³ C ₁₂ -2,3,7,8-TCDF	42
¹³ C ₁₂ -1,2,3,7,8-PeCDF	53
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	57
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	54

METHOD 23/1-RM-3 DATA REPORT

Client: A. Lanfranco & Associates
Client ID: Run 3 – Dioxin Unit – 1
PRL ID: PR253125

Sample Date: 1-Aug-25
Date Extracted: 11-Aug-25
Date Analysed: 25-Aug-25
Filter Wt.: 0.36g

DIOXINS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDD	ND	2	
Total TCDD	ND	2	0
1,2,3,7,8-PeCDD	ND	4	
Total PeCDD	ND	4	0
1,2,3,4,7,8-HxCDD	ND	4	
1,2,3,6,7,8-HxCDD	ND	4	
1,2,3,7,8,9-HxCDD	ND	4	
Total HxCDD	25	4	1
1,2,3,4,6,7,8-HpCDD	20	4	
Total HpCDD	40	4	2
OCDD	37	15	1
			Total Dioxin TEQ

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	1	2
ND	1	2
ND	0.2	0.4
ND	0.2	0.4
ND	0.2	0.4
0.2	0.2	0.2
0.037	0.037	0.037
0.2	2.8	5.4

FURANS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDF	ND	2	
Total TCDF	33	2	4
1,2,3,7,8-PeCDF	ND	4	
2,3,4,7,8-PeCDF	4.8	4	
Total PeCDF	13	4	2
1,2,3,4,7,8-HxCDF	ND	4	
1,2,3,6,7,8-HxCDF	ND	4	
1,2,3,7,8,9-HxCDF	ND	4	
2,3,4,6,7,8-HxCDF	ND	4	
Total HxCDF	ND	4	0
1,2,3,4,6,7,8-HpCDF	24	4	
1,2,3,4,7,8,9-HpCDF	ND	4	
Total HpCDF	34	4	2
OCDF	20	15	1
			Total Furan TEQ

I-TEQs		
(ND=0) pg	(ND=½DL) pg	(ND=DL) pg
ND	0.1	0.2
ND	0.1	0.2
2.4	2.4	2.4
ND	0.2	0.4
0.24	0.24	0.24
ND	0.02	0.04
0.02	0.02	0.02
2.7	3.7	4.7

Total PCDD/PCDF Toxic Equivalent (pg)

2.9 6.5 10.1

Surrogate Recoveries (%)

³⁷ Cl ₄ -2,3,7,8-TCDD	86
¹³ C ₁₂ -2,3,4,7,8-PeCDF	101
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	84
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	87
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	94

ND - none detected

Internal Standards (%)

¹³ C ₁₂ -2,3,7,8-TCDD	50
¹³ C ₁₂ -1,2,3,7,8-PeCDD	62
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	68
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	64
¹³ C ₁₂ -OCDD	54
¹³ C ₁₂ -2,3,7,8-TCDF	40
¹³ C ₁₂ -1,2,3,7,8-PeCDF	58
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	65
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	64



METHOD 23/1-RM-3 DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: BLANK
 PRL ID: DF250651B

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

DIOXINS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDD	ND	2	
Total TCDD	ND	2	0
1,2,3,7,8-PeCDD	ND	4	
Total PeCDD	ND	4	0
1,2,3,4,7,8-HxCDD	ND	4	
1,2,3,6,7,8-HxCDD	ND	4	
1,2,3,7,8,9-HxCDD	ND	4	
Total HxCDD	ND	4	0
1,2,3,4,6,7,8-HpCDD	ND	4	
Total HpCDD	ND	4	0
OCDD	ND	15	0
		Total Dioxin TEQ	

I-TEQs		
(ND=0)	(ND=½DL)	(ND=DL)
pg	pg	pg
ND	1	2
ND	1	2
ND	0.2	0.4
ND	0.2	0.4
ND	0.2	0.4
ND	0.02	0.04
ND	0.0075	0.015
0.0	2.6	5.3

FURANS			
Congeners	pg	DL pg	# of peaks
2,3,7,8-TCDF	ND	2	
Total TCDF	ND	2	0
1,2,3,7,8-PeCDF	ND	4	
2,3,4,7,8-PeCDF	ND	4	
Total PeCDF	ND	4	0
1,2,3,4,7,8-HxCDF	ND	4	
1,2,3,6,7,8-HxCDF	ND	4	
1,2,3,7,8,9-HxCDF	ND	4	
2,3,4,6,7,8-HxCDF	ND	4	
Total HxCDF	ND	4	0
1,2,3,4,6,7,8-HpCDF	ND	4	
1,2,3,4,7,8,9-HpCDF	ND	4	
Total HpCDF	ND	4	0
OCDF	ND	15	0
		Total Furan TEQ	

I-TEQs		
(ND=0)	(ND=½DL)	(ND=DL)
pg	pg	pg
ND	0.1	0.2
ND	0.1	0.2
ND	1	2
ND	0.2	0.4
ND	0.02	0.04
ND	0.02	0.04
ND	0.0075	0.015
0.0	2.0	4.1

Total PCDD/PCDF Toxic Equivalent (pg)

0.0 4.7 9.4

ND - none detected

Internal Standards (%)

¹³ C ₁₂ -2,3,7,8-TCDD	49
¹³ C ₁₂ -1,2,3,7,8-PeCDD	66
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	56
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	58
¹³ C ₁₂ -OCDD	49
¹³ C ₁₂ -2,3,7,8-TCDF	42
¹³ C ₁₂ -1,2,3,7,8-PeCDF	60
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	58
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	56

QC REPORT - SPIKE

Client: A. Lanfranco & Associates
 Client ID: SPIKE
 PRL ID: DF250652S

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

DIOXINS Congeners	LOF pg	Recovery %	Acceptable Recovery		Pass/Fail
			Min %	Max %	
2,3,7,8-TCDD	200	90	80	120	Pass
1,2,3,7,8-PeCDD	200	101	80	120	Pass
1,2,3,4,7,8-HxCDD	400	97	80	120	Pass
1,2,3,6,7,8-HxCDD	400	105	80	120	Pass
1,2,3,7,8,9-HxCDD	400	116	80	120	Pass
1,2,3,4,6,7,8-HpCDD	400	114	80	120	Pass
OCDD	1000	118	80	120	Pass

Int. Std Recoveries %
49
59
-
70
-
61
44

FURANS Congeners	LOF pg	Recovery %	Acceptable Recovery		Pass/Fail
			Min %	Max %	
2,3,7,8-TCDF	200	93	80	120	Pass
1,2,3,7,8-PeCDF	200	90	80	120	Pass
2,3,4,7,8-PeCDF	200	95	80	120	Pass
1,2,3,4,7,8-HxCDF	400	92	80	120	Pass
1,2,3,6,7,8-HxCDF	400	94	80	120	Pass
1,2,3,7,8,9-HxCDF	400	97	80	120	Pass
2,3,4,6,7,8-HxCDF	400	94	80	120	Pass
1,2,3,4,6,7,8-HpCDF	400	102	80	120	Pass
1,2,3,4,7,8,9-HpCDF	400	81	80	120	Pass
OCDF	1000	91	80	120	Pass

Int. Std Recoveries %
43
57
-
-
73
-
-
63
-
-

LOF - Level of Fortification



DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Blk Dioxin Unit – 1
 PRL ID: PR253122

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

Dioxin-like PCBs			DL		Surrogate Recoveries
Chemical Name	IUPAC #	ng	ng		%
3,4,4',5-TeCB	PCB 81	ND	0.02		64
3,3',4,4'-TeCB	PCB 77	ND	0.02		68
2,3',4,4',5'-PeCB	PCB 123	ND	0.02		56
2,3',4,4',5-PeCB	PCB 118	ND	0.02		52
2,3,4,4',5-PeCB	PCB 114	ND	0.02		44
2,3,3',4,4'-PeCB	PCB 105	ND	0.02		68
3,3',4,4',5-PeCB	PCB 126	ND	0.02		84
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02		72
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02		60
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02		112
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02		100
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02		48
Toxic Equivalent (WHO-TEQ)					

WHO-TEQs (2005)	
(ND=0)	(ND=DL)
ng	ng
ND	6.00E-06
ND	2.00E-06
ND	6.00E-07
ND	2.00E-03
ND	6.00E-07
ND	6.00E-07
ND	6.00E-07
ND	6.00E-04
ND	6.00E-07
0.00E+00	2.61E-03

Total PCB		
Homologs	ng	DL ng
Monochlorobiphenyls	ND	0.05
Dichlorobiphenyls	0.91	0.05
Trichlorobiphenyls	0.06	0.05
Tetrachlorobiphenyls	0.11	0.05
Pentachlorobiphenyls	0.14	0.05
Hexachlorobiphenyls	0.16	0.05
Heptachlorobiphenyls	ND	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	1.38	

ND - none detected

Surrogate Recoveries		
Chemical Name	IUPAC #	%
¹³ C12-2-MoCB	1L	12
¹³ C12-4,4'-DiCB	15L	28
¹³ C12-2,2',6'-TrCB	19L	24
¹³ C12-3,4,4'-TrCB	37L	52
¹³ C12-2,2',6,6'-TeCB	54L	40
¹³ C12-2,2',4,6,6'-PeCB	104L	40
¹³ C12-2,2',4,4',6,6'-HxCB	155L	40
¹³ C12-2,2',3,4',5,6,6'-HpCB	188L	32
¹³ C12-2,2',3,3',5,5',6,6'-OcCB	202L	44
¹³ C12-2,3,3',4,4',5,5',6-OcCB	205L	92
¹³ C12-2,2',3,3',4,4',5,5',6-NoCB	206L	52
¹³ C12-DeCB	209L	68

DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Run 1 – Dioxin Unit – 1
 PRL ID: PR253123

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

Dioxin-like PCBs				DL	Surrogate Recoveries
Chemical Name	IUPAC #	ng	ng		%
3,4,4',5-TeCB	PCB 81	ND	0.02		72
3,3',4,4'-TeCB	PCB 77	ND	0.02		72
2,3',4,4',5'-PeCB	PCB 123	ND	0.02		76
2,3',4,4',5-PeCB	PCB 118	0.11	0.02		76
2,3,4,4',5-PeCB	PCB 114	ND	0.02		72
2,3,3',4,4'-PeCB	PCB 105	0.06	0.02		80
3,3',4,4',5-PeCB	PCB 126	ND	0.02		100
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02		80
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02		88
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02		120
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02		108
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02		100
Toxic Equivalent (WHO-TEQ)					

