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Report:

Annual Compliance Emission Testing Program at the Clean Harbors Sarnia Incineration Facility (2019)

Date: December 16, 2019

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Annual Compliance Emission Testing Program at the Clean Harbors Sarnia Incineration Facility (2018)

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NOTICE:

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EXECUTIVE SUMMARY

ORTECH Consulting Inc. (ORTECH) was requested by Clean Harbors to conduct a comprehensive emission testing program at the incineration facility located at 4090 Telfer Road in Corunna, Ontario. The emission testing is required annually as part of the Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) No. 8-1030-94-006 (formerly Certificate of Approval (Air) No. 8-1030-94-006), dated April 19, 1994. A Notice of Amendment to the ECA was issued on January 24, 2003, ECA Waste/Air No. 6547-5G5MSP (referred to herein as "Notice of Amendment").

The primary objective of the testing program was to determine the emission rates of specific contaminants and to demonstrate the facility's ability to meet the allowable emission levels for these contaminants according to the specified point of impingement concentration limits.

In addition to the requirements of Regulation 419, the ECA provides criteria for the total hydrocarbon (THC) concentration at the Main Stack. The ECA also provides concentration limits for carbon monoxide, oxygen, particulate matter, mercury, and the toxic equivalent concentration of dioxins and furans in the stack gases.

The following table summarizes the average test results and the corresponding emission criteria:

Stack Gas Concentration Criterion	Allowable Value	Test Average Value
Particulate Matter	maximum 20 mg/Rm^{3}(1)	11.7 mg/Rm^{3}(1)
Mercury	maximum 50 µg/Rm^{3}(1)	2.13 µg/Rm^{3}(1)
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm^{3}(1)	<5.48 pg TEQ/Rm^{3}(1)
Carbon Monoxide	maximum 100 ppm(1)	71.1 ppm(1)
Oxygen	minimum 8.0 %(2)	9.64 %(2)
Total Hydrocarbons(3)	maximum 100 ppm	53.2 ppm(1)
Total Hydrocarbons(4)	maximum 100 ppm	31.6 ppm(4)
Total Hydrocarbons(5)	maximum 100 ppm	42.0 ppm(5)

(1) adjusted to 11% oxygen, dry at 25°C and 1 atmosphere
(2) dry by volume
(3) as per ECA No. 6547-5G5MSP (dry adjusted stack concentration)
(4) 10-minute rolling average - wet basis, expressed as equivalent methane
(5) maximum 10-minute average during the test program - wet basis, expressed as equivalent methane

Note: The dioxin and furan concentration in the above table was calculated using the calculation method detailed in Schedule 3 of the ECA.

Included as part of the emission testing program was a comprehensive, internal Quality Assurance/Quality Control (QA/QC) program. This report describes both the emission testing program and the internal QA/QC program conducted by ORTECH, and summarizes the results.

The emission testing program was conducted over three days between October 8 and October 10, 2019 during which three tests were completed for each emission component group using several types of sampling trains and sampling methods. The particulate and metals, semi-volatile organics and combustion gas tests were performed simultaneously at the main stack location. During the time required to complete these tests, acid gas and volatile organics tests were also run.

As requested by the MECP in the Pre-Test Plan acceptance letter, a certification of the Clean Harbors CEMS was also conducted concurrently with the compliance emission testing program. The results of the CEMS certification are detailed in ORTECH Report No. 21939-2.

Testing was performed at a high feed rate, as specified by the ECA, to demonstrate compliance with MECP emission criteria. During the emission tests, the rich, lean and emulsion feed rates combined were 209.6, 204.3 and 201.2 L/min for Test No. 1, Test No. 2, and Test No. 3, respectively. The Thermal Desorber Unit (TDU) was exhausting to the incinerator during each test.

Also during the emission testing program, process data was recorded and composite samples of the liquid waste materials being incinerated were collected for subsequent analysis. The results of these analyses, coupled with the stack gas emission rate measurements, were used to calculate destruction and removal efficiencies (DREs) for six target principal organic hazardous compounds. The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9990%), Ethyl Acetate (99.9998%), Tetrachloroethene (99.9919%), Toluene (99.9994%), 1,2,4-Trichlorobenzene (100.0000%) and Total Xylenes (99.9995%). Note that the contribution of the Thermal Desorber Unit was not included in the DRE calculations.

All tables referenced in this report (excluding the internal QA/QC summary tables) are provided in Appendix 1.

Summary results tables for the 2019 emission testing program are provided on the following pages based on calculated ground level point of impingement concentrations for the stack emissions and the DREs. Please note that the dispersion modelling was conducted using the AERMOD model. Point of impingement calculations for testing programs prior to 2013 were conducted using the Regulation 346 model.

None of the analytical data was blank corrected, although analytical data for some metals (aluminum, boron, calcium, magnesium, silicon and sodium) does not include amounts detected in the hydrofluoric acid extracts of the sampling train filters because of the normally high background levels of these metals resulting in an over-estimation of the contaminant emission rates.

Regulation 419 Dispersion Modelling Results for Inorganic and Semi-Volatile Organic Compounds

Contaminant	Average Emission Rate		Calculated Impingement Concentration		Allowable Impingement Concentration		Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00	g/s	0.0479	µg/m³				
Base Case - 30 Day	1.00	g/s	0.1385	µg/m³				
Base Case - 24 hour	1.00	g/s	0.4761	µg/m³				
Base Case - 1 hour	1.00	g/s	1.7745	µg/m³				
Base Case - 1/2 hour	1.00	g/s	2.1294	µg/m³				
Particulate matter	0.27	g/s	0.13	µg/m³	120	µg/m³	0.11	S
Sulphur dioxide	24.6	g/s	11.7	µg/m³	275	µg/m³	4.26	S - 24 hour
Sulphur dioxide	24.6	g/s	43.7	µg/m³	690	µg/m³	6.33	S - 1 hour
Nitrogen oxides	5.35	g/s	2.55	µg/m³	200	µg/m³	1.27	S - 24 hour
Nitrogen oxides	5.35	g/s	9.49	µg/m³	400	µg/m³	2.37	S - 1 hour
Carbon monoxide	1.85	g/s	3.94	µg/m³	6000	µg/m³	0.066	S - 1/2 hour
Carbon dioxide	2995	g/s	1426	µg/m³	255800	µg/m³	0.56	SL
Hydrogen chloride	4.64	g/s	2.21	µg/m³	20	µg/m³	11.0	S
Fluorides (as hydrogen fluoride)	1.53	g/s	0.73	µg/m³	0.86	µg/m³	84.7	S - 24 hour
Fluorides (as hydrogen fluoride)	1.53	g/s	0.21	µg/m³	0.34	µg/m³	62.3	S - 30 day
Hydrogen bromide	0.10	g/s	0.18	µg/m³	668	µg/m³	0.027	G - 1 hour
Hydrogen iodide	0.048	g/s	0.023	µg/m³	0.5	µg/m³	4.57	SL
Hydrogen cyanide	<0.00057	g/s	0.00027	µg/m³	8	µg/m³	0.0034	S
Dioxins & Furans (TEQ) *	<0.12	ng TEQ/s	0.000057	pg TEQ/m³				
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.087	ng TEQ/s	0.000041	pg TEQ/m³	0.1	pg TEQ/m³	0.041	S
Benzo(a)Pyrene	0.092	µg/s	0.0000000044	µg/m³	0.00001	µg/m³	0.044	S - Annual
Biphenyl	1.86	µg/s	0.0000033	µg/m³	60	µg/m³	<0.0001	G - 1 hour
2-Chloronaphthalene	<0.066	µg/s	0.000000031	µg/m³	1	µg/m³	<0.0001	SL
1-Methylnaphthalene	1.91	µg/s	0.00000091	µg/m³	35.5	µg/m³	<0.0001	SL
Naphthalene	20.5	µg/s	0.0000098	µg/m³	22.5	µg/m³	<0.0001	G
Quinoline	<0.20	µg/s	0.000000095	µg/m³	0.005	µg/m³	0.0019	SL
Terphenyls (m, o, p)	0.28	µg/s	0.00000013	µg/m³	15	µg/m³	<0.0001	SL
1,2-Dichlorobenzene	4.28	µg/s	0.0000076	µg/m³	30500	µg/m³	<0.0001	G - 1 hour
1,3-Dichlorobenzene	4.06	µg/s	0.0000019	µg/m³	50	µg/m³	<0.0001	SL
1,4-Dichlorobenzene	0.64	µg/s	0.00000030	µg/m³	95	µg/m³	<0.0001	S
1,3,5-Trichlorobenzene	0.080	µg/s	0.000000038	µg/m³	3.6	µg/m³	<0.0001	SL
1,2,4-Trichlorobenzene	1.75	µg/s	0.00000083	µg/m³	400	µg/m³	<0.0001	G
1,2,3-Trichlorobenzene	4.51	µg/s	0.0000021	µg/m³	135	µg/m³	<0.0001	SL
1,2,4,5-Tetrachlorobenzene	2.09	µg/s	0.0000010	µg/m³	1	µg/m³	0.00010	SL
1,2,3,4-Tetrachlorobenzene	1.53	µg/s	0.00000073	µg/m³	600	µg/m³	<0.0001	SL
Pentachlorobenzene	2.12	µg/s	0.0000010	µg/m³	80	µg/m³	<0.0001	SL
Hexachlorobenzene	0.31	µg/s	0.00000015	µg/m³	0.011	µg/m³	0.0013	SL
2,4-Dichlorophenol	3.54	µg/s	0.0000017	µg/m³	33.5	µg/m³	<0.0001	SL
2,6-Dichlorophenol	2.24	µg/s	0.0000011	µg/m³	19	µg/m³	<0.0001	SL
2,4,5-Trichlorophenol	<0.27	µg/s	0.00000013	µg/m³	220	µg/m³	<0.0001	SL
2,4,6-Trichlorophenol	12.7	µg/s	0.0000060	µg/m³	1.5	µg/m³	0.00040	SL
2,3,4,6-Tetrachlorophenol	0.44	µg/s	0.00000021	µg/m³	0.75	µg/m³	<0.0001	SL
Pentachlorophenol	<0.27	µg/s	0.00000013	µg/m³	20	µg/m³	<0.0001	G
Polychlorinated biphenyls	<0.53	µg/s	0.00000025	µg/m³	0.15	µg/m³	0.00017	G
Hexachlorobutadiene	0.16	µg/s	0.000000076	µg/m³	0.225	µg/m³	<0.0001	SL
Hexachloroethane	<0.053	µg/s	0.000000025	µg/m³	115	µg/m³	<0.0001	SL
Heptachlor	<0.013	µg/s	0.0000000062	µg/m³	0.004	µg/m³	0.00015	SL
Toxaphene	<0.029	µg/s	0.000000014	µg/m³	0.015	µg/m³	<0.0001	SL
Hexachlorophene	<0.27	µg/s	0.00000013	µg/m³	0.5	µg/m³	<0.0001	SL

S - Standard
G - Guideline
SL - Screening Level
* Calculated using the detection limit for those isomers not detected in quantities greater than the reportable detection limit.
** Calculated using half the detection limit for those isomers not detected in quantities greater than the reportable detection limit.

Regulation 419 Dispersion Modelling Results for Metals

Contaminant	Average Emission Rate	Calculated Impingement Concentration	Allowable Impingement Concentration	Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00 g/s	0.0479 µg/m^3			
Base Case - 30 Day	1.00 g/s	0.1385 µg/m^3			
Base Case - 24 hour	1.00 g/s	0.4761 µg/m^3			
Aluminum	12.1 mg/s	0.0058 µg/m^3	12 µg/m^3	0.048	SL
Antimony	0.072 mg/s	0.000034 µg/m^3	25 µg/m^3	0.00014	S
Arsenic	3.43 mg/s	0.0016 µg/m^3	0.3 µg/m^3	0.54	G
Barium (as water soluble)	0.27 mg/s	0.00013 µg/m^3	10 µg/m^3	0.0013	G
Beryllium*	<0.0020 mg/s	0.00000097 µg/m^3	0.01 µg/m^3	0.0097	S
Boron	44.9 mg/s	0.021 µg/m^3	120 µg/m^3	0.018	S
Cadmium	0.023 mg/s	0.000011 µg/m^3	0.025 µg/m^3	0.043	S
Calcium oxide	69.3 mg/s	0.033 µg/m^3	10 µg/m^3	0.33	S
Chromium	0.44 mg/s	0.00021 µg/m^3	0.5 µg/m^3	0.042	G
Cobalt	0.0076 mg/s	0.0000036 µg/m^3	0.1 µg/m^3	0.0036	G
Copper	0.77 mg/s	0.00037 µg/m^3	50 µg/m^3	0.00074	S
Iron (as metal)	5.51 mg/s	0.0026 µg/m^3	4 µg/m^3	0.066	S
Lead	0.047 mg/s	0.000022 µg/m^3	0.5 µg/m^3	0.0045	S - 24 hour
Lead	0.047 mg/s	0.0000065 µg/m^3	0.2 µg/m^3	0.0033	S - 30 day
Lithium	0.060 mg/s	0.000029 µg/m^3	20 µg/m^3	0.00014	S
Magnesium	2.14 mg/s	0.0010 µg/m^3	72 µg/m^3	0.0014	SL
Manganese (as compounds)	0.27 mg/s	0.00013 µg/m^3	0.4 µg/m^3	0.033	G
Mercury	0.049 mg/s	0.000023 µg/m^3	2 µg/m^3	0.00116	S
Molybdenum	0.084 mg/s	0.000040 µg/m^3	120 µg/m^3	<0.0001	G
Nickel	0.11 mg/s	0.0000052 µg/m^3	0.04 µg/m^3	0.013	S - Annual
Phosphorus	1.94 mg/s	0.00093 µg/m^3	0.5 µg/m^3	0.19	SL
Potassium	32.3 mg/s	0.015 µg/m^3	1 µg/m^3	1.54	SL
Selenium	5.15 mg/s	0.0025 µg/m^3	10 µg/m^3	0.025	G
Silicon	169 mg/s	0.080 µg/m^3	27 µg/m^3	0.30	SL
Silver	0.0026 mg/s	0.0000012 µg/m^3	1 µg/m^3	0.00012	S
Sodium hydroxide	219 mg/s	0.10 µg/m^3	10 µg/m^3	1.04	G
Strontium	0.12 mg/s	0.000059 µg/m^3	120 µg/m^3	<0.0001	G
Tin	0.45 mg/s	0.00022 µg/m^3	10 µg/m^3	0.0022	S
Titanium	0.70 mg/s	0.00033 µg/m^3	120 µg/m^3	0.00028	S
Vanadium	0.016 mg/s	0.0000076 µg/m^3	2 µg/m^3	0.00038	S
Zinc	0.78 mg/s	0.00037 µg/m^3	120 µg/m^3	0.00031	S

S - Standard
G - Guideline
SL - Screening Level
* These compounds were not detected in any of the emission samples (all analytical results were <MDL).

Regulation 419 Dispersion Modelling Results for Volatile Organic Compounds

Contaminant	Average Emission Rate		Calculated Impingement Concentration		Allowable Impingement Concentration		Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00	g/s	0.0479	µg/m^3				
Base Case - 24 hour	1.00	g/s	0.4761	µg/m^3				
Base Case - 1 hour	1.00	g/s	1.7745	µg/m^3				
Benzene	1.97	mg/s	0.000094	µg/m^3	0.45	µg/m^3	0.021	S - Annual
Bromodichloromethane	0.38	mg/s	0.00018	µg/m^3	350	µg/m^3	<0.0001	SL
Bromomethane (methyl bromide)	1.16	mg/s	0.00055	µg/m^3	1350	µg/m^3	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.078	mg/s	0.000037	µg/m^3	1000	µg/m^3	<0.0001	S
Chloroethene (vinyl chloride)	0.0048	mg/s	0.0000023	µg/m^3	1	µg/m^3	0.00023	S
Dibromochloromethane	0.14	mg/s	0.000069	µg/m^3	0.2	µg/m^3	0.034	SL
1,2-Dibromoethane (Ethylene dibromide)	0.0073	mg/s	0.0000035	µg/m^3	3	µg/m^3	0.00012	G
Dichlorodifluoromethane	0.0065	mg/s	0.0000031	µg/m^3	500000	µg/m^3	<0.0001	G
1,1-Dichloroethane (ethylene dichloride) *	0	mg/s	0	µg/m^3	165	µg/m^3	<0.0001	S
1,1-Dichloroethene*	0	mg/s	0	µg/m^3	10	µg/m^3	<0.0001	S
trans-1,2-Dichloroethene *	0	mg/s	0	µg/m^3	105	µg/m^3	<0.0001	G
Dichloromethane (methylene chloride)	0.45	mg/s	0.00022	µg/m^3	220	µg/m^3	0.00010	G
1,2-Dichloropropane*	0	mg/s	0	µg/m^3	2400	µg/m^3	<0.0001	G
Ethyl Acetate *	0	mg/s	0	µg/m^3	19000	µg/m^3	<0.0001	G - 1 hour
Ethylbenzene	0.0011	mg/s	0.00000054	µg/m^3	1000	µg/m^3	<0.0001	S
Isopropylbenzene (cumene) *	0	mg/s	0	µg/m^3	400	µg/m^3	<0.0001	S
2-Propanone (acetone)	0.33	mg/s	0.00015	µg/m^3	11880	µg/m^3	<0.0001	S
Styrene	0.063	mg/s	0.000030	µg/m^3	400	µg/m^3	<0.0001	S
Tetrachloroethene (perchloroethylene)	0.11	mg/s	0.000053	µg/m^3	360	µg/m^3	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0.040	mg/s	0.000019	µg/m^3	2.4	µg/m^3	0.00080	S
Toluene	0.13	mg/s	0.000060	µg/m^3	2000	µg/m^3	<0.0001	S
Tribromomethane (bromoform)	0.13	mg/s	0.000063	µg/m^3	55	µg/m^3	0.00011	G
1,1,1-Trichloroethane (methyl chloroform)*	0	mg/s	0	µg/m^3	115000	µg/m^3	<0.0001	S
Trichloroethene	0.048	mg/s	0.000023	µg/m^3	12	µg/m^3	0.00019	S
Trichlorofluoromethane *	0	mg/s	0	µg/m^3	6000	µg/m^3	<0.0001	G
Trichloromethane (chloroform)	0.11	mg/s	0.000053	µg/m^3	1	µg/m^3	0.0053	S
Trichlorotrifluoroethane*	0	mg/s	0	µg/m^3	800000	µg/m^3	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene) *	0	mg/s	0	µg/m^3	220	µg/m^3	<0.0001	S
1,3,5-Trimethylbenzene *	0	mg/s	0	µg/m^3	220	µg/m^3	<0.0001	S
Xylenes	0.039	mg/s	0.000019	µg/m^3	730	µg/m^3	<0.0001	S

S - Standard
G - Guideline
SL - Screening Level

* These compounds were not detected in any of the emission samples (all analytical results were <MDL).

Summary of Destruction and Removal Efficiencies for Volatile Organic Compounds

Compound	Destruction and Removal Efficiency Test No. 1 %	Test No. 2 %	Test No. 3 %	Average %	Coefficient of Variation %
2-Butanone	99.9993	99.9994	99.9985	99.9990	0.00048
Ethyl Acetate	99.9998	99.9997	99.9998	99.9998	0.0000077
Tetrachloroethene	99.9922	99.9912	99.9923	99.9919	0.00059
Toluene	99.9994	99.9993	99.9994	99.9994	0.000020
Total Xylenes	99.9995	99.9994	99.9996	99.9995	0.00011
1,2,4-Trichlorobenzene	100.0000	100.0000	99.9999	100.0000	0.0000065

1. INTRODUCTION

Clean Harbors Canada Inc. (Clean Harbors) owns and operates an incineration facility located at 4090 Telfer Road, in Corunna, Ontario.

ORTECH Consulting Inc. (ORTECH) was requested by Clean Harbors to conduct a comprehensive emission testing program at the incineration facility. The emission testing is required annually as part of the Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) No. 8-1030-94-006 (formerly Certificate of Approval (Air) No. 8-1030-94-006), dated April 19, 1994. A Notice of Amendment to the ECA was issued on January 24, 2003, ECA Waste/Air No. 6547-5G5MSP. Copies of these two documents are contained in Appendix 2.

The objective of the testing program was to determine the emission rates of specific compounds and to demonstrate the facility's ability to meet the emission levels for contaminants according to the limits as specified by the plant's ECA. Process samples were also collected and analyzed for specific compounds.

Included (and conducted by ORTECH) as part of the emission testing program was an internal Quality Assurance/Quality Control (QA/QC) program.

All tables referenced in this report (excluding the internal QA/QC summary tables) are provided in Appendix 1. The air emission test and process sample components are summarized in Table 1 to Table 8.

2. SOURCE DESCRIPTION

2.1 Process Description

The incineration system, shown in Figure 1, consists of a refractory-lined, fixed-chamber combustion reactor and a three-stage gas conditioning and cleaning system. In the combustion chamber there are two reaction zones referred to as the primary zone and secondary zone. In the primary zone, high heating value ("rich") wastes are intimately mixed with combustion air and ignited to produce a turbulent, luminous flame. Intermediate heating value ("emulsion") wastes are also injected into the primary zone. Reaction temperatures are continuously monitored and controlled to maintain temperatures normally in excess of 1300°C.

Downstream of the luminous primary reaction zone, aqueous ("lean") wastes with a much lower heating value are sprayed into the combustion chamber. This portion of the chamber is known as the secondary zone and temperatures within this zone are maintained in excess of 800°C.

Upon exiting the secondary zone of the combustion chamber, the combustion gases are cooled in a quench chamber to about 550°C by the injection of process water. The combustion gases are further cooled and acid gases are removed in a spray dryer where alkaline waste liquid ("alkaline") and/or reagent grade lime slurry is injected. The exit temperature of the gases leaving the spray dryer is typically between 160°C and 195°C, and should not exceed 220°C. Powdered activated carbon (PAC) is injected into the air pollution control system to absorb contaminants.

Finally, the gases are directed to a four-compartment baghouse where the fine suspended particulate matter and PAC in the gas phase is filtered out. The hot, humid gases exiting the baghouse are then discharged to the atmosphere through a 68.8 meter high, 1.52 meter inside diameter, insulated steel main stack. The stack gases are monitored by continuous emission monitors (CEMs) located in the induced draft fan discharge ducting with opacity being measured in-situ eight stack diameters downstream of the breaching inlet to the stack (approximately fifteen meters above grade, accessible by a ladder). The CEMs record the oxygen, carbon monoxide, total hydrocarbon, sulphur dioxide and hydrochloric acid concentrations. As well, stack gas flowrate and temperature are recorded.

During the testing program the incinerator was operated normally, as specified in Part 15, "Limitation on Wastes", and Part 16, "Detailed Operating Conditions", of the ECA, while maintaining high feed rates in order to demonstrate compliance with emission guidelines, with the following exception.

Clean Harbors was granted Amended ECA No. 4650-8N6L9N, dated May 29, 2012, to treat up to 36 tonnes per hour of hazardous waste at the Thermal Desorber Unit (TDU). The thermal desorption system uses standard rotary kiln technology to remove organic contaminants from solid wastes. The kiln off-gas is directed through a multi-stage treatment sequence before being released to the atmosphere. Kiln off-gas is drawn through a cyclone to remove coarse particulate matter. The gas then enters a set of scrubbers to reduce acid levels and any other condensable material. The gas is then directed to the hazardous waste liquid incinerator to combust organic constituents at temperatures up to 1300°C. The Thermal Desorber Unit (TDU) was exhausting to the incinerator during each test.

2.2 Process Operations

During the emission testing program, the incinerator was operated with an average primary zone temperature of 1392°C. Normal operating temperature must be in excess of 1300°C while achieving the maximum thermal and feed loading practical within the incineration system. The average spray dryer outlet temperature was 189°C (must not exceed 220°C).

Average process feed conditions measured for the rich, lean and emulsion streams for the emission testing program were as follows:

Feed Stream	Average Process Feed Conditions		
	Flow (L/min)	Density (g/mL)	Heating Value (MJ/kg)
Rich	38.3	0.88	27.6
Lean	154	1.05	4.43
Emulsion	12.4	0.94	17.8
Total	205		

The density data for each test was used to calculate the DREs.

The powdered activated carbon (PAC) injection rate during the test program was 11.8 kg/h (26.1 lb/h).

3. EMISSION TESTING PROGRAM

The emission testing program was conducted over three days between October 8 and October 10, 2019 during which three tests were completed for each emission and process component group (as shown in Table 1 to Table 8).

Testing was performed at the highest possible waste feed rate attainable as specified by the ECA (not to exceed 245 L/min), to demonstrate compliance with MECP emission criteria.

Several types of sampling trains and sampling methods were used to sample for the emission test components. The test matrix is summarized in Table 9.

Particulate matter and metals were collected by a single sampling train, as were the semi-volatile organics. The acid gases and volatile organic compounds were also collected by individual sampling trains. The ORTECH continuous emission monitors (CEMs) used to sample for combustion gases consisted of carbon monoxide (CO), carbon dioxide (CO_2), nitric oxide (NO) and nitrogen oxides (NO_X), oxygen (O_2), sulphur dioxide (SO_2) and total hydrocarbon (THC) analyzers which are mounted in ORTECHs Mobile Source Monitoring Laboratory (MSML).

Table 10 summarizes the particulate and metals, semi-volatile organics and acid gases test schedules. Table 11 summarizes the combustion gases test schedule, and Table 12 summarizes the volatile organics test schedule.

The sampling methodologies and analytical methodologies are discussed further in Section 6 and Section 7, respectively, of this report. The internal QA/QC program is discussed in Section 8.

4. PROGRAM ORGANIZATION AND RESPONSIBILITIES

The principal organizations involved in the emission testing program were:

- Ontario Ministry of the Environment, Conservation and Parks (MECP)
- Clean Harbors Canada Inc. (Clean Harbors)
- ORTECH Consulting Inc. (ORTECH)
- ALS Laboratory Group
- Petro Laboratories Inc.

The program responsibilities of the various organizations are summarized as follows. The MECP was responsible for evaluating and approving the Pre-Test Plan (PTP), and reviewing the final emission testing report. The MECP was also notified of the testing schedule so that the testing could be witnessed.

Clean Harbors was responsible for the overall program and issuing the contract with ORTECH. Clean Harbors was also responsible to the MECP for compliance with the conditions as stipulated in the ECA and for the performance of the incinerator and pollution control equipment during the emission testing program. The responsibilities included operating the incineration facility according to the required test operating conditions, generating all incinerator process data and process descriptions and ensuring that the scope of the emission testing program was in compliance with the terms set out in the ECA. Clean Harbors personnel were also responsible for the collection of the feed material and the baghouse dust samples. Clean Harbors laboratories were responsible for analysis of the feed samples for organic chlorine, heating value, viscosity and density.

ORTECH was responsible for conducting the emission testing according to the MECP approved Pre-Test Plan, attending meetings with the MECP as required, liaising with Clean Harbors and submitting a final report. ORTECH and Clean Harbors were both involved in the selection of the analytical laboratories used for the emission testing program.

ALS Laboratory Group was responsible for cleaning and proving of the semi-volatile organics trains as well as the subsequent analysis of these train samples, and for dioxin, furan and PCB analysis of the feed samples provided. They were also responsible for metal and halide analysis of the emission samples and metal analysis of the feed samples and baghouse dust samples. ALS provided the volatile organic analysis of the feed samples and of the Volatile Organic Sampling Train (VOST) tubes.

Petro Laboratories Inc. was responsible for the ultimate analysis of the feed samples as well as sulphur and ash content analysis.

5. SAMPLING LOCATIONS

The Main Stack has an inside diameter of 1.52 meters at the sampling platform and 1.22 meters at the stack exit. The stack height above grade is 68.6 meters.

Sampling for particulate and metals and semi-volatile organics was conducted at the sampling platform permanently installed on the stack, through two ports at 90° to each other and at the same vertical height. Acid gases and volatile organics were sampled through a third port located on the same sampling platform.

The plant opacity monitor which was previously installed at the sample port level and could not function during the earlier emission testing programs has been moved to another, higher location on the stack, thereby enabling opacity data to be obtained during the emission testing program.

The sampling ports were located at an "ideal" location as defined by the Ontario Source Testing Code(1). An "ideal" location is defined as being at least eight stack diameters downstream and at least two stack diameters upstream of flow disturbances.

The combustion gases sampling probe was inserted into the breaching connecting the induced draft fan to the stack. Previous testing programs conducted by ORTECH at the Clean Harbors Main Stack have shown that there is no stack gas stratification between the breaching connecting the induced draft fan to the stack and the stack sampling platform location.

6. SAMPLING METHODOLOGY

Equipment calibrations, analyzer linearizations and other pre-test and QA/QC activities were performed prior to the commencement of the emission testing program. These results are presented and discussed in Section 8 of this report.

6.1 Isokinetic Sampling Trains

Particulate matter and metals were sampled together using a modified version of the sampling train and sampling procedures outlined in United States Environmental Protection Agency (US EPA) Method 29(2). The modification to this procedure, to accommodate the high stack gas moisture content, was the inclusion of a knock-out bottle prior to the hydrogen peroxide/nitric acid impingers and an empty impinger between the hydrogen peroxide/nitric acid impingers and the acidified potassium permanganate impingers.

Major components of the sampling train, which is shown in Figure 2, were as follows:

- A one-piece glass nozzle and probe liner assembly was used to minimize background metal contamination.
- A quartz fiber filter with low metal background was used.
- The first impinger contained 100 mL of distilled, de-ionized water.
- The second (knock-out) impinger was initially empty.
- The third and fourth impingers contained 100 mL each of 5% nitric acid/10% hydrogen peroxide solution to collect metals.
- The fifth impinger was initially empty.
- The sixth and seventh impingers contained 100 mL each of 4% potassium permanganate/10% sulphuric acid solution to collect mercury.
- The eighth impinger contained silica gel.