WHO-TEQs (2005)	
(ND=0)	(ND=DL)
ng	ng
ND	6.00E-06
ND	2.00E-06
ND	6.00E-07
3.37E-06	3.37E-06
ND	6.00E-07
1.73E-06	1.73E-06
ND	2.00E-03
ND	6.00E-07
ND	6.00E-07
ND	6.00E-07
ND	6.00E-04
ND	6.00E-07
5.10E-06	2.62E-03

Total PCB		
Homologs	ng	DL ng
Monochlorobiphenyls	0.10	0.05
Dichlorobiphenyls	13.4	0.05
Trichlorobiphenyls	1.00	0.05
Tetrachlorobiphenyls	0.73	0.05
Pentachlorobiphenyls	0.52	0.05
Hexachlorobiphenyls	0.31	0.05
Heptachlorobiphenyls	0.11	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	16.2	

ND - none detected

Surrogate Recoveries		
Chemical Name	IUPAC #	%
¹³ C12-2-MoCB	1L	20
¹³ C12-4,4'-DiCB	15L	28
¹³ C12-2,2',6'-TrCB	19L	32
¹³ C12-3,4,4'-TrCB	37L	60
¹³ C12-2,2',6,6'-TeCB	54L	36
¹³ C12-2,2',4,6,6'-PeCB	104L	44
¹³ C12-2,2',4,4',6,6'-HxCB	155L	48
¹³ C12-2,2',3,4',5,6,6'-HpCB	188L	44
¹³ C12-2,2',3,3',5,5',6,6'-OcCB	202L	56
¹³ C12-2,3,3',4,4',5,5',6-OcCB	205L	92
¹³ C12-2,2',3,3',4,4',5,5',6-NoCB	206L	76
¹³ C12-DeCB	209L	76

DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Run 2 – Dioxin Unit – 1
 PRL ID: PR253124

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

Dioxin-like PCBs			DL		Surrogate Recoveries
Chemical Name	IUPAC #	ng	ng		%
3,4,4',5-TeCB	PCB 81	ND	0.02		72
3,3',4,4'-TeCB	PCB 77	ND	0.02		80
2,3',4,4',5'-PeCB	PCB 123	ND	0.02		72
2,3',4,4',5-PeCB	PCB 118	0.13	0.02		76
2,3,4,4',5-PeCB	PCB 114	ND	0.02		72
2,3,3',4,4'-PeCB	PCB 105	0.08	0.02		76
3,3',4,4',5-PeCB	PCB 126	ND	0.02		96
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02		76
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02		84
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02		116
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02		104
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02		92
Toxic Equivalent (WHO-TEQ)					

WHO-TEQs (2005)	
(ND=0)	(ND=DL)
ng	ng
ND	6.00E-06
ND	2.00E-06
ND	6.00E-07
3.97E-06	3.97E-06
ND	6.00E-07
2.25E-06	2.25E-06
ND	2.00E-03
ND	6.00E-07
ND	6.00E-07
ND	6.00E-07
ND	6.00E-04
ND	6.00E-07
6.22E-06	2.62E-03

Total PCB		
Homologs	ng	DL ng
Monochlorobiphenyls	0.23	0.05
Dichlorobiphenyls	11.6	0.05
Trichlorobiphenyls	0.71	0.05
Tetrachlorobiphenyls	0.90	0.05
Pentachlorobiphenyls	0.48	0.05
Hexachlorobiphenyls	0.56	0.05
Heptachlorobiphenyls	0.15	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	0.06	0.05
Total PCB	14.7	

ND - none detected

Surrogate Recoveries		
Chemical Name	IUPAC #	%
¹³ C12-2-MoCB	1L	32
¹³ C12-4,4'-DiCB	15L	32
¹³ C12-2,2',6'-TrCB	19L	32
¹³ C12-3,4,4'-TrCB	37L	60
¹³ C12-2,2',6,6'-TeCB	54L	40
¹³ C12-2,2',4,6,6'-PeCB	104L	40
¹³ C12-2,2',4,4',6,6'-HxCB	155L	44
¹³ C12-2,2',3,4',5,6,6'-HpCB	188L	44
¹³ C12-2,2',3,3',5,5',6,6'-OcCB	202L	52
¹³ C12-2,3,3',4,4',5,5',6-OcCB	205L	84
¹³ C12-2,2',3,3',4,4',5,5',6-NoCB	206L	92
¹³ C12-DeCB	209L	72

DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: Run 3 – Dioxin Unit – 1
 PRL ID: PR253125

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

Dioxin-like PCBs			DL		Surrogate Recoveries
Chemical Name	IUPAC #	ng	ng		%
3,4,4',5-TeCB	PCB 81	ND	0.02		68
3,3',4,4'-TeCB	PCB 77	ND	0.02		72
2,3',4,4',5'-PeCB	PCB 123	ND	0.02		72
2,3',4,4',5-PeCB	PCB 118	0.17	0.02		68
2,3,4,4',5-PeCB	PCB 114	ND	0.02		68
2,3,3',4,4'-PeCB	PCB 105	0.07	0.02		76
3,3',4,4',5-PeCB	PCB 126	ND	0.02		92
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02		76
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02		84
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02		116
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02		96
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02		92
Toxic Equivalent (WHO-TEQ)					

WHO-TEQs (2005)	
(ND=0)	(ND=DL)
ng	ng
ND	6.00E-06
ND	2.00E-06
ND	6.00E-07
5.15E-06	5.15E-06
ND	6.00E-07
2.11E-06	2.11E-06
ND	2.00E-03
ND	6.00E-07
ND	6.00E-07
ND	6.00E-07
ND	6.00E-04
ND	6.00E-07
7.25E-06	2.62E-03

Total PCB		
Homologs	ng	DL ng
Monochlorobiphenyls	0.38	0.05
Dichlorobiphenyls	54.6	0.05
Trichlorobiphenyls	0.54	0.05
Tetrachlorobiphenyls	0.57	0.05
Pentachlorobiphenyls	0.43	0.05
Hexachlorobiphenyls	0.43	0.05
Heptachlorobiphenyls	ND	0.05
Octachlorobiphenyls	ND	0.05
Nonachlorobiphenyls	ND	0.05
Decachlorobiphenyl	ND	0.05
Total PCB	56.9	

ND - none detected

Surrogate Recoveries		
Chemical Name	IUPAC #	%
¹³ C12-2-MoCB	1L	20
¹³ C12-4,4'-DiCB	15L	28
¹³ C12-2,2',6'-TrCB	19L	32
¹³ C12-3,4,4'-TrCB	37L	56
¹³ C12-2,2',6,6'-TeCB	54L	36
¹³ C12-2,2',4,6,6'-PeCB	104L	40
¹³ C12-2,2',4,4',6,6'-HxCB	155L	44
¹³ C12-2,2',3,4',5,6,6'-HpCB	188L	36
¹³ C12-2,2',3,3',5,5',6,6'-OcCB	202L	56
¹³ C12-2,3,3',4,4',5,5',6-OcCB	205L	88
¹³ C12-2,2',3,3',4,4',5,5',6-NoCB	206L	84
¹³ C12-DeCB	209L	76

DATA REPORT

Client: A. Lanfranco & Associates
 Client ID: BLANK
 PRL ID: PC250651B

Contact: Mark Lanfranco
 Date Extracted: 11-Aug-25
 Date Analysed: 25-Aug-25

Dioxin-like PCBs			DL		Surrogate Recoveries
Chemical Name	IUPAC #	ng	ng		%
3,4,4',5-TeCB	PCB 81	ND	0.02		56
3,3',4,4'-TeCB	PCB 77	ND	0.02		64
2,3',4,4',5'-PeCB	PCB 123	ND	0.02		60
2,3',4,4',5-PeCB	PCB 118	ND	0.02		60
2,3,4,4',5-PeCB	PCB 114	ND	0.02		56
2,3,3',4,4'-PeCB	PCB 105	ND	0.02		64
3,3',4,4',5-PeCB	PCB 126	ND	0.02		76
2,3',4,4',5,5'-HxCB	PCB 167	ND	0.02		68
2,3,3',4,4',5-HxCB	PCB 156	ND	0.02		80
2,3,3',4,4',5'-HxCB	PCB 157	ND	0.02		112
3,3',4,4',5,5'-HxCB	PCB 169	ND	0.02		92
2,3,3',4,4',5,5'-HpCB	PCB 189	ND	0.02		88
Toxic Equivalent (WHO-TEQ)					

WHO-TEQs (2005)	
(ND=0)	(ND=DL)
ng	ng
ND	6.00E-06
ND	2.00E-06
ND	6.00E-07
ND	2.00E-03
ND	6.00E-07
ND	6.00E-07
ND	6.00E-07
ND	6.00E-04
ND	6.00E-07
0.00E+00	2.61E-03

Total PCB		
Homologs	ng	DL
Monochlorobiphenyls	ND	0.05
Dichlorobiphenyls	ND	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	ND	

ND - none detected

Surrogate Recoveries		
Chemical Name	IUPAC #	%
¹³ C12-2-MoCB	1L	24
¹³ C12-4,4'-DiCB	15L	24
¹³ C12-2,2',6'-TrCB	19L	32
¹³ C12-3,4,4'-TrCB	37L	40
¹³ C12-2,2',6,6'-TeCB	54L	32
¹³ C12-2,2',4,6,6'-PeCB	104L	36
¹³ C12-2,2',4,4',6,6'-HxCB	155L	36
¹³ C12-2,2',3,4',5,6,6'-HpCB	188L	36
¹³ C12-2,2',3,3',5,5',6,6'-OoCB	202L	48
¹³ C12-2,3,3',4,4',5,5',6-OoCB	205L	88
¹³ C12-2,2',3,3',4,4',5,5',6-NoCB	206L	76
¹³ C12-DeCB	209L	64

QC REPORT - SPIKE

Client: A. Lanfranco & Associates
 Client ID: **SPIKE**
 PRL ID: PC250652S

Contact: Mark Lanfranco
 Date Extracted: 2-Aug-24
 Date Analysed: 15-Aug-24

Dioxin-like PCBs	LOF	Recovery	Acceptable Recovery		Pass/Fail
			Min	Max	
Chemical Name	ng	%	%	%	
3,4,4',5-TeCB (81)	1	93	60	135	Pass
3,3',4,4'-TeCB (77)	1	81	60	135	Pass
2,3',4,4',5'-PeCB (123)	1	74	60	135	Pass
2,3',4,4',5'-PeCB (118)	1	94	60	135	Pass
2,3,4,4',5'-PeCB (114)	1	79	60	135	Pass
2,3,3',4,4'-PeCB (105)	1	92	60	135	Pass
3,3',4,4',5'-PeCB (126)	1	95	60	135	Pass
2,3',4,4',5,5'-HxCB (167)	1	89	60	135	Pass
2,3,3',4,4',5'-HxCB (156)	1	86	60	135	Pass
2,3,3',4,4',5'-HxCB (157)	1	76	60	135	Pass
3,3',4,4',5,5'-HxCB (169)	1	100	60	135	Pass
2,3,3',4,4',5,5'-HpCB (189)	1	89	60	135	Pass

Surrogate Recoveries
%
52
44
60
56
60
60
72
60
68
108
76
84

Total PCB	LOF	Recovery	Acceptable Recovery		Pass/Fail
			Min	Max	
Homologs	ng	%	%	%	
Monochlorobiphenyls	2	76			
Dichlorobiphenyls	4	104			
Trichlorobiphenyls	6	77			
Tetrachlorobiphenyls	12	81			
Pentachlorobiphenyls	13	87			
Hexachlorobiphenyls	15	83			
Heptachlorobiphenyls	11	88			
Octachlorobiphenyls	6	83			
Nonachlorobiphenyls	2	114			
Decachlorobiphenyl	1	115			
Total PCB	72	86	50	150	Pass

LOF - Level of Fortification

DATA REPORT

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

Date Extracted: 11-Aug-25
 Date Analysed: 18-Aug-25

Client ID:		Blk Dioxin Unit – 1	Run 1 – Dioxin Unit – 1	Run 2 – Dioxin Unit – 1	Run 3 – Dioxin Unit – 1		BLANK
PRL ID:		PR253122	PR253123	PR253124	PR253125		PH250651B
NPRI PAH	DL						
	µg	µg	µg	µg	µg		µg
Acenaphthylene	0.05	ND	ND	ND	0.07		ND
Acenaphthene	0.05	ND	ND	ND	ND		ND
Fluorene	0.02	ND	ND	0.08	ND		ND
Phenanthrene	0.02	ND	0.13	0.16	0.12		ND
Fluoranthene	0.01	0.01	0.07	0.04	0.05		ND
Pyrene	0.01	0.01	0.12	0.04	0.05		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	0.01	0.04	ND		ND
Benzo(k)fluoranthene	0.01	0.02	0.03	0.04	0.04		ND
Benzo(a)pyrene	0.01	ND	0.01	ND	ND		ND
Indeno(1,2,3-cd)pyrene	0.01	ND	0.01	ND	0.01		ND
Dibenz(a,h)anthracene	0.01	ND	ND	ND	ND		ND
Benzo(ghi)perylene	0.01	ND	0.06	0.10	0.08		ND
1-Nitropyrene	0.05	ND	ND	ND	ND		ND
5-Methylchrysene	0.05	ND	ND	ND	ND		ND
7,12-Dimethylbenz(a)anthracene	0.05	ND	ND	ND	ND		ND
3-Methylcholanthrene	0.05	ND	ND	ND	ND		ND
Benzo(e)pyrene	0.01	ND	0.04	0.03	0.03		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	ND		ND
Other PAH							
Naphthalene	0.05	2.9	2.7	3.0	3.4		ND
Anthracene	0.05	ND	ND	0.10	ND		ND



DATA REPORT

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

Date Extracted: 11-Aug-25
 Date Analysed: 18-Aug-25

		Client ID:	Blk Dioxin Unit – 1	Run 1 – Dioxin Unit – 1	Run 2 – Dioxin Unit – 1	Run 3 – Dioxin Unit – 1		BLANK
		PRL ID:	PR253122	PR253123	PR253124	PR253125		PH250651B
NPRI PAH	DL							
Surrogate Recoveries (%)								
d8-Naphthalene			20	22	48	24		31
d10-Acenaphthylene			22	25	19	22		28
d10-Acenaphthene			32	35	65	38		42
d10-Fluorene			37	42	74	48		48
d10-Phenanthrene			45	45	54	43		48
d10-Fluoranthene			57	58	70	62		56
d10-Pyrene			56	56	64	61		53
d12-Chrysene			90	80	77	78		84
d12-Benzo(b)fluoranthene			113	111	101	102		114
d12-Benzo(a)pyrene			102	106	69	105		96
d14-Dibenz(a,h)anthracene			70	76	80	77		77

ND - none detected



DATA REPORT

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

Date Extracted: 11-Aug-25
 Date Analysed: 18-Aug-25

Client ID: **SPIKE**
 PRL ID: PH250652S

NPRI PAH

	µg/g	LOF	Recovery	Acceptable	Pass/Fail
Acenaphthene	1.13	1	113%	50-150%	pass
Acenaphthylene	1.21	1	121%	50-150%	pass
Benz(a)anthracene	0.98	1	98%	50-150%	pass
Benzo(a)pyrene	0.92	1	92%	50-150%	pass
Benzo(b)fluoranthene	1.08	1	108%	50-150%	pass
Benzo(ghi)perylene	1.20	1	120%	50-150%	pass
Benzo(k)fluoranthene	1.11	1	111%	50-150%	pass
Chrysene	1.21	1	121%	50-150%	pass
Dibenz(a,h)anthracene	1.13	1	113%	50-150%	pass
Fluoranthene	1.16	1	116%	50-150%	pass
Fluorene	0.96	1	96%	50-150%	pass
Indeno(1,2,3-cd)pyrene	1.23	1	123%	50-150%	pass
Phenanthrene	1.04	1	104%	50-150%	pass
Pyrene	1.07	1	107%	50-150%	pass
Other PAH					
Naphthalene	1.08	1	108%	50-150%	pass



DATA REPORT

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco

Date Extracted: 11-Aug-25
Date Analysed: 25-Aug-25

Compound	DL µg	Client ID:	Blk Dioxin Unit – 1	Run 1 – Dioxin Unit – 1	Run 2 – Dioxin Unit – 1	Run 3 – Dioxin Unit – 1	BLANK
		PRL ID:	PR253122	PR253123	PR253124	PR253125	CP250651B
Trichlorobenzenes	0.05		ND	0.09	ND	0.17	ND
Tetrachlorobenzenes	0.05		ND	ND	0.06	0.06	ND
Pentachlorobenzene	0.05		ND	ND	ND	ND	ND
Hexachlorobenzene	0.01		ND	ND	ND	ND	ND

Surrogate Recoveries (%)

13C6-Hexachlorobenzene		75	70	74	65		86
------------------------	--	----	----	----	----	--	----

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	ND	ND	ND	ND

Surrogate Recoveries (%)

13C6-Trichlorophenol		62	61	94	97		90
13C6-Tetrachlorophenol		31	107	123	109		33
13C6-Pentachlorophenol		80	77	63	101		65

ND - none detected



QC REPORT - SPIKE

Client: A. Lanfranco & Associates
Contact: Mark Lanfranco

Date Extracted: 11-Aug-25
Date Analysed: 25-Aug-25

Client ID: SPIKE
PRL ID: CP250652S

Compound	LOF		Recovery
	μg	μg	
Trichlorobenzenes	2.00	1.45	73%
Tetrachlorobenzenes	3.00	2.78	93%
Pentachlorobenzene	1.00	0.71	71%
Hexachlorobenzene	1.00	0.71	71%
Trichlorophenols	1.00	1.00	100%
Tetrachlorophenols	1.00	0.86	86%
Pentachlorophenol	1.00	0.71	71%

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
Acenaphthylene-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



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. CONTACT: Mark Lanfranco
101-9488 189 Street
Surrey, BC Canada V4N 4W7 PHONE: 604-881-2582
 DATE: 5-Aug-25 EMAIL: mark.lanfranco@alanfranco.com
 CLIENT: Metro Vancouver WTE SOURCE: Unit 1

SAMPLE ID	PRL ID	DATE SAMPLED	SAMPLE MATRIX	NUMBER OF CONTAINERS											COMMENTS	
				DIOXIN/FURAN	PCB - dioxin-like (12)	PCB - 209 congener	PAH	HCB	TBT	Nonylphenol	PBDE	CB, CP				
Blk Dioxin Unit - 1	PR253122	28-Jul-25		5	X	X		X	X						X	Solvent btls say Unit # 2 not #1
Run 1 - Dioxin Unit - 1	PR253123	28-Jul-25		5	X	X		X	X						X	
Run 2 - Dioxin Unit - 1	PR253124	31-Jul-25		5	X	X		X	X						X	
Run 3 - Dioxin Unit - 1	PR253125	1-Aug-25		5	X	X		X	X						X	
Run 1 - Dioxin Unit - 2	PR253126	28-Jul-25		5												

Sampler's Signature	Relinquished by:	Company	Date	Time	Received by:
Comments:	Method of Shipment	Waybill No.:	Rec'd for PRL:	Date	Time
	Shipment Condition	Temp:	Cooler Opened By:	05 Aug 25	3:00pm
		24°C			



APPENDIX 2

COMPUTER OUTPUTS OF MEASURED and CALCULATED DATA

Client:	Metro Vancouver	Date:	30-Jul-25
Jobsite:	WTE (Burnaby, BC)	Run:	2 PCDD-PCDF
Source:	Unit 1	Run Time:	07:59 - 12:05

Dioxin Concentration:	0.7 pg/dscm	0.0003 gr/dscf
	0.4 pg/dscm	0.0002 gr/Acf
	0.6 pg/dscm (@ 11% O2)	0.0003 gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.4047 dscm	120.238 dscf
Total Sample Time:	240.0 minutes	

Average Isokineticity: 101.1 %

Flue Gas Characteristics

Moisture:	13.80 %	
Temperature	148.0 oC	298.3 oF
Flow	1115.5 dscm/min	39395 dscf/min
	18.59 dscm/sec	656.6 dscf/sec
	1945.1 Acfm/min	68690 Acf/min
Velocity	12.727 m/sec	41.76 f/sec
Gas Analysis	10.18 % O2	9.69 % CO2
	29.957 Mol. Wt (g/gmole) Dry	28.307 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
Jobsite: WTE (Burnaby, BC)
Source: Unit 1

Date: 30-Jul-25
Run: 2 PCDD-PCDF
Run Time: 07:59 - 12:05

Control Unit (Y) 1.0230
Nozzle Diameter (in.) 0.2515
Pitot Factor 0.8510
Baro. Press. (in. Hg) 30.03
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	9.38	10.45
Trav 2	10.00	9.92
Average = 9.69		10.18

Condensate Collection:

Impinger 1 (grams)	370.0
Impinger 2 (grams)	15.0
Impinger 3 (grams)	5.0
Impinger 4 (grams)	18.9
Total Gain (grams) 408.9	

Collection:

D/F TEQ (ng) 0.0024

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature		Stack (oF)	Wall Dist. (in.)	Isokin. (%)
						Inlet (oF)	Outlet (oF)			
		0.0	371.735							
1	1	5.0	374.300	0.380	1.02	80	80	308	1.5	100.9
		10.0	376.950	0.400	1.08	80	80	307	1.5	101.5
	2	15.0	379.490	0.370	1.00	81	81	308	4.7	101.0
		20.0	381.980	0.360	0.97	81	81	307	4.7	100.3
	3	25.0	384.440	0.340	0.92	83	83	303	8.4	101.3
		30.0	386.860	0.330	0.90	84	84	304	8.4	101.1
	4	35.0	389.250	0.320	0.87	85	85	302	12.5	101.0
		40.0	391.600	0.310	0.85	86	86	301	12.5	100.7
	5	45.0	394.350	0.420	1.15	86	86	301	17.7	101.3
		50.0	397.060	0.410	1.13	87	87	301	17.7	100.8
	6	55.0	399.500	0.330	0.91	87	87	301	25.2	101.1
		60.0	401.980	0.340	0.93	88	88	302	25.2	101.2
7	65.0	404.430	0.330	0.91	89	89	299	45.6	101.0	
	70.0	406.850	0.320	0.88	89	89	302	45.6	101.6	
8	75.0	409.380	0.350	0.97	89	89	300	53.2	101.4	
	80.0	411.950	0.360	1.00	90	90	299	53.2	101.3	
9	85.0	414.620	0.390	1.08	91	91	299	58.3	101.0	
	90.0	417.260	0.380	1.06	91	91	298	58.3	101.1	
10	95.0	419.840	0.360	1.00	91	91	298	62.5	101.5	
	100.0	422.380	0.350	0.97	92	92	299	62.5	101.2	
11	105.0	424.850	0.330	0.92	92	92	298	66.1	101.3	
	110.0	427.280	0.320	0.89	93	93	296	66.1	100.8	
12	115.0	429.680	0.310	0.87	93	93	295	69.4	101.1	
	120.0	432.030	0.300	0.84	93	93	293	69.4	100.5	
		0.0	432.030							
2	1	5.0	434.350	0.290	0.81	93	93	296	1.5	101.1
		10.0	436.720	0.300	0.84	96	96	297	1.5	101.1
	2	15.0	439.090	0.300	0.84	97	97	297	4.7	100.9
		20.0	441.500	0.310	0.87	98	98	297	4.7	100.8
	3	25.0	443.790	0.280	0.79	96	96	296	8.4	101.0
		30.0	446.120	0.290	0.81	95	95	296	8.4	101.2
	4	35.0	448.400	0.280	0.78	94	94	296	12.5	100.9
		40.0	450.720	0.290	0.81	95	95	296	12.5	100.7
	5	45.0	453.200	0.330	0.93	95	95	295	17.7	100.9
		50.0	455.720	0.340	0.95	95	95	295	17.7	101.0
	6	55.0	458.280	0.350	0.98	96	96	295	25.2	101.0
		60.0	460.850	0.350	0.98	96	96	296	25.2	101.4
	7	65.0	463.520	0.380	1.07	95	95	296	45.6	101.4
		70.0	466.180	0.380	1.06	95	95	297	45.6	101.0
	8	75.0	468.880	0.390	1.09	95	95	296	53.2	101.2
		80.0	471.620	0.400	1.12	95	95	296	53.2	101.4
	9	85.0	474.460	0.430	1.21	96	96	295	58.3	101.1
		90.0	477.260	0.420	1.18	96	96	296	58.3	100.9
	10	95.0	480.030	0.410	1.15	96	96	296	62.5	101.1
		100.0	482.780	0.400	1.12	97	97	297	62.5	101.5
	11	105.0	485.650	0.440	1.23	96	96	297	66.1	101.2
		110.0	488.430	0.420	1.18	96	96	296	66.1	100.2
	12	115.0	491.140	0.390	1.10	96	96	294	69.4	101.2
		120.0	493.780	0.370	1.05	96	96	291	69.4	101.0
			Average:	0.353	0.981	91.6	91.6	298.3		101.1

Client:	Metro Vancouver	Date:	31-Jul-25
Jobsite:	WTE (Burnaby, BC)	Run:	2 PCDD-PCDF
Source:	Unit 1	Run Time:	08:25 - 12:26

Dioxin Concentration:	0.48 pg/dscm	0.0002 gr/dscf
	0.3 pg/dscm	0.0001 gr/Acf
	0.43 pg/dscm (@ 11% O2)	0.0002 gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.6056 dscm	127.331 dscf
Total Sample Time:	240.0 minutes	

Average Isokineticity: 102.6 %

Flue Gas Characteristics

Moisture:	13.37 %	
Temperature	151.1 oC	304.1 oF
Flow	1164.7 dscm/min	41132 dscf/min
	19.41 dscm/sec	685.5 dscf/sec
	2040.3 Acfm/min	72054 Acf/min
Velocity	13.351 m/sec	43.80 f/sec
Gas Analysis	9.91 % O2	10.06 % CO2
	30.007 Mol. Wt (g/gmole) Dry	28.401 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
Jobsite: WTE (Burnaby, BC)
Source: Unit 1

Date: 31-Jul-25
Run: 2 PCDD-PCDF
Run Time: 08:25 - 12:26

Control Unit (Y) 1.0230
Nozzle Diameter (in.) 0.2515
Pitot Factor 0.8515
Baro. Press. (in. Hg) 29.97
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	9.88	10.08
Trav 2	10.25	9.75
Average =		10.06 9.91

Condensate Collection:

Impinger 1 (grams)	383.0
Impinger 2 (grams)	13.0
Impinger 3 (grams)	2.0
Impinger 4 (grams)	19.5
Total Gain (grams)	417.5

Collection:

D/F TEQ (ng) 0.0017

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature			Wall Dist. (in.)	Isokin. (%)
						Inlet (oF)	Outlet (oF)	Stack (oF)		
		0.0	493.820							
1	1	5.0	496.730	0.470	1.31	80	80	310	1.5	102.6
		10.0	499.680	0.480	1.34	81	81	311	1.5	102.8
	2	15.0	502.540	0.450	1.25	81	81	312	4.7	103.0
		20.0	505.380	0.440	1.23	81	81	312	4.7	103.4
	3	25.0	508.240	0.450	1.25	82	82	314	8.4	102.9
		30.0	511.140	0.460	1.28	83	83	314	8.4	103.0
	4	35.0	514.050	0.470	1.30	83	83	315	12.5	102.4
		40.0	516.980	0.480	1.34	84	84	315	12.5	101.8
	5	45.0	520.080	0.520	1.45	85	85	315	17.7	103.3
		50.0	523.200	0.540	1.51	86	86	315	17.7	101.9
	6	55.0	526.080	0.450	1.27	86	86	312	25.2	102.7
		60.0	528.800	0.400	1.13	87	87	313	25.2	102.8
7	65.0	531.580	0.420	1.18	87	87	314	45.6	102.6	
	70.0	534.300	0.400	1.13	88	88	311	45.6	102.4	
8	75.0	537.120	0.430	1.22	88	88	311	53.2	102.5	
	80.0	539.980	0.440	1.25	89	89	311	53.2	102.5	
9	85.0	542.530	0.350	0.99	89	89	308	58.3	102.3	
	90.0	545.080	0.340	0.97	90	90	306	58.3	103.4	
10	95.0	547.480	0.310	0.89	90	90	304	62.5	101.8	
	100.0	549.860	0.300	0.86	90	90	304	62.5	102.6	
11	105.0	552.280	0.310	0.89	90	90	302	66.1	102.5	
	110.0	554.630	0.290	0.84	91	91	300	66.1	102.6	
12	115.0	556.860	0.260	0.75	91	91	296	69.4	102.5	
	120.0	559.050	0.250	0.73	91	91	295	69.4	102.6	
		0.0	559.050							
2	1	5.0	561.700	0.370	1.07	92	92	302	1.5	102.4
		10.0	564.300	0.360	1.04	92	92	302	1.5	101.9
	2	15.0	566.850	0.340	0.98	93	93	301	4.7	102.5
		20.0	569.360	0.330	0.95	93	93	301	4.7	102.4
	3	25.0	571.950	0.350	1.01	94	94	300	8.4	102.4
		30.0	574.580	0.360	1.04	95	95	301	8.4	102.4
	4	35.0	577.180	0.350	1.01	94	94	300	12.5	102.8
		40.0	579.720	0.330	0.96	95	95	299	12.5	103.1
	5	45.0	582.220	0.320	0.93	95	95	299	17.7	103.1
		50.0	584.650	0.310	0.90	94	94	298	17.7	101.9
	6	55.0	587.250	0.350	1.02	94	94	299	25.2	102.7
		60.0	589.890	0.360	1.05	95	95	297	25.2	102.5
7	65.0	592.640	0.390	1.13	94	94	298	45.6	102.9	
	70.0	595.400	0.400	1.16	94	94	298	45.6	102.0	
8	75.0	598.080	0.370	1.08	94	94	297	53.2	102.9	
	80.0	600.720	0.360	1.05	94	94	298	53.2	102.8	
9	85.0	603.440	0.380	1.11	95	95	298	58.3	102.9	
	90.0	606.200	0.390	1.14	95	95	297	58.3	103.0	
10	95.0	608.980	0.400	1.16	94	94	297	62.5	102.6	
	100.0	611.800	0.410	1.19	95	95	298	62.5	102.7	
11	105.0	614.580	0.400	1.16	95	95	299	66.1	102.6	
	110.0	617.440	0.420	1.22	95	95	299	66.1	103.0	
12	115.0	620.250	0.410	1.19	95	95	299	69.4	102.4	
	120.0	622.980	0.390	1.14	95	95	298	69.4	102.0	
		Average:		0.387	1.105	90.3	90.3	304.1		102.6

Client:	Metro Vancouver	Date:	1-Aug-25
Jobsite:	WTE (Burnaby, BC)	Run:	3 - PCDD-PCDF
Source:	Unit 1	Run Time:	08:41 - 12:45

Dioxin Concentration:	0.9 pg/dscm	0.0004 gr/dscf
	0.5 pg/Acm	0.0002 gr/Acf
	0.9 pg/dscm (@ 11% O2)	0.0004 gr/dscf (@ 11% O2)

Emission Rate: see D/F data Table 2

Sample Gas Volume:	3.5823 dscm	126.508 dscf
Total Sample Time:	240.0 minutes	

Average Isokineticity: 100.4 %

Flue Gas Characteristics

Moisture:	11.67 %	
Temperature	152.5 oC	306.5 oF
Flow	1181.4 dscm/min	41723 dscf/min
	19.69 dscm/sec	695.4 dscf/sec
	2035.4 Acm/min	71880 Acf/min
Velocity	13.319 m/sec	43.70 f/sec
Gas Analysis	10.40 % O2	9.60 % CO2
	29.952 Mol. Wt (g/gmole) Dry	28.557 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
Jobsite: WTE (Burnaby, BC)
Source: Unit 1