Semi-volatile organics were sampled using the sampling train and sampling procedures outlined in Environment Canada Report EPS 1/RM/2(3). Major components of the sampling train, which is shown in Figure 3, were as follows:

- A one-piece glass nozzle and probe liner assembly was used to minimize background contamination.
- A clean and proven glass fiber filter was used.
- XAD-2 sorbent was used in a trap to collect semi-volatile organics.
- The first impinger (knock-out) was initially empty.
- The second impinger contained 100 mL of ethylene glycol.
- The third impinger was initially empty.
- The fourth impinger contained silica gel.

All test train and auxiliary glassware was cleaned and proven clean (where required) according to the appropriate methods as outlined in the Pre-Test Plan(4). Proving data for the semi-volatile organics train components is provided in Appendix 3. ALS also loaded and spiked the XAD-2 resin traps used in the semi-volatile organics trains with a surrogate standard (field spike) before the emission testing program started.

A single test for each of the above mentioned trains involved the collection of stack gas sampled at ten points centered on equal areas along each of the two stack traverses. Each point was sampled for twelve minutes for a total actual sampling time of two hundred and forty minutes per test.

At three minute time increments for each of the two test trains, the following information was measured and recorded:

- Elapsed sampling time
- Dry gas meter volume
- Pitot tube pressure
- Stack gas temperature
- Probe, oven, and impinger outlet temperatures
- Trap outlet temperature (semi-volatile organics train only)
- Dry gas meter temperatures
- Control module orifice pressure
- Sampling pump vacuum

At the start and finish of sampling each traverse, the sampling trains were leak-checked. A valid leak-check as specified by each of the sampling methods is a leakage rate of less than 0.00057 cubic meters per minute (m^3/min) or 4% of the sampling rate, whichever is less. The leak checks performed for all tests were less than this maximum permitted leakage rate. The leak-check data is summarized in Section 8 of this report.

Field data sheets for the three particulate and metals tests performed at the main stack are provided in Appendix 4. Field data sheets for the three semi-volatile organics tests performed at the main stack are provided in Appendix 5.

A field blank semi-volatile organics train was prepared and recovered in an identical manner to the test sampling trains. It was assembled, transported and left on site for a period of time equal to the test sampling trains. For the semi-volatile organics blank train, a volume of ambient air similar to the leak-check volume sampled through a test train was drawn through the blank train. The metals blank train was prepared in an identical manner to the test trains, transported to site as a spare test train, and then recovered at the end of the test day in a manner identical to the test trains. All sampling schedules are shown in Table 10 to Table 12.

6.2 Acid Gases

Hydrogen chloride, hydrogen fluoride, hydrogen bromide, hydrogen iodide and hydrogen cyanide were sampled at the incinerator stack using the sampling train and sampling procedures outlined in US EPA Method 26[(5)]. The acid gases sampling train is shown in Figure 4.

A single test for these components involved the collection of stack gas sampled at a single point in the main stack using a sampling flowrate of approximately two liters per minute for sixty minutes.

At five minute time increments throughout each test, the following information was measured and recorded for the Method 26 sampling train:

- Elapsed sampling time
- Dry gas meter volume
- Stack gas temperature
- Probe, oven and impinger outlet temperatures
- Dry gas meter temperatures
- Control module orifice pressure
- Sampling pump vacuum

At the start and finish of each test the sampling train was leak-checked. A valid leak check as specified by US EPA Method 26[(5)] is a leakage rate of less than 0.04 L/min. The leak checks performed for each of the acid gases tests met this criterion. All leak checks were performed through the entire sampling system by sealing the probe end. The leak check data for the acid gases tests is summarized in Section 8 of this report.

All test train components were cleaned according to the procedures outlined in US EPA Method 26[(5)]. Field data sheets for the three Method 26 tests performed are provided in Appendix 6.

One Method 26 reagent blank was prepared during the test program.

6.3 Volatile Organics

Volatile organics were sampled at the main stack using the sampling train and sampling procedures outlined in US EPA SW-846 Method 0030[(6)].

The volatile organics sampling train is shown in Figure 5. Briefly, the volatile organic sampling method involved withdrawing a sample of the stack gas through a heated glass lined sampling probe containing a glass wool plug to remove particulate matter. The sample was then passed through a water cooled condenser and a Tenax GC adsorbent tube as the primary volatile organic compound collection device.

Any condensate was then collected in an initial condensate trap and the sample was then drawn through a second condenser and a combined Tenax GC/charcoal adsorbent tube as the secondary volatile organic compound collection device. The sampled gas stream then passed through a silica gel trap to remove any remaining traces of moisture prior to the rotameter, pump and dry gas meter.

Four tube pairs were collected for each compliance test, at an approximate actual flowrate of one liter per minute, for twenty minutes each. Three tube pairs per test were analyzed for volatile organic compounds. The fourth tube pair was archived for future analysis, if necessary.

At five minute time increments throughout each test, the following information was measured and recorded for the sampling train:

- Elapsed sampling time
- Dry gas meter volume
- Stack gas temperature
- Probe and first condenser outlet temperatures
- Dry gas meter temperatures
- Control module orifice pressure
- Sampling pump vacuum

At the start and finish of each sampling run the sampling train was leak-checked. If a tube pair did not have an acceptable initial leak check, the leak was found and repaired and/or the tubes were replaced with a new pair until no leak was discernible. All the leak checks performed for the tubes used showed no discernible leak through the test train. The leak check data for the tests is summarized in Section 8 of this report.

Prior to use in the field the sampling train components were cleaned using the procedures described in US EPA SW-846 Method 0030[6]. Briefly, the VOST tubes were conditioned thermally by passing a stream of nitrogen through each tube overnight in an oven at 280°C. The tubes were conditioned on a manifold capable of treating up to 25 pairs at a time. For each batch of tubes, a minimum of 1 pair in 10 was analyzed as a proof to demonstrate an absence of significant background from the tubes. The proof analysis was done via the same instrumental approach as for VOST samples using the process described as follows: A Tenax tube for proofing is spiked with internal standards and surrogates, then the corresponding pair (a Tenax and Tenax/charcoal tube pair) is thermally desorbed via a clamshell heater and the desorbed gas stream purged through a water purge into an intermediate sorbant tube. This intermediate sorbant tube is then back flushed with nitrogen as an initial 'dry out' of the sample, then thermally desorbed into an Envirochem 810A VOC concentrator. The captured volatiles are, in turn, processed within the sample concentrator and thermally desorbed into a GC column within a Hewlett-Packard 5890 GC and analyzed for volatiles via GC/MS. Those tube pairs which met the 2 ng benzene-equivalents proofing criterion (relative to the most concentrated sample split to be taken for analysis) were sent to the field. The tube proving data is supplied in Appendix 3.

Field testing data sheets for the volatile organic tests performed are provided in Appendix 7.

In addition to the field blank tube pair, which was taken on each test day, a trip blank pair of tubes was also analyzed. A method blank pair of tubes was retained by the analytical laboratory after tube cleaning and proofing, as a control pair of tubes, was also analyzed with the samples.

6.4 Combustion Gases

Sampling by ORTECH for the combustion gases involved the insertion of a 9 millimeter inside diameter stainless steel probe into the breaching leading to the main stack. The combustion gases were drawn through the probe and heated filter oven and transferred to the Mobile Source Monitoring Laboratory (MSML) by way of a heated Teflon sampling line that was maintained at a temperature of approximately 160°C throughout the test program to prevent possible condensation.

The combustion gas sample was then conditioned through another heated filter and dried using a two-pass refrigeration unit. The gas was then split into several portions that were metered with rotameters and delivered to each continuous combustion gas analyzer with the exception of the total hydrocarbon analyzer. A portion of the hot, wet gas stream was delivered directly to the total hydrocarbon analyzer. The continuous emission monitoring (CEM) system is shown schematically in Figure 6.

A Siemens Ultramat 23 analyzer was used to measure oxygen and carbon dioxide concentrations. The method used for sampling was US EPA (40 CFR 60) Method 3A(7).

A Teledyne API 200EH chemiluminescence analyzer was used to measure the nitrogen oxides concentrations. The method used for sampling was US EPA (40 CFR 60) Method 7E(8).

A Teledyne API T100H analyzer was used to measure sulphur dioxide concentrations. The method used was EPA (40 CFR 60) Method 6C(9).

A Siemens Ultramat 23 analyzer was used to measure carbon monoxide concentrations. The method used for sampling was US EPA (40 CFR 60) Method 10(10).

A VIG 20 flame ionization analyzer was used to measure total hydrocarbons (THC) concentrations. The method used was US EPA (40 CFR 60) Method 25A(11).

The following data acquisition devices were used in conjunction with the continuous analyzers:

Data Logger:	Modicon TSX Momentum data acquisition system, 16 channels
Data Software:	CEMView
Data Processing:	Lap Top Computer

These data acquisition devices were used to transfer the electrical signals from each analyzer into a data file for later processing in a spreadsheet format.

Calibrations were completed before and after each test run according to the sampling protocols.

Linearization checks were performed on the CEMs prior to and at the conclusion of testing. Zero and span drifts, and bias checks were performed prior to and at the completion of each test.

Leak checks of the CEM system were conducted sporadically throughout the program. ORTECH generally relied on other indicators of leakage problems, such as oxygen interference. However, it should be noted that all leak checks performed were acceptable.

6.5 Process Sample Collection

Liquid waste (rich, lean, alkaline, emulsion and leachate) samples were collected and composited by Clean Harbors personnel based on US EPA Method S004 (Tap) in SW-846, 3rd Edition. A sample was collected every thirty minutes during the stack testing periods and placed in a large chilled container for compositing. Clean Harbors personnel also collected a sample of baghouse dust every thirty minutes during the stack testing periods. ORTECH personnel obtained sub-samples for each liquid waste stream and baghouse dust at the conclusion of each sampling day. Four composite sub-samples were obtained, one sample for Clean Harbors, one sample as a spare and two samples were retained by ORTECH.

ORTECH made a composite sample of each feed for the test program for metals, dioxins and furans and PCBs analysis. The baghouse dust composite sample collected during the test program was analyzed for metals. Individual process stream (rich, lean, alkaline, emulsion and leachate) composite samples collected during each test were analyzed for DRE compounds. The individual process stream samples, except for alkaline and leachate, also underwent an elemental analysis.

7. ANALYTICAL METHODOLOGY

7.1 Particulate Matter and Metals

Before loading of the field test trains commenced, recovery data sheets were prepared to record the initial weights of the test train components. These sheets were also used during sample recovery to record final weights and determine moisture gains and sample volumes. The train recovery data sheets are provided in Appendix 8.

Following the conclusion of each test performed with the metals sampling train, the probe was disconnected, and all openings were sealed with Teflon tape. The probe was recovered in the ORTECH on-site mobile laboratory in preparation for the next test. The test train was transported to the ORTECH Sarnia laboratory for sample recovery.

At the ORTECH laboratory the test trains were visually inspected to ensure that no damage during transportation had occurred. The train recovery procedures are detailed in the Pre-Test Plan as well as in the recovery data sheets and are described briefly as follows.

The condition of the test train was noted. Filter and impinger content colours were recorded. The filter housing was disassembled and the filter carefully transferred to its pre-test petri dish with the use of Teflon coated tweezers.

All of the impingers were wiped dry on the outside then weighed and the results used to determine the volume of stack gas moisture condensed.

The front half of the sampling train was brushed and rinsed thoroughly with acetone. A nylon bristle probe brush was used to assist in dislodging particulate matter that may have adhered to the inside surfaces of the nozzle and probe assembly. This front half rinse was then repeated using 0.1N nitric acid, however no brushing was performed.

The contents of the first to fifth impingers were then combined. Triplicate rinses of the impingers and connecting glassware back to and including the Teflon filter support were performed with 0.1N nitric acid and combined with the impinger solution sample.

The contents of the sixth and seventh impingers were transferred to an amber glass sample bottle and the impingers with connecting glassware were rinsed in triplicate with approximately 100 mL of fresh acidified potassium permanganate solution followed by a triplicate rinse with 100 mL of distilled, de-ionized water. All the rinsing of this glassware was then added to the impinger solution sample.

Any brown residue, which was present in the sixth and seventh impingers, was removed by rinsing with 8N hydrochloric acid (HCl). These acid rinses were added to a separate amber glass sample bottle that initially contained 150 mL of distilled, de-ionized water. The impingers were then rinsed with distilled, de-ionized water to remove remaining traces of 8N HCl and this rinse was also added to the sample bottle.

Each sample container was sealed and labeled once that portion of the recovery was completed. The samples were then checked against the master sample log/chain of custody form and refrigerated until they were transported to the ALS Environmental laboratory for analysis.

Particulate samples (front half acetone rinse and filter) collected from the metals trains underwent gravimetric determination before metals analysis. When gravimetric determinations were completed, the samples were processed and analyzed by ALS Laboratory Group for metals.

The analytical reports for the particulate and metals analyses are provided in Appendix 9.

7.2 Semi-Volatile Organics

Prior to loading the field test trains, recovery data sheets were prepared to record the initial weights of the test train components. These sheets were also used during sample recovery to record final weights and determine moisture gains and sample volumes. The train recovery data sheets are provided in Appendix 10.

Following the conclusion of each test performed with the semi-volatile organics trains, the probe was disconnected and all openings were sealed with Teflon tape. The probe was cleaned on-site by brushing and rinsing with a Teflon probe brush and acetone into a pre-cleaned sample bottle. The probe was then rinsed with hexane into the same sample bottle and the test train and probe rinse sample were then transported to the ORTECH Sarnia laboratory for sample recovery.

At the ORTECH laboratory the test trains were visually inspected to ensure that no damage during transportation had occurred. The train recovery procedures are detailed in the Pre-Test Plan as well as in the recovery data sheets (Appendix 10) and are described briefly as follows.

The condition of the test train was noted. Filter, XAD-2 trap and impinger content colours were recorded. The filter housing was disassembled and the filter carefully transferred, with the use of Teflon coated tweezers, to a piece of pre-cleaned aluminum foil. The filter was then folded in half onto itself within the foil, the foil ends crimped, then placed in a pre-cleaned glass petri dish. Both the foil containing the filter and the glass Petri dish were labeled.

All of the impingers were wiped dry on the outside then weighed and the results used to determine the volume of stack gas moisture condensed.

The front half of the sampling train (up to but not including the trap) was brushed and rinsed thoroughly with acetone. A Teflon probe brush was used to assist in dislodging particulate material that may have adhered to the inside surfaces of the cyclone bypass and filter top assembly. This front half rinse was then repeated using hexane, with no brushing, and all rinsing was combined with the probe rinse sample recovered in the field.

The XAD-2 trap was drained of excess cooling water and weighed. The ends were then sealed with Teflon tape and the trap was labeled and wrapped in aluminum foil.

The contents of the first three impingers were combined in a pre-cleaned amber glass sample bottle. Triplicate rinses of the impingers and connecting glassware back to and including the trap bottom u-tube were performed first with HPLC water, which was added to the impinger solution sample, and then with acetone followed by hexane. The acetone and hexane rinses were combined in a separate sample bottle from the impinger solutions.

Due to the design of ORTECH's glassware, the filter bottom, filter bottom u-tube and trap inlet stem were not soaked for five minutes in each of acetone and hexane. Instead, these pieces of glassware were given extra rinses with each of the solvents. Also, since ORTECH uses a one piece trap and condenser, the five minute soak of this component was performed by the analytical laboratory.

Each sample container was sealed and labeled once that portion of the recovery was completed. The samples were then checked against the master sample log/chain of custody form then refrigerated until they were delivered to ALS for analysis.

The analytical reports prepared by ALS are provided in Appendix 11.

7.3 Acid Gases

Prior to loading of the field test trains, a recovery data sheet was prepared to record initial volumes of the test train components. This sheet was also used during sample recovery to record final volumes. The train recovery data sheet for the three tests is provided in Appendix 12.

After sampling but prior to recovery, the sampling train was purged with nitrogen at two liters per minute for approximately fifteen minutes to ensure that any cyanide present in the stack gas was collected in the fifth impinger.

On site, the train was disassembled, and the volumes of the first impinger to the fourth impinger were measured. The impingers with connecting glassware back to but not including the three way valve were rinsed in triplicate with distilled, deionized water and made up to a known volume which was recorded on the sample recovery sheet.

The volume of the fifth impinger, which initially contained 15 mL of 0.1N sodium hydroxide was measured and then the impinger with connecting glassware back to but not including the fourth impinger were rinsed in triplicate with distilled, deionized water and made up to a known volume then added to a second sample container.

These samples were then sealed, labeled and the fluid levels marked. The samples were then refrigerated until they were delivered to the ALS laboratory for analysis.

The analytical reports for the acid gas analysis are provided in Appendix 13.

7.4 Volatile Organics

Following the conclusion of each tube run performed with the volatile organic compounds train, the tubes were removed from the train, capped and placed in appropriately labeled test tubes which were also capped. The tubes were sent to ALS for volatile organics analysis.

The VOST samples were analyzed via SW846 Method 5041A/8260B. Briefly, after spiking with internal and surrogate standards, the traps were thermally desorbed through a clam shell heater then through a chilled aqueous purge to remove the bulk of the moisture onto a secondary trap. These secondary traps are further dried using a counter current flow of helium. The secondary traps are then thermally desorbed into a VOC sample concentrator and again the VOCs are thermally transferred/concentrated onto a GC column. The VOC compounds are separated by gas chromatography (GC) and analyzed via GC/MS.

The analytical report for the volatile organic tests is provided in Appendix 14.

7.5 Feed and Baghouse Dust Samples

Various analytical methods were used for the feed and baghouse dust sample analyses. The analytical methods used are discussed in the analytical reports for the feed and baghouse dust samples. The semi-volatile organic compound analytical report contained in Appendix 11 includes feed analysis performed by ALS. The ALS volatile organic compound analytical report is contained in Appendix 14. The DRE feed compound analysis performed by ALS is also provided in Appendix 14. Appendix 15 contains the metals feed analytical report also provided by ALS Laboratory Group.

The master sample logs/chain of custody forms for all of the samples collected and submitted for analysis (sampling trains and feeds) are presented in Appendix 16.

8. INTERNAL AND EXTERNAL QA/QC PROGRAM

8.1 General

As with other emission testing programs conducted by ORTECH, a comprehensive internal quality assurance/quality control (QA/QC) program was included. Details of ORTECH's pre-test internal QA/QC program are discussed in Section 8.2. Details of ORTECH's internal emission testing QA/QC results are discussed in Section 8.3 and include ORTECH's CEM QA/QC program. Details of the sample recovery, handling and custody are discussed in Section 8.4. Details of the analytical results are discussed in Section 8.5 and data QA/QC results are discussed in Section 8.6.

Testing was conducted in accordance with ECA No. 8-1030-94-006 and the Notice of Amendment, and the Pre-Test Plan detailing the sampling and analytical methodologies submitted to and approved by the MECP.

Blank sampling trains were recovered and analyzed or reagent blanks were analyzed using the same procedures as the test trains to provide background concentrations of the emission test components. For the particulate and metals and SVOC blanks a spare test train was prepared and taken to site. The spare trains were recovered in a manner identical to that for the test trains. For each of the above mentioned blank trains, the blank probe rinse was performed on the appropriate probe after the test train recovery was performed. Reagent blanks were obtained on site for the Method 26 tests.

For the volatile organic tests, in addition to the field blank tube pair analyzed, a method blank pair of tubes was also analyzed.

All tables referenced in this section can be found in Appendix 17.

8.2 Pre-Test Activities

Prior to the commencement of the emission testing program, the following activities were performed:

- Preparation, pre-cleaning and proofing of the manual stack sampling trains and sample containers;
- Preparation and quality checks of chemicals, reagents, filters and XAD-2 adsorbent resin;
- Calibration of all sampling and monitoring equipment, as well as CEM system linearity and bias checks;
- Development (and review) of data acquisition, data reduction and summary procedures;
- Development of internal QA/QC field data sheets;
- Review of equipment calibration logs; and
- Review of proposed field and laboratory procedures.

All proving data for the semi-volatile organics test train glassware and auxiliary equipment was deemed acceptable prior to the test program. As previously mentioned, proving data received prior to the field testing program is given in Appendix 3.

For each batch of VOC tubes, a minimum of 1 pair in 10 is analyzed as a 'proof' to demonstrate an absence of significant background from the traps. All proving data for the tubes was deemed to be acceptable before the test program.

All equipment used in the field testing program was calibrated and checked prior to the field testing program. Pertinent equipment calibration data is supplied in Appendix 18.

As part of ORTECH's internal QA/QC, data acquisition, data reduction and summary procedures were already in place and periodic spot checks of the computer programs was performed using known data sets.

A Pre-Test Plan letter, dated July 4, 2019, was sent to the MECP stating that the testing would be conducted following the procedures detailed in ORTECH Pre-Test Plan No. 21607, "Annual Compliance Emission Testing Program at the Clean Harbors Sarnia Incineration Facility", June 17, 2015. Provided in Appendix 19 is a copy of the letter, dated July 4, 2019, from the MECP accepting the testing methodology. Testing was conducted following the sampling and analytical methodologies detailed in the Pre-Test Plan under normal operating conditions.

As part of the pre-test activities linearization checks were performed on the ORTECH CEMs. The linearization check data is provided in Appendix 20. All analyzer linearization results met the recommended acceptable limits of >0.995.

8.3 Emission Testing QA/QC Results

On the day of set up for the field testing program, the following activities were performed. Preliminary testing at the Main Stack involved collecting data necessary to perform the required calculations for choosing a nozzle size to permit isokinetic sampling. Much of the preliminary data used in the initial calculations was collected during previous testing programs conducted by ORTECH at this location, and also by reference to the on-site CEM system.

The internal diameter of the main stack was verified and the appropriate number of sampling points was marked on the sampling probes. The number of sampling points to be used was stated in the Pre-Test Plan as well as the required sampling time per point.

The following general QA/QC criteria were satisfied for each of the test trains where applicable:

- All sampling equipment was cleaned and proven clean (where applicable) prior to the commencement of the field testing program.
- All sampling equipment passed a visual and operational check prior to use.
- Oil filled manometer gauges which had been properly leveled and zeroed were used to measure the velocity pressure.
- A test was only considered acceptable if the proper number and location of traverse points had been sampled.
- All sampling data was recorded in ink on preformatted data sheets at least once every three minutes and at least twice during sampling each point.
- Any unusual occurrences were noted on the appropriate data form.
- The team leader reviewed all calibration and sampling data forms daily.
- Only tapered edge sampling nozzles and S-type pitot tubes that had been visually inspected and caliper measured, and deemed acceptable, were used.
- Each leg of the S-type pitot was leak-checked before the start of testing. The leak-checks were all acceptable (no change in pressure occurred).
- Each entire sampling train, met acceptable leak-check criteria before and after each test, and during any move from one traverse to another.
- The S-type pitot tube and sampling nozzle were maintained parallel to the flow during testing and care was taken to ensure that they did not scrape the ports when being inserted and removed from the stack.
- The probe and filter components were maintained at 120°C ± 14°C during testing.

Equipment calibration details are summarized in Table 1 (Appendix 17).

Percent isokineticity data is summarized in Table 2. The average percent isokineticity fell within the QA/QC criteria limits of 90 to 110% for each test.

Leak-check data for all leak-checks performed on the manual sampling trains are shown on the field data sheets. A summary of the isokinetic sampling train leak checks is given in Table 3. The leak check data for all of the leak-checks performed for the volatile organic sampling tubes are also summarized in the field data sheets (Appendix 7).

As previously discussed in Section 6.4, the ORTECH CEM system was not formally leak checked at the beginning and end of each test. Other indicators were used to determine leaks, such as oxygen levels during calibrations.

Prior to and at the end of each test, ORTECH's CEMs were zeroed and spanned. The QA/QC acceptance criterion for the daily zero and span drifts set out in the PTP was ±3% of span. The zero and span drift data for ORTECH's CEMs are summarized in Table 4. All analyzer zero drift data and span drift data was within the acceptable limit of ±3%. The calibration data for ORTECH's CEM systems is supplied in Appendix 21.

The sampling system bias checks for ORTECH's CEMs are provided in Table 5. All system bias results were within the stated guidelines of ±5% of span.

8.4 Sample Recovery, Handling and Custody

ORTECH's sample identification scheme and system for handling and processing samples was initiated as part of ORTECH's sample tracking system for stack emission samples. All samples were identified by a unique sample number comprised of a series of numbers and letters. A master sample log/chain of custody form was maintained by the QA/QC designate and was made available to the ORTECH personnel designated to perform the sample recovery for a specific sampling train. Once a sample was collected it was labeled and checked against the sample log by the QA/QC designate.

The information contained within the sample number and the sample log enabled the sampling, recovery, data reduction and report writing personnel to easily determine the test date, test number, test type and train sample identification for a given sample. To ensure continuity, the analytical laboratories were requested to use the ORTECH number for sample identification.

The ORTECH personnel responsible for shipping samples used the master sample log/chain of custody form to document the transfer of the samples to the appropriate analytical laboratory. Care was taken when shipping the samples in order to maintain sample integrity. Once the samples and master sample log/chain of custody forms were received by the analytical laboratory, the laboratory personnel verified that all samples had been received and their integrity maintained. The laboratory personnel then signed the master log and made a photocopy which ORTECH personnel received as a record of the chain of custody for the samples.

As previously mentioned the master sample logs/chain of custody forms are presented in Appendix 16.

8.5 Analytical Results

It should be noted that due to the design of ORTECH's semi-volatile organic sampling train glassware, the filter bottom, filter bottom u-tube and trap inlet stems are not soaked with each of the required solvents (acetone and hexane) during test train recovery. Instead, these components of the test train were given additional rinses with each of the required solvents. Also, because ORTECH uses a one piece condenser and XAD-2 trap, this component of the test train was Teflon sealed and wrapped with foil prior to being transported to the appropriate analytical laboratory where it was given the required five minute soaking with each of acetone and hexane.

All analyses for the present emission testing program were performed using acceptable laboratory procedures in accordance with the specified analytical protocols. Adherence to the prescribed QA/QC procedures ensured data of consistent and measurable quality. Analytical quality control focused on the use of control standards to provide a measure of analytical accuracy. Replicate analyses (usually duplicate analysis) of the same sample were used as a means of determining precision of the various analytical procedures. Also specific acceptance criteria were defined for various analytical operations including calibrations, control standard analysis, drift checks, blanks, etc.

The following general QA/QC procedures were incorporated into the analytical effort:

- the on-site Field Supervisor reviewed all data and QA/QC data on a daily basis for completeness and acceptability
- master sample logs were maintained for all samples collected
- analytical QA/QC data was tabulated by the analytical laboratories using appropriate charts or forms
- all hard copy raw data was maintained in organized files

Specific analytical QA/QC procedures are discussed in the analytical reports and are briefly summarized below.

8.5.1 Metal Sample Analysis QA/QC

The analyses for mercury on the Method 29 stack samples employed cold vapour atomic absorption (CVAA). The analysis of all other metals on the feed and stack samples involved sample digestion followed by Inductively Coupled Argon Plasma Mass Spectroscopy (ICP-MS) analysis. The analytical QA/QC is described as follows and the results are provided in Appendix 9.

ICPMS Analysis

- An instrument calibration check standard was analyzed immediately after the calibration curve and must be within 90%-110% of the actual concentrations.
- Instrument calibration blank check sample were analyzed with every 10 samples and must be within three times the minimum detection limit.
- A continuing calibration check is run every 10 samples and must be within 85%-115% of the actual concentrations.
- Instrument (interference) check sample for ICAP analysis was analyzed before and after each analytical run. The value(s) found for the interference check sample must be within 80%-120% of the true value.
- One duplicate sample analysis was performed for this program on Test No. 1. The relative percent difference was less than 12.1% within the acceptable limit of less than ±20%, for elements that are greater than 5 times the minimum detection limit.

- One blank spike (performed as a pre-digestion spike) was analyzed for this program. All of the recoveries were between 83-115% of the true value (limit of 80-120%), except for aluminum in the nitric acid digest sample and the hydrofluoric acid digest sample.
- One matrix spike (performed as a post digestion spike) was analyzed for this program. All of the results were between 80-107% of the true value (limit of 80-120%), except for beryllium and lithium in the back half samples. The spike recovery for several of the target compounds could not be quantified due to the high concentration in the sample relative to the spike amount.

Mercury Analysis

- A 5 point calibration bracketing the expected range.
- An instrument check calibration standard was analyzed immediately after the calibration and must be within 90%-110% of the actual concentration.
- One mid-range calibration standard was analyzed after 10 samples and at the end of the run and must be within 85%-115% of the actual concentration.
- Instrument calibration blank check sample is analyzed with every 10 samples and must be within three times the minimum detection limit.
- One duplicate sample analysis was performed for this program on Test No. 1. The relative percent difference was less than 1.0% well within the acceptable limit of less than ±20%, for fractions that are greater than 5 times the minimum detection limit.
- One blank spike (performed as a pre-digestion spike) was analyzed for this program. All of the results were between 95-97% within the acceptable limit of 80-120% of the true value.
- One matrix spike (performed as a post digestion spike) was analyzed for this program. All of the results were between 89-102% within the acceptable limit of 80-120% of the true value.

8.5.2 Dioxin and Furan Sample Analysis QA/QC

Semi-volatile organic analyses were performed on single composite extracts for each test according to EPS 1/RM/3 and EPS 1/RM/23.

Samples were analyzed by an enhanced version of Environment Canada method EPS 1/RM/3. The method was modified to include enhancements available from US EPA Method 23 including (a) a larger list of C-13 labeled extraction standards for more accurate determination of the PCDF targets, (b) a list of 5 C-13 labeled field standards added to the XAD-2 traps prior to sampling (to demonstrate an absence of target losses during the sampling event) and (c) the use of high resolution mass spectrometry (to improve limits of detection and help eliminate potential interferences).

After extraction of the dioxin and furan train samples, staff at ALS Laboratory Group added internal standards to all samples prior to analysis and surrogate standards were added to the filters and XAD resin prior to extraction. The analytical report contained in Appendix 11 details the sample clean-up, analytical procedures, and analytical QA/QC employed by the laboratory. The analytical report includes the lists of the analytical surrogate standards and internal standards used.

8.5.3 Acid Gas Sample Analysis QA/QC

Analyses of the acid gas samples from the Method 26 sampling train involved suppressed ion chromatography-conductivity detection. The analytical QA/QC included the following:

- A 6 point calibration bracketing the expected range.
- An instrument check calibration standard was analyzed immediately after the calibration and must be within 90%-110% of the actual concentration.
- A complete set of calibration standards were analyzed at the end of the analysis and must be within 10% of the true value.
- One mid-range calibration standard was analyzed after 10 samples and at the end of the run and actual concentration and must be within 90%-110% of the actual concentration.
- Instrument calibration blank check sample were analyzed with every 10 samples and must be within three times the minimum detection limit for each ion.
- All samples were analyzed in duplicate for each compound except for hydrogen iodide and hydrogen cyanide, and the results had a relative percent difference of less than 2.2%, for analyses that are greater than 5 times the minimum detection limit.
- One blank spike was analyzed for this program. All of the results were between 91-95% within the acceptable limit of 80-120% of the true value.
- A matrix spike (spike confirmation) sample was analyzed with every 20 samples to confirm the identity of each peak. The results of the matrix spike sample must be within 80%-120% of the true value. The matrix spikes for this test program were between 98-105%.

8.5.4 Volatile Organic Compound Analysis QA/QC

Prior to sampling, VOST tube pairs were cleaned and conditioned under helium sweep (approximately 50 mL/min flow) through each tube in an oven at 280°C for at least 12 hours. One VOST pair was proofed for every 10 pairs cleaned. VOST tubes were end-capped and stored sealed in individual screw-capped vials at 4°C between conditioning and shipment to the field.

A field blank and a laboratory method blank were analyzed with the test sample tubes that were taken in the field. VOST tubes were desorbed and analyzed combined as pairs and analyzed according to SW846 Method 5041A/8260B.

The surrogate recoveries for each of the surrogates should be between 50-150%. Recoveries that were below or above the control limit were flagged in the analytical report. The surrogate recoveries for the test samples were between 64-134%, within the acceptance criteria.

The analysis of the waste feeds was via US EPA SW-846 Methods 5035 (waste dilution into methanol), dilution of the methanolic extract into water, 5030B (purge-and-trap) VOC concentration, and 8260B (capillary GC/MS instrumental analysis). The condensates were analyzed via SW846 method 5030B and 8260B.

For the wastes, where percentage levels were expected, care was taken to generate a representative sub-sample by accurately weighing multiple aliquots upon repeated mixing of the non-homogenous waste liquid into clean methanol, then quantitatively diluting the “extract” to a level suitable for further purge-and-trap analysis.

Appropriate volumes of either the waste “extract” or the aqueous condensate were taken for direct purge-and-trap processing onto a GC/MSD. Before analysis commenced, the MSD was tuned to BFB specifications. A 5 point calibration was run for both native and deuterated analogues, with a minimum correlation coefficient of 0.995 enforced (from linear least squares regression using internal standard calculations). Deuterated surrogates and internal standards were added to the samples just prior to sparging to allow sample-to-sample performance monitoring. Surrogate standards were not added to the waste samples prior to sample dilution since the appropriate levels to obtain an analytical response were not known. The analysis sequence included system blanks at appropriate intervals to monitor potential carryover. Calibration validations were run at least once every 12 hours of uninterrupted analysis after full system calibration to monitor calibration stability (±20% was deemed acceptable for revalidating the existing calibration table).

For a compound response to be accepted as a positive identification, in addition to a proper retention time match, not only was the presence of a primary quantitation ion necessary, but the secondary and tertiary ions had to be present to within 20% of the ion ratios established from the standard runs. This criterion was met for the sample analysis.

Refer to the volatile organic analytical report in Appendix 14 for a detailed explanation of the analytical methodologies, sample preparation, and discussion of results for the feed and volatile organic tube samples.

9. RESULTS AND DISCUSSION

9.1 Stack Gas Sampling Parameters

Emission test calculations for the particulate and metals tests are provided in Appendix 22. Emission test calculations for the semi-volatile organics tests are provided in Appendix 23.

Stack gas sampling parameters for the particulate and metals, and semi-volatile organics tests are summarized in Table 13. These parameters include calibration data, nozzle diameter, dry gas volume sampled and average percentage of isokineticity for each test.

9.2 Stack Gas Physical Parameters

Stack gas physical parameters for the particulate and metals, and semi-volatile organics tests are presented in Table 14. The average values (average of three tests) for each of the two types of test trains, which show good agreement, are summarized below:

Stack Gas Parameter	Particulate and Metals Trains	Semi-Volatile Organics Trains
Gas Temperature (°C)	177	177
Moisture by Volume (%)	47.9	47.3
Velocity (m/s)	32.3	31.5
Absolute Pressure (kPa)	100.5	100.5
Carbon Dioxide by Volume (%)*	8.32	8.32
Oxygen by Volume (%)*	9.64	9.64

* dry at 25°C and 1 atmosphere

9.3 Volumetric Flowrate Data

Stack gas volumetric flowrates for the particulate and metals, and semi-volatile organics tests are given in Table 15. The average flowrate values (average of three tests) for each of the two types of test trains, which show good agreement, are summarized below:

Stack Gas Parameter	Particulate and Metals Trains	Semi-Volatile Organics Trains
Actual Flowrate (m^3/s)	59.0	57.4
Dry Reference Flowrate (Rm^3/s)*	20.2	19.9
Dry Adjusted Flowrate (Rm^3/s)**	22.9	22.6
Wet Reference Flowrate (Rm^3/s)*	38.7	37.7

* at 25°C and 1 atmosphere
** at 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

9.4 Particulate Emission Data

Particulate emission data obtained from each of the three particulate and metals tests are given in Table 16. The results for the three particulate tests were consistent. The average particulate emission results are presented below:

Particulate Emission Parameter	Average
Actual Concentration (mg/m^3)	4.55
Dry Reference Concentration (mg/Rm^3)*	13.3
Dry Adjusted Concentration (mg/Rm^3)**	11.7
Wet Reference Concentration (mg/Rm^3)*	6.93
Particulate Emission Rate (g/s)	0.27

* at 25°C and 1 atmosphere
** at 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

9.5 Acid Gases Emission Data

Hydrogen chloride, hydrogen fluoride, hydrogen bromide, hydrogen iodide and hydrogen cyanide emission data obtained from each of the three acid gas tests are given in Table 17.

Hydrogen chloride, hydrogen fluoride, hydrogen bromide and hydrogen iodide were detected in quantities greater than the detect limit in all three tests. Hydrogen cyanide was not detected in quantities greater than the detection limit in any of the tests. The emission calculations are based on the value of the detection limit where the analytical result is less than the detection limit. The average acid gas emission results are presented below:

Parameter	HCl	HF	HBr	HI	HCN
Actual Conc. (mg/m^3)	79.9	26.5	1.72	0.84	<0.0099
Dry Reference Conc. (mg/Rm^3)*	232	76.8	4.99	2.43	<0.029
Dry Adjusted Conc. (mg/Rm^3)**	204	67.1	4.39	2.12	<0.025
Dry Conc. (ppm)	156	93.9	1.51	0.47	<0.026
Emission Rate (g/s)	4.64	1.53	0.10	0.048	<0.00057

* at 25°C and 1 atmosphere
** at 25°C and 1 atmosphere, adjusted to 11% oxygen

The blank analysis data is supplied in Table 18.

9.6 Combustion Gas Emission Data

Average combustion gas analysis data for each of the tests are summarized in Table 19 as dry concentrations except for total hydrocarbons, which was measured on a wet basis. The average combustion gas analysis data is also shown on a dry basis adjusted to 11% oxygen in Table 19.

Combustion gas emission data for the three tests performed at the incinerator stack are given in Table 20. The combustion gas emission data are summarized in Table 21.

The average combustion gas emission results were as follows:

Combustion Gas Parameter	Average Value						
	CO_2	CO	NO_X	NO	O_2	SO_2	THC
Actual Conc. (mg/m^3)	51484	31.8	91.9	59.1	43418	423	13.6
Dry Reference Conc. (mg/Rm^3)**	149568	92.4	267	172	126129	1228	39.5
Dry Adjusted Conc. (mg/Rm^3)***	131570	81.4	235	151	143873	1080	34.7
Dry Conc. (ppm)	83167	80.7	142	140	96433	469	31.7*
Emission Rate (g/s)	2995	1.85	5.35	3.44	2528	24.6	0.79

* wet basis as methane
** at 25°C and 1 atmosphere
*** at 25°C and 1 atmosphere, adjusted to 11% oxygen

Combustion gas concentrations measured by the ORTECH continuous emission monitoring system, expressed as 1-minute average concentrations, for the three tests performed at the incinerator stack are provided in Appendix 24. The average results are calculated for the approximate isokinetic test periods. The gas analysis results are shown graphically in Appendix 25.

9.7 Metal and Sulphur Emission Data

Metal analytical results including sulphur, are given in Tables 22, 23 and 24 for Test No. 1, Test No. 2 and Test No. 3, respectively. Metal concentrations and emission rates are shown in Tables 25, 26 and 27 for Test No. 1, Test No. 2 and Test No. 3, respectively.

Summaries of the metal actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates including the coefficients of variation for the three tests performed during the emission testing program are provided in Tables 28, 29, 30, 31, and 32, respectively. The highest average metal emission rates were reported for aluminum (12.1 mg/s), arsenic (3.43 mg/s), boron (44.9 mg/s), calcium (49.5 mg/s), iron (5.51 mg/s), magnesium (2.14 mg/s), phosphorus (1.94 mg/s), potassium (32.3 mg/s), selenium (5.15 mg/s), silicon (169 mg/s) and sodium (126 mg/s). The average sulphur emission rate was 11491 mg/s. All other average metal emission rates, including mercury, were below 1.0 mg/s.

The metals analysis of the Method 29 test trains is performed on three separate analytical fractions, the probe and filter nitric acid digest, the probe and filter hydrofluoric acid digest, and the analysis of the train impingers and associated rinses. In instances where all analyses were reported to be below the detection limit for a given metal, the value of the detection limit for the fraction most likely to contain that metal was used to calculate emission data, and the remaining fractions was assigned a value of zero. In instances where any given fraction(s) was detected that value was used to calculate emission data and the remaining undetected fraction(s) was assigned a value of zero. Table 33 summarizes the average metal emission data for the three tests performed.

The relatively high blank analyses for aluminum, boron, calcium, magnesium, silicon and sodium (Table 34) were likely caused by the harsh digestion conditions for the filter.

9.8 Mercury Emission Data

Mercury analysis, concentration and emission data are also summarized in the metal emission tables. Mercury was detected in samples from each test primarily in the impinger sample analysis. Blank train analysis data (Table 34) shows that mercury was not detected in any of the fractions in quantities greater than the reportable detection limit. The mercury analytical results are not blank corrected.

The average mercury emission data for the three tests is as follows:

Mercury Emission Parameter	Average Values
Actual Concentration (µg/m^3)	0.83
Dry Reference Concentration (µg/Rm^3)*	2.42
Dry Adjusted Concentration (µg/Rm^3)**	2.13
Wet Reference Concentration (µg/Rm^3)*	1.26
Emission Rate (mg/s)	0.049

* at 25°C and 1 atmosphere

** at 25°C and 1 atmosphere, adjusted to 11% oxygen

9.9 Semi-Volatile Organic Emission Data

The combined filter and probe rinse, and combined Amberlite XAD-2 cartridge and impinger solutions for each of the semi-volatile organics trains were analyzed together (one analysis per test) for the semi-volatile organic compounds.

9.9.1 Dioxins and Furans Emission Data

Dioxins and furans are groups of chemically related chlorinated organic compounds or congeners. There are seventy-five dioxin congeners and one hundred and thirty five furan congeners. The individual congeners all have different molecular structures and they may also have different molecular formulae. Individual congeners, which have the same molecular formula but different molecular structure, are referred to as isomers. Groups of isomers are referred to as congener groups or homologues. The basic dioxin and furan molecules have the molecular formulae $C_{12}H_8O_2$ and $C_{12}H_8O$, respectively. In chlorinated dioxin and furans, between one and eight chlorine atoms may replace an equal number of hydrogen atoms in the basic molecule.

The following table lists the chlorinated dioxin and furan congener groups, and the number of isomers present in each group:

Congener Group Abbreviation		Number of Chlorine Atoms Per Molecule	Molecular Formula	Number of Isomers Per Congener Group
Dioxins	M1CDD	1	$C_{12}H_7ClO_2$	2
	D2CDD	2	$C_{12}H_6Cl_2O_2$	10
	T3CDD	3	$C_{12}H_5Cl_3O_2$	14
	T4CDD	4	$C_{12}H_4Cl_4O_2$	22
	P5CDD	5	$C_{12}H_3Cl_5O_2$	14
	H6CDD	6	$C_{12}H_2Cl_6O_2$	10
	H7CDD	7	$C_{12}H_1Cl_7O_2$	2
	O8CDD	8	$C_{12}Cl_8O_2$	1
Furans	M1CDF	1	$C_{12}H_7ClO$	4
	D2CDF	2	$C_{12}H_6Cl_2O$	16
	T3CDF	3	$C_{12}H_5Cl_3O$	28
	T4CDF	4	$C_{12}H_4Cl_4O$	38
	P5CDF	5	$C_{12}H_3Cl_5O$	28
	H6CDF	6	$C_{12}H_2Cl_6O$	16
	H7CDF	7	$C_{12}H_1Cl_7O$	4
	O8CDF	8	$C_{12}Cl_8O$	1

In Ontario, the MECP normally requires that only the higher tetra to octa (T4CDD to O8CDD) dioxin congeners and the higher tetra to octa (T4CDF to O8CDF) furan congeners are included in air emission testing. This is because the lower mono to tri congener groups (M1CDD to T3CDD and M1CDF to T3CDF) are considered to be generally less toxic than the higher congener groups and the test procedures have not been validated for these lower groups. In addition, it is acceptable to the MECP to use only specific isomers in the higher congener groups to compare emission data with the MECP interim guideline for dioxin and furan emissions.

Dioxin and furan congener group analytical results and emission data for the three tests performed are given in Table 35, Table 36 and Table 37 for Test No. 1, Test No. 2 and Test No. 3, respectively. These analyses are shown as congener groups from T4CDF to O8CDF and T4CDD to O8CDD, as normally required by the MECP.

For the dioxin and furans, as with the other semi-volatile organic components, amounts collected were assumed to be equivalent to the detection limit, where the analytical results were below the reportable detection limit.

Summaries of the dioxin and furan congener group actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates, including the coefficients of variation for the tests performed during the emission testing program are provided in Tables 38, 39, 40, 41, and 42, respectively. A summary of the dioxin and furan congener group emission data is detailed in Table 43.

The total dioxin and furan congener emission rates were <1.38 ng/s for dioxins and <1.16 ng/s for furans.

The amounts of dioxins and furans detected in the blank sampling train and in the lab blank were significant when compared to the amounts detected in the test trains since most of the congener groups were at or slightly above the detection limit. The blank sampling train analytical results are shown in Table 44. The blank analyses were not subtracted from the test sample analyses during calculation of the dioxin and furan emission data.

Dioxin and furan isomer analytical results and emission data for the three tests performed are given in Table 45, Table 46 and Table 47 for Test No. 1, Test No. 2 and Test No. 3, respectively. The isomers included in these tables are considered the most toxic of all the dioxin and furan isomers. They are characterized by having chlorine atoms located at the 2, 3, 7 and 8 positions of the basic dioxin and furan molecules.

Summaries of the dioxin and furan isomer actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates including the coefficients of variation for the three tests performed during the emission testing program are provided in Tables 48, 49, 50, 51, and 52, respectively.

A summary of the dioxin and furan specific isomer emission data is detailed in Table 53.

The amounts of dioxins and furans detected in the blank sampling train (<37.7 pg) and in the lab blank (<56.5 pg) were significant compared to the amounts detected in the test trains (from <188 to <637 pg) since most of the isomers were at or near the reportable detection limit. The blank analyses were not subtracted from the test sample analyses during the calculation of the emission data. The specific isomer blank analysis is provided in Table 54.

Several schemes have been proposed for calculating dioxin and furan toxic equivalents (TEQ's) in which different factors have been assigned to the various isomers and congener groups. Calculations in this report are based on the method preferred by the MECP, which uses International Toxicity Equivalency Factors (I-TEFs).

The purpose in calculating dioxin and furan emission rates as toxic equivalents is to provide a means of assessing and comparing the effects of dioxin and furan emission rates for different emission sources. In these calculations, 2,3,7,8-T4CDD, the most toxic of all the dioxin and furan isomers, is assigned an arbitrary value of 1.0 for a toxic equivalency factor. Then, other dioxin and furan isomers are assigned toxic equivalency factors which are based on their relative toxicity compared with 2,3,7,8-T4CDD. Emission rates for each isomer are multiplied by their assigned factor and the products are summed to provide the toxic equivalency emission rate.

Dioxin and furan TEQ actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations and emission rates are shown in Tables 55, 56, 57, 58 and 59, respectively. A summary of the average dioxin and furan toxicity equivalent emission data is given in Table 60.

The MECP "Summary of Standards and Guidelines to Support Ontario Regulation 419/05 – Air Pollution – Local Air Quality", dated April 2012, provided a new framework for calculating dioxin and furan toxicity equivalent concentrations which includes emission data for 12 dioxin-like PCBs. This document was replaced by "Air Contaminants Benchmarks List: standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants", published on January 4, 2017 and updated April 2018, however the dioxin and furan toxicity equivalent calculation methodology remains the same.

Table 55 to 60 show the total dioxins and furan emission data calculated using the toxicity equivalent calculation method detailed in Schedule 3 of the ECA. The calculation methodology detailed in Schedule 3 of the ECA was used to assess the emission data against the criteria listed in the ECA.

The average test result (<5.48 pg I-TEQ/Rm^3 calculated using Schedule 3) is well below the Environment Canada level of quantification (LOQ) for dioxin and furan emissions (32 pg I-TEQ Rm^3) at dry reference conditions.

The dioxins and furans point of impingement concentration was calculated using the methodology detailed in the "Air Contaminants Benchmarks List: standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants", published on January 4, 2017 and updated April 2018, and includes the 12 dioxin-like PCBs. Table 61 shows the dioxins, furans and dioxin-like PCBs emission data calculated using the framework detailed in the MECP document (using half the detection limit for those compounds not found in quantities greater than the reportable detection limit).

A summary of the dioxin and furan toxicity equivalent emission data obtained during the test program is presented below:

Dioxin and Furan Emission Parameter	Calculated using Schedule 3 of the ECA (Table 60)	Calculated using O. Reg. 419* (Table 61)
Actual Conc. (pg TEQ/m^3)	<2.15	1.52
Dry Reference Conc. (pg TEQ/Rm^3)**	<6.20	5.37
Dry Adjusted Conc. (pg TEQ/Rm^3)***	<5.48	3.86
Wet Reference Conc. (pg TEQ/Rm^3)**	<3.27	2.31
Emission Rate (ng TEQ/s)	<0.12	0.087

* includes the 12 dioxin-like PCBs and using half the detection limit
** at 25°C and 1 atmosphere
*** at 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

9.9.2 Polychlorinated Biphenyl Emission Data

Polychlorinated Biphenyl's (PCB's) are also a family of congeners with different molecular structures and different numbers of chlorine atoms in the molecular structure. The results are shown as congener groups that include congeners with the same number of chlorine atoms. Normally, the MECP requires that dichlorinated PCB (D2PCB) congeners to decachlorinated PCB (D10PCB) congeners are included in PCB emission data.

PCB analytical results and emission data are given in Table 62, Table 63 and Table 64 for Test No. 1, Test No. 2 and Test No. 3, respectively. The amount collected in a test train was assumed to be equivalent to the detection limit, where the analytical results were below the reportable detection limit.

A summary of the PCB actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates are shown in Tables 65, 66, 67, 68 and 69, respectively. A summary of the average PCB emission data is given in Table 70.

The average total PCB emission rate was calculated to be <0.53 µg/s for the tests performed.

Blank sampling train and laboratory blank analytical results for PCBs are given in Table 71. As with all other analytical results reported the test train samples were not blank corrected.

9.9.3 Chlorobenzene and Chlorophenol Emission Data

As with dioxins and furans, chlorobenzenes and chlorophenols are groups of compounds that have different molecular structures and may also have different numbers of chlorine atoms in the basic molecule. Chlorobenzenes have the structure of the benzene molecule except that between one and six chlorine atoms are substituted for an equal number of hydrogen atoms in the benzene ring. Benzene has the molecular formula C_6H_6. Chlorobenzene congener groups have the molecular formulae C_6H_5Cl, $C_6H_4Cl_2$, $C_6H_3Cl_3$, $C_6H_2Cl_4$, C_6HCl_5 and C_6Cl_6. Chlorophenols have the structure of the phenol molecule except that between one and five chlorine atoms are substituted for an equal number of hydrogen atoms in the benzene ring. Phenol has the molecular formula C_6H_5OH. Chlorophenol congener groups have the molecular formulae C_6H_4ClOH, $C_6H_3Cl_2OH$, $C_6H_2Cl_3OH$, C_6HCl_4OH and C_6Cl_5OH.

Chlorobenzene isomer and congener group analytical results and emission data are provided in Table 72, Table 73 and Table 74 for Test No. 1, Test No. 2 and Test No. 3, respectively. Chlorobenzene isomer and congener group actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates are shown in Tables 75, 76, 77, 78 and 79, respectively.

A summary of the average isomer and congener group emission data for chlorobenzenes, and other related chlorinated compounds, is given in Table 80.

The average chlorobenzene congener group emission rates were as follows:

Congener Group	Average Emission Rates (µg/s)
Dichlorobenzenes	8.98
Trichlorobenzenes	6.34
Tetrachlorobenzenes	3.63
Pentachlorobenzene	2.12
Hexachlorobenzene	0.31

The total chlorobenzene congener group emission rate averaged 21.4 µg/s for the tests performed.

Two additional related chlorinated compounds were analyzed (hexachloroethane and a,2,6-trichlorotoluene). However, these compounds were not detected in levels greater than the reportable detection limit in any of the tests performed.

The chlorobenzene isomer and congener lab blank and blank train analyses are summarized in Table 81. The analytical results for the test train samples were not blank corrected.

Chlorophenol isomer and congener group analytical results and emission data are provided in Table 82, Table 83 and Table 84 for Test No. 1, Test No. 2 and Test No. 3, respectively. Chlorophenol isomer and congener group actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates are shown in Tables 85, 86, 87, 88 and 89, respectively.

A summary of the average chlorophenol emission data is given in Table 90.

The average chlorophenol congener emission rates were as follows:

Congener Group	Average Emission Rates (µg/s)
Dichlorophenols	<7.62
Trichlorophenols	<18.2
Tetrachlorophenols	<0.70
Pentachlorophenol	<0.27

The total chlorophenol congener group emission rate averaged <26.8 µg/s for the tests performed.

Seven additional related compounds were included in the chlorophenol tables (total heptachlor as its three major constituents, total chlorodane as its three major constituents, toxaphene as its three major constituents, hexachlorophene, hexachlorobutadiene, octachlorostyrene and tributyltin). However, only hexachlorobutadiene was detected in all three of the test samples in levels greater than the reportable detection limit.

All of the blank analyses data is detailed in Table 91. The analytical results for the test train samples were not blank corrected.

9.9.4 Polycyclic Aromatic Hydrocarbon Emission Data

The SVOC samples were analyzed for 42 polycyclic aromatic hydrocarbons. Dibenzo(a,h)anthracene co-elutes with dibenzo(a,c)anthracene on the GC/MS. The data reported for dibenzo(a,c)anthracene represents the total of the (a,h) and (a,c) isomers. Similarly, triphenylene, chrysene and benzo(b)anthracene co-elute. Analytical results and emission data are provided in Table 92, Table 93 and Table 94 for Test No. 1, Test No. 2 and Test No. 3, respectively.

PAH actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates are shown in Tables 95, 96, 97, 98 and 99, respectively.

A summary of the average PAH emission data is given in Table 100.

The total PAH emission rate averaged <34.0 µg/s with five of the PAH compounds (biphenyl, 2-methylnaphthalene, 1-methylnaphthalene, naphthalene and phenanthrene) representing approximately 80% of the total PAH emissions.

Table 101 summarizes the lab blank and blank train PAH analysis. Note that the above compounds were also detected in the blank train in significant amounts when compared to the amounts collected in the test samples. The blank train sample analyses were not subtracted from the test train sample analyses for the purposes of emission rate calculations.

9.9.5 Volatile Organic Emission Data

Volatile organic analysis data is provided in Table 102, Table 103 and Table 104 for Test No. 1, Test No. 2 and Test No. 3, respectively. These tables indicate the total amount of the thirty volatile organics analyzed in the adsorbent tube samples from each volatile organics sampling train (VOST). Concentrations and emission rates are shown in Tables 105, 106 and 107 for Test No. 1, Test No. 2 and Test No. 3, respectively.

The average test results of volatile organic actual concentrations, dry reference concentrations, dry adjusted concentrations, wet reference concentrations, and emission rates are shown in Tables 108, 109, 110, 111 and 112, respectively. The volatile organic emission data are summarized in Table 113 for the three tests performed.

Nineteen compounds out of thirty were detected in quantities greater than the reportable detection limit in at least one of the tests. The average emission rate for each compound was less than 1.0 mg/s, except for benzene (1.97 mg/s) and bromomethane (1.16 mg/s).

The total average volatile organic emission rate was 5.20 mg/s for the three tests performed with benzene and bromomethane representing 60% of the total.

Analysis of the blank adsorbent tubes is provided in Table 114. One pair of field blank adsorbent tubes was analyzed for the test program. The field blank tubes were taken to the test site and uncapped in order to expose the tubes to the ambient environment at the sampling location. Test sample analyses were not blank corrected during the calculation of the emission data.

Mesitylene (1,3,5-trimethylbenzene) is included in the volatile organic emission tables (Table 102 to Table 110) but it is incorrectly identified in Schedule A of the ECA as 1,2,4-trimethylbenzene. Mesitylene is again listed in Schedule B of the ECA, Volatile Organics in Stack Samples, but it is assumed that this is again referring to 1,2,4-trimethylbenzene. Both compounds were included in the test program.

10. DESTRUCTION AND REMOVAL EFFICIENCIES

Destruction and removal efficiencies (DREs) for the target compounds were calculated by expressing the combined amounts of these compounds destroyed by the incinerator and removed by the air pollution control equipment as a percentage of the feed rates of the compounds (equivalent to the [FEED RATE – EMISSION RATE]/[FEED RATE]%). The organic analysis report (Appendix 14) describes the DRE compound feed analysis program.

Equivalent emission data for the DRE compounds (2-butanone, ethyl acetate, tetrachloroethene, toluene, and total xylenes) from the volatile organics emission test samples are provided in Table 115 for Test No. 1, Table 116 for Test No. 2 and Table 117 for Test No. 3. The total for 1,2,4-trichlorobenzene is also included in these tables but this compound is captured and analyzed in the semi-volatile organic compound (SVOC) test trains. A summary of the emission data is provided in Table 118. For those compounds whose analysis was indicated as being lower than the analytical detection limit, the value of the detection limit was used for DRE calculation purposes.

The field and lab blank tube analyses for the DRE compounds are provided in Table 119. Blank analyses were not subtracted from the test tube sample analyses during the calculation of DRE compound emission rates.

Incineration feed material analyses and feed rates for the DRE volatile organic compounds are provided in Table 120, Table 121 and Table 122 for Test No. 1, Test No. 2 and Test No. 3, respectively. For compounds whose analytical results were less than the method detection limit, the detection limits were used in the total organic feed rate calculation.

DRE results are provided in Table 123, Table 124 and Table 125 for Test No. 1, Test No. 2 and Test No. 3, respectively. The DRE results are summarized and averaged in Table 126. The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9990%), Ethyl Acetate (99.9998%), Tetrachloroethene (99.9919%), Toluene (99.9994%), Total Xylenes (99.9995%) and 1,2,4-Trichlorobenzene (100.0000%). Note that although the Thermal Desorber (TDU) Unit was operating during testing the contribution of the TDU feed was not included in the DRE calculations.

11. DISPERSION MODELLING

The AERMOD dispersion model (version 16216R) has been used to assess compliance for the facility. The dispersion modelling was completed in accordance with the MECP publication, "Air Dispersion Modelling Guideline for Ontario, Version 3.0" (ADMGO), dated July 2016.

The AERMOD model was run using default regulatory options. The Universal Transverse Mercator (UTM) projection (NAD 83, Zone 17) was used as the coordinate system for defining all model objects.

Since over 50% of the land surrounding the facility is rural, the model was run with rural dispersion coefficients.

11.1 Receptors

A receptor grid was defined as per the ADMGO and is described below. Distances are defined as the distance from any emission source.

- 20 m spacing within 200 m;
- 50 m spacing from 200 – 500 m;
- 100 m spacing from 500 – 1,000 m;
- 200 m spacing from 1,000 – 2,000 m;
- 500 m spacing from 2,000 – 5,000 m; and,
- 10 m spacing along the property boundary.

No receptors were placed inside the property boundary. The property boundary coordinates are presented in the following table:

Property Boundary

#	X (m)	Y (m)
1	393617	4748831
2	393685	4748896
3	394286	4748883
4	394527	4748877
5	394500	4747539
6	394174	4747547
7	393594	4747560

11.2 Sources

Only emissions from the Incinerator Exhaust Stack were modelled. The emission rate was set to a unit emission rate (1 g/s), and assumed to be constant and continuous. Subsequently the dispersion factors were applied to all the contaminants for calculating the maximum off-property ground-level concentrations associated with the Incinerator Exhaust Stack.

The temperature and velocity parameters used in the dispersion modelling were average values obtained during testing with the isokinetic sampling trains. The average velocity measured at the sampling port level (stack diameter 1.52 m) has been adjusted to account for the stack exit diameter (1.22 m).