Date: 1-Aug-25
Run: 3 - PCDD-PCDF
Run Time: 08:41 - 12:45

Control Unit (Y) 1.0230
Nozzle Diameter (in.) 0.2515
Pitot Factor 0.8510
Baro. Press. (in. Hg) 30.01
Static Press. (in. H2O) -19.90
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	9.33	10.87
Trav 2	9.86	9.94
Average = 9.60		10.40

Condensate Collection:

Impinger 1 (grams)	326.0
Impinger 2 (grams)	8.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	21.0
Total Gain (grams)	355.0

Collection:

D/F TEQ (ng)	0.0033
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Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature		Stack (oF)	Wall Dist. (in.)	Isokin. (%)
						Inlet (oF)	Outlet (oF)			
		0.0	623.340							
1	1	5.0	625.410	0.230	0.64	79	79	311	1.5	102.9
		10.0	627.580	0.270	0.75	78	78	311	1.5	99.7
	2	15.0	629.740	0.270	0.75	79	79	310	4.7	99.0
		20.0	632.130	0.320	0.89	79	79	309	4.7	100.6
	3	25.0	634.520	0.330	0.92	80	80	309	8.4	98.9
		30.0	636.810	0.290	0.81	80	80	309	8.4	101.1
	4	35.0	639.240	0.330	0.92	80	80	309	12.5	100.6
		40.0	641.580	0.310	0.87	81	81	308	12.5	99.6
	5	45.0	643.750	0.270	0.76	81	81	308	17.7	99.0
		50.0	646.110	0.310	0.87	82	82	309	17.7	100.4
	6	55.0	648.380	0.290	0.81	82	82	308	25.2	99.7
		60.0	650.630	0.270	0.76	84	84	308	25.2	102.1
7	65.0	653.590	0.470	1.33	85	85	306	45.6	101.6	
	70.0	656.490	0.450	1.27	84	84	305	45.6	101.8	
8	75.0	659.720	0.560	1.59	85	85	304	53.2	101.5	
	80.0	662.680	0.490	1.39	86	86	304	53.2	99.2	
9	85.0	665.950	0.590	1.68	86	86	303	58.3	99.9	
	90.0	669.250	0.590	1.67	86	86	304	58.3	100.9	
10	95.0	672.590	0.600	1.70	87	87	306	62.5	101.2	
	100.0	676.000	0.640	1.81	87	87	307	62.5	100.1	
11	105.0	679.210	0.550	1.56	87	87	306	66.1	101.5	
	110.0	682.040	0.440	1.25	88	88	307	66.1	99.9	
12	115.0	684.830	0.420	1.20	88	88	303	69.4	100.5	
	120.0	687.530	0.400	1.14	88	88	303	69.4	99.7	
		0.0	687.530							
2	1	5.0	689.880	0.290	0.82	89	89	309	1.5	102.0
		10.0	692.240	0.310	0.88	89	89	311	1.5	99.2
	2	15.0	694.920	0.400	1.13	89	89	310	4.7	99.2
		20.0	697.550	0.370	1.05	90	90	311	4.7	101.1
	3	25.0	700.400	0.440	1.25	90	90	309	8.4	100.4
		30.0	703.170	0.420	1.19	90	90	310	8.4	99.9
	4	35.0	706.000	0.440	1.25	91	91	310	12.5	99.5
		40.0	708.930	0.460	1.31	91	91	310	12.5	100.8
	5	45.0	711.540	0.370	1.06	92	92	308	17.7	99.7
		50.0	714.110	0.370	1.05	92	92	309	17.7	98.3
	6	55.0	716.840	0.390	1.12	93	93	307	25.2	101.4
		60.0	719.770	0.440	1.26	93	93	309	25.2	102.6
	7	65.0	722.850	0.520	1.48	93	93	309	45.6	99.3
		70.0	725.960	0.520	1.48	93	93	310	45.6	100.3
	8	75.0	728.800	0.430	1.22	93	93	311	53.2	100.7
		80.0	731.810	0.470	1.34	94	94	311	53.2	102.0
	9	85.0	734.590	0.410	1.17	94	94	310	58.3	100.7
		90.0	737.370	0.410	1.17	94	94	310	58.3	100.7
	10	95.0	739.910	0.350	1.01	93	93	304	62.5	99.4
		100.0	742.450	0.340	0.98	93	93	301	62.5	100.6
	11	105.0	744.690	0.250	0.73	94	94	297	66.1	102.9
		110.0	746.800	0.250	0.73	94	94	295	66.1	96.8
	12	115.0	748.830	0.210	0.62	94	94	287	69.4	101.1
		120.0	750.905	0.230	0.68	93	93	286	69.4	98.9
		Average:		0.391	1.111	87.8	87.8	306.5		100.4

APPENDIX 3
FIELD DATA SHEETS

(1 of 2)

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.

NOZZLE	P-258	DIAMETER, IN.	0.2515	IMPINGING VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
PROBE	71C	Cp	0.8570	Imp. #1	100	370	370
PORT LENGTH				Imp. #2		115	115
STATIC PRESSURE, IN. H2O	-19.5"			Imp. #3		5	5
STACK DIAMETER	70.9"			Imp. #4	200g		
STACK HEIGHT	30.0			Imp. #5			
				Imp. #6			
INITIAL LEAK TEST	0.00 / 0.15"			Imp. #7			
FINAL LEAK TEST	0.002 @ 15"			Imp. #8			

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature of				Fyrites		XAD		
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg		CO ₂ Vol. %	O ₂ Vol. %
1	0759	371.735	0.38	1.02	80	308	228	226	45	4	9.5	10.4	42
2	10	374.30	0.40	1.08	89	307	259	254	47	5			44
3	20	379.49	0.37	1.00	81	307	251	251	48	5			75
4	30	384.44	0.34	0.92	83	303	253	251	46	5			47
5	40	386.86	0.33	0.90	84	304	253	251	48	5			49
6	50	389.25	0.32	0.87	85	307	253	251	45	5			45
7	60	391.65	0.31	0.85	85	301	252	252	46	5			
8		394.35	0.47	1.15	87	301	252	251	48	5.5	9.5	10.2	49
9		397.06	0.41	1.13	87	301	252	252	45	5			45
10		399.50	0.33	0.91	88	302	252	252	46	5			42
11		401.98	0.34	0.93	89	299	252	251	46	5	9.5	10.5	44
12		404.43	0.33	0.91	89	302	251	250	50	5			46
13		406.85	0.37	0.97	89	309	249	250	52	5.5			46
14		409.38	0.35	1.00	89	299	249	250	54	5.5			47
15		411.95	0.36	1.08	91	298	250	249	51	5	9.0	10.7	40
16		414.62	0.39	1.08	91	298	250	249	46	5			42
17		417.26	0.38	1.06	91	298	250	249	46	5			
18		419.84	0.36	1.00	92	299	250	249	46	5			
19		422.38	0.35	0.97	92	298	250	249	46	5			
20		424.83	0.32	0.87	93	298	250	249	46	5			
21		427.28	0.32	0.87	93	298	250	249	46	5			
22		429.68	0.31	0.87	93	298	250	249	46	5			
23		432.03	0.30	0.84	93	293	250	249	46	5			

(Test #2)

5 min Ready.

(2 of 2)

A. Lanfranco and Associates Inc.

Lanfranco

METRO VANCOUVER WTE - BURNABY B.C.		NOZZLE PROBE	DIAMETER, IN. Cp	IMPINGING VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)	
SOURCE	Unit #1			Imp. #1				
PARAMETER/RUN No	PC00/PROF / R-01 Cont.	PORT LENGTH		Imp. #2				
DATE	July 30, 2025	STATIC PRESSURE, IN. H2O		Imp. #3				
OPERATOR:		STACK DIAMETER		Imp. #4				
CONTROL UNIT		STACK HEIGHT		Imp. #5				
		INITIAL LEAK TEST		Imp. #6				
		FINAL LEAK TEST	0.002 @ 15"	Imp. #7				
		FINAL LEAK TEST		Imp. #8				
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature of			Fyrites
					Dry Gas Outlet	Stack	Impinger Exit	
1		432.03	0.29	0.81	299	250	52	CO ₂ Vol. % 10.5
2	10	434.35	0.30	0.84	297	250	50	O ₂ Vol. % 9.4
3	20	439.09	0.31	0.87	297	250	49	
4	30	441.59	0.28	0.79	296	250	50	
5	40	446.12	0.28	0.81	296	250	50	
6	50	450.72	0.33	0.83	296	251	52	
7	60	453.70	0.34	0.95	295	252	46	
8		458.72	0.35	0.98	295	252	48	
9		460.85	0.35	0.98	296	250	48	
10	10	463.52	0.38	1.07	296	250	48	
11	20	466.18	0.38	1.08	297	250	49	
12	30	468.88	0.39	1.09	296	250	48	
13	40	471.67	0.40	1.11	296	250	48	
14	50	474.46	0.47	1.21	295	250	49	
15		477.25	0.41	1.15	295	251	50	
16		480.03	0.40	1.17	295	250	50	
17		482.78	0.44	1.23	297	250	50	
18		485.53	0.47	1.28	296	251	47	
19		488.23	0.47	1.10	296	251	47	
20		491.14	0.37	1.05	296	251	47	
21	12:05	493.78	0.37	1.05	297	250	47	

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No	Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F						Fyrites		TOTAL GAIN (mL)
						Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	CO ₂ Vol. %	O ₂ Vol. %	
METRO VANCOUVER WTE - BURNABY B.C. NOZZLE <i>F-256</i> DIAMETER, IN. <i>0.2515</i> INITIAL (mL) <i>0</i> FINAL (mL) <i>383</i> TOTAL GAIN (mL) <i>383</i> PROBE <i>7°C</i> Cp <i>0.855</i> PORT LENGTH STATIC PRESSURE, IN. H ₂ O <i>-19.5'</i> STACK DIAMETER <i>30.96</i> STACK HEIGHT <i>30.0'</i> INITIAL LEAK TEST <i>0.002 @ 15'</i> FINAL LEAK TEST <i>0.002 @ 15'</i>														
SOURCE <i>Unit #1</i> PARAMETER / RUN No <i>PCD/PCDF / R-2L</i> DATE <i>July 30 2025</i> OPERATOR <i>DS + RP</i> CONTROL UNIT <i>Y 1.0230</i> ΔH@ <i>2.066</i> BAROMETRIC PRESSURE, IN. Hg <i>29.97</i> ASSUMED MOISTURE, Bw <i>14%</i>														
1	10	0825	493.820	0.47	1.34	310	252	261	45	5	9.0	11.1	XAD	90
2	20		499.68	0.48	1.34	311	264	258	44	5				94
3	30		502.54	0.45	1.23	312	254	259	46	6				96
4	40		505.36	0.47	1.23	314	252	259	49	6				92
5	50		508.24	0.45	1.25	315	251	252	48	6	9.5	10.4		94
6	60		511.14	0.46	1.28	315	251	254	49	5.5				93
7	70		514.05	0.47	1.34	315	251	249	45	5.5				94
8	80		516.98	0.48	1.34	315	251	249	48	5.5	10.0	10.1		98
9	90		520.08	0.52	1.45	315	249	250	47	6.5				98
10	100		523.20	0.54	1.51	318	249	250	49	6	11.0	8.7		90
11	110		526.08	0.48	1.27	306	250	248	50	5				92
12	120		528.80	0.40	1.13	304	251	248	52	5				94
13	130		536.58	0.42	1.18	304	251	247	45	5.5				94
14	140		534.30	0.40	1.13	311	251	249	48	5.8				98
15	150		537.12	0.43	1.22	311	251	249	48	5.8				98
16	160		539.98	0.44	1.25	311	249	250	47	6.5				98
17	170		542.53	0.38	0.99	308	249	250	49	6				90
18	180		545.06	0.39	0.97	306	250	248	49	6	11.0	8.7		90
19	190		547.48	0.31	0.84	304	250	248	50	5				92
20	200		549.86	0.30	0.84	302	251	250	50	5				92
21	210		552.28	0.31	0.84	300	251	248	52	5				94
22	220		554.68	0.29	0.84	298	251	248	52	5				94
23	230		556.86	0.26	0.75	296	251	248	52	5				94
24	240		559.05	0.25	0.73	295	251	245						

5 min ready.