Modelling Input Parameters

Modelling ID	Source Description	Release Height (m)	Temp. (°C)	Exit Diameter (m)	Exit Velocity (m/s)	X (m)	Y (m)
I01	Incinerator Stack	68.8	177	1.22	49.5	393878	4747950

11.3 Buildings

A building or structure is considered sufficiently close to a stack to cause wake effects when the distance between the stack and the nearest part of the building is less than or equal to five (5) times the lesser of the building height or the projected width of the building. All buildings and structures within the Area of Influence were input into the current version of the Building Profile Input Program for Prime (BPIP-PRIME) for calculating downwash effects.

11.4 Terrain

The USGS 7.5-minute Ontario data set was used as digital terrain input to the AERMAP preprocessor as outlined in the ADMGO. AERMAP was run to determine the elevations for receptors, sources and buildings.

11.5 Meteorological Data

The MECP provides pre-processed 5-year (1996-2000) regional meteorological data sets for use with the AERMOD dispersion model. The data sets are processed for urban, crops or forest land uses. The London meteorological data set for the Southwestern region processed for crops surface conditions was selected. The data set was downloaded directly from the MECP website and used in AERMOD without any additional processing.

11.6 Elimination of Meteorological Anomalies

As described in Section 6.6 of the ADMGO, for 1-hr concentrations, the eight hours with the highest 1-hour concentrations in each single meteorological year may be discarded. For 24-hour concentrations, the 1 day with the highest 24-hour concentration in each meteorological year may be discarded. For compliance assessments the MECP will consider the highest concentration after elimination of these meteorological anomalies. As a consequence, the meteorological anomalies were discarded for the 1-hr and 24-hour dispersion factors. Meteorological outliers were not removed from the 30-day and annual dispersion factors.

11.7 Averaging Period Conversions

AERMOD cannot model averaging periods less than 1-hour. Therefore, for the ½ hour dispersion factor, the 1-hour predicted concentration was converted to the applicable shorter averaging period using the MECP recommended factor described in Section 17(3) of O.Reg.419/05.

11.8 Modelling Results

As previously mentioned, the dispersion modelling was only carried out for the Incinerator Exhaust Stack and the dispersion factors, as shown in the following table, were determined for ½-hour, 1-hour, 24-hour, 30-day and annual averaging periods for a unit emission rate (1 g/s).

Dispersion Factors Predicted by the AERMOD Model

Averaging Period	Dispersion Factor ($\mu g/m^3/g/s$)
½-hour	2.1294
1-hour	1.7745
24-hour	0.4761
30-day	0.1385
Annual	0.0479

The dispersion factors were then multiplied by the emission rates of the individual contaminants to derive the maximum POI concentrations.

The predicted maximum POI concentrations for contaminants were compared to the MECP "Air Contaminants Benchmarks List: standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants" (April 2018) where available.

The AERMOD model files are provided on a CD in Appendix 26.

Dispersion modelling results for the actual stack gas component average emissions are provided in Table 127 for semi-volatile organic compounds and inorganic compounds, Table 128 for metals and metallic compounds and Table 129 for volatile organic compounds. These tables indicate the maximum ground level impingement concentrations for each component and the calculated maximum impingement concentrations allowed by the Regulation 419 standards and guidelines. Calculated maximum concentrations are expressed as percentages of the allowable concentrations.

As indicated in Tables 127 to 129, all of the calculated point of impingement concentrations were well below the allowable impingement concentrations, based on the average emission rates.

Of the calculated maximum point-of-impingement concentrations for inorganic and semi-volatile organic compounds (Table 127) the only percentage of allowable concentrations that were higher than 1% were for sulphur dioxide (6.33% for the 1-hour standard and 4.26% for the 24-hour standard), nitrogen oxides (2.37% for the 1-hour standard and 1.27% for the 24-hour standard), hydrogen chloride (11.0% for the 1-hour standard), fluorides (84.7% for the 24-hour standard and 62.3% for the 30-day standard) and hydrogen iodide (4.57% for the 24-hour screening level).

The calculated maximum point-of-impingement concentrations for metals and metallic compounds (Table 128) were less than 1% of the allowable concentration for all metals and metallic compounds except for potassium (1.54% for the 1-hour standard) and sodium hydroxide (1.04% for the 1-hour guideline).

All of the calculated maximum point-of-impingement concentrations for the volatile organic compounds (Table 129) were less than 0.1% of the allowable concentration for these compounds.

12. FACILITY PROCESS DATA

Incinerator process data was supplied by Clean Harbors personnel for the emission test periods. The process data is provided in Appendix 27 as average values for each test and as overall average values for the following process parameters:

- incinerator feed rates (rich, lean, emulsion, alkaline and leachate streams)
- volumetric flowrates (TDU, secondary air and stack gases)
- PAC feed rate
- temperatures (primary zone, secondary zone, spray dryer inlet and outlet)
- pressures (spray dryer outlet, baghouse differential)
- combustion gas stack concentrations (CO, HCl, CO_2, H_2O, THC, O_2, SO_2)
- stack gas opacity

One-minute average values for these process parameters are shown in Appendix 28 (combustion gas concentrations) and in Appendix 29 (other process parameters).

13. OTHER EMISSION CRITERIA

In addition to requiring that the incineration facility comply with Regulation 419/05, the ECA also provided maximum allowable concentrations for particulate matter, mercury, and carbon monoxide in the stack gases, a minimum concentration of oxygen in the stack gases, and a maximum concentration for total hydrocarbons (measured at the stack and reported on a dry basis adjusted to 11% oxygen). For the emission test program, total hydrocarbon concentrations were measured at the breaching leading to the stack.

The following table summarizes the average test results for the three tests conducted by ORTECH and the corresponding emission criteria:

Stack Gas Concentration Criterion	Allowable Value	Test Average Value
Particulate Matter	maximum 20 mg/Rm^{3}(1)	11.7 mg/Rm^{3}(1)
Mercury	maximum 50 µg/Rm^{3}(1)	2.13 µg/Rm^{3}(1)
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm^{3}(1)	<5.48 pg TEQ/Rm^{3}(1)
Carbon Monoxide	maximum 100 ppm(1)	71.1 ppm(1)
Oxygen	minimum 8.0 %(2)	9.64 %(2)
Total Hydrocarbons(3)	maximum 100 ppm	53.2 ppm(1)
Total Hydrocarbons(4)	maximum 100 ppm	31.6 ppm(4)
Total Hydrocarbons(5)	maximum 100 ppm	42.0 ppm(5)

(1) adjusted to 11% oxygen, dry at 25°C and 1 atmosphere
(2) dry by volume
(3) as per ECA No. 6547-5G5MSP (dry adjusted stack concentration)
(4) 10-minute rolling average - wet basis, expressed as equivalent methane
(5) maximum 10-minute average during the test program - wet basis, expressed as equivalent methane

Note: The dioxin and furan concentration in the above table was calculated using the calculation method detailed in Schedule 3 of the ECA.

14. FEED SAMPLE ANALYSIS

Presented in Appendix 30 are the results of the ultimate analysis conducted by Petro Laboratories on samples of the rich, lean and emulsion feeds. This data is summarized in Table 130. Other analysis performed on the feed samples can be found in the appropriate analytical reports.

Metals analyses of the feed samples are summarized in Table 131. Table 132 summarizes the metals analyses performed on the baghouse dust samples.

Congener group analyses for dioxin and furans in the rich, lean, emulsion and alkaline feed samples are summarized in Table 133. These analyses are reported as picograms per gram (pg/g). Dioxin and furan isomer analyses in the rich, lean, emulsion and alkaline feed samples are summarized in Table 134. The detected levels in the rich feed sample and the laboratory duplicate did not replicate well, although the observed patterns were similar. The sample consisted of a liquid containing a particulate. Although efforts were taken to homogenize the sample, the two replicates may have contained varying amounts of solid. The original analysis is included in Tables 133 and 134.

Total polychlorinated biphenyl analyses in the rich, lean, emulsion and alkaline feed samples are summarized in Table 135 reported as picograms per gram (pg/g).

15. LIMITATION ON WASTES

As well as the emission criteria limitations stated in Section 13, the Notice of Amendment to the ECA also specifies limitations on the feeding rates of each of the wastes (the combined feed rate of the rich, lean, and emulsion waste streams not to exceed 245 L/min). The individual waste feed rates and heating values are contained in Appendix 27. During the emission tests, the rich, lean and emulsion feed rates combined were 209.6, 204.3 and 201.2 L/min for Test No. 1, Test No. 2, and Test No. 3, respectively. The Thermal Desorber Unit (TDU) was exhausting to the incinerator during each test.

In addition, the waste fed into the incinerator should not contain more than 2% organic chlorine by weight. Organic chlorine was not reported by the Clean Harbors laboratory; only total chloride was reported for the tanks used during the test program. However, the total chlorine was less than 2%. The total chlorine content in the individual waste feed streams was as follows:

Test No.	Total Chlorine Content (% w/w)		
	Rich	Lean	Emulsion
1	0.43	1.02	1.27
2	0.74	0.63	1.63
3	0.74	0.85	1.23
Average	0.64	0.83	1.38

Total chlorine analyses of the individual waste streams fed to the incinerator are shown in Table 130.

16. COMPARISON OF CONTINUOUS EMISSION MONITORING DATA

Average one-minute combustion gas concentrations recorded by the Clean Harbors stack gas continuous emission monitors (CEMs) for the emission testing periods are provided in Appendix 28.

As requested by the MECP in the Pre-Test Plan acceptance letter, a certification of the Clean Harbors CEMS was also conducted concurrently with the compliance emission testing program. The results of the CEMS certification are detailed in ORTECH Report No. 21939-2.

The stack gas opacity was also recorded as one-minute average concentrations for each test period. The opacity at the exit of the main stack cannot be more than 5%, calculated on a 2 hour average, and 10%, calculated on a 6 minute average. The minimum, maximum and average opacity measurements for each test, using the one-minute data, are as follows:

Test No.	Maximum Opacity (%)	Minimum Opacity (%)	Average Opacity (%)
1	1.1	0.2	0.6
2	1.1	0.2	0.5
3	0.9	0	0.5

The one-minute average concentrations are shown in Appendix 28.

17. CONCLUSIONS

The main conclusions which can be drawn from the present emission testing program, carried out as a requirement of the Ontario Ministry of Environment ECA No. 8-1030-94-006 and Notice of Amendment are:

- Using the dispersion equations contained in the Appendix to the previous Air Quality Regulation (R.R.O.) 1990, Reg. 346 under the Ontario Environmental Protection Act, the predicted maximum ground level point of impingement concentrations, based on average test results, show that the incineration process is operating well below the standards and guidelines in Regulation 419/05 under the Ontario Environmental Protection Act(12) at an average combined rich, lean and emulsion feed rate of 205.0 L/min.
- The average total hydrocarbon concentration at the stack was 31.7 ppm (wet basis) for the three tests performed. The average total dry adjusted hydrocarbon concentration in the stack was 53.2 ppm for the three tests performed which is well below the maximum criterion (100 ppm).
- The average particulate concentration in the stack gas for the tests performed during the emission testing program was within the criteria provided in the ECA for the incinerator. The average particulate dry adjusted concentration (adjusted to 11% oxygen, dry at 25°C and 1 atmosphere) for the three tests performed was 11.7 mg/Rm^3, which is below the maximum criterion (20 mg/Rm^3).
- The average mercury concentration in the stack gas for the tests performed during the emission testing program was within the criteria provided in the Notice of Amendment to the ECA for the incinerator. The average mercury dry adjusted concentration (adjusted to 11% oxygen, dry at 25°C and 1 atmosphere) for the three tests performed was 2.13 µg/Rm^3, which is well below the maximum mercury concentration criterion of 50 µg/Rm^3.
- The average dry adjusted (adjusted to 11% oxygen, dry at 25°C and 1 atmosphere) carbon monoxide concentration in the stack gas for all of the tests performed during the emission testing program (81.4 mg/Rm^3 or 71.1 ppm) is within the criterion provided in the ECA for the incinerator (110 mg/Rm^3 or 100 ppm).
- The average dioxin and furan toxicity equivalent dry adjusted concentration in the stack gas for the tests performed during the emission testing program (<5.48 pg TEQ/Rm^3) is well below the criterion provided in the Notice of Amendment to the ECA for the incinerator (80 pg TEQ/Rm^3).
- The average oxygen concentration in the stack gas for the tests performed was 9.64%, which is above the minimum 8.0% oxygen criterion.
- The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9990%), Ethyl Acetate (99.9998%), Tetrachloroethene (99.9919%), Toluene (99.9994%), Total Xylenes (99.9995%) and 1,2,4-Trichlorobenzene (100.0000%). Note that during all tests, the Thermal Desorber Unit (TDU) was exhausting through the incinerator however the contribution of the TDU feed was not included in the DRE calculations.
- The average opacity measurements recorded by Clean Harbors (the test average opacity measurements are all less than 1%) are lower than the criterion provided in the Notice of Amendment to the ECA.

REFERENCES

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3. “Reference Method for Source Testing: Measurement of Releases of Selected Semi-Volatile Organic Compounds from Stationary Sources”. Environment Canada Report EPS 1/RM/2. June, 1989.
4. “Annual Compliance Emission Testing Program at the Clean Harbors Sarnia Incineration Facility”, Pre-Test Plan No. 21607, June 17, 2015.
5. “Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Non-Isokinetic Method”, U.S. Environmental Protection Agency, Method 26. Federal Register, Part 60, Appendix A. January 14, 2019.
6. “Volatile Organic Sampling Train”, U. S. Environmental Protection Agency, Method 0030. September, 1986.
7. “Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)”. U.S. Environmental Protection Agency, Method 3A, Federal Register, Part 60, Appendix A. August 3, 2017.
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9. “Determination of Sulphur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)”. U.S. Environmental Protection Agency, Method 6C, Federal Register, Part 60, Appendix A. August 2, 2017.
10. “Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)”. U.S. Environmental Protection Agency, Method 10, Federal Register, Part 60, Appendix A. August 2, 2017.
11. “Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer”. U.S. Environmental Protection Agency, Method 25A, Federal Register, Part 60, Appendix A. August 3, 2017.
12. “Environmental Protection Act”. Revised Statutes of Ontario, 1990, c.E.19.
13. “Air Contaminants Benchmarks List: standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants”. Standards Development Branch, Ontario Ministry of the Environment, April 2018.

Figure 1
Incinerator Schematic

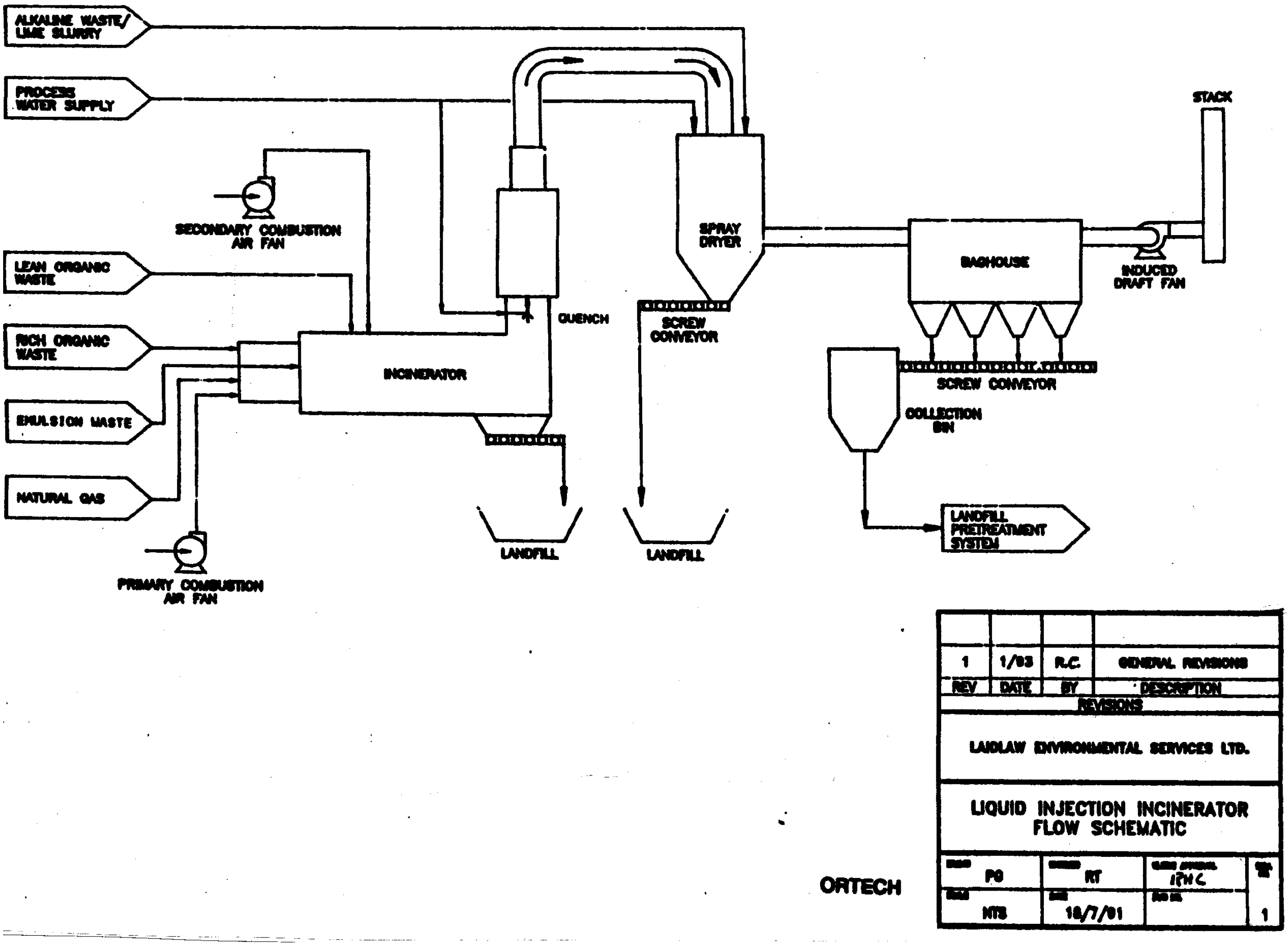
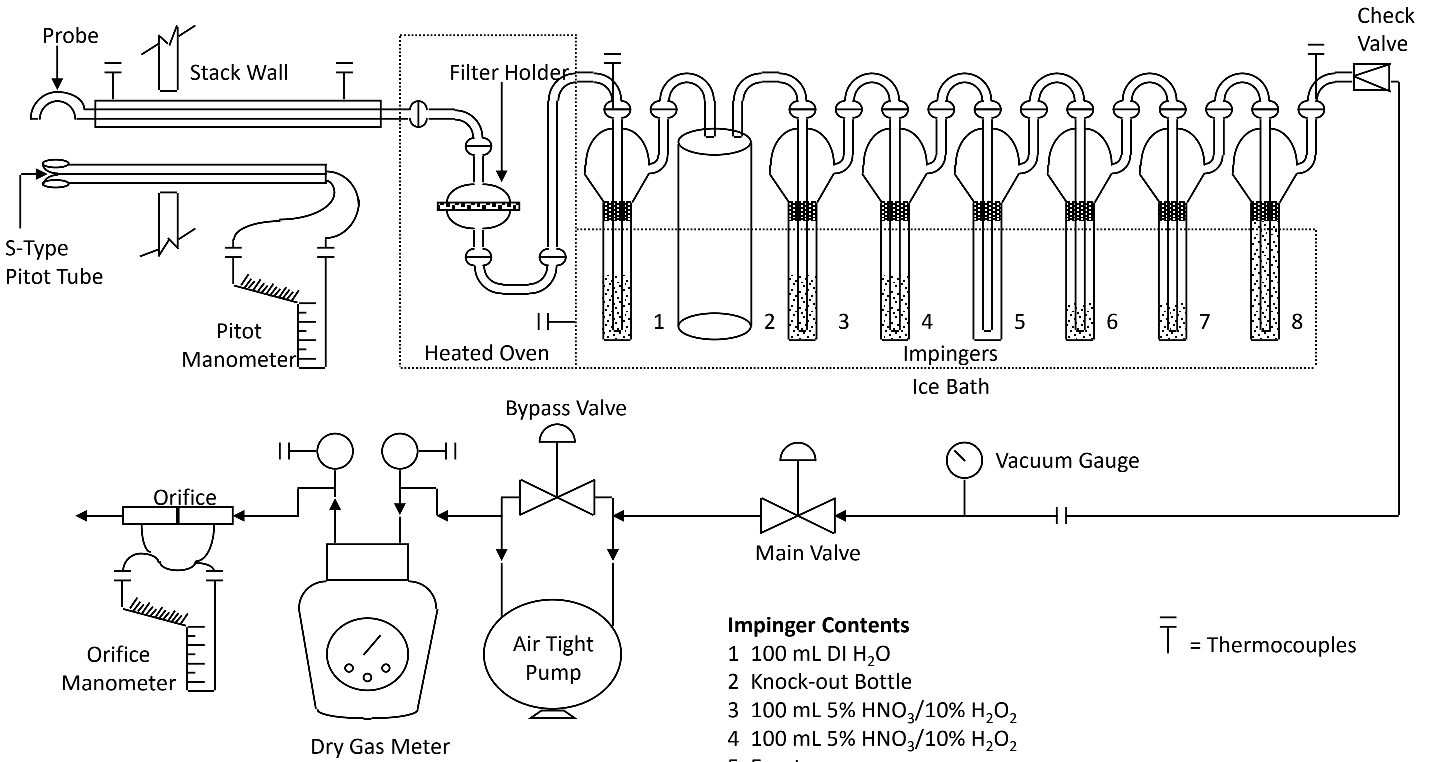


Figure 2
Particulate Matter and Metals Sampling Train



Impinger Contents

1 100 mL DI H_2O
2 Knock-out Bottle
3 100 mL 5% HNO_3/10% H_2O_2
4 100 mL 5% HNO_3/10% H_2O_2
5 Empty
6 4% $KMnO_4$/10% H_2SO_4
7 4% $KMnO_4$/10% H_2SO_4
8 Silica Gel

Figure 3
Semi-Volatile Organic Compounds Sampling Train

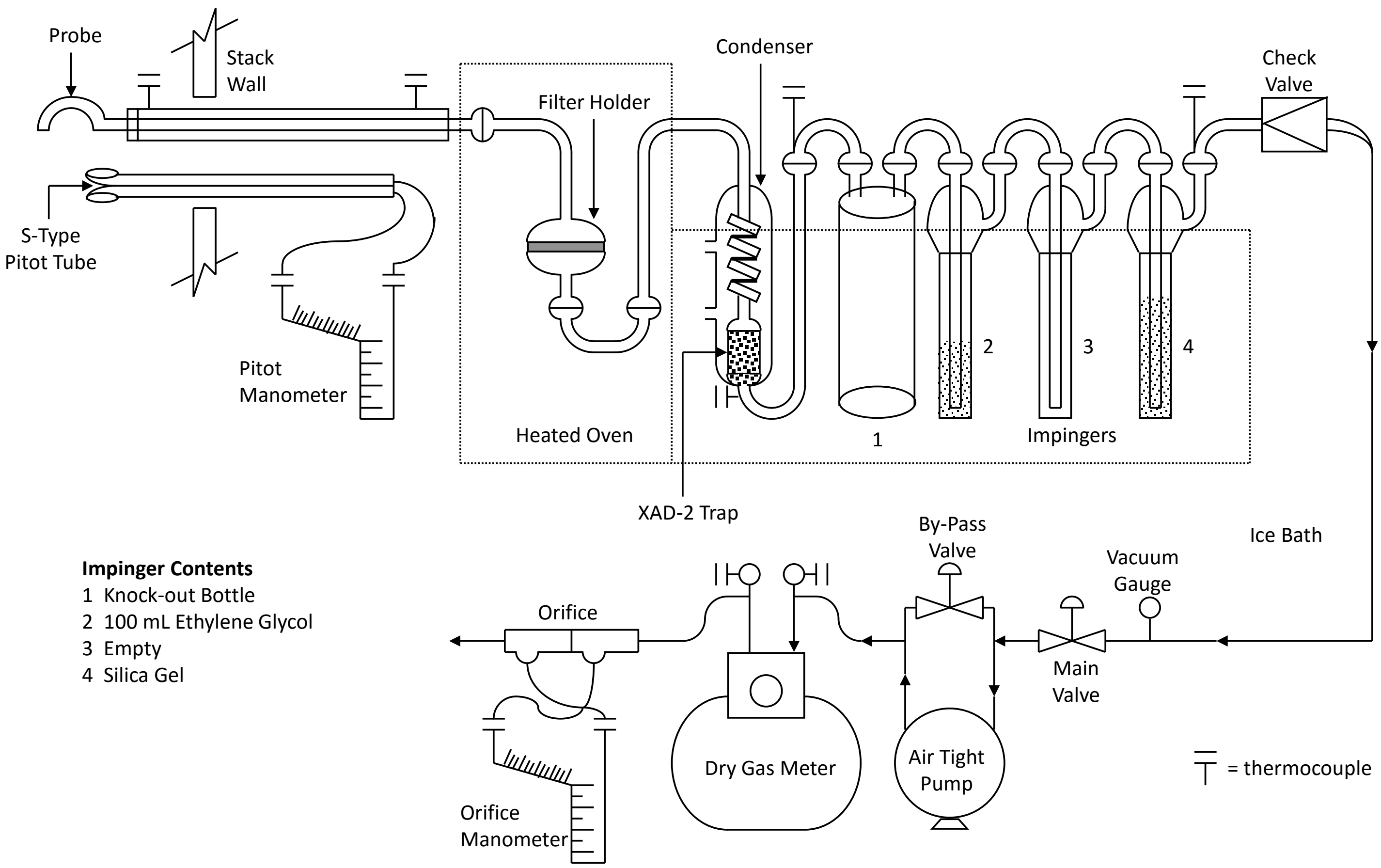
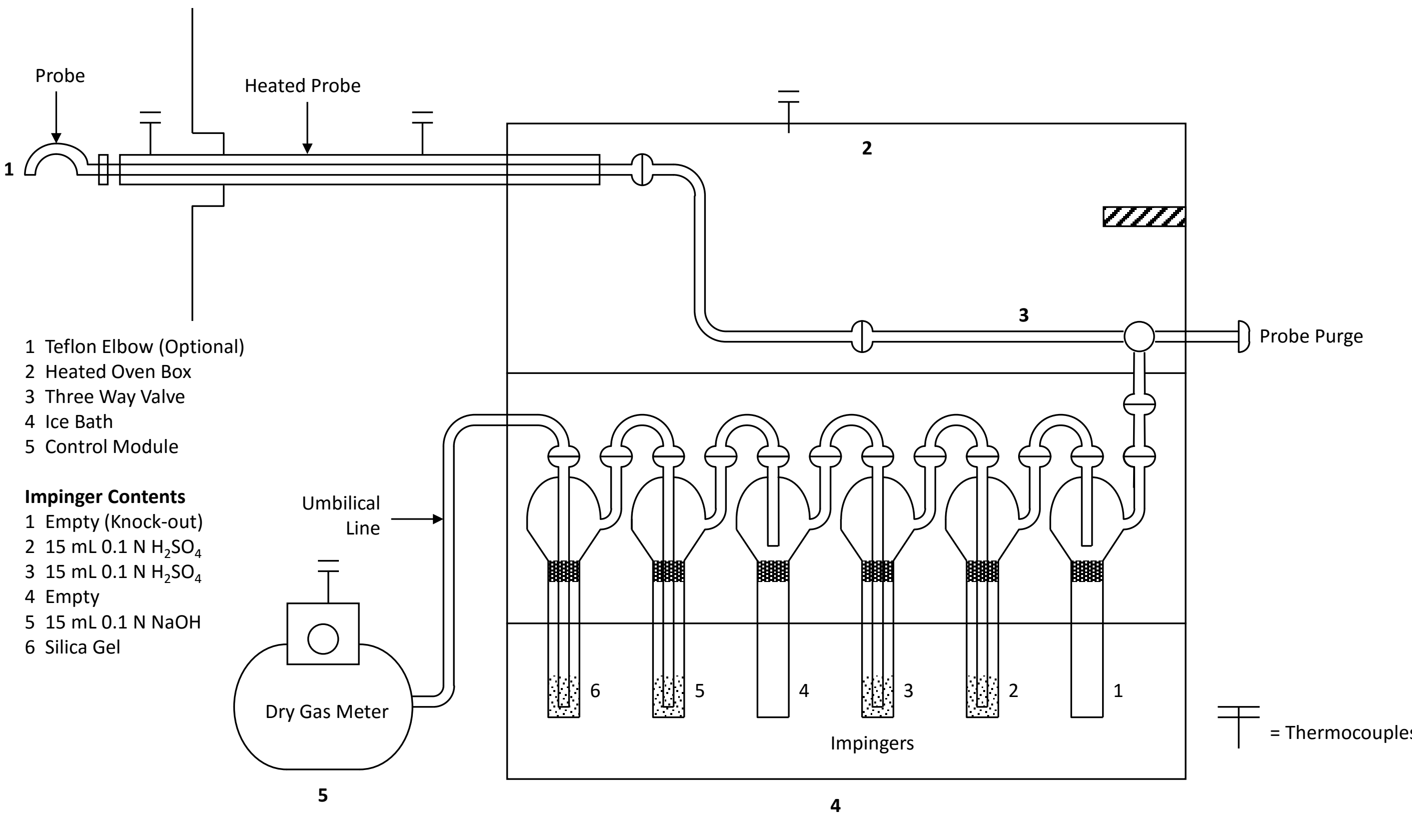


Figure 4
Acid Gases Sampling Train



1 Teflon Elbow (Optional)
2 Heated Oven Box
3 Three Way Valve
4 Ice Bath
5 Control Module

Impinger Contents
1 Empty (Knock-out)
2 15 mL 0.1 N H_2SO_4
3 15 mL 0.1 N H_2SO_4
4 Empty
5 15 mL 0.1 N NaOH
6 Silica Gel