Handwritten signature/initials

METRO VANCOUVER WTE - BURNABY B.C.		NOZZLE	DIAMETER, IN.	IMPINGING VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)					
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	CO ₂ Vol. %	O ₂ Vol. %
1	10	559.05	0.37	1.07	92	302	250	252	45	6	9.5	10.3
2	20	564.30	0.34	1.04	92	302	252	254	46	6		46
3	30	566.85	0.33	0.98	93	301	251	246	48	6		48
4	40	571.96	0.33	1.04	94	300	250	248	49	6		42
5	50	574.58	0.33	1.01	95	299	251	252	50	6	10.0	10.1
6	60	577.18	0.32	0.98	95	298	249	248	42	6		43
7	10	579.77	0.31	0.99	94	298	251	258	45	7	11.5	8.5
8	20	582.22	0.35	1.02	94	297	250	259	47	7		49
9	30	584.65	0.35	1.05	94	298	249	260	48	7		50
10	40	587.25	0.39	1.14	95	297	250	258	49	7		47
11	50	589.89	0.40	1.19	95	297	251	248	50	8	10.0	10.1
12	60	592.64	0.40	1.16	95	299	251	248	51	8		43
1	10	595.40	0.37	1.13	94	298	251	258	45	7		47
2	20	598.08	0.37	1.08	94	297	250	259	47	7		49
3	30	600.77	0.38	1.05	94	298	249	260	48	7		50
4	40	603.44	0.39	1.14	95	297	250	258	49	7		47
5	50	606.20	0.40	1.19	94	297	251	248	50	8	10.0	10.1
6	60	608.98	0.40	1.16	95	299	251	248	51	8		43
7	10	611.80	0.41	1.27	95	299	252	247	51	8		43
8	20	614.58	0.41	1.14	95	298	252	247	51	8		43
9	30	617.44	0.41	1.19	95	299	252	247	51	8		43
10	40	620.28	0.39	1.14	95	298	252	247	51	8		43
11	50	622.98	0.39	1.14	95	298	252	247	51	8		43
12	60	625.78	0.39	1.14	95	298	252	247	51	8		43

UNIT #1
 PARAMETER / RUN No
 DATE July 31st, 2028
 OPERATOR
 CONTROL UNIT
 BAROMETRIC PRESSURE, IN. Hg
 ASSUMED MOISTURE, Bw

NOZZLE
 PROBE
 DIAMETER, IN.
 Cp
 IMPINGING VOLUMES
 Imp. #1
 Imp. #2
 Imp. #3
 Imp. #4
 Imp. #5
 Imp. #6
 Imp. #7
 Imp. #8

NOZZLE
 PROBE
 DIAMETER, IN.
 Cp
 IMPINGING VOLUMES
 Imp. #1
 Imp. #2
 Imp. #3
 Imp. #4
 Imp. #5
 Imp. #6
 Imp. #7
 Imp. #8

NOZZLE
 PROBE
 DIAMETER, IN.
 Cp
 IMPINGING VOLUMES
 Imp. #1
 Imp. #2
 Imp. #3
 Imp. #4
 Imp. #5
 Imp. #6
 Imp. #7
 Imp. #8

NOZZLE
 PROBE
 DIAMETER, IN.
 Cp
 IMPINGING VOLUMES
 Imp. #1
 Imp. #2
 Imp. #3
 Imp. #4
 Imp. #5
 Imp. #6
 Imp. #7
 Imp. #8

NOZZLE
 PROBE
 DIAMETER, IN.
 Cp
 IMPINGING VOLUMES
 Imp. #1
 Imp. #2
 Imp. #3
 Imp. #4
 Imp. #5
 Imp. #6
 Imp. #7
 Imp. #8

Continued

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Temperature °F		Impinger Exit	Pump Vac. IN. Hg	Fyrites		TOTAL GAIN (mL)
							Probe	Box			CO ₂ Vol. %	O ₂ Vol. %	
1		687.53	0.29	0.82	89	309	250	250	53	6	9.5	10.9	42
2	10	689.88	0.31	0.83	89	311	250	250	51	7			43
3	20	694.92	0.40	1.13	90	310	250	250	51	7	9.5	11.2	45
4	30	697.53	0.37	1.05	90	309	250	250	52	7			45
5	40	706.40	0.47	1.25	90	310	250	250	53	7	10.0	10.6	44
6	50	703.17	0.44	1.19	91	310	250	250	53	7			44
7	60	706.06	0.46	1.25	91	310	250	250	54	8	9.5	10.8	43
8	70	718.93	0.57	1.51	92	308	250	250	54	7			47
9	80	714.54	0.37	1.06	92	309	250	250	53	7	10.0	10.6	44
10	90	716.84	0.39	1.07	93	309	250	250	53	7			44
11	100	719.17	0.44	1.21	93	309	250	250	54	8	9.5	10.8	43
12	110	722.85	0.57	1.48	93	309	250	250	54	7			47
13	120	725.91	0.43	1.22	93	310	250	250	53	7	9.5	10.7	42
END	12:45	728.50	0.47	1.34	94	310	250	250	54	7			41
		734.89	0.41	1.17	94	310	250	250	54	6	9.5	10.8	42
		737.37	0.41	1.17	94	310	250	250	54	6	9.5	10.8	42
		739.91	0.41	1.01	93	309	250	250	54	7			41
		742.45	0.34	0.98	93	309	250	250	54	6	9.5	10.8	42
		744.69	0.25	0.73	94	297	250	250	54	6	9.5	10.8	42
		746.80	0.25	0.73	94	295	250	250	54	6	9.5	10.8	42
		748.83	0.25	0.68	94	287	250	250	54	6			42
		750.165	0.23	0.68	93	286	250	250	54	6			42

CLIENT: **MUWTE**
 SOURCE: **Unit 1**
 PARAMETER / RUN NO: **Diox₂ Run 3 continued**
 DATE: **Aug 12 2005**
 OPERATOR: **Justin Ching**
 CONTROL UNIT: **JUH4**
 Y: **10230**
 ΔH: **0.066**

NOZZLE DIAMETER, IN. Cp
 PROBE
 PORT LENGTH
 STATIC PRESSURE, IN. H₂O
 STACK DIAMETER
 STACK HEIGHT
 INITIAL LEAK TEST
 FINAL LEAK TEST

IMPINGER INITIAL (mL) FINAL (mL) TOTAL GAIN (mL)
 VOLUMES
 Imp. #1 0 376 376
 Imp. #2 0 103 103
 Imp. #3 0 0 0
 Imp. #4 GBL
 Imp. #5
 Imp. #6
 Upstream Diameters
 Downstream Diameters

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Temperature °F		Impinger Exit	Pump Vac. IN. Hg	Fyrites		TOTAL GAIN (mL)
							Probe	Box			CO ₂ Vol. %	O ₂ Vol. %	
1		687.53	0.29	0.82	89	309	250	250	53	6	9.5	10.9	42
2	10	689.88	0.31	0.83	89	311	250	250	51	7			43
3	20	694.92	0.40	1.13	90	310	250	250	51	7	9.5	11.2	45
4	30	697.53	0.37	1.05	90	309	250	250	52	7			45
5	40	706.40	0.47	1.25	90	310	250	250	53	7	10.0	10.6	44
6	50	703.17	0.44	1.19	91	310	250	250	53	7			44
7	60	706.06	0.46	1.25	91	310	250	250	54	8	9.5	10.8	43
8	70	718.93	0.57	1.51	92	308	250	250	54	7			47
9	80	714.54	0.37	1.06	92	309	250	250	53	7	10.0	10.6	44
10	90	716.84	0.39	1.07	93	309	250	250	53	7			44
11	100	719.17	0.44	1.21	93	309	250	250	54	8	9.5	10.8	43
12	110	722.85	0.57	1.48	93	310	250	250	54	7			47
13	120	725.91	0.43	1.22	93	310	250	250	54	7	9.5	10.7	42
END	12:45	728.50	0.47	1.34	94	310	250	250	54	7			41
		734.89	0.41	1.17	94	310	250	250	54	6	9.5	10.8	42
		737.37	0.41	1.17	94	310	250	250	54	6	9.5	10.8	42
		739.91	0.41	1.01	93	309	250	250	54	7			41
		742.45	0.34	0.98	93	309	250	250	54	6	9.5	10.8	42
		744.69	0.25	0.73	94	297	250	250	54	6	9.5	10.8	42
		746.80	0.25	0.73	94	295	250	250	54	6	9.5	10.8	42
		748.83	0.25	0.68	94	287	250	250	54	6			42
		750.165	0.23	0.68	93	286	250	250	54	6			42