Figure 5
Volatile Organics Sampling Train

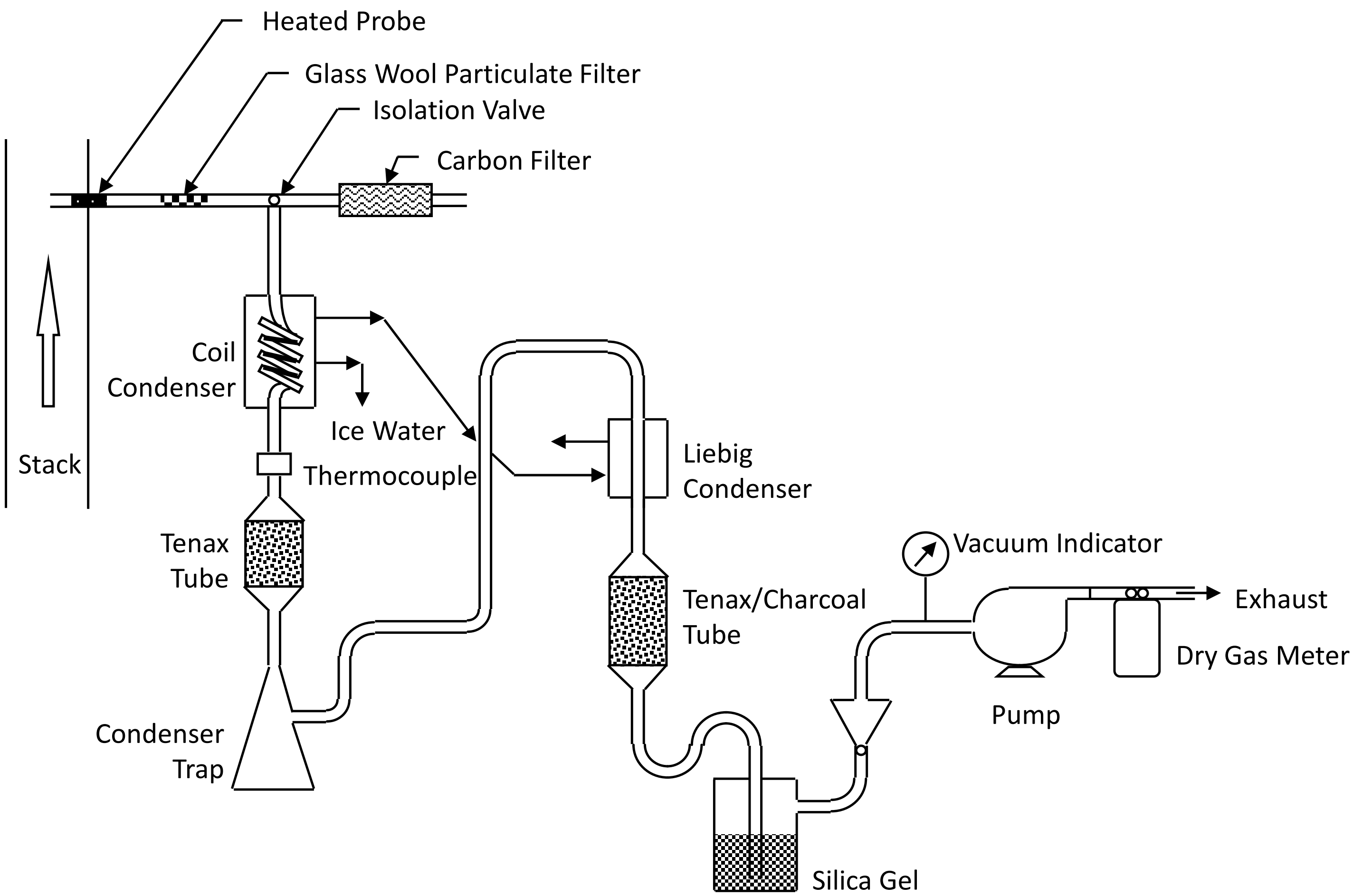
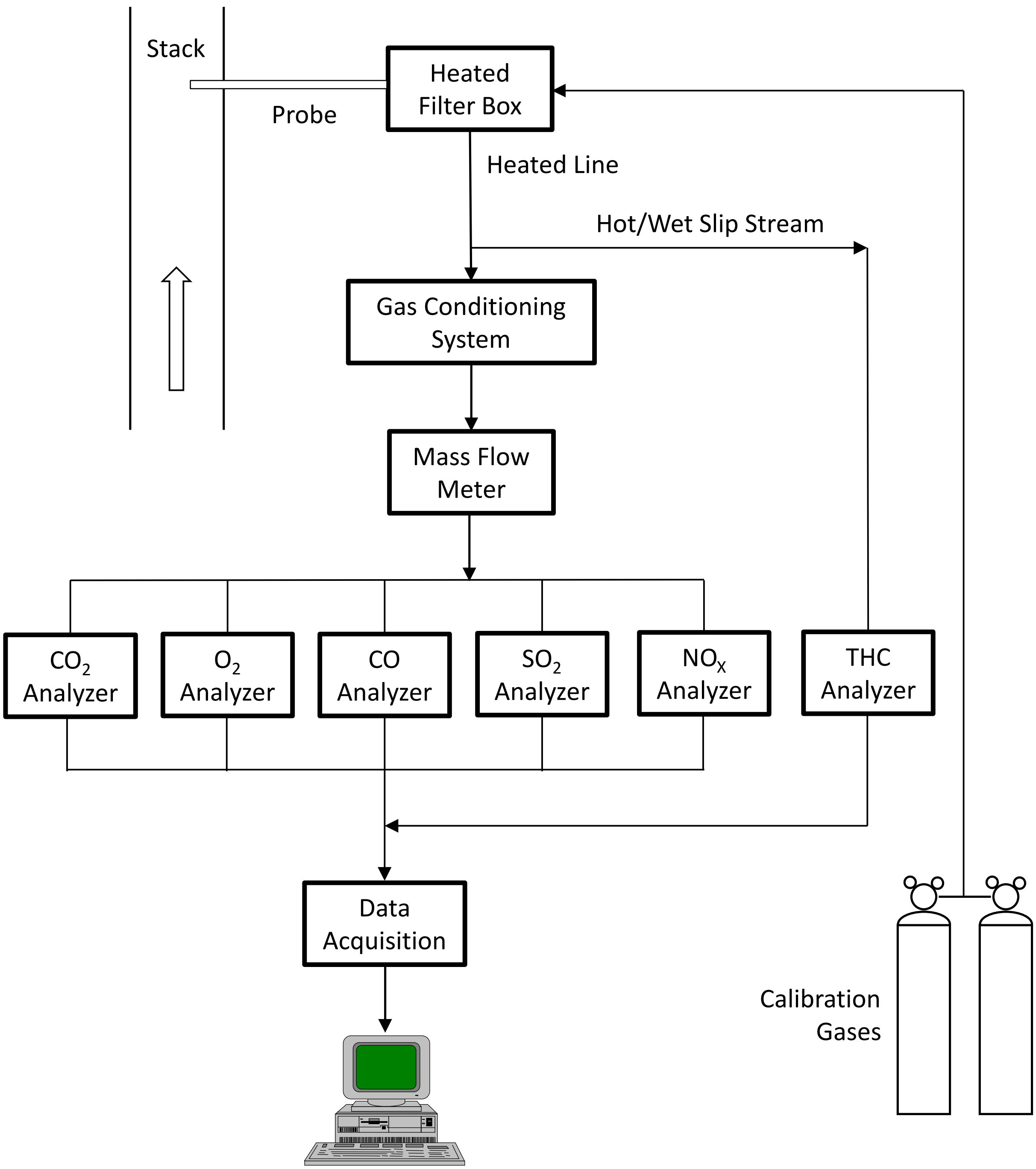


Figure 6
CEM System Schematic



APPENDIX 1

Data Tables
(135 pages)

TABLE 1
Clean Harbors Sarnia
Polychlorinated Aromatic Congener Group Emission Components

Contaminant Groups	Contaminants
Compound Groups	Polychlorinated dibenzo-p-dioxins Polychlorinated dibenzofurans Chlorobenzenes Chlorophenols Polychlorinated biphenyls
Congener Groups	Tetrachloro dibenzo-p-dioxins (T4CDD) Pentachloro dibenzo-p-dioxins (P5CDD) Hexachloro dibenzo-p-dioxins (H6CDD) Heptachloro dibenzo-p-dioxins (H7CDD) Octachloro dibenzo-p-dioxin (O8CDD)
	Tetrachloro dibenzofurans (T4CDF) Pentachloro dibenzofurans (P5CDF) Hexachloro dibenzofurans (H6CDF) Heptachloro dibenzofurans (H7CDF) Octachloro dibenzofuran (O8CDF)
	Dichlorobenzenes (D2CB) Trichlorobenzenes (T3CB) Tetrachlorobenzenes (T4CB) Pentachlorobenzene (P5CB) Hexachlorobenzene (H6CB)
	Dichlorophenols (D2CP) Trichlorophenols (T3CP) Tetrachlorophenols (T4CP) Pentachlorophenol (P5CP)
	Dichlorobiphenyls (D2PCB) Trichlorobiphenyls (T3PCB) Tetrachlorobiphenyls (T4PCB) Pentachlorobiphenyls (P5PCB) Hexachlorobiphenyls (H6PCB) Heptachlorobiphenyls (H7PCB) Octachlorobiphenyls (O8PCB) Nonachlorobiphenyls (N9BCB) Decachlorobiphenyl (D10PCB)
	Heptachlor Chlorodane Toxaphene
	Hexachlorophene
	Tributyltin

TABLE 2
Clean Harbors Sarnia
Polychlorinated Aromatic Isomer Emission Components

Contaminant Groups	Contaminants
Isomers	2,3,7,8 Tetrachloro dibenzo-p-dioxin
	1,2,3,7,8 Pentachloro dibenzo-p-dioxin
	1,2,3,4,7,8 Hexachloro dibenzo-p-dioxin
	1,2,3,6,7,8 Hexachloro dibenzo-p-dioxin
	1,2,3,7,8,9 Hexachloro dibenzo-p-dioxin
	1,2,3,4,6,7,8 Heptachloro dibenzo-p-dioxin
	2,3,7,8 Tetrachloro dibenzofuran
	1,2,3,7,8 Pentachloro dibenzofuran
	2,3,4,7,8 Pentachloro dibenzofuran
	1,2,3,4,7,8 Hexachloro dibenzofuran
	1,2,3,6,7,8 Hexachloro dibenzofuran
	1,2,3,7,8,9 Hexachloro dibenzofuran
	2,3,4,6,7,8 Hexachloro dibenzofuran
	1,2,3,4,6,7,8 Heptachloro dibenzofuran
	1,2,3,4,7,8,9 Heptachloro dibenzofuran
	PCB 77
	PCB 81
	PCB 126
	PCB 169
	PCB 105
	PCB 114
	PCB 118
	PCB 123
	PCB 156/157
	PCB 167
	PCB 189
	1,2-Dichlorobenzene
	1,3-Dichlorobenzene
	1,4-Dichlorobenzene
	1,3,5-Trichlorobenzene
	1,2,3-Trichlorobenzene
	1,2,4-Trichlorobenzene
	1,2,4,5-Tetrachlorobenzene
	1,2,3,5-Tetrachlorobenzene
	1,2,3,4-Tetrachlorobenzene
	2,3-dichlorophenol
	2,4-dichlorophenol
	2,6-dichlorophenol
	2,5-dichlorophenol
	3,4-dichlorophenol
	3,5-dichlorophenol
	2,4,6-trichlorophenol
	2,3,6-trichlorophenol
	2,3,5-trichlorophenol
	2,4,5-trichlorophenol
	2,3,4-trichlorophenol
	3,4,5-trichlorophenol
	2,3,5,6-tetrachlorophenol
	2,3,4,6-tetrachlorophenol
	2,3,4,5-tetrachlorophenol
	Pentachlorophenol
Compounds (aliphatic)	Hexachlorobutadiene
	Hexachloroethane
	a,2,6-Trichlorotoluene
	Octachlorostyrene

TABLE 3
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Components

Contaminant Groups	Contaminants
Compound Group	Acenaphthene
	Acenaphthylene
	Anthracene
	Benzo(a)Anthracene
	Benzo(b)Fluoranthene
	Benzo(k)Fluoranthene
	Benzo(a)fluorene
	Benzo(b)fluorene
	Benzo(g,h,i)Perylene
	Benzo(a)Pyrene
	Benzo(e)Pyrene
	Biphenyl
	2-Chloronaphthalene
	Chrysene/Triphenylene/Benzo(b)anthracene*
	Coronene
	Dibenzo(a,c/a,h)Anthracene*
	Dibenzo(a,e)pyrene
	9,10-dimethylanthracene
	7,12-Dimethylbenzo(a)anthracene
	Fluoranthene
	Fluorene
	Indeno(1,2,3-cd)Pyrene
	2-methylanthracene
	3-Methylcholanthrene
	1-Methylnaphthalene
	2-Methylnaphthalene
	1-Methylphenanthrene
	9-Methylphenanthrene
	Naphthalene
	Perylene
	Phenanthrene
	Picene
	Pyrene
	Quinoline
	m-terphenyl
	o-Terphenyl
	p-terphenyl
	Tetralin

* compounds coelute

TABLE 4
Clean Harbors Sarnia
Metal Emission Components

Contaminant Groups	Contaminants
Metal Group	Aluminum
	Antimony
	Arsenic
	Barium
	Beryllium
	Boron
	Cadmium
	Calcium
	Chromium
	Cobalt
	Copper
	Iron
	Lead
	Lithium
	Magnesium
	Manganese
	Mercury
	Molybdenum
	Nickel
	Phosphorus
	Potassium
	Selenium
	Silicon
	Silver
	Sodium
	Strontium
	Sulphur
	Tin
	Titanium
	Vanadium
	Zinc

TABLE 5
Clean Harbors Sarnia
Particulate, Acid Gas and Combustion Gas Emission Components

Particulate Matter

Contaminant Group	Contaminants
Acid Gas Group	Chloride Fluoride Bromide Iodide Cyanide

Contaminant Group	Contaminants
Combustion Gas Group	Carbon dioxide Carbon monoxide Moisture Nitrogen oxides Oxygen Sulphur dioxide Total hydrocarbons

TABLE 6
Clean Harbors Sarnia
Volatile Organic Compound Emission Components

Contaminant Group	Contaminants
Volatile Organic Compound Group	Benzene Bromodichloromethane Bromomethane (Methyl bromide) 2-Butanone (Methyl ethyl ketone) Chloroethene (Vinyl chloride) Dibromochloromethane 1,2-Dibromoethane (Ethylene dibromide) Dichlorodifluoromethane 1,1-Dichloroethane trans-1,2-Dichloroethene 1,1-Dichloroethene Dichloromethane (Methylene chloride) 1,2-Dichloropropane Ethyl Acetate Ethylbenzene Isopropylbenzene (Cumene) 2-Propanone (Acetone) Styrene Tetrachloroethene (Perchloroethylene) Tetrachloromethane (Carbon tetrachloride) Toluene Tribromomethane (Bromoform) 1,1,1-Trichloroethane (Methyl chloroform) Trichloroethene Trichlorofluoromethane Trichloromethane (Chloroform) Trichlorotrifluoroethane 1,3,5-Trimethyl benzene (Mesitylene) 1,2,4-Trimethyl benzene (Pseudocumene) Xylenes (Total)

TABLE 7
Clean Harbors Sarnia
Destruction and Removal Efficiency (DRE) Compounds

Contaminant Group	DRE Compounds
Volatile Organic Compound Group	2-Butanone (Methyl Ethyl Ketone)
	Ethyl Acetate
	Tetrachloroethene (Perchloroethylene)
	Toluene
	1,2,4-Trichlorobenzene
	Total Xylenes

TABLE 8
Clean Harbors Sarnia
Incinerator Feed Stream and
Baghouse Dust Sampling and Analysis Components

Sampling or Analysis Group	Sampling or Analysis Components
Process Sampling Components	Rich feed stream Lean feed stream Emulsion feed stream Alkaline feed stream Leachate feed stream Baghouse dust
Feed Stream Analysis Components	Organic chlorine content Ash Heating value Viscosity Density Water content Sulphur content Ultimate analysis Polychlorinated dibenzo-p-dioxins Polychlorinated dibenzofurans Polychlorinated biphenyls DRE compounds (Table 7) Metals (Table 4)
Baghouse Dust Analysis Components	Metals (Table 4)

TABLE 9
Clean Harbors Sarnia
Emission Testing Program Test Matrix

Contaminant	Number of Tests	Sampling Location	Sampling Duration/Gas Volume	Sampling Frequency	Sampling Method	Analytical Method
Particulate, Metals	3	Main Stack	240 minutes / >5m^3	Integrated	Modified US EPA Method 29	Gravimetric (MECP Method 5) ICAP, HGAA, CVAA
Semi-Volatile Organics	3	Main Stack	240 minutes / >5m^3	Integrated	EPS 1/RM/2	Modified EPS 1/RM/2 Modified EPS 1/RM/3* EPS 1/RM/23 US EPA Method 23 High and Low Res. GC/MS
Acid Gas	3	Main Stack	60 minutes /~0.12 m^3	Continuous	Modified US EPA Method 26	Modified US EPA Method 26, APHA 4500CN
Volatile Organics	3	Main Stack	3 pair @ 20 minutes / ~0.02 m^3	Continuous	US EPA SW-846 Method 0030	US EPA SW-846 Method 5040 US EPA SW-846 Method 8260
Carbon Dioxide	3	Breaching	Continuous	1 minute	US EPA Method 3A	CEM
Carbon Monoxide	3	Breaching	Continuous	1 minute	US EPA Method 10	CEM
Nitrogen Oxides	3	Breaching	Continuous	1 minute	US EPA Method 7E	CEM
Oxygen	3	Breaching	Continuous	1 minute	US EPA Method 3A	CEM
Sulfur Dioxide	3	Breaching	Continuous	1 minute	US EPA Method 6C	CEM
Total Hydrocarbons	3	Breaching	Continuous	1 minute	US EPA Method 25A	CEM (as CH_4)
Feed Samples and Baghouse Dust	3	Various	NA	Grab Sample	NA	ASTM D-808, D-240 (mod) D-1744, D-2983 (mod), D-70 (mod), D-1552, D-3176 (mod), HRGC/LRMS, HRGC/HRMS ICP/FAA, CVAA.

* Includes Environment Canada methodology for PAHs, CPs and CBs from the NITEP/Mid Connecticut combustion procedures
CEM: Continuous Emission Monitor

TABLE 10
Clean Harbors Sarnia
Isokinetic Sampling Trains and Acid Gases Train Test Schedules

Particulate and Metals Trains

Test Number	Test Date	Sampling Period Start	Sampling Period Finish	Sampling Time* min
1	October 8, 2019	9:52	15:38	240
2	October 9, 2019	9:04	14:03	240
3	October 10, 2019	9:03	14:07	240

Semi-Volatile Organics Trains

Test Number	Test Date	Sampling Period Start	Sampling Period Finish	Sampling Time* min
1	October 8, 2019	9:52	15:38	240
2	October 9, 2019	9:04	14:03	240
3	October 10, 2019	9:03	14:07	240

Acid Gases Trains

Test Number	Test Date	Sampling Period Start	Sampling Period Finish	Sampling Time* min
1	October 8, 2019	14:00	15:00	60
2	October 9, 2019	12:11	13:11	60
3	October 10, 2019	12:12	13:12	60

* Actual sampling time excluding leak-checks and traverse changes.

TABLE 11
Clean Harbors Sarnia
Combustion Gases Train Test Schedule

Test Number	Test Date	Sampling Period * Start	Finish	Sampling Time min
1	October 8, 2019	9:52	15:38	242
2	October 9, 2019	9:04	14:03	242
3	October 10, 2019	9:03	14:07	242

* Covers the sampling periods for the isokinetic sampling trains

TABLE 12
Clean Harbors Sarnia
Volatile Organics Train Test Schedule

Test Number	Tube Pair	Test Date	Sampling Period Start	Sampling Period Finish	Sampling Time min
1	1	October 8, 2019	9:53	10:13	20
1	2	October 8, 2019	10:22	10:42	20
1	3	October 8, 2019	10:51	11:11	20
1	4	October 8, 2019	11:21	11:41	20
2	1	October 9, 2019	9:18	9:38	20
2	2	October 9, 2019	9:50	10:10	20
2	3	October 9, 2019	10:22	10:42	20
2	4	October 9, 2019	10:52	11:12	20
3	1	October 10, 2019	9:12	9:32	20
3	2	October 10, 2019	9:41	10:01	20
3	3	October 10, 2019	10:12	10:32	20
3	4	October 10, 2019	10:44	11:04	20

TABLE 13
Clean Harbors Sarnia
Stack Gas Sampling Parameters

Particulate and Metals Trains

Test No.	Pitot Tube Coefficient	Dry Gas Meter Factor	Nozzle Diameter mm	Gas Volume Sampled Rm^3 *	Percentage of Isokineticity %
1	0.850	1.018	6.44	5.181	102.6
2	0.850	1.018	6.44	5.351	102.4
3	0.850	1.018	6.44	5.402	101.9

Semi-Volatile Organics Trains

Test No.	Pitot Tube Coefficient	Dry Gas Meter Factor	Nozzle Diameter mm	Gas Volume Sampled Rm^3 *	Percentage of Isokineticity %
1	0.849	1.006	6.46	5.159	101.2
2	0.849	1.006	6.46	5.270	102.3
3	0.849	1.006	6.46	5.272	101.7

* Dry at 25°C and 1 atmosphere

TABLE 14
Clean Harbors Sarnia
Stack Gas Physical Parameters

Particulate and Metals Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	180	48.2	31.8	100.5	8.59	9.26
2	175	47.7	32.2	100.6	8.26	9.77
3	178	47.8	33.0	100.4	8.10	9.90
Average	177	47.9	32.3	100.5	8.32	9.64

Semi-Volatile Organics Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	178	47.0	31.1	100.5	8.59	9.26
2	174	47.4	31.4	100.6	8.26	9.77
3	178	47.5	31.9	100.4	8.10	9.90
Average	177	47.3	31.5	100.5	8.32	9.64

Averaged Metals and Semi-Volatile Organics Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	179	47.6	31.5	100.5	8.59	9.26
2	174	47.6	31.8	100.6	8.26	9.77
3	178	47.7	32.5	100.4	8.10	9.90
Average	177	47.6	31.9	100.5	8.32	9.64
Coefficient of Variation, %	1.3	0.1	1.6	0.1	3.0	3.5

* Dry basis

TABLE 15
Clean Harbors Sarnia
Stack Gas Volumetric Flowrates

Particulate and Metals Trains

Test No.	Actual Flowrate m^3/s	Dry Reference Flowrate Rm^3/s *	Dry Adjusted Flowrate Rm^3/s **	Wet Reference Flowrate Rm^3/s*
1	58.0	19.6	23.1	37.9
2	58.7	20.3	22.8	38.8
3	60.2	20.6	22.9	39.5
Average	59.0	20.2	22.9	38.7

Semi-Volatile Organics Trains

Test No.	Actual Flowrate m^3/s	Dry Reference Flowrate Rm^3/s *	Dry Adjusted Flowrate Rm^3/s **	Wet Reference Flowrate Rm^3/s*
1	56.7	19.7	23.2	37.2
2	57.2	19.9	22.4	37.8
3	58.2	20.0	22.2	38.2
Average	57.4	19.9	22.6	37.7

Averaged Metals and Semi-Volatile Organics Trains

Test No.	Actual Flowrate m^3/s	Dry Reference Flowrate Rm^3/s *	Dry Adjusted Flowrate Rm^3/s **	Wet Reference Flowrate Rm^3/s*
1	57.4	19.7	23.1	37.5
2	58.0	20.1	22.6	38.3
3	59.2	20.3	22.6	38.8
Average	58.2	20.0	22.8	38.2
Coefficient of Variation, %	1.6	1.7	1.4	1.7

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 16
Clean Harbors Sarnia
Particulate Emission Data

Test No.	Particulate Collected Probe Rinse mg	Main Filter mg	Total mg	Dry Gas Volume Sampled Rm^3*	Particulate Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	Particulate Emission Rate g/s
1	7.4	63.4	70.8	5.181	4.62	13.7	11.6	7.08	0.27
2	8.6	61.4	70.0	5.351	4.52	13.1	11.6	6.85	0.27
3	8.1	63.0	71.1	5.402	4.51	13.2	11.8	6.88	0.27
Average					4.55	13.3	11.7	6.93	0.27
Coefficient of Variation, %					1.4	2.4	1.1	1.8	1.1

* At 25 °C and 1 atmosphere

** At 25 °C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 17
Clean Harbors Sarnia
Acid Gas Emission Data

Hydrogen Chloride

Test No.	HCl Collected mg	Dry Volume Sampled Rm^3*	Hydrogen Chloride Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	HCl Emission Rate g/s
1	29.5	0.1221	82.9	242	206	127	4.76
2	36.2	0.1244	101	291	259	153	5.85
3	20.0	0.1228	55.9	163	146	85.2	3.31
Average			79.9	232	204	122	4.64

Hydrogen Fluoride

Test No.	HF Collected mg	Dry Volume Sampled Rm^3*	Hydrogen Fluoride Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	HF Emission Rate g/s
1	12.2	0.1221	34.3	99.9	85.2	52.5	1.97
2	14.0	0.1244	39.0	113	100	59.1	2.26
3	2.20	0.1228	6.15	17.9	16.1	9.38	0.36
Average			26.5	76.8	67.1	40.3	1.53

Hydrogen Bromide

Test No.	HBr Collected mg	Dry Volume Sampled Rm^3*	Hydrogen Bromide Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	HBr Emission Rate g/s
1	0.673	0.1221	1.89	5.51	4.70	2.89	0.11
2	0.681	0.1244	1.90	5.47	4.87	2.87	0.11
3	0.491	0.1228	1.37	4.00	3.59	2.09	0.081
Average			1.72	4.99	4.39	2.62	0.10

Hydrogen Iodide

Test No.	HI Collected mg	Dry Volume Sampled Rm^3*	Hydrogen Iodide Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	HI Emission Rate g/s
1	0.446	0.1221	1.25	3.65	3.11	1.92	0.072
2	0.371	0.1244	1.03	2.98	2.65	1.57	0.060
3	0.0799	0.1228	0.22	0.65	0.58	0.34	0.013
Average			0.84	2.43	2.12	1.27	0.048

Hydrogen Cyanide

Test No.	HCN Collected µg	Dry Volume Sampled Rm^3*	Hydrogen Cyanide Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	HCN Emission Rate g/s
1	<10.4	0.1221	<0.029	<0.085	<0.073	<0.045	<0.0017
2	<0.10	0.1244	<0.00029	<0.00083	<0.00074	<0.00044	<0.000017
3	<0.10	0.1228	<0.00029	<0.00085	<0.00076	<0.00044	<0.000017
Average			<0.0099	<0.029	<0.025	<0.015	<0.00057

* At 25 °C and 1 atmosphere
** At 25 °C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: All analytical results are reported as the average of duplicate analyses except for hydrogen cyanide.
"<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 18
Clean Harbors Sarnia
Halide Blank and Test Analyses Comparison

Hydrogen Chloride

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.107	<0.0103	28.6

Hydrogen Fluoride

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.0730	<0.00702	9.47

Hydrogen Bromide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.0895	<0.0339	<0.62

Hydrogen Iodide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.00524	<0.000504	0.30

Hydrogen Cyanide

Method Blank Analysis µg	Reagent Blank Analysis µg	Average Analysis of Test No. 1 to No. 3 µg
<0.10	<0.10	<3.53

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit).

TABLE 19
Clean Harbors Sarnia
Combustion Gas Analyses

Average Combustion Gases - As Measured

Test No.	Carbon Dioxide %	Carbon Monoxide ppm	Nitrogen Oxides * ppm	Nitric Oxide ppm	Oxygen %	Sulfur Dioxide ppm	Total Hydrocarbons ** ppm
1	8.59	73.2	150	147	9.26	498	33.1
2	8.26	82.3	134	132	9.77	451	29.0
3	8.10	86.6	142	141	9.90	459	32.9
Average	8.32	80.7	142	140	9.64	469	31.7

Average Combustion Gases - Dry Basis Adjusted to 11% Oxygen

Test No.	Carbon Dioxide %	Carbon Monoxide ppm	Nitrogen Oxides * ppm	Nitric Oxide ppm	Oxygen %	Sulfur Dioxide ppm	Total Hydrocarbons ppm
1	7.31	62.3	128	125	-	424	53.7
2	7.35	73.2	119	117	-	401	49.2
3	7.29	77.9	128	127	-	413	56.6
Average	7.31	71.1	125	123	-	413	53.2

* Nitric oxide and nitrogen dioxide
** Wet basis as methane, one-minute average data

TABLE 20
Clean Harbors Sarnia
Combustion Gas Emission Data

Test No.	Combustion Gas	Dry Actual Concentration	Dry Adjusted Concentration	Dry Concentration by Weight Reference**	Dry Concentration by Weight Adjusted ***	Wet Concentration by Weight Actual	Wet Concentration by Weight Reference**	Emission Rate
		ppm	ppm	mg/Rm^3	mg/Rm^3	mg/m^3	mg/Rm^3	g/s
1	Carbon Dioxide	85900	73257	154484	131746	53020	81155	3043
	Carbon Monoxide	73.2	62.4	83.8	71.4	28.8	44.0	1.65
	Nitrogen Oxides ****	150	128	282	241	96.8	148	5.56
	Nitric Oxide	147	125	180	154	61.9	94.7	3.55
	Oxygen	92600	110000	121115	143873	41567	63626	2386
	Sulphur Dioxide	498	425	1303	1111	447	684	25.7
	Total Hydrocarbons	33.1 *	53.7	41.2	35.1	14.1	21.6	0.81
2	Carbon Dioxide	82600	73463	148549	132117	51480	77959	2986
	Carbon Monoxide	82.3	73.2	94.2	83.8	32.6	49.4	1.89
	Nitrogen Oxides ****	134	119	252	224	87.3	132	5.06
	Nitric Oxide	132	117	162	144	56.1	84.9	3.25
	Oxygen	97700	110000	127785	143873	44284	67062	2568
	Sulphur Dioxide	451	401	1180	1049	409	619	23.7
	Total Hydrocarbons	29.0 *	49.1	36.1	32.1	12.5	19.0	0.73
3	Carbon Dioxide	81000	72757	145672	130847	49952	76215	2957
	Carbon Monoxide	86.6	77.8	99.1	89.0	34.0	51.9	2.01
	Nitrogen Oxides ****	142	128	267	240	91.5	140	5.42
	Nitric Oxide	141	127	173	155	59.3	90.5	3.51
	Oxygen	99000	110000	129486	143873	44401	67746	2629
	Sulphur Dioxide	459	412	1201	1078	412	628	24.4
	Total Hydrocarbons	32.9 *	56.5	41.1	36.9	14.1	21.5	0.83

* THC concentrations by volume (ppm) are provided on a wet basis
** At 25°C and 1 atmosphere
*** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
**** Nitric oxide and nitrogen dioxide as the equivalent amount of nitrogen dioxide

TABLE 21
Clean Harbors Sarnia
Summary of Combustion Gas Emission Data

Combustion Gas	Test No. 1 mg/m^3	Actual Concentration Test No. 2 mg/m^3	Test No. 3 mg/m^3	Average mg/m^3	Coefficient of Variation %
Carbon Dioxide	53020	51480	49952	51484	3.0
Carbon Monoxide	28.8	32.6	34.0	31.8	8.5
Nitrogen Oxides ***	96.8	87.3	91.5	91.9	5.2
Nitric Oxide	61.9	56.1	59.3	59.1	4.9
Oxygen	41567	44284	44401	43418	3.7
Sulphur Dioxide	447	409	412	423	5.0
Total Hydrocarbons	14.1	12.5	14.1	13.6	6.8

Combustion Gas	Test No. 1 mg/Rm^3*	Dry Reference Concentration Test No. 2 mg/Rm^3*	Test No. 3 mg/Rm^3*	Average mg/Rm^3*	Coefficient of Variation %
Carbon Dioxide	154484	148549	145672	149568	3.0
Carbon Monoxide	83.8	94.2	99.1	92.4	8.5
Nitrogen Oxides ***	282	252	267	267	5.6
Nitric Oxide	180	162	173	172	5.4
Oxygen	121115	127785	129486	126129	3.5
Sulphur Dioxide	1303	1180	1201	1228	5.4
Total Hydrocarbons	41.2	36.1	41.1	39.5	7.4

Combustion Gas	Test No. 1 mg/Rm^3**	Dry Adjusted Concentration Test No. 2 mg/Rm^3**	Test No. 3 mg/Rm^3**	Average mg/Rm^3**	Coefficient of Variation %
Carbon Dioxide	131746	132117	130847	131570	0.5
Carbon Monoxide	71.4	83.8	89.0	81.4	11.1
Nitrogen Oxides ***	241	224	240	235	4.0
Nitric Oxide	154	144	155	151	4.1
Oxygen	143873	143873	143873	143873	-
Sulphur Dioxide	1111	1049	1078	1080	2.9
Total Hydrocarbons	35.1	32.1	36.9	34.7	7.0

Combustion Gas	Test No. 1 g/s	Emission Rate Test No. 2 g/s	Test No. 3 g/s	Average g/s	Coefficient of Variation %
Carbon Dioxide	3043	2986	2957	2995	1.5
Carbon Monoxide	1.65	1.89	2.01	1.85	10.0
Nitrogen Oxides ***	5.56	5.06	5.42	5.35	4.8
Nitric Oxide	3.55	3.25	3.51	3.44	4.7
Oxygen	2386	2568	2629	2528	5.0
Sulphur Dioxide	25.7	23.7	24.4	24.6	4.0
Total Hydrocarbons	0.81	0.73	0.83	0.79	7.2

* Dry at 25°C and 1 atmosphere.
** Dry at 25°C and 1 atmosphere, adjusted to 11% oxygen by volume.
*** Nitrogen oxides are expressed as the equivalent amount of nitrogen dioxide.

TABLE 22
Clean Harbors Sarnia
Metal Analyses, Test No. 1

Metal	Probe & Filter Nitric Acid Digest	Probe & Filter Hydrofluoric Acid Digest	Impingers & Rinses	Total Collected
	µg	µg	µg	µg
Aluminum *	137	177	3540	3677
Antimony	5.43	1.08	8.72	15.2
Arsenic	85.1	7.04	863	955
Barium	20.5	12.0	28.6	61.1
Beryllium	<0.2	<0.2	<0.1	<0.10
Boron *	<30	<30	13000	13000
Cadmium	3.82	0.33	0.29	4.44
Calcium *	1330	<500	16000	17330
Chromium	67.1	31.5	19.5	118
Cobalt	1.05	0.25	0.67	1.97
Copper	192	16.9	7.16	216
Iron	281	<200	1540	1821
Lead	4.44	0.56	4.71	9.71
Lithium	8.97	<0.5	2.75	11.7
Magnesium *	256	56.4	297	553
Manganese	48.1	9.39	13.5	71.0
Mercury **	0.54	0.069	11.7	12.3
Molybdenum	10.6	10.3	1.07	22.0
Nickel	12.7	5.54	7.37	25.6
Phosphorus	478	<100	41.5	520
Potassium	7660	516	658	8834
Selenium	33.4	4.51	1830	1868
Silicon *	597	-	66500	67097
Silver	0.22	<0.2	0.50	0.72
Sodium *	13800	1020	25900	39700
Strontium	5.38	1.19	27.1	33.7
Sulphur	<10000	<10000	3130000	3130000
Tin	37.8	10.6	69.0	117
Titanium	78.5	44.1	88.2	211
Vanadium	1.98	<1	0.85	2.83
Zinc	151	29.3	38.0	218
Total				<3286508

* Hydrofluoric acid digest not included in the total.

** Includes the permanganate impingers

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit, "<MDL"). Where all values were reported below the detection limit for a given metal, the value of the detection limit for the fraction most likely to contain that metal was used to calculate emission data, the remaining fractions were assigned a value of zero. In instances where only one fraction was below the detection limit, that fraction was assigned a value of zero to calculate emission data.

TABLE 23
Clean Harbors Sarnia
Metal Analyses, Test No. 2

Metal	Probe & Filter Nitric Acid Digest	Probe & Filter Hydrofluoric Acid Digest	Impingers & Rinses	Total Collected
	µg	µg	µg	µg
Aluminum *	173	168	1490	1663
Antimony	5.77	1.12	12.1	19.0
Arsenic	77.4	8.39	487	573
Barium	18.2	9.41	37.2	64.8
Beryllium	<0.2	<0.2	0.68	0.68
Boron *	<30	<30	8860	8860
Cadmium	4.24	0.48	1.70	6.42
Calcium *	1150	<500	7260	8410
Chromium	75.0	23.4	11.7	110
Cobalt	1.14	0.24	0.38	1.76
Copper	174	19.2	5.13	198
Iron	298	<200	733	1031
Lead	4.39	0.69	7.95	13.0
Lithium	9.15	<0.5	5.19	14.3
Magnesium *	246	53.6	230	476
Manganese	47.0	7.95	19.9	74.9
Mercury **	0.52	0.061	12.9	13.5
Molybdenum	10.4	10.2	0.45	21.1
Nickel	15.3	4.86	7.50	27.7
Phosphorus	450	<100	<25	450
Potassium	6870	645	540	8055
Selenium	32.9	4.66	798	836
Silicon *	797	-	25600	26397
Silver	0.25	<0.2	0.24	0.49
Sodium *	12800	1280	11100	23900
Strontium	5.10	1.23	19.4	25.7
Sulphur	<10000	<10000	2880000	2880000
Tin	39.9	7.05	72.9	120
Titanium	74.6	34.4	34.7	144
Vanadium	2.12	<1	2.06	4.18
Zinc	127	25.0	46.5	199
Total				2961708

* Hydrofluoric acid digest not included in the total.

** Includes the permanganate impingers

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit, "<MDL"). Where all values were reported below the detection limit for a given metal, the value of the detection limit for the fraction most likely to contain that metal was used to calculate emission data, the remaining fractions were assigned a value of zero. In instances where only one fraction was below the detection limit, that fraction was assigned a value of zero to calculate emission data.

TABLE 24
Clean Harbors Sarnia
Metal Analyses, Test No. 3

Metal	Probe & Filter Nitric Acid Digest µg	Probe & Filter Hydrofluoric Acid Digest µg	Impingers & Rinses µg	Total Collected µg
Aluminum *	213	180	4040	4253
Antimony	7.75	2.04	12.7	22.5
Arsenic	77.1	6.33	1100	1183
Barium	23.1	8.78	56.6	88.5
Beryllium	<0.2	<0.2	0.82	0.82
Boron *	<30	<30	13600	13600
Cadmium	5.95	0.72	0.27	6.95
Calcium *	1410	<500	12000	13410
Chromium	71.0	28.0	19.5	119
Cobalt	1.37	0.35	0.59	2.31
Copper	174	15.2	6.71	196
Iron	296	<200	1210	1506
Lead	5.59	0.65	8.33	14.6
Lithium	12.8	<0.5	8.68	21.5
Magnesium *	285	52.5	373	658
Manganese	44.4	8.29	18.1	70.8
Mercury **	0.62	0.068	12.1	12.7
Molybdenum	11.6	10.7	1.03	23.3
Nickel	14.6	7.66	9.50	31.8
Phosphorus	567	<100	<25	567
Potassium	7320	439	882	8641
Selenium	33.1	4.42	1330	1368
Silicon *	483	-	39400	39883
Silver	0.32	<0.2	0.52	0.85
Sodium *	14000	933	21900	35900
Strontium	6.21	1.26	31.4	38.9
Sulphur	<10000	<10000	3070000	3070000
Tin	39.5	9.56	70.5	120
Titanium	88.0	48.1	63.5	200
Vanadium	2.59	<1	2.95	5.54
Zinc	123	25.7	53.0	202
Total				3192145

* Hydrofluoric acid digest not included in the total.

** Includes the permanganate impingers

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit, "<MDL"). Where all values were reported below the detection limit for a given metal, the value of the detection limit for the fraction most likely to contain that metal was used to calculate emission data, the remaining fractions were assigned a value of zero. In instances where only one fraction was below the detection limit, that fraction was assigned a value of zero to calculate emission data.

TABLE 25
Clean Harbors Sarnia
Metal Emission Data, Test No. 1

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	3677	240	710	602	367	13.9
Antimony	15.2	0.99	2.94	2.49	1.52	0.058
Arsenic	955	62.3	184	156	95.3	3.61
Barium	61.1	3.99	11.8	10.0	6.10	0.23
Beryllium	<0.10	<0.0065	<0.019	<0.016	<0.010	<0.00038
Boron	13000	848	2509	2129	1298	49.2
Cadmium	4.44	0.29	0.86	0.73	0.44	0.017
Calcium	17330	1130	3345	2838	1730	65.6
Chromium	118	7.70	22.8	19.3	11.8	0.45
Cobalt	1.97	0.13	0.38	0.32	0.20	0.0075
Copper	216	14.1	41.7	35.4	21.6	0.82
Iron	1821	119	351	298	182	6.89
Lead	9.71	0.63	1.87	1.59	0.97	0.037
Lithium	11.7	0.76	2.26	1.92	1.17	0.044
Magnesium	553	36.1	107	90.6	55.2	2.09
Manganese	71.0	4.63	13.7	11.6	7.09	0.27
Mercury	12.3	0.80	2.37	2.01	1.23	0.046
Molybdenum	22.0	1.43	4.24	3.60	2.19	0.083
Nickel	25.6	1.67	4.94	4.19	2.56	0.097
Phosphorus	520	33.9	100	85.1	51.9	1.97
Potassium	8834	576	1705	1447	882	33.4
Selenium	1868	122	361	306	186	7.07
Silicon	67097	4376	12951	10988	6697	254
Silver	0.72	0.047	0.14	0.12	0.072	0.0027
Sodium	39700	2589	7663	6502	3963	150
Strontium	33.7	2.20	6.50	5.51	3.36	0.13
Sulphur	3130000	204154	604130	512596	312426	11841
Tin	117	7.66	22.7	19.2	11.7	0.44
Titanium	211	13.7	40.7	34.5	21.0	0.80
Vanadium	2.83	0.18	0.55	0.46	0.28	0.011
Zinc	218	14.2	42.1	35.8	21.8	0.83
Total	<3286508	<214363	<634338	<538227	<328048	<12433

Dry Gas Volume Sampled (Rm³*) :	5.181
Actual Flowrate (m³/s) :	58.0
Dry Reference Flowrate (Rm³/s*) :	19.6
Dry Adjusted Flowrate (Rm³/s**) :	23.1
Wet Reference Flowrate (Rm³/s*) :	37.9

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 26
Clean Harbors Sarnia
Metal Emission Data, Test No. 2

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	1663	107	311	277	163	6.31
Antimony	19.0	1.23	3.55	3.16	1.86	0.072
Arsenic	573	37.0	107	95.3	56.0	2.17
Barium	64.8	4.19	12.1	10.8	6.34	0.25
Beryllium	0.68	0.044	0.13	0.11	0.066	0.0026
Boron	8860	573	1656	1474	866	33.6
Cadmium	6.42	0.41	1.20	1.07	0.63	0.024
Calcium	8410	544	1572	1399	822	31.9
Chromium	110	7.12	20.6	18.3	10.8	0.42
Cobalt	1.76	0.11	0.33	0.29	0.17	0.0067
Copper	198	12.8	37.1	33.0	19.4	0.75
Iron	1031	66.6	193	172	101	3.91
Lead	13.0	0.84	2.44	2.17	1.27	0.049
Lithium	14.3	0.93	2.68	2.39	1.40	0.054
Magnesium	476	30.8	89.0	79.2	46.5	1.81
Manganese	74.9	4.84	14.0	12.5	7.32	0.28
Mercury	13.5	0.87	2.52	2.25	1.32	0.051
Molybdenum	21.1	1.36	3.93	3.50	2.06	0.080
Nickel	27.7	1.79	5.17	4.60	2.70	0.10
Phosphorus	450	29.1	84.1	74.9	44.0	1.71
Potassium	8055	521	1505	1340	788	30.6
Selenium	836	54.0	156	139	81.7	3.17
Silicon	26397	1706	4933	4392	2581	100
Silver	0.49	0.031	0.091	0.081	0.048	0.0018
Sodium	23900	1545	4466	3977	2337	90.7
Strontium	25.7	1.66	4.81	4.28	2.52	0.098
Sulphur	2880000	186130	538217	479202	281593	10926
Tin	120	7.75	22.4	19.9	11.7	0.45
Titanium	144	9.29	26.9	23.9	14.1	0.55
Vanadium	4.18	0.27	0.78	0.70	0.41	0.016
Zinc	199	12.8	37.1	33.0	19.4	0.75
Total	2961708	191410	553487	492798	289582	11236

Dry Gas Volume Sampled (Rm^3*) :	5.351
Actual Flowrate (m^3/s) :	58.7
Dry Reference Flowrate (Rm^3/s*) :	20.3
Dry Adjusted Flowrate (Rm^3/s**) :	22.8
Wet Reference Flowrate (Rm^3/s*) :	38.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 27
Clean Harbors Sarnia
Metal Emission Data, Test No. 3

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	4253	269	787	708	411	16.2
Antimony	22.5	1.42	4.16	3.75	2.17	0.086
Arsenic	1183	75.0	219	197	114	4.51
Barium	88.5	5.60	16.4	14.7	8.54	0.34
Beryllium	0.82	0.052	0.15	0.14	0.079	0.0031
Boron	13600	861	2518	2265	1313	51.9
Cadmium	6.95	0.44	1.29	1.16	0.67	0.026
Calcium	13410	849	2482	2233	1295	51.1
Chromium	119	7.51	21.9	19.7	11.4	0.45
Cobalt	2.31	0.15	0.43	0.38	0.22	0.0088
Copper	196	12.4	36.3	32.6	18.9	0.75
Iron	1506	95.4	279	251	145	5.74
Lead	14.6	0.92	2.70	2.43	1.41	0.056
Lithium	21.5	1.36	3.98	3.58	2.07	0.082
Magnesium	658	41.7	122	110	63.5	2.51
Manganese	70.8	4.48	13.1	11.8	6.83	0.27
Mercury	12.7	0.81	2.36	2.12	1.23	0.049
Molybdenum	23.3	1.48	4.32	3.89	2.25	0.089
Nickel	31.8	2.01	5.88	5.29	3.07	0.12
Phosphorus	567	35.9	105	94.4	54.7	2.16
Potassium	8641	547	1600	1439	834	33.0
Selenium	1368	86.6	253	228	132	5.21
Silicon	39883	2526	7383	6641	3850	152
Silver	0.85	0.054	0.16	0.14	0.082	0.0032
Sodium	35900	2274	6646	5978	3466	137
Strontium	38.9	2.46	7.20	6.47	3.75	0.15
Sulphur	3070000	194471	568308	511229	296383	11707
Tin	120	7.57	22.1	19.9	11.5	0.46
Titanium	200	12.6	36.9	33.2	19.3	0.76
Vanadium	5.54	0.35	1.03	0.92	0.53	0.021
Zinc	202	12.8	37.3	33.6	19.5	0.77
Total	3192145	202208	590919	531569	308176	12173

Dry Gas Volume Sampled (Rm³*) :	5.402
Actual Flowrate (m³/s) :	60.2
Dry Reference Flowrate (Rm³/s*) :	20.6
Dry Adjusted Flowrate (Rm³/s**) :	22.9
Wet Reference Flowrate (Rm³/s*) :	39.5

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 28
Clean Harbors Sarnia
Summary of Metal Actual Concentrations

Metal	Actual Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	µg/m³	µg/m³	µg/m³	µg/m³	%
Aluminum	240	107	269	206	41.9
Antimony	0.99	1.23	1.42	1.22	17.8
Arsenic	62.3	37.0	75.0	58.1	33.3
Barium	3.99	4.19	5.60	4.59	19.2
Beryllium	<0.0065	0.044	0.052	<0.034	71.1
Boron	848	573	861	761	21.4
Cadmium	0.29	0.41	0.44	0.38	21.1
Calcium	1130	544	849	841	34.9
Chromium	7.70	7.12	7.51	7.44	4.0
Cobalt	0.13	0.11	0.15	0.13	12.7
Copper	14.1	12.8	12.4	13.1	6.7
Iron	119	66.6	95.4	93.6	27.9
Lead	0.63	0.84	0.92	0.80	18.7
Lithium	0.76	0.93	1.36	1.02	30.3
Magnesium	36.1	30.8	41.7	36.2	15.1
Manganese	4.63	4.84	4.48	4.65	3.8
Mercury	0.80	0.87	0.81	0.83	4.7
Molybdenum	1.43	1.36	1.48	1.42	4.2
Nickel	1.67	1.79	2.01	1.82	9.5
Phosphorus	33.9	29.1	35.9	33.0	10.6
Potassium	576	521	547	548	5.1
Selenium	122	54.0	86.6	87.5	38.8
Silicon	4376	1706	2526	2870	47.7
Silver	0.047	0.031	0.054	0.044	25.8
Sodium	2589	1545	2274	2136	25.1
Strontium	2.20	1.66	2.46	2.11	19.3
Sulphur	204154	186130	194471	194918	4.6
Tin	7.66	7.75	7.57	7.66	1.1
Titanium	13.7	9.29	12.6	11.9	19.5
Vanadium	0.18	0.27	0.35	0.27	30.9
Zinc	14.2	12.8	12.8	13.3	6.2
Total	<214363	191410	202208	<202660	5.7

TABLE 29
Clean Harbors Sarnia
Summary of Metal Dry Reference Concentrations

Metal	Dry Reference Concentration Test No. 1 µg/Rm³*	Test No. 2 µg/Rm³*	Test No. 3 µg/Rm³*	Average µg/Rm³*	Coefficient of Variation %
Aluminum	710	311	787	603	42.4
Antimony	2.94	3.55	4.16	3.55	17.2
Arsenic	184	107	219	170	33.7
Barium	11.8	12.1	16.4	13.4	19.1
Beryllium	<0.019	0.13	0.15	<0.10	71.0
Boron	2509	1656	2518	2228	22.2
Cadmium	0.86	1.20	1.29	1.11	20.3
Calcium	3345	1572	2482	2466	36.0
Chromium	22.8	20.6	21.9	21.8	5.1
Cobalt	0.38	0.33	0.43	0.38	13.1
Copper	41.7	37.1	36.3	38.3	7.7
Iron	351	193	279	274	29.0
Lead	1.87	2.44	2.70	2.34	18.0
Lithium	2.26	2.68	3.98	2.97	30.1
Magnesium	107	89.0	122	106	15.5
Manganese	13.7	14.0	13.1	13.6	3.3
Mercury	2.37	2.52	2.36	2.42	3.8
Molybdenum	4.24	3.93	4.32	4.16	4.9
Nickel	4.94	5.17	5.88	5.33	9.2
Phosphorus	100	84.1	105	96.4	11.4
Potassium	1705	1505	1600	1603	6.2
Selenium	361	156	253	257	39.8
Silicon	12951	4933	7383	8422	48.8
Silver	0.14	0.091	0.16	0.13	26.4
Sodium	7663	4466	6646	6258	26.1
Strontium	6.50	4.81	7.20	6.17	19.9
Sulphur	604130	538217	568308	570219	5.8
Tin	22.7	22.4	22.1	22.4	1.2
Titanium	40.7	26.9	36.9	34.8	20.5
Vanadium	0.55	0.78	1.03	0.78	30.5
Zinc	42.1	37.1	37.3	38.9	7.3
Total	<634338	553487	590919	<592915	6.8

* At 25°C and 1 atmosphere

TABLE 30
Clean Harbors Sarnia
Summary of Metal Dry Adjusted Concentrations

Metal	Dry Adjusted Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	602	277	708	529	42.5
Antimony	2.49	3.16	3.75	3.13	20.0
Arsenic	156	95.3	197	150	34.2
Barium	10.0	10.8	14.7	11.8	21.4
Beryllium	<0.016	0.11	0.14	<0.089	71.9
Boron	2129	1474	2265	1956	21.6
Cadmium	0.73	1.07	1.16	0.98	23.0
Calcium	2838	1399	2233	2157	33.5
Chromium	19.3	18.3	19.7	19.1	3.8
Cobalt	0.32	0.29	0.38	0.33	14.1
Copper	35.4	33.0	32.6	33.7	4.4
Iron	298	172	251	240	26.6
Lead	1.59	2.17	2.43	2.06	20.8
Lithium	1.92	2.39	3.58	2.63	32.5
Magnesium	90.6	79.2	110	93.1	16.5
Manganese	11.6	12.5	11.8	12.0	3.7
Mercury	2.01	2.25	2.12	2.13	5.5
Molybdenum	3.60	3.50	3.89	3.66	5.4
Nickel	4.19	4.60	5.29	4.70	11.8
Phosphorus	85.1	74.9	94.4	84.8	11.5
Potassium	1447	1340	1439	1409	4.2
Selenium	306	139	228	224	37.2
Silicon	10988	4392	6641	7341	45.7
Silver	0.12	0.081	0.14	0.11	26.7
Sodium	6502	3977	5978	5486	24.3
Strontium	5.51	4.28	6.47	5.42	20.3
Sulphur	512596	479202	511229	501009	3.8
Tin	19.2	19.9	19.9	19.7	2.1
Titanium	34.5	23.9	33.2	30.6	19.0
Vanadium	0.46	0.70	0.92	0.69	33.0
Zinc	35.8	33.0	33.6	34.1	4.2
Total	<538227	492798	531569	<520864	4.7

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 31
Clean Harbors Sarnia
Summary of Metal Wet Reference Concentrations

Metal	Wet Reference Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	367	163	411	313	42.2
Antimony	1.52	1.86	2.17	1.85	17.6
Arsenic	95.3	56.0	114	88.5	33.6
Barium	6.10	6.34	8.54	6.99	19.3
Beryllium	<0.010	0.066	0.079	<0.052	71.1
Boron	1298	866	1313	1159	21.9
Cadmium	0.44	0.63	0.67	0.58	20.8
Calcium	1730	822	1295	1282	35.4
Chromium	11.8	10.8	11.4	11.3	4.6
Cobalt	0.20	0.17	0.22	0.20	13.0
Copper	21.6	19.4	18.9	20.0	7.1
Iron	182	101	145	143	28.4
Lead	0.97	1.27	1.41	1.22	18.5
Lithium	1.17	1.40	2.07	1.55	30.3
Magnesium	55.2	46.5	63.5	55.1	15.4
Manganese	7.09	7.32	6.83	7.08	3.4
Mercury	1.23	1.32	1.23	1.26	4.2
Molybdenum	2.19	2.06	2.25	2.17	4.6
Nickel	2.56	2.70	3.07	2.78	9.4
Phosphorus	51.9	44.0	54.7	50.2	11.1
Potassium	882	788	834	835	5.6
Selenium	186	81.7	132	133	39.3
Silicon	6697	2581	3850	4376	48.2
Silver	0.072	0.048	0.082	0.067	26.2
Sodium	3963	2337	3466	3255	25.6
Strontium	3.36	2.52	3.75	3.21	19.7
Sulphur	312426	281593	296383	296801	5.2
Tin	11.7	11.7	11.5	11.7	0.9
Titanium	21.0	14.1	19.3	18.1	20.1
Vanadium	0.28	0.41	0.53	0.41	30.8
Zinc	21.8	19.4	19.5	20.2	6.7
Total	<328048	289582	308176	<308602	6.2

* At 25°C and 1 atmosphere

TABLE 32
Clean Harbors Sarnia
Summary of Metal Emission Rates

Metal	Emission Rate				Coefficient
	Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s	of Variation %
Aluminum	13.9	6.31	16.2	12.1	42.7
Antimony	0.058	0.072	0.086	0.072	19.6
Arsenic	3.61	2.17	4.51	3.43	34.4
Barium	0.23	0.25	0.34	0.27	21.2
Beryllium	<0.00038	0.0026	0.0031	<0.0020	71.8
Boron	49.2	33.6	51.9	44.9	22.0
Cadmium	0.017	0.024	0.026	0.023	22.6
Calcium	65.6	31.9	51.1	49.5	34.1
Chromium	0.45	0.42	0.45	0.44	4.2
Cobalt	0.0075	0.0067	0.0088	0.0076	14.2
Copper	0.82	0.75	0.75	0.77	5.1
Iron	6.89	3.91	5.74	5.51	27.2
Lead	0.037	0.049	0.056	0.047	20.4
Lithium	0.044	0.054	0.082	0.060	32.3
Magnesium	2.09	1.81	2.51	2.14	16.6
Manganese	0.27	0.28	0.27	0.27	3.1
Mercury	0.046	0.051	0.049	0.049	4.8
Molybdenum	0.083	0.080	0.089	0.084	5.5
Nickel	0.097	0.10	0.12	0.11	11.5
Phosphorus	1.97	1.71	2.16	1.94	11.7
Potassium	33.4	30.6	33.0	32.3	4.8
Selenium	7.07	3.17	5.21	5.15	37.8
Silicon	254	100	152	169	46.3
Silver	0.0027	0.0018	0.0032	0.0026	26.9
Sodium	150	90.7	137	126	24.8
Strontium	0.13	0.098	0.15	0.12	20.4
Sulphur	11841	10926	11707	11491	4.3
Tin	0.44	0.45	0.46	0.45	1.4
Titanium	0.80	0.55	0.76	0.70	19.5
Vanadium	0.011	0.016	0.021	0.016	32.7
Zinc	0.83	0.75	0.77	0.78	4.9
Total	<12433	11236	12173	<11947	5.3

TABLE 33
Clean Harbors Sarnia
Summary of Metal Emission Data

Metal	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	206	603	529	313	12.1
Antimony	1.22	3.55	3.13	1.85	0.072
Arsenic	58.1	170	150	88.5	3.43
Barium	4.59	13.4	11.8	6.99	0.27
Beryllium	<0.034	<0.100	<0.089	<0.052	<0.0020
Boron	761	2228	1956	1159	44.9
Cadmium	0.38	1.11	0.98	0.58	0.023
Calcium	841	2466	2157	1282	49.5
Chromium	7.44	21.8	19.1	11.3	0.44
Cobalt	0.13	0.38	0.33	0.20	0.0076
Copper	13.1	38.3	33.7	20.0	0.77
Iron	93.6	274	240	143	5.51
Lead	0.80	2.34	2.06	1.22	0.047
Lithium	1.02	2.97	2.63	1.55	0.060
Magnesium	36.2	106	93.1	55.1	2.14
Manganese	4.65	13.6	12.0	7.08	0.27
Mercury	0.83	2.42	2.13	1.26	0.049
Molybdenum	1.42	4.16	3.66	2.17	0.084
Nickel	1.82	5.33	4.70	2.78	0.11
Phosphorus	33.0	96.4	84.8	50.2	1.94
Potassium	548	1603	1409	835	32.3
Selenium	87.5	257	224	133	5.15
Silicon	2870	8422	7341	4376	169
Silver	0.044	0.13	0.11	0.067	0.0026
Sodium	2136	6258	5486	3255	126
Strontium	2.11	6.17	5.42	3.21	0.12
Sulphur	194918	570219	501009	296801	11491
Tin	7.66	22.4	19.7	11.7	0.45
Titanium	11.9	34.8	30.6	18.1	0.70
Vanadium	0.27	0.78	0.69	0.41	0.016
Zinc	13.3	38.9	34.1	20.2	0.78
Total	<202660	<592915	<520864	<308602	<11947

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 34
Clean Harbors Sarnia
Blank Train Metal Analyses

Metal	Probe & Filter Nitric Acid Digest µg	Probe & Filter Hydrofluoric Acid Digest µg	Impingers & Rinses µg	Total Collected µg
Aluminum *	<20	134	32.5	32.5
Antimony	<0.2	<0.2	0.20	0.20
Arsenic	<1	<1	0.20	0.20
Barium	<5	6.50	2.07	8.57
Beryllium	<0.2	<0.2	<0.1	<0.10
Boron *	<30	<30	87.8	87.8
Cadmium	<0.1	<0.1	1.79	1.79
Calcium *	<500	<500	546	546
Chromium	<1	1.31	4.31	5.62
Cobalt	<0.2	<0.2	0.19	0.19
Copper	5.42	<1	10.7	16.1
Iron	<200	<200	63.9	63.9
Lead	0.51	<0.5	2.06	2.57
Lithium	<0.5	<0.5	<0.25	<0.50
Magnesium *	<10	25.4	35.3	35.3
Manganese	<0.5	1.50	3.94	5.44
Mercury **	<0.015	<0.015	<0.36	<0.36
Molybdenum	<0.2	9.29	0.14	9.43
Nickel	0.73	2.47	7.09	10.3
Phosphorus	<100	<100	<25	<100
Potassium	<100	<100	290	290
Selenium	<2	<2	<1	<1.00
Silicon *	<150	-	115	115
Silver	<0.2	<0.2	<0.1	<0.20
Sodium *	295	83.1	455	750
Strontium	<0.2	0.69	1.18	1.87
Sulphur	<10000	<10000	<3000	<3000
Tin	0.43	<0.3	16.8	17.2
Titanium	<10	<10	1.53	1.53
Vanadium	<1	<1	0.15	0.15
Zinc	<6	<6	81.0	81.0
Total				<5185

* Hydrofluoric acid digest not included in the total.
** Includes the permanganate impingers.