APPENDIX 4
SITE AND LOCATION MAPS

SITE PLAN



FENCE ON PROPERTY LINE

RIVERBEND DRIVE

FLY ASH SILO

LIME SILO

ACTIVATED CARBON SILO

AIR COOLED CONDENSER

TURBO GENERATOR/
CLOSED-CIRCUIT
COOLING TOWER

SCALE

PARKING

OFFICE

STACK

CHANGE ROOM

AIR POLLUTION
CONTROL
EQUIPMENT

CONTROL ROOM

BOILER HOUSE

BOILER #3

BOILER #2

BOILER #1

EMERGENCY POWER GENERATOR

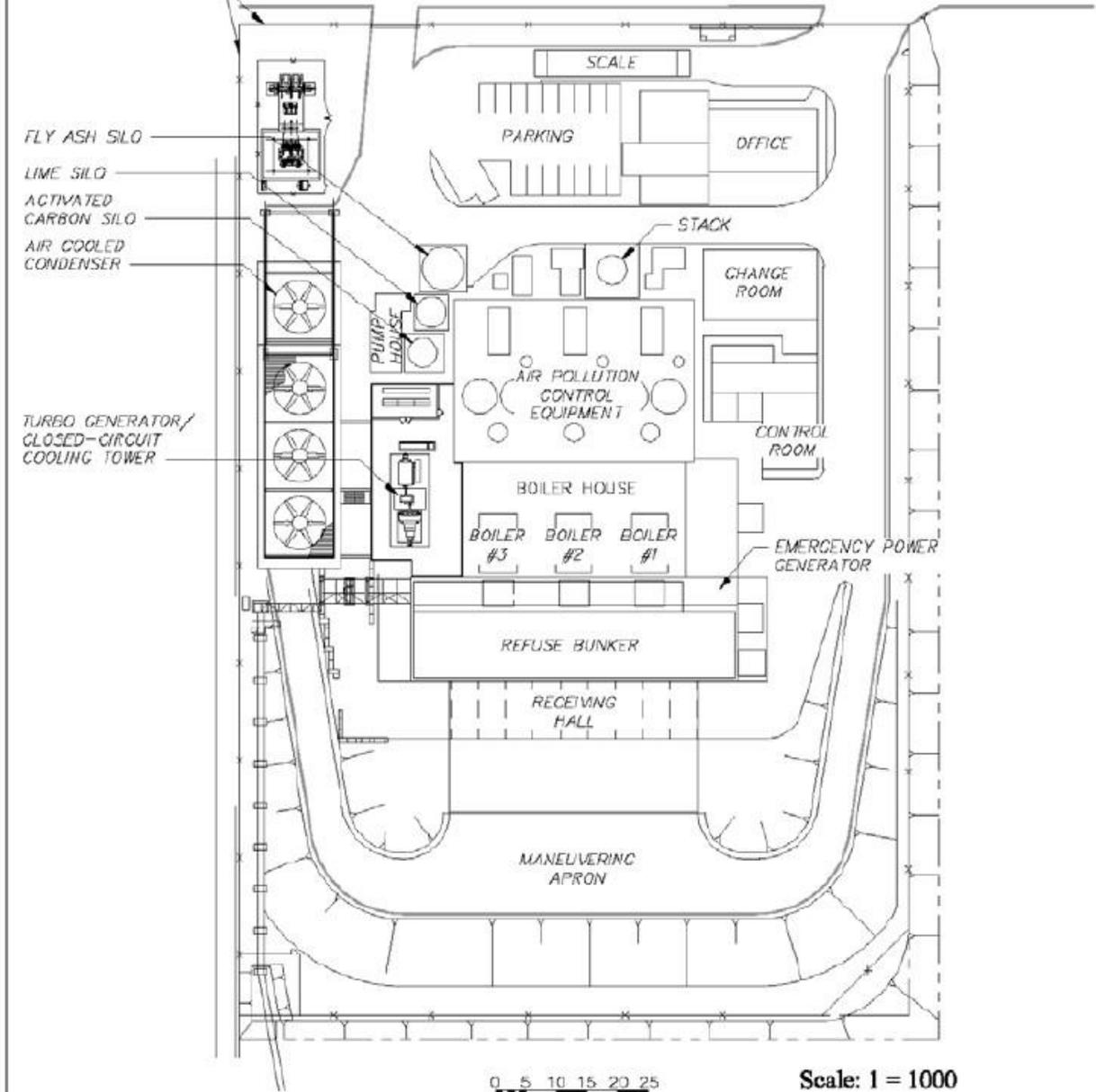
REFUSE BUNKER

RECEIVING HALL

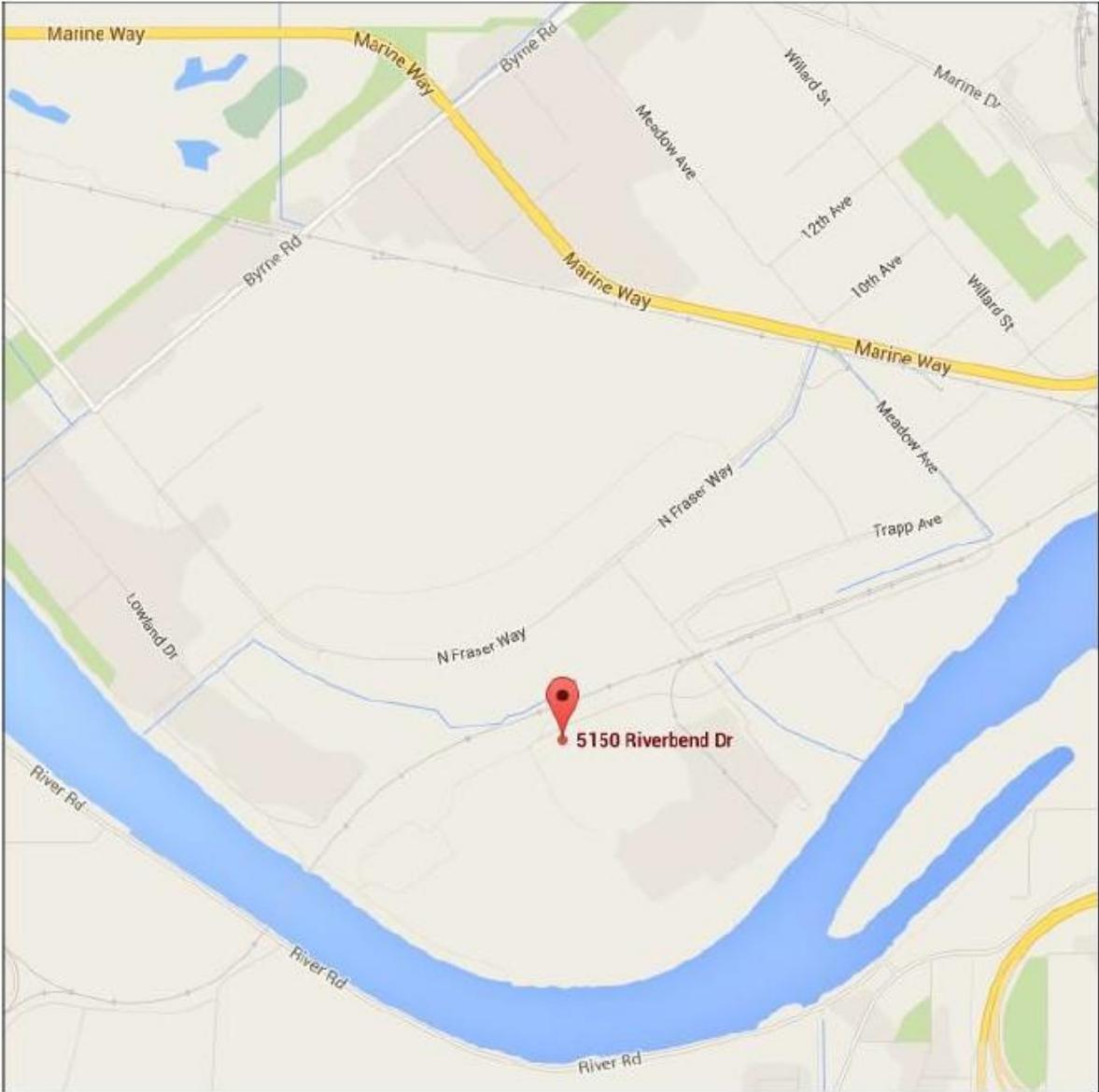
MANEUVERING APRON

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 #: JU 14
Serial #: 0028-030615-1

Date: 2-Jul-25
Barometric Pressure: 29.84 (in. Hg)
Theoretical Critical Vacuum: 14.08 (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)²(min)).
!!!!!!!

----- DRY GAS METER READINGS -----										-CRITICAL ORIFICE READINGS-				
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. (deg F)		Final Temps. (deg F)		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial Final Average (deg F) (deg F) (deg F)		
4.10	18.00	937.846	956.692	18.846	77.0	77.0	80.0	80.0	73	0.8185	15.0	79.0	81.0	80.0
2.15	16.00	956.652	968.818	12.166	80.0	80.0	81.0	81.0	63	0.5956	17.0	81.0	83.0	82.0
1.35	16.00	968.818	978.314	9.496	81.0	81.0	83.0	83.0	55	0.4606	18.0	83.0	86.0	84.5
0.76	15.00	978.314	985.093	6.779	83.0	83.0	84.0	84.0	48	0.3560	20.0	86.0	87.0	86.5
0.37	17.00	985.093	990.397	5.304	84.0	84.0	86.0	86.0	40	0.2408	21.0	87.0	88.0	87.5

***** RESULTS *****												
-- DRY GAS METER --			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----			
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)	CALIBRATION FACTOR Y Value (number)	Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)		
18.608	527.0	18.919	535.8	19.408	1.017	-0.006	2.041	51.85	-0.024	0.673		
11.911	337.3	12.214	345.9	12.577	1.025	0.002	2.022	51.35	-0.044	0.672		
9.253	262.0	9.424	266.9	9.749	1.019	-0.005	2.127	54.01	0.061	0.661		
6.578	186.3	6.816	193.0	7.077	1.036	0.013	2.006	50.95	-0.060	0.669		
5.127	145.2	5.221	147.8	5.430	1.018	-0.005	2.132	54.16	0.067	0.661		
Average Y----->					1.0230	Average dH@----->		2.066	52.5	Average Ko----->		0.667

TEMPERATURE CALIBRATION										
Calibration Standard -----> Omega Model CL23A S/N:T-218768										
Reference Set-Point (deg F)	Stack (deg F)	(% diff)	Hot Box (deg F)	(% diff)	Probe (deg F)	(% diff)	Imp Out (deg F)	(% diff)	Aux (deg F)	(% diff)
32	31	-0.20%	32	0.00%	32	0.00%	31	-0.20%	31	-0.20%
100	99	-0.18%	100	0.00%	100	0.00%	100	0.00%	98	-0.36%
300	299	-0.13%	299	-0.13%	299	-0.13%	300	0.00%	298	-0.26%
500	498	-0.21%	498	-0.21%	498	-0.21%	498	-0.21%	497	-0.31%
1000	998	-0.14%	998	-0.14%	998	-0.14%	999	-0.07%	997	-0.21%

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 H2O 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 Device, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Justin Ching

Signature: 