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). Where all values are reported below the detection limit for a given metal, the value of the detection limit for the fraction most likely to contain that metal was used to calculate the total collected in the blank, the remaining fractions are assigned a value of zero. In instances where only one fraction was below the detection limit, that fraction was assigned a value of zero to calculate the total collected in the blank.

TABLE 35
Clean Harbors Sarnia
Dioxin and Furan Congener Group Emission Data
Test No. 1

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	16.9	0.0011	0.0033	0.0028	0.0017	0.065
Pentachlorodibenzo-p-dioxins	35.2	0.0024	0.0068	0.0058	0.0036	0.13
Hexachlorodibenzo-p-dioxins	104	0.0070	0.020	0.017	0.011	0.40
Heptachlorodibenzo-p-dioxins	57.1	0.0038	0.011	0.0094	0.0059	0.22
Octachlorodibenzo-p-dioxin	44.4	0.0030	0.0086	0.0073	0.0046	0.17
Total	258	0.017	0.050	0.042	0.026	0.98

Furans

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzofurans	103	0.0069	0.020	0.017	0.011	0.39
Pentachlorodibenzofurans	49.0	0.0033	0.0095	0.0081	0.0050	0.19
Hexachlorodibenzofurans	43.5	0.0029	0.0084	0.0072	0.0045	0.17
Heptachlorodibenzofurans	31.0	0.0021	0.0060	0.0051	0.0032	0.12
Octachlorodibenzofuran	<9.7	<0.00065	<0.0019	<0.0016	<0.0010	<0.037
Total	<236	<0.016	<0.046	<0.039	<0.024	<0.90

Dry Gas Volume Sampled (Rm³*) :	5.159
Actual Flowrate (m³/s) :	56.7
Dry Reference Flowrate (Rm³/s*) :	19.7
Dry Adjusted Flowrate (Rm³/s**) :	23.2
Wet Reference Flowrate (Rm³/s*) :	37.2

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the emission data.

TABLE 36
Clean Harbors Sarnia
Dioxin and Furan Congener Group Emission Data
Test No. 2

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	72.5	0.0048	0.014	0.012	0.0072	0.27
Pentachlorodibenzo-p-dioxins	<15	<0.00099	<0.0028	<0.0025	<0.0015	<0.057
Hexachlorodibenzo-p-dioxins	<18	<0.0012	<0.0034	<0.0030	<0.0018	<0.068
Heptachlorodibenzo-p-dioxins	49.5	0.0033	0.0094	0.0083	0.0049	0.19
Octachlorodibenzo-p-dioxin	<180	<0.012	<0.034	<0.030	<0.018	<0.68
Total	<335	<0.022	<0.064	<0.056	<0.033	<1.26

Furans

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzofurans	166	0.011	0.031	0.028	0.017	0.63
Pentachlorodibenzofurans	<15	<0.00099	<0.0028	<0.0025	<0.0015	<0.057
Hexachlorodibenzofurans	<24	<0.0016	<0.0046	<0.0040	<0.0024	<0.091
Heptachlorodibenzofurans	<44	<0.0029	<0.0083	<0.0074	<0.0044	<0.17
Octachlorodibenzofuran	<81	<0.0053	<0.015	<0.014	<0.0081	<0.31
Total	<330	<0.022	<0.063	<0.056	<0.033	<1.25

Dry Gas Volume Sampled (Rm³*) :	5.270
Actual Flowrate (m³/s) :	57.2
Dry Reference Flowrate (Rm³/s*) :	19.9
Dry Adjusted Flowrate (Rm³/s**) :	22.4
Wet Reference Flowrate (Rm³/s*) :	37.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the emission data.

TABLE 37
Clean Harbors Sarnia
Dioxin and Furan Congener Group Emission Data
Test No. 3

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	45.3	0.0030	0.0086	0.0077	0.0045	0.17
Pentachlorodibenzo-p-dioxins	34.6	0.0023	0.0066	0.0059	0.0034	0.13
Hexachlorodibenzo-p-dioxins	174	0.011	0.033	0.030	0.017	0.66
Heptachlorodibenzo-p-dioxins	142	0.0093	0.027	0.024	0.014	0.54
Octachlorodibenzo-p-dioxin	102	0.0066	0.019	0.017	0.010	0.39
Total	498	0.032	0.094	0.085	0.049	1.89

Furans

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzofurans	80.4	0.0052	0.015	0.014	0.0080	0.31
Pentachlorodibenzofurans	49.3	0.0032	0.0094	0.0084	0.0049	0.19
Hexachlorodibenzofurans	107	0.0070	0.020	0.018	0.011	0.41
Heptachlorodibenzofurans	79.6	0.0052	0.015	0.014	0.0079	0.30
Octachlorodibenzofuran	34.5	0.0022	0.0065	0.0059	0.0034	0.13
Total	351	0.023	0.067	0.060	0.035	1.33

Dry Gas Volume Sampled (Rm³*) :	5.272
Actual Flowrate (m³/s) :	58.2
Dry Reference Flowrate (Rm³/s*) :	20.0
Dry Adjusted Flowrate (Rm³/s**) :	22.2
Wet Reference Flowrate (Rm³/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 38
Clean Harbors Sarnia
Dioxin and Furan Congener Group Actual Concentrations

Dioxins

Congener Group	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0011	0.0048	0.0030	0.0030	61.6
Pentachlorodibenzo-p-dioxins	0.0024	<0.00099	0.0023	<0.0019	40.9
Hexachlorodibenzo-p-dioxins	0.0070	<0.0012	0.011	<0.0065	78.2
Heptachlorodibenzo-p-dioxins	0.0038	0.0033	0.0093	0.0055	60.5
Octachlorodibenzo-p-dioxin	0.0030	<0.012	0.0066	<0.0072	62.3
Total	0.017	<0.022	0.032	<0.024	32.2

Furans

Congener Group	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
Tetrachlorodibenzofurans	0.0069	0.011	0.0052	0.0077	38.1
Pentachlorodibenzofurans	0.0033	<0.00099	0.0032	<0.0025	52.3
Hexachlorodibenzofurans	0.0029	<0.0016	0.0070	<0.0038	73.3
Heptachlorodibenzofurans	0.0021	<0.0029	0.0052	<0.0034	47.4
Octachlorodibenzofuran	<0.00065	<0.0053	0.0022	<0.0027	86.8
Total	<0.016	<0.022	0.023	<0.020	18.6

TABLE 39
Clean Harbors Sarnia
Dioxin and Furan Congener Group Dry Reference Concentrations

Dioxins

Congener Group	Dry Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0033	0.014	0.0086	0.0085	61.4
Pentachlorodibenzo-p-dioxins	0.0068	<0.0028	0.0066	<0.0054	41.1
Hexachlorodibenzo-p-dioxins	0.020	<0.0034	0.033	<0.019	78.7
Heptachlorodibenzo-p-dioxins	0.011	0.0094	0.027	0.016	61.3
Octachlorodibenzo-p-dioxin	0.0086	<0.034	0.019	<0.021	62.0
Total	0.050	<0.064	0.094	<0.069	32.9

Furans

Congener Group	Dry Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzofurans	0.020	0.031	0.015	0.022	37.6
Pentachlorodibenzofurans	0.0095	<0.0028	0.0094	<0.0072	52.5
Hexachlorodibenzofurans	0.0084	<0.0046	0.020	<0.011	73.9
Heptachlorodibenzofurans	0.0060	<0.0083	0.015	<0.0098	48.1
Octachlorodibenzofuran	<0.0019	<0.015	0.0065	<0.0079	86.4
Total	<0.046	<0.063	0.067	<0.058	18.9

* At 25°C and 1 atmosphere

TABLE 40
Clean Harbors Sarnia
Dioxin and Furan Congener Group Dry Adjusted Concentrations

Dioxins

Congener Group	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0028	0.012	0.0077	0.0076	62.3
Pentachlorodibenzo-p-dioxins	0.0058	<0.0025	0.0059	<0.0047	40.5
Hexachlorodibenzo-p-dioxins	0.017	<0.0030	0.030	<0.017	80.3
Heptachlorodibenzo-p-dioxins	0.0094	0.0083	0.024	0.014	63.6
Octachlorodibenzo-p-dioxin	0.0073	<0.030	0.017	<0.018	62.9
Total	0.042	<0.056	0.085	<0.061	35.5

Furans

Congener Group	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzofurans	0.017	0.028	0.014	0.020	38.2
Pentachlorodibenzofurans	0.0081	<0.0025	0.0084	<0.0063	52.1
Hexachlorodibenzofurans	0.0072	<0.0040	0.018	<0.0098	76.1
Heptachlorodibenzofurans	0.0051	<0.0074	0.014	<0.0087	50.5
Octachlorodibenzofuran	<0.0016	<0.014	0.0059	<0.0070	86.7
Total	<0.039	<0.056	0.060	<0.051	21.6

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 41
Clean Harbors Sarnia
Dioxin and Furan Congener Group Wet Reference Concentrations

Dioxins

Congener Group	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0017	0.0072	0.0045	0.0045	61.3
Pentachlorodibenzo-p-dioxins	0.0036	<0.0015	0.0034	<0.0028	41.2
Hexachlorodibenzo-p-dioxins	0.011	<0.0018	0.017	<0.0099	78.3
Heptachlorodibenzo-p-dioxins	0.0059	0.0049	0.014	0.0083	60.7
Octachlorodibenzo-p-dioxin	0.0046	<0.018	0.010	<0.011	61.9
Total	0.026	<0.033	0.049	<0.036	32.3

Furans

Congener Group	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzofurans	0.011	0.017	0.0080	0.012	37.7
Pentachlorodibenzofurans	0.0050	<0.0015	0.0049	<0.0038	52.6
Hexachlorodibenzofurans	0.0045	<0.0024	0.011	<0.0058	73.4
Heptachlorodibenzofurans	0.0032	<0.0044	0.0079	<0.0052	47.5
Octachlorodibenzofuran	<0.0010	<0.0081	0.0034	<0.0042	86.5
Total	<0.024	<0.033	0.035	<0.031	18.4

* At 25°C and 1 atmosphere

TABLE 42
Clean Harbors Sarnia
Dioxin and Furan Congener Group Emission Rates

Dioxins

Congener Group	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.065	0.27	0.17	0.17	61.5
Pentachlorodibenzo-p-dioxins	0.13	<0.057	0.13	<0.11	41.0
Hexachlorodibenzo-p-dioxins	0.40	<0.068	0.66	<0.38	79.1
Heptachlorodibenzo-p-dioxins	0.22	0.19	0.54	0.31	61.9
Octachlorodibenzo-p-dioxin	0.17	<0.68	0.39	<0.41	62.1
Total	0.98	<1.26	1.89	<1.38	33.6

Furans

Congener Group	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
Tetrachlorodibenzofurans	0.39	0.63	0.31	0.44	37.6
Pentachlorodibenzofurans	0.19	<0.057	0.19	<0.14	52.4
Hexachlorodibenzofurans	0.17	<0.091	0.41	<0.22	74.5
Heptachlorodibenzofurans	0.12	<0.17	0.30	<0.20	48.7
Octachlorodibenzofuran	<0.037	<0.31	0.13	<0.16	86.4
Total	<0.90	<1.25	1.33	<1.16	19.6

TABLE 43
Clean Harbors Sarnia
Summary of Dioxin and Furan Congener Group Emission Data

Dioxins

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	0.0030	0.0085	0.0076	0.0045	0.17
Pentachlorodibenzo-p-dioxins	<0.0019	<0.0054	<0.0047	<0.0028	<0.11
Hexachlorodibenzo-p-dioxins	<0.0065	<0.019	<0.017	<0.0099	<0.38
Heptachlorodibenzo-p-dioxins	0.0055	0.016	0.014	0.0083	0.31
Octachlorodibenzo-p-dioxin	<0.0072	<0.021	<0.018	<0.011	<0.41
Total	<0.024	<0.069	<0.061	<0.036	<1.38

Furans

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzofurans	0.0077	0.022	0.020	0.012	0.44
Pentachlorodibenzofurans	<0.0025	<0.0072	<0.0063	<0.0038	<0.14
Hexachlorodibenzofurans	<0.0038	<0.011	<0.0098	<0.0058	<0.22
Heptachlorodibenzofurans	<0.0034	<0.0098	<0.0087	<0.0052	<0.20
Octachlorodibenzofuran	<0.0027	<0.0079	<0.0070	<0.0042	<0.16
Total	<0.020	<0.058	<0.051	<0.031	<1.16

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 44
Clean Harbors Sarnia
Blank Dioxin and Furan Congener Group Analyses

Dioxins

Congener Group	Blank Train pg	Laboratory Blank pg
Tetrachlorodibenzo-p-dioxins	<3.1	<6.0
Pentachlorodibenzo-p-dioxins	<1.7	<3.4
Hexachlorodibenzo-p-dioxins	<1.6	<4.1
Heptachlorodibenzo-p-dioxins	<1.3	<2.9
Octachlorodibenzo-p-dioxin	<5.0	<2.7
Total	<12.7	<19.1

Furans

Congener Group	Blank Train pg	Laboratory Blank pg
Tetrachlorodibenzofurans	<2.5	<4.7
Pentachlorodibenzofurans	2.80	<3.4
Hexachlorodibenzofurans	<1.6	3.19
Heptachlorodibenzofurans	<0.93	<2.6
Octachlorodibenzofuran	3.21	<3.1
Total	<11.0	<17.0

"<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the total collected.

TABLE 45
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Emission Data
Test No. 1

Specific Isomer	Total Collected pg	Actual Concentration pg/m^3	Dry Reference Concentration pg/Rm^3*	Dry Adjusted Concentration pg/Rm^3**	Wet Reference Concentration pg/Rm^3*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<5.2	<0.35	<1.01	<0.86	<0.53	<0.020
12378-pentachlorodibenzo-p-dioxin	<2.9	<0.20	<0.56	<0.48	<0.30	<0.011
123478-hexachlorodibenzo-p-dioxin	<3.8	<0.26	<0.74	<0.63	<0.39	<0.015
123678-hexachlorodibenzo-p-dioxin	5.97	0.40	1.16	0.98	0.61	0.023
123789-hexachlorodibenzo-p-dioxin	<3.8	<0.26	<0.74	<0.63	<0.39	<0.015
1234678-heptachlorodibenzo-p-dioxin	28.6	1.93	5.54	4.71	2.94	0.11
Octachlorodibenzo-p-dioxin	44.4	2.99	8.61	7.31	4.56	0.17
2378-tetrachlorodibenzofuran	<5.6	<0.38	<1.09	<0.92	<0.57	<0.021
12378-pentachlorodibenzofuran	<8.3	<0.56	<1.61	<1.37	<0.85	<0.032
23478-pentachlorodibenzofuran	<8.8	<0.59	<1.71	<1.45	<0.90	<0.034
123478-hexachlorodibenzofuran	<5.5	<0.37	<1.07	<0.91	<0.56	<0.021
123678-hexachlorodibenzofuran	<6.9	<0.46	<1.34	<1.14	<0.71	<0.026
234678-hexachlorodibenzofuran	9.65	0.65	1.87	1.59	0.99	0.037
123789-hexachlorodibenzofuran	9.18	0.62	1.78	1.51	0.94	0.035
1234678-heptachlorodibenzofuran	24.2	1.63	4.69	3.98	2.48	0.092
1234789-heptachlorodibenzofuran	<5.6	<0.38	<1.09	<0.92	<0.57	<0.021
Octachlorodibenzofuran	<9.7	<0.65	<1.88	<1.60	<1.00	<0.037
PCB 77	454	30.6	88.0	74.7	46.6	1.73
PCB 81	<65	<4.38	<12.6	<10.7	<6.67	<0.25
PCB 126	<74	<4.98	<14.3	<12.2	<7.60	<0.28
PCB 169	<39	<2.63	<7.56	<6.42	<4.00	<0.15
PCB 105	2730	184	529	449	280	10.4
PCB 114	<220	<14.8	<42.6	<36.2	<22.6	<0.84
PCB 118	9350	630	1812	1539	960	35.7
PCB 123	<53	<3.57	<10.3	<8.72	<5.44	<0.20
PCB 156/157	209	14.1	40.5	34.4	21.5	0.80
PCB 167	<75	<5.05	<14.5	<12.3	<7.70	<0.29
PCB 189	<16	<1.08	<3.10	<2.63	<1.64	<0.061
Total Dioxins & Furans Only	<188	<12.7	<36.5	<31.0	<19.3	<0.72

Dry Gas Volume Sampled (Rm^3*) :	5.159
Actual Flowrate (m^3/s) :	56.7
Dry Reference Flowrate (Rm^3/s*) :	19.7
Dry Adjusted Flowrate (Rm^3/s**) :	23.2
Wet Reference Flowrate (Rm^3/s*) :	37.2

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 46
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Emission Data
Test No. 2

Specific Isomer	Total Collected pg	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<25	<1.65	<4.74	<4.21	<2.50	<0.094
12378-pentachlorodibenzo-p-dioxin	<15	<0.99	<2.85	<2.53	<1.50	<0.057
123478-hexachlorodibenzo-p-dioxin	<17	<1.12	<3.23	<2.87	<1.70	<0.064
123678-hexachlorodibenzo-p-dioxin	<16	<1.06	<3.04	<2.70	<1.60	<0.060
123789-hexachlorodibenzo-p-dioxin	<18	<1.19	<3.42	<3.03	<1.80	<0.068
1234678-heptachlorodibenzo-p-dioxin	<42	<2.77	<7.97	<7.08	<4.20	<0.16
Octachlorodibenzo-p-dioxin	<180	<11.9	<34.2	<30.3	<18.0	<0.68
2378-tetrachlorodibenzofuran	<21	<1.39	<3.98	<3.54	<2.10	<0.079
12378-pentachlorodibenzofuran	<15	<0.99	<2.85	<2.53	<1.50	<0.057
23478-pentachlorodibenzofuran	<16	<1.06	<3.04	<2.70	<1.60	<0.060
123478-hexachlorodibenzofuran	<20	<1.32	<3.80	<3.37	<2.00	<0.076
123678-hexachlorodibenzofuran	<19	<1.25	<3.61	<3.20	<1.90	<0.072
234678-hexachlorodibenzofuran	<20	<1.32	<3.80	<3.37	<2.00	<0.076
123789-hexachlorodibenzofuran	<54	<3.56	<10.2	<9.10	<5.39	<0.20
1234678-heptachlorodibenzofuran	<34	<2.24	<6.45	<5.73	<3.40	<0.13
1234789-heptachlorodibenzofuran	<44	<2.90	<8.35	<7.42	<4.40	<0.17
Octachlorodibenzofuran	<81	<5.35	<15.4	<13.7	<8.09	<0.31
PCB 77	<360	<23.8	<68.3	<60.7	<36.0	<1.36
PCB 81	<140	<9.24	<26.6	<23.6	<14.0	<0.53
PCB 126	<110	<7.26	<20.9	<18.5	<11.0	<0.42
PCB 169	<130	<8.58	<24.7	<21.9	<13.0	<0.49
PCB 105	1210	79.9	230	204	121	4.57
PCB 114	<100	<6.60	<19.0	<16.9	<9.99	<0.38
PCB 118	3860	255	732	651	386	14.6
PCB 123	116	7.66	22.0	19.6	11.6	0.44
PCB 156/157	<130	<8.58	<24.7	<21.9	<13.0	<0.49
PCB 167	<91	<6.01	<17.3	<15.3	<9.09	<0.34
PCB 189	<85	<5.61	<16.1	<14.3	<8.49	<0.32
Total Dioxins & Furans Only	<637	<42.1	<121	<107	<63.6	<2.41

Dry Gas Volume Sampled (Rm³*) :	5.270
Actual Flowrate (m³/s) :	57.2
Dry Reference Flowrate (Rm³/s*) :	19.9
Dry Adjusted Flowrate (Rm³/s**) :	22.4
Wet Reference Flowrate (Rm³/s*) :	37.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 47
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Emission Data
Test No. 3

Specific Isomer	Total Collected pg	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<3.6	<0.23	<0.68	<0.62	<0.36	<0.014
12378-pentachlorodibenzo-p-dioxin	<1.6	<0.10	<0.30	<0.27	<0.16	<0.0061
123478-hexachlorodibenzo-p-dioxin	<2.9	<0.19	<0.55	<0.50	<0.29	<0.011
123678-hexachlorodibenzo-p-dioxin	<8.5	<0.55	<1.61	<1.45	<0.84	<0.032
123789-hexachlorodibenzo-p-dioxin	<2.9	<0.19	<0.55	<0.50	<0.29	<0.011
1234678-heptachlorodibenzo-p-dioxin	67.1	4.37	12.7	11.5	6.66	0.25
Octachlorodibenzo-p-dioxin	102	6.65	19.3	17.4	10.1	0.39
2378-tetrachlorodibenzofuran	<3.1	<0.20	<0.59	<0.53	<0.31	<0.012
12378-pentachlorodibenzofuran	7.56	0.49	1.43	1.29	0.75	0.029
23478-pentachlorodibenzofuran	<11	<0.72	<2.09	<1.88	<1.09	<0.042
123478-hexachlorodibenzofuran	8.57	0.56	1.63	1.46	0.85	0.033
123678-hexachlorodibenzofuran	11.3	0.74	2.14	1.93	1.12	0.043
234678-hexachlorodibenzofuran	26.7	1.74	5.06	4.56	2.65	0.10
123789-hexachlorodibenzofuran	12.6	0.82	2.39	2.15	1.25	0.048
1234678-heptachlorodibenzofuran	42.9	2.80	8.14	7.33	4.26	0.16
1234789-heptachlorodibenzofuran	19.6	1.28	3.72	3.35	1.95	0.074
Octachlorodibenzofuran	34.5	2.25	6.54	5.90	3.43	0.13
PCB 77	178	11.6	33.8	30.4	17.7	0.68
PCB 81	<36	<2.35	<6.83	<6.15	<3.58	<0.14
PCB 126	<21	<1.37	<3.98	<3.59	<2.09	<0.080
PCB 169	<22	<1.43	<4.17	<3.76	<2.18	<0.083
PCB 105	1600	104	303	273	159	6.07
PCB 114	<110	<7.17	<20.9	<18.8	<10.9	<0.42
PCB 118	5560	362	1055	950	552	21.1
PCB 123	<69	<4.50	<13.1	<11.8	<6.85	<0.26
PCB 156/157	<130	<8.47	<24.7	<22.2	<12.9	<0.49
PCB 167	<52	<3.39	<9.86	<8.89	<5.16	<0.20
PCB 189	<7.7	<0.50	<1.46	<1.32	<0.76	<0.029
Total Dioxins & Furans Only	<366	<23.9	<69.5	<62.6	<36.4	<1.39

Dry Gas Volume Sampled (Rm³*) :	5.272
Actual Flowrate (m³/s) :	58.2
Dry Reference Flowrate (Rm³/s*) :	20.0
Dry Adjusted Flowrate (Rm³/s**) :	22.2
Wet Reference Flowrate (Rm³/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 48
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Actual Concentrations

Specific Isomer	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	pg/m³	pg/m³	pg/m³	pg/m³	%
2378-tetrachlorodibenzo-p-dioxin	<0.35	<1.65	<0.23	<0.75	106
12378-pentachlorodibenzo-p-dioxin	<0.20	<0.99	<0.10	<0.43	113
123478-hexachlorodibenzo-p-dioxin	<0.26	<1.12	<0.19	<0.52	99.6
123678-hexachlorodibenzo-p-dioxin	0.40	<1.06	<0.55	<0.67	51.0
123789-hexachlorodibenzo-p-dioxin	<0.26	<1.19	<0.19	<0.54	103
1234678-heptachlorodibenzo-p-dioxin	1.93	<2.77	4.37	<3.02	41.1
Octachlorodibenzo-p-dioxin	2.99	<11.9	6.65	<7.17	62.3
2378-tetrachlorodibenzofuran	<0.38	<1.39	<0.20	<0.66	97.6
12378-pentachlorodibenzofuran	<0.56	<0.99	0.49	<0.68	39.7
23478-pentachlorodibenzofuran	<0.59	<1.06	<0.72	<0.79	30.4
123478-hexachlorodibenzofuran	<0.37	<1.32	0.56	<0.75	67.1
123678-hexachlorodibenzofuran	<0.46	<1.25	0.74	<0.82	49.0
234678-hexachlorodibenzofuran	0.65	<1.32	1.74	<1.24	44.5
123789-hexachlorodibenzofuran	0.62	<3.56	0.82	<1.67	98.7
1234678-heptachlorodibenzofuran	1.63	<2.24	2.80	<2.22	26.2
1234789-heptachlorodibenzofuran	<0.38	<2.90	1.28	<1.52	84.3
Octachlorodibenzofuran	<0.65	<5.35	2.25	<2.75	86.8
PCB 77	30.6	<23.8	11.6	<22.0	43.7
PCB 81	<4.38	<9.24	<2.35	<5.32	66.6
PCB 126	<4.98	<7.26	<1.37	<4.54	65.5
PCB 169	<2.63	<8.58	<1.43	<4.21	90.9
PCB 105	184	79.9	104	123	44.3
PCB 114	<14.8	<6.60	<7.17	<9.53	48.1
PCB 118	630	255	362	416	46.4
PCB 123	<3.57	7.66	<4.50	<5.24	40.9
PCB 156/157	14.1	<8.58	<8.47	<10.4	30.9
PCB 167	<5.05	<6.01	<3.39	<4.82	27.5
PCB 189	<1.08	<5.61	<0.50	<2.40	117
Total Dioxins & Furans Only	<12.7	<42.1	<23.9	<26.2	56.6

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 49
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Dry Reference Concentrations

Specific Isomer	Dry Reference Concentration Test No. 1 pg/Rm³*	Test No. 2 pg/Rm³*	Test No. 3 pg/Rm³*	Average pg/Rm³*	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	<1.01	<4.74	<0.68	<2.14	105
12378-pentachlorodibenzo-p-dioxin	<0.56	<2.85	<0.30	<1.24	113
123478-hexachlorodibenzo-p-dioxin	<0.74	<3.23	<0.55	<1.50	99.3
123678-hexachlorodibenzo-p-dioxin	1.16	<3.04	<1.61	<1.94	50.6
123789-hexachlorodibenzo-p-dioxin	<0.74	<3.42	<0.55	<1.57	102
1234678-heptachlorodibenzo-p-dioxin	5.54	<7.97	12.7	<8.75	41.8
Octachlorodibenzo-p-dioxin	8.61	<34.2	19.3	<20.7	62.0
2378-tetrachlorodibenzofuran	<1.09	<3.98	<0.59	<1.89	97.3
12378-pentachlorodibenzofuran	<1.61	<2.85	1.43	<1.96	39.2
23478-pentachlorodibenzofuran	<1.71	<3.04	<2.09	<2.28	30.1
123478-hexachlorodibenzofuran	<1.07	<3.80	1.63	<2.16	66.7
123678-hexachlorodibenzofuran	<1.34	<3.61	2.14	<2.36	48.7
234678-hexachlorodibenzofuran	1.87	<3.80	5.06	<3.58	45.0
123789-hexachlorodibenzofuran	1.78	<10.2	2.39	<4.81	98.3
1234678-heptachlorodibenzofuran	4.69	<6.45	8.14	<6.43	26.8
1234789-heptachlorodibenzofuran	<1.09	<8.35	3.72	<4.38	83.9
Octachlorodibenzofuran	<1.88	<15.4	6.54	<7.93	86.4
PCB 77	88.0	<68.3	33.8	<63.4	43.3
PCB 81	<12.6	<26.6	<6.83	<15.3	66.2
PCB 126	<14.3	<20.9	<3.98	<13.1	65.2
PCB 169	<7.56	<24.7	<4.17	<12.1	90.5
PCB 105	529	230	303	354	44.1
PCB 114	<42.6	<19.0	<20.9	<27.5	47.8
PCB 118	1812	732	1055	1200	46.2
PCB 123	<10.3	22.0	<13.1	<15.1	40.5
PCB 156/157	40.5	<24.7	<24.7	<29.9	30.6
PCB 167	<14.5	<17.3	<9.86	<13.9	27.0
PCB 189	<3.10	<16.1	<1.46	<6.90	117
Total Dioxins & Furans Only	<36.5	<121	<69.5	<75.6	56.3

* At 25°C and 1 atmosphere

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 50
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Dry Adjusted Concentrations