Date: July 2, 2025

Pitot Tube Calibration

Date: 02-Jul-25
Pbar (in.Hg): 29.94

Temp (R): 539
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)
0.025	0.035	10.6	0.8367	0.0061
0.140	0.195	25.0	0.8388	0.0040
0.225	0.310	31.7	0.8434	0.0006
0.510	0.695	47.7	0.8481	0.0052
0.820	1.120	60.4	0.8471	0.0043
Average :			0.8428	0.0040

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	0.0128
0.340	0.480	38.9	0.8332	0.0018
0.430	0.610	43.8	0.8312	0.0038
0.520	0.740	48.1	0.8299	0.0051
0.630	0.890	53.0	0.8329	0.0021
Average :			0.8350	0.0051

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	14.9	0.8367	0.0020
0.150	0.205	25.8	0.8468	0.0082
0.260	0.360	34.0	0.8413	0.0027
0.420	0.595	43.3	0.8318	0.0069
0.750	1.050	57.8	0.8367	0.0020
Average :			0.8387	0.0043

Pitot ID: **ST 8B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	14.9	0.8367	0.0091
0.175	0.240	27.9	0.8454	0.0005
0.330	0.450	38.3	0.8478	0.0019
0.560	0.760	49.9	0.8498	0.0040
0.810	1.100	60.1	0.8495	0.0037
Average :			0.8458	0.0038

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

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.060	0.080	16.3	0.8574	0.0006
0.175	0.235	19.9	0.8543	0.0025
0.320	0.430	25.3	0.8540	0.0028
0.505	0.670	35.8	0.8595	0.0027
0.790	1.050	48.4	0.8587	0.0019
Average :			0.8568	0.0021

Pitot ID: **ST 8C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.030	0.040	14.9	0.8574	0.0093
0.160	0.220	19.4	0.8443	0.0038
0.255	0.360	29.0	0.8332	0.0149
0.580	0.790	43.1	0.8483	0.0002
0.900	1.200	52.8	0.8574	0.0093
Average :			0.8481	0.0075

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.025	0.035	10.6	0.8367	0.0143
0.140	0.190	16.3	0.8498	0.0012
0.255	0.345	33.7	0.8511	0.0001
0.425	0.565	30.5	0.8586	0.0076
0.700	0.930	47.0	0.8589	0.0079
Average :			0.8510	0.0062

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: Jack Dennis

Signature: 

Date:

July 2, 2024

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Christian De La O
Date: 24-Jun-25

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	0.1881	0.1884	0.1874	0.0010	0.1880	0.0001927
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-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
C-250	0.2500	0.2500	0.2500	0.0000	0.2500	0.0003409
P-250	0.2500	0.2495	0.2505	0.0010	0.2500	0.0003409
P-254	0.2535	0.2535	0.2530	0.0005	0.2533	0.0003500
P-256	0.2520	0.2510	0.2515	0.0010	0.2515	0.0003450
C-280	0.2800	0.2800	0.2800	0.0000	0.2800	0.0004276
C-281	0.2800	0.2820	0.2780	0.0040	0.2800	0.0004276
P-281	0.2820	0.2820	0.2815	0.0005	0.2818	0.0004332
C-282	0.2800	0.2800	0.2800	0.0000	0.2800	0.0004276
C-283	0.2800	0.2800	0.2800	0.0000	0.2800	0.0004276
G-2825	0.2825	0.2820	0.2825	0.0005	0.2823	0.0004348
G-304	0.3038	0.3028	0.3035	0.0010	0.3034	0.0005020
G-3121	0.3055	0.3063	0.3070	0.0015	0.3063	0.0005116
P-307	0.3070	0.3065	0.3075	0.0010	0.3070	0.0005140
G-3092	0.3100	0.3085	0.3090	0.0015	0.3092	0.0005213
P-31	0.3120	0.312	0.3120	0.0000	0.3120	0.0005309
P-311	0.3105	0.3115	0.3110	0.0010	0.3110	0.0005275
P-312	0.3120	0.312	0.3120	0.0000	0.3120	0.0005309
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	0.3210	0.3200	0.3200	0.0010	0.3203	0.0005597
P-34	0.3430	0.3430	0.3430	0.0000	0.3430	0.0006417
343-GS	0.3430	0.3430	0.3430	0.0000	0.3430	0.0006417
P-343	0.3425	0.3420	0.3425	0.0005	0.3423	0.0006392
G-345	0.3470	0.3475	0.3475	0.0005	0.3473	0.0006580
G-349	0.3655	0.3659	0.3665	0.0010	0.3660	0.0007305
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-375	0.3705	0.3710	0.3709	0.0005	0.3708	0.0007499
C-3751	0.3675	0.3672	0.3673	0.0003	0.3673	0.0007359
P-38	0.3750	0.3750	0.3750	0.0000	0.3750	0.0007670
P-381	0.3800	0.3800	0.3800	0.0000	0.3800	0.0007876
P-401	0.3980	0.3990	0.4000	0.0020	0.3990	0.0008683
P-405	0.4047	0.4055	0.4056	0.0009	0.4053	0.0008958
P-407	0.4065	0.4070	0.4072	0.0007	0.4069	0.0009030
P-406	0.4058	0.4062	0.4060	0.0004	0.4060	0.0008990
P-41	0.4060	0.4060	0.4060	0.0000	0.4060	0.0008990
G-433	0.4360	0.4360	0.4355	0.0005	0.4358	0.0010360
P-47	0.4680	0.4680	0.4680	0.0000	0.4680	0.0011946
P-29	0.4681	0.4683	0.4685	0.0004	0.4683	0.0011961
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
G-540	0.5400	0.5410	0.5400	0.0010	0.5403	0.0015924

- (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

Calibration Certificate

Date: 03-Jul-25
Calibrated by: Louis Agassiz
Authorizing Signature: 

Instrument Calibrated: Testo 2 (330-2LX)
Serial #: 03282252
Customer: ALA

Ambient Conditions: Temperature: 20 °C Barometric Pressure: 102 kPa Relative Humidity: 78%

A. Lanfranco and Associates Inc. certifies that the described instrument has been inspected and tested following calibration procedures in the Environment Canada Report EPS 1/PG/7 (Revised 2005). Below are the observed readings after calibrations are complete. Calibration checks should be completed at least every 6 months.

O ₂ Gas	Initial Evaluation				After Calibration				Certified Value (vol %)
	Instrument Reading (vol %)	Calibration Error	Pass/Fail	Notes	Instrument Reading (vol %)	Calibration Error	Pass/Fail	Notes	
Zero	0	0.00	Pass		0	0.00	Pass		0
O ₂	10.9	0.07	Pass		10.9	0.07	Pass		10.83
Ambient	20.9	0.06	Pass		20.9	0.06	Pass		20.96

Performance Specification: +/- 1% O₂ (absolute diff)

CO Gas	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	0	0.0%	Pass		0	0.0%	Pass		0
1 Gas	251	1.2%	Pass		251	1.2%	Pass		254
2 Gas	491	0.6%	Pass		491	0.6%	Pass		494
3 Gas	941	1.2%	Pass		941	1.2%	Pass		953

Performance Specification: +/- 5% of Certified Gas Value

NO Gas	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	0.5	0.2%	Pass		0	0.0%	Pass		0
1 Gas	47	4.9%	Pass		45	0.4%	Pass		44.8
2 Gas	85	4.6%	Pass		89	0.1%	Pass		89.1
3 Gas	241	3.4%	Pass		249	0.2%	Pass		249.6

Performance Specification: +/- 5% of Certified Gas Value

NIST Traceable Calibration Gases:

Cylinder	Cylinder ID Number	Certification Date	Expiration Date	Cylinder Pressure (PSI)	NO (ppm)	O ₂ (Vol. %)	CO (ppm)
Zero Gas (N ₂)	353			500	0	0	0
1 Gas	435	19-Dec-23	20-Dec-31	250	44.81	0	254.1
2 Gas	K9P	15-Apr-24	15-Apr-32	1200	89.11	0	494.2
3 Gas	K2H	22-May-24	22-May-32	1600	249.6	0	952.9
O ₂ /CO ₂	A1M	14-Mar-24	14-Mar-32	500	0	10.83	0

Note: National Institute of Standards and Technology traceable certificates are available upon request.

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	2-Jul-25	101.4	29.95	29.88	29.95	0.00
DS	2-Jul-25	101.4	29.95	29.86	29.93	0.02
CL	2-Jul-25	101.4	29.95	29.88	29.95	0.00
JC	2-Jul-25	101.4	29.95	29.88	29.95	0.00
LF	2-Jul-25	101.4	29.95	29.85	29.92	0.03
SV	2-Jul-25	101.4	29.95	29.85	29.92	0.03
CDO	2-Jul-25	101.4	29.95	29.85	29.92	0.03
JG	2-Jul-25	101.4	29.95	29.85	29.92	0.03
ML	2-Jul-25	101.4	29.95	29.85	29.92	0.03
JD	2-Jul-25	101.4	29.95	29.87	29.94	0.01

Calibrated by: Louis Agassiz Signature:  Date: 02-Jul-25

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

A. LANFRANCO and ASSOCIATES INC.
ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Christian De La O

Date: 2-Jul-25

Signature: *Carter Lanfranco*

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	ALA #	Serial #	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation
TPI 341K	7	20314590036		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	8	20313490047	30.8	-0.24%	99.1	-0.16%	198.6	-0.21%	298.1	-0.25%	497.7	-0.24%	796.9	-0.25%	1695	-0.23%
TPI 341K	11	20345510024	31.6	-0.08%	99.7	-0.05%	199.7	-0.05%	299.1	-0.12%	498.5	-0.16%	798.5	-0.12%	1696	-0.19%
TPI 341K	12	20345510031		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	18	20329480036		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	20	20329480013	31	-0.20%	99.5	-0.09%	199.1	-0.14%	298.6	-0.18%	498.6	-0.15%	798.2	-0.14%	1698	-0.09%
TPI 341K	22	20329480041	30.4	-0.33%	98.4	-0.29%	198	-0.30%	298.1	-0.25%	497.4	-0.27%	797.3	-0.21%	1696	-0.19%
TPI 341K	24	20142030017		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	26	20345510036		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	28	20142030009		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	30	20345510023		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	32	20142030028	28.9	-0.63%	97.6	-0.43%	198.4	-0.24%	298.4	-0.21%	498.5	-0.16%	798.4	-0.13%	1697	-0.14%

Reference device is a NIST certified digital thermocouple calibrator

Variation expressed as a percentage of the absolute temperature must be within 1.5 %



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

Dean
Faculty of Continuing Education and Extension

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

¹Qualified 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.

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 professionals¹, 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:

X *Daryl Sampson*

Print Name: Daryl Sampson

Witnessed by:

X *Louis Agassiz*

Print Name: Louis Agassiz

Date signed: November 23, 2020

¹Qualified 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.