Specific Isomer	Dry Adjusted Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	pg/Rm^3*	pg/Rm^3*	pg/Rm^3*	pg/Rm^3*	%
2378-tetrachlorodibenzo-p-dioxin	<0.86	<4.21	<0.62	<1.90	106
12378-pentachlorodibenzo-p-dioxin	<0.48	<2.53	<0.27	<1.09	114
123478-hexachlorodibenzo-p-dioxin	<0.63	<2.87	<0.50	<1.33	100
123678-hexachlorodibenzo-p-dioxin	0.98	<2.70	<1.45	<1.71	51.8
123789-hexachlorodibenzo-p-dioxin	<0.63	<3.03	<0.50	<1.39	103
1234678-heptachlorodibenzo-p-dioxin	4.71	<7.08	11.5	<7.75	44.2
Octachlorodibenzo-p-dioxin	7.31	<30.3	17.4	<18.4	62.9
2378-tetrachlorodibenzofuran	<0.92	<3.54	<0.53	<1.66	98.4
12378-pentachlorodibenzofuran	<1.37	<2.53	1.29	<1.73	40.1
23478-pentachlorodibenzofuran	<1.45	<2.70	<1.88	<2.01	31.6
123478-hexachlorodibenzofuran	<0.91	<3.37	1.46	<1.91	67.6
123678-hexachlorodibenzofuran	<1.14	<3.20	1.93	<2.09	49.9
234678-hexachlorodibenzofuran	1.59	<3.37	4.56	<3.17	47.2
123789-hexachlorodibenzofuran	1.51	<9.10	2.15	<4.26	98.9
1234678-heptachlorodibenzofuran	3.98	<5.73	7.33	<5.68	29.5
1234789-heptachlorodibenzofuran	<0.92	<7.42	3.35	<3.90	84.2
Octachlorodibenzofuran	<1.60	<13.7	5.90	<7.05	86.7
PCB 77	74.7	<60.7	30.4	<55.3	41.0
PCB 81	<10.7	<23.6	<6.15	<13.5	67.1
PCB 126	<12.2	<18.5	<3.59	<11.4	65.6
PCB 169	<6.42	<21.9	<3.76	<10.7	91.7
PCB 105	449	204	273	309	40.9
PCB 114	<36.2	<16.9	<18.8	<24.0	44.5
PCB 118	1539	651	950	1047	43.2
PCB 123	<8.72	19.6	<11.8	<13.4	41.8
PCB 156/157	34.4	<21.9	<22.2	<26.2	27.2
PCB 167	<12.3	<15.3	<8.89	<12.2	26.5
PCB 189	<2.63	<14.3	<1.32	<6.09	118
Total Dioxins & Furans Only	<31.0	<107	<62.6	<67.0	57.3

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 51
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Wet Reference Concentrations

Specific Isomer	Wet Reference Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	pg/Rm³*	pg/Rm³*	pg/Rm³*	pg/Rm³*	%
2378-tetrachlorodibenzo-p-dioxin	<0.53	<2.50	<0.36	<1.13	105
12378-pentachlorodibenzo-p-dioxin	<0.30	<1.50	<0.16	<0.65	113
123478-hexachlorodibenzo-p-dioxin	<0.39	<1.70	<0.29	<0.79	99.3
123678-hexachlorodibenzo-p-dioxin	0.61	<1.60	<0.84	<1.02	50.6
123789-hexachlorodibenzo-p-dioxin	<0.39	<1.80	<0.29	<0.83	102
1234678-heptachlorodibenzo-p-dioxin	2.94	<4.20	6.66	<4.60	41.2
Octachlorodibenzo-p-dioxin	4.56	<18.0	10.1	<10.9	61.9
2378-tetrachlorodibenzofuran	<0.57	<2.10	<0.31	<0.99	97.2
12378-pentachlorodibenzofuran	<0.85	<1.50	0.75	<1.03	39.2
23478-pentachlorodibenzofuran	<0.90	<1.60	<1.09	<1.20	30.0
123478-hexachlorodibenzofuran	<0.56	<2.00	0.85	<1.14	66.7
123678-hexachlorodibenzofuran	<0.71	<1.90	1.12	<1.24	48.6
234678-hexachlorodibenzofuran	0.99	<2.00	2.65	<1.88	44.5
123789-hexachlorodibenzofuran	0.94	<5.39	1.25	<2.53	98.3
1234678-heptachlorodibenzofuran	2.48	<3.40	4.26	<3.38	26.3
1234789-heptachlorodibenzofuran	<0.57	<4.40	1.95	<2.31	83.9
Octachlorodibenzofuran	<1.00	<8.09	3.43	<4.17	86.5
PCB 77	46.6	<36.0	17.7	<33.4	43.8
PCB 81	<6.67	<14.0	<3.58	<8.08	66.2
PCB 126	<7.60	<11.0	<2.09	<6.89	65.2
PCB 169	<4.00	<13.0	<2.18	<6.39	90.5
PCB 105	280	121	159	187	44.6
PCB 114	<22.6	<9.99	<10.9	<14.5	48.4
PCB 118	960	386	552	633	46.7
PCB 123	<5.44	11.6	<6.85	<7.96	40.5
PCB 156/157	21.5	<13.0	<12.9	<15.8	31.1
PCB 167	<7.70	<9.09	<5.16	<7.32	27.2
PCB 189	<1.64	<8.49	<0.76	<3.63	116
Total Dioxins & Furans Only	<19.3	<63.6	<36.4	<39.8	56.2

* At 25°C and 1 atmosphere

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 52
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Emission Rates

Specific Isomer	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	<0.020	<0.094	<0.014	<0.043	105
12378-pentachlorodibenzo-p-dioxin	<0.011	<0.057	<0.0061	<0.025	113
123478-hexachlorodibenzo-p-dioxin	<0.015	<0.064	<0.011	<0.030	99.5
123678-hexachlorodibenzo-p-dioxin	0.023	<0.060	<0.032	<0.038	50.9
123789-hexachlorodibenzo-p-dioxin	<0.015	<0.068	<0.011	<0.031	102
1234678-heptachlorodibenzo-p-dioxin	0.11	<0.16	0.25	<0.17	42.4
Octachlorodibenzo-p-dioxin	0.17	<0.68	0.39	<0.41	62.1
2378-tetrachlorodibenzofuran	<0.021	<0.079	<0.012	<0.037	97.5
12378-pentachlorodibenzofuran	<0.032	<0.057	0.029	<0.039	39.3
23478-pentachlorodibenzofuran	<0.034	<0.060	<0.042	<0.045	30.4
123478-hexachlorodibenzofuran	<0.021	<0.076	0.033	<0.043	66.8
123678-hexachlorodibenzofuran	<0.026	<0.072	0.043	<0.047	48.9
234678-hexachlorodibenzofuran	0.037	<0.076	0.10	<0.071	45.5
123789-hexachlorodibenzofuran	0.035	<0.20	0.048	<0.096	98.4
1234678-heptachlorodibenzofuran	0.092	<0.13	0.16	<0.13	27.5
1234789-heptachlorodibenzofuran	<0.021	<0.17	0.074	<0.087	83.9
Octachlorodibenzofuran	<0.037	<0.31	0.13	<0.16	86.4
PCB 77	1.73	<1.36	0.68	<1.26	42.7
PCB 81	<0.25	<0.53	<0.14	<0.30	66.3
PCB 126	<0.28	<0.42	<0.080	<0.26	65.2
PCB 169	<0.15	<0.49	<0.083	<0.24	90.8
PCB 105	10.4	4.57	6.07	7.02	43.3
PCB 114	<0.84	<0.38	<0.42	<0.54	47.0
PCB 118	35.7	14.6	21.1	23.8	45.5
PCB 123	<0.20	0.44	<0.26	<0.30	40.8
PCB 156/157	0.80	<0.49	<0.49	<0.59	29.7
PCB 167	<0.29	<0.34	<0.20	<0.28	26.7
PCB 189	<0.061	<0.32	<0.029	<0.14	117
Total Dioxins & Furans Only	<0.72	<2.41	<1.39	<1.50	56.5

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 53
Clean Harbors Sarnia
Summary of Dioxin and Furan Specific Isomer Emission Data

Specific Isomer	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<0.75	<2.14	<1.90	<1.13	<0.043
12378-pentachlorodibenzo-p-dioxin	<0.43	<1.24	<1.09	<0.65	<0.025
123478-hexachlorodibenzo-p-dioxin	<0.52	<1.50	<1.33	<0.79	<0.030
123678-hexachlorodibenzo-p-dioxin	<0.67	<1.94	<1.71	<1.02	<0.038
123789-hexachlorodibenzo-p-dioxin	<0.54	<1.57	<1.39	<0.83	<0.031
1234678-heptachlorodibenzo-p-dioxin	<3.02	<8.75	<7.75	<4.60	<0.17
Octachlorodibenzo-p-dioxin	<7.17	<20.7	<18.4	<10.9	<0.41
2378-tetrachlorodibenzofuran	<0.66	<1.89	<1.66	<0.99	<0.037
12378-pentachlorodibenzofuran	<0.68	<1.96	<1.73	<1.03	<0.039
23478-pentachlorodibenzofuran	<0.79	<2.28	<2.01	<1.20	<0.045
123478-hexachlorodibenzofuran	<0.75	<2.16	<1.91	<1.14	<0.043
123678-hexachlorodibenzofuran	<0.82	<2.36	<2.09	<1.24	<0.047
234678-hexachlorodibenzofuran	<1.24	<3.58	<3.17	<1.88	<0.071
123789-hexachlorodibenzofuran	<1.67	<4.81	<4.26	<2.53	<0.096
1234678-heptachlorodibenzofuran	<2.22	<6.43	<5.68	<3.38	<0.13
1234789-heptachlorodibenzofuran	<1.52	<4.38	<3.90	<2.31	<0.087
Octachlorodibenzofuran	<2.75	<7.93	<7.05	<4.17	<0.16
PCB 77	<22.0	<63.4	<55.3	<33.4	<1.26
PCB 81	<5.32	<15.3	<13.5	<8.08	<0.30
PCB 126	<4.54	<13.1	<11.4	<6.89	<0.26
PCB 169	<4.21	<12.1	<10.7	<6.39	<0.24
PCB 105	123	354	309	187	7.02
PCB 114	<9.53	<27.5	<24.0	<14.5	<0.54
PCB 118	416	1200	1047	633	23.8
PCB 123	<5.24	<15.1	<13.4	<7.96	<0.30
PCB 156/157	<10.4	<29.9	<26.2	<15.8	<0.59
PCB 167	<4.82	<13.9	<12.2	<7.32	<0.28
PCB 189	<2.40	<6.90	<6.09	<3.63	<0.14
Total Dioxins & Furans Only	<26.2	<75.6	<67.0	<39.8	<1.50

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 54
Clean Harbors Sarnia
Blank Dioxin and Furan Specific Isomer Analyses

Specific Isomer	Blank Train pg	Laboratory Blank pg
2378-tetrachlorodibenzo-p-dioxin	<3.1	<6.0
12378-pentachlorodibenzo-p-dioxin	<1.7	<3.4
123478-hexachlorodibenzo-p-dioxin	<1.6	<4.1
123678-hexachlorodibenzo-p-dioxin	<1.5	<3.8
123789-hexachlorodibenzo-p-dioxin	<1.6	<4.1
1234678-heptachlorodibenzo-p-dioxin	<4.1	<2.9
Octachlorodibenzo-p-dioxin	<5.0	<2.7
2378-tetrachlorodibenzofuran	<2.5	<4.7
12378-pentachlorodibenzofuran	2.80	<3.4
23478-pentachlorodibenzofuran	<1.7	<3.1
123478-hexachlorodibenzofuran	<1.3	<2.5
123678-hexachlorodibenzofuran	<1.3	<2.4
234678-hexachlorodibenzofuran	<1.3	<2.5
123789-hexachlorodibenzofuran	<3.1	3.19
1234678-heptachlorodibenzofuran	<0.96	<2.0
1234789-heptachlorodibenzofuran	<0.93	<2.6
Octachlorodibenzofuran	3.21	<3.1
PCB 77	2280	<15
PCB 81	<15	<15
PCB 126	<40	<27
PCB 169	<15	<13
PCB 105	<170	<36
PCB 114	<14	<22
PCB 118	627	<87
PCB 123	<13	<22
PCB 156/157	<18	<15
PCB 167	<15	<15
PCB 189	<6.7	<16
Total Dioxins & Furans Only	<37.7	<56.5

"<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the total collected.

TABLE 55
Clean Harbors Sarnia
Dioxin and Furan Toxicity Equivalent Actual Concentrations

Specific Isomer	Toxicity Equivalency Factor	Actual Concentration Test No. 1 pg TEQ/m³	Test No. 2 pg TEQ/m³	Test No. 3 pg TEQ/m³	Average pg TEQ/m³
2378-tetrachlorodibenzo-p-dioxin	1.000	<0.35	<1.65	<0.23	<0.75
12378-pentachlorodibenzo-p-dioxin	0.500	<0.098	<0.50	<0.052	<0.21
123478-hexachlorodibenzo-p-dioxin	0.100	<0.026	<0.11	<0.019	<0.052
123678-hexachlorodibenzo-p-dioxin	0.100	0.040	<0.11	<0.055	<0.067
123789-hexachlorodibenzo-p-dioxin	0.100	<0.026	<0.12	<0.019	<0.054
1234678-heptachlorodibenzo-p-dioxin	0.010	0.019	<0.028	0.044	<0.030
Octachlorodibenzo-p-dioxin	0.001	0.0030	<0.012	0.0066	<0.0072
2378-tetrachlorodibenzofuran	0.100	<0.038	<0.14	<0.020	<0.066
12378-pentachlorodibenzofuran	0.050	<0.028	<0.050	0.025	<0.034
23478-pentachlorodibenzofuran	0.500	<0.30	<0.53	<0.36	<0.39
123478-hexachlorodibenzofuran	0.100	<0.037	<0.13	0.056	<0.075
123678-hexachlorodibenzofuran	0.100	<0.046	<0.13	0.074	<0.082
234678-hexachlorodibenzofuran	0.100	0.065	<0.13	0.17	<0.12
123789-hexachlorodibenzofuran	0.100	0.062	<0.36	0.082	<0.17
1234678-heptachlorodibenzofuran	0.010	0.016	<0.022	0.028	<0.022
1234789-heptachlorodibenzofuran	0.010	<0.0038	<0.029	0.013	<0.015
Octachlorodibenzofuran	0.001	<0.00065	<0.0053	0.0022	<0.0027
PCB 77	0.0001	0.0031	<0.0024	0.0012	<0.0022
PCB 81	0.0003	<0.0013	<0.0028	<0.00070	<0.0016
PCB 126	0.1000	<0.50	<0.73	<0.14	<0.45
PCB 169	0.0300	<0.079	<0.26	<0.043	<0.13
PCB 105	0.00003	0.0055	0.0024	0.0031	0.0037
PCB 114	0.00003	<0.00044	<0.00020	<0.00022	<0.00029
PCB 118	0.00003	0.019	0.0076	0.011	0.012
PCB 123	0.00003	<0.00011	0.00023	<0.00013	<0.00016
PCB 156/157	0.00003	0.00042	<0.00026	<0.00025	<0.00031
PCB 167	0.00003	<0.00015	<0.00018	<0.00010	<0.00014
PCB 189	0.00003	<0.000032	<0.00017	<0.000015	<0.000072
Total Dioxins & Furans Only		<1.15	<4.04	<1.26	<2.15

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 56
Clean Harbors Sarnia
Dioxin and Furan Toxicity Equivalent Dry Reference Concentrations

Specific Isomer	Toxicity Equivalency Factor	Dry Reference Concentration Test No. 1 pg TEQ/Rm³*	Test No. 2 pg TEQ/Rm³*	Test No. 3 pg TEQ/Rm³*	Average pg TEQ/Rm³*
2378-tetrachlorodibenzo-p-dioxin	1.000	<1.01	<4.74	<0.68	<2.14
12378-pentachlorodibenzo-p-dioxin	0.500	<0.28	<1.42	<0.15	<0.62
123478-hexachlorodibenzo-p-dioxin	0.100	<0.074	<0.32	<0.055	<0.15
123678-hexachlorodibenzo-p-dioxin	0.100	0.12	<0.30	<0.16	<0.19
123789-hexachlorodibenzo-p-dioxin	0.100	<0.074	<0.34	<0.055	<0.16
1234678-heptachlorodibenzo-p-dioxin	0.010	0.055	<0.080	0.13	<0.087
Octachlorodibenzo-p-dioxin	0.001	0.0086	<0.034	0.019	<0.021
2378-tetrachlorodibenzofuran	0.100	<0.11	<0.40	<0.059	<0.19
12378-pentachlorodibenzofuran	0.050	<0.080	<0.14	0.072	<0.098
23478-pentachlorodibenzofuran	0.500	<0.85	<1.52	<1.04	<1.14
123478-hexachlorodibenzofuran	0.100	<0.11	<0.38	0.16	<0.22
123678-hexachlorodibenzofuran	0.100	<0.13	<0.36	0.21	<0.24
234678-hexachlorodibenzofuran	0.100	0.19	<0.38	0.51	<0.36
123789-hexachlorodibenzofuran	0.100	0.18	<1.02	0.24	<0.48
1234678-heptachlorodibenzofuran	0.010	0.047	<0.065	0.081	<0.064
1234789-heptachlorodibenzofuran	0.010	<0.011	<0.083	0.037	<0.044
Octachlorodibenzofuran	0.001	<0.0019	<0.015	0.0065	<0.0079
PCB 77	0.0001	0.0088	<0.0068	0.0034	<0.0063
PCB 81	0.0003	<0.0038	<0.0080	<0.0020	<0.0046
PCB 126	0.1000	<1.43	<2.09	<0.40	<1.31
PCB 169	0.0300	<0.23	<0.74	<0.13	<0.36
PCB 105	0.00003	0.016	0.0069	0.0091	0.011
PCB 114	0.00003	<0.0013	<0.00057	<0.00063	<0.00082
PCB 118	0.00003	0.054	0.022	0.032	0.036
PCB 123	0.00003	<0.00031	0.00066	<0.00039	<0.00045
PCB 156/157	0.00003	0.0012	<0.00074	<0.00074	<0.00090
PCB 167	0.00003	<0.00044	<0.00052	<0.00030	<0.00042
PCB 189	0.00003	<0.000093	<0.00048	<0.000044	<0.00021
Total Dioxins & Furans Only		<3.32	<11.6	<3.67	<6.20

* At 25°C and 1 atmosphere

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 57
Clean Harbors Sarnia
Dioxin and Furan Toxicity Equivalent Dry Adjusted Concentrations

Specific Isomer	Toxicity Equivalency Factor	Test No. 1 pg TEQ/Rm³*	Dry Adjusted Concentration Test No. 2 pg TEQ/Rm³*	Test No. 3 pg TEQ/Rm³*	Average pg TEQ/Rm³*
2378-tetrachlorodibenzo-p-dioxin	1.000	<0.86	<4.21	<0.62	<1.90
12378-pentachlorodibenzo-p-dioxin	0.500	<0.24	<1.26	<0.14	<0.55
123478-hexachlorodibenzo-p-dioxin	0.100	<0.063	<0.29	<0.050	<0.13
123678-hexachlorodibenzo-p-dioxin	0.100	0.098	<0.27	<0.15	<0.17
123789-hexachlorodibenzo-p-dioxin	0.100	<0.063	<0.30	<0.050	<0.14
1234678-heptachlorodibenzo-p-dioxin	0.010	0.047	<0.071	0.11	<0.078
Octachlorodibenzo-p-dioxin	0.001	0.0073	<0.030	0.017	<0.018
2378-tetrachlorodibenzofuran	0.100	<0.092	<0.35	<0.053	<0.17
12378-pentachlorodibenzofuran	0.050	<0.068	<0.13	0.065	<0.086
23478-pentachlorodibenzofuran	0.500	<0.72	<1.35	<0.94	<1.00
123478-hexachlorodibenzofuran	0.100	<0.091	<0.34	0.15	<0.19
123678-hexachlorodibenzofuran	0.100	<0.11	<0.32	0.19	<0.21
234678-hexachlorodibenzofuran	0.100	0.16	<0.34	0.46	<0.32
123789-hexachlorodibenzofuran	0.100	0.15	<0.91	0.22	<0.43
1234678-heptachlorodibenzofuran	0.010	0.040	<0.057	0.073	<0.057
1234789-heptachlorodibenzofuran	0.010	<0.0092	<0.074	0.033	<0.039
Octachlorodibenzofuran	0.001	<0.0016	<0.014	0.0059	<0.0070
PCB 77	0.0001	0.0075	<0.0061	0.0030	<0.0055
PCB 81	0.0003	<0.0032	<0.0071	<0.0018	<0.0040
PCB 126	0.1000	<1.22	<1.85	<0.36	<1.14
PCB 169	0.0300	<0.19	<0.66	<0.11	<0.32
PCB 105	0.00003	0.013	0.0061	0.0082	0.0093
PCB 114	0.00003	<0.0011	<0.00051	<0.00056	<0.00072
PCB 118	0.00003	0.046	0.020	0.029	0.031
PCB 123	0.00003	<0.00026	0.00059	<0.00035	<0.00040
PCB 156/157	0.00003	0.0010	<0.00066	<0.00067	<0.00079
PCB 167	0.00003	<0.00037	<0.00046	<0.00027	<0.00037
PCB 189	0.00003	<0.000079	<0.00043	<0.000039	<0.00018
Total Dioxins & Furans Only		<2.82	<10.3	<3.31	<5.48

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 58
Clean Harbors Sarnia
Dioxin and Furan Toxicity Equivalent Wet Reference Concentrations

Specific Isomer	Toxicity Equivalency Factor	Wet Reference Concentration Test No. 1 pg TEQ/Rm^3*	Test No. 2 pg TEQ/Rm^3*	Test No. 3 pg TEQ/Rm^3*	Average pg TEQ/Rm^3*
2378-tetrachlorodibenzo-p-dioxin	1.000	<0.53	<2.50	<0.36	<1.13
12378-pentachlorodibenzo-p-dioxin	0.500	<0.15	<0.75	<0.079	<0.33
123478-hexachlorodibenzo-p-dioxin	0.100	<0.039	<0.17	<0.029	<0.079
123678-hexachlorodibenzo-p-dioxin	0.100	0.061	<0.16	<0.084	<0.10
123789-hexachlorodibenzo-p-dioxin	0.100	<0.039	<0.18	<0.029	<0.083
1234678-heptachlorodibenzo-p-dioxin	0.010	0.029	<0.042	0.067	<0.046
Octachlorodibenzo-p-dioxin	0.001	0.0046	<0.018	0.010	<0.011
2378-tetrachlorodibenzofuran	0.100	<0.057	<0.21	<0.031	<0.099
12378-pentachlorodibenzofuran	0.050	<0.043	<0.075	0.038	<0.052
23478-pentachlorodibenzofuran	0.500	<0.45	<0.80	<0.55	<0.60
123478-hexachlorodibenzofuran	0.100	<0.056	<0.20	0.085	<0.11
123678-hexachlorodibenzofuran	0.100	<0.071	<0.19	0.11	<0.12
234678-hexachlorodibenzofuran	0.100	0.099	<0.20	0.27	<0.19
123789-hexachlorodibenzofuran	0.100	0.094	<0.54	0.13	<0.25
1234678-heptachlorodibenzofuran	0.010	0.025	<0.034	0.043	<0.034
1234789-heptachlorodibenzofuran	0.010	<0.0057	<0.044	0.019	<0.023
Octachlorodibenzofuran	0.001	<0.0010	<0.0081	0.0034	<0.0042
PCB 77	0.0001	0.0047	<0.0036	0.0018	<0.0033
PCB 81	0.0003	<0.0020	<0.0042	<0.0011	<0.0024
PCB 126	0.1000	<0.76	<1.10	<0.21	<0.69
PCB 169	0.0300	<0.12	<0.39	<0.066	<0.19
PCB 105	0.00003	0.0084	0.0036	0.0048	0.0056
PCB 114	0.00003	<0.00068	<0.00030	<0.00033	<0.00043
PCB 118	0.00003	0.029	0.012	0.017	0.019
PCB 123	0.00003	<0.00016	0.00035	<0.00021	<0.00024
PCB 156/157	0.00003	0.00064	<0.00039	<0.00039	<0.00047
PCB 167	0.00003	<0.00023	<0.00027	<0.00015	<0.00022
PCB 189	0.00003	<0.000049	<0.00025	<0.000023	<0.00011
Total Dioxins & Furans Only		<1.76	<6.11	<1.92	<3.27

* At 25°C and 1 atmosphere

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 59
Clean Harbors Sarnia
Dioxin and Furan Toxicity Equivalent Emission Rates

Specific Isomer	Toxicity Equivalency Factor	Emission Rate Test No. 1 ng TEQ/s	Test No. 2 ng TEQ/s	Test No. 3 ng TEQ/s	Average ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	1.000	<0.020	<0.094	<0.014	<0.043
12378-pentachlorodibenzo-p-dioxin	0.500	<0.0055	<0.028	<0.0030	<0.012
123478-hexachlorodibenzo-p-dioxin	0.100	<0.0015	<0.0064	<0.0011	<0.0030
123678-hexachlorodibenzo-p-dioxin	0.100	0.0023	<0.0060	<0.0032	<0.0038
123789-hexachlorodibenzo-p-dioxin	0.100	<0.0015	<0.0068	<0.0011	<0.0031
1234678-heptachlorodibenzo-p-dioxin	0.010	0.0011	<0.0016	0.0025	<0.0017
Octachlorodibenzo-p-dioxin	0.001	0.00017	<0.00068	0.00039	<0.00041
2378-tetrachlorodibenzofuran	0.100	<0.0021	<0.0079	<0.0012	<0.0037
12378-pentachlorodibenzofuran	0.050	<0.0016	<0.0028	0.0014	<0.0020
23478-pentachlorodibenzofuran	0.500	<0.017	<0.030	<0.021	<0.023
123478-hexachlorodibenzofuran	0.100	<0.0021	<0.0076	0.0033	<0.0043
123678-hexachlorodibenzofuran	0.100	<0.0026	<0.0072	0.0043	<0.0047
234678-hexachlorodibenzofuran	0.100	0.0037	<0.0076	0.010	<0.0071
123789-hexachlorodibenzofuran	0.100	0.0035	<0.020	0.0048	<0.0096
1234678-heptachlorodibenzofuran	0.010	0.00092	<0.0013	0.0016	<0.0013
1234789-heptachlorodibenzofuran	0.010	<0.00021	<0.0017	0.00074	<0.00087
Octachlorodibenzofuran	0.001	<0.000037	<0.00031	0.00013	<0.00016
PCB 77	0.0001	0.00017	<0.00014	0.000068	<0.00013
PCB 81	0.0003	<0.000074	<0.00016	<0.000041	<0.000091
PCB 126	0.1000	<0.028	<0.042	<0.0080	<0.026
PCB 169	0.0300	<0.0045	<0.015	<0.0025	<0.0072
PCB 105	0.00003	0.00031	0.00014	0.00018	0.00021
PCB 114	0.00003	<0.000025	<0.000011	<0.000013	<0.000016
PCB 118	0.00003	0.0011	0.00044	0.00063	0.00071
PCB 123	0.00003	<0.0000061	0.000013	<0.0000079	<0.0000090
PCB 156/157	0.00003	0.000024	<0.000015	<0.000015	<0.000018
PCB 167	0.00003	<0.0000086	<0.000010	<0.0000059	<0.0000083
PCB 189	0.00003	<0.0000018	<0.0000096	<0.00000088	<0.0000041
Total Dioxins & Furans Only		<0.065	<0.23	<0.073	<0.12

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.

TABLE 60
Clean Harbors Sarnia
Summary of Dioxin and Furan Toxicity Equivalent Emission Data
Calculated Using the Full Detection Limit

Specific Isomer	Actual Concentration pg TEQ/m³	Dry Reference Concentration pg TEQ/Rm³*	Dry Adjusted Concentration pg TEQ/Rm³**	Wet Reference Concentration pg TEQ/Rm³*	Emission Rate ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	<0.75	<2.14	<1.90	<1.13	<0.043
12378-pentachlorodibenzo-p-dioxin	<0.21	<0.62	<0.55	<0.33	<0.012
123478-hexachlorodibenzo-p-dioxin	<0.052	<0.15	<0.13	<0.079	<0.0030
123678-hexachlorodibenzo-p-dioxin	<0.067	<0.19	<0.17	<0.10	<0.0038
123789-hexachlorodibenzo-p-dioxin	<0.054	<0.16	<0.14	<0.083	<0.0031
1234678-heptachlorodibenzo-p-dioxin	<0.030	<0.087	<0.078	<0.046	<0.0017
Octachlorodibenzo-p-dioxin	<0.0072	<0.021	<0.018	<0.011	<0.00041
2378-tetrachlorodibenzofuran	<0.066	<0.19	<0.17	<0.099	<0.0037
12378-pentachlorodibenzofuran	<0.034	<0.098	<0.086	<0.052	<0.0020
23478-pentachlorodibenzofuran	<0.39	<1.14	<1.00	<0.60	<0.023
123478-hexachlorodibenzofuran	<0.075	<0.22	<0.19	<0.11	<0.0043
123678-hexachlorodibenzofuran	<0.082	<0.24	<0.21	<0.12	<0.0047
234678-hexachlorodibenzofuran	<0.12	<0.36	<0.32	<0.19	<0.0071
123789-hexachlorodibenzofuran	<0.17	<0.48	<0.43	<0.25	<0.0096
1234678-heptachlorodibenzofuran	<0.022	<0.064	<0.057	<0.034	<0.0013
1234789-heptachlorodibenzofuran	<0.015	<0.044	<0.039	<0.023	<0.00087
Octachlorodibenzofuran	<0.0027	<0.0079	<0.0070	<0.0042	<0.00016
PCB 77	<0.0022	<0.0063	<0.0055	<0.0033	<0.00013
PCB 81	<0.0016	<0.0046	<0.0040	<0.0024	<0.000091
PCB 126	<0.45	<1.31	<1.14	<0.69	<0.026
PCB 169	<0.13	<0.36	<0.32	<0.19	<0.0072
PCB 105	0.0037	0.011	0.0093	0.0056	0.00021
PCB 114	<0.00029	<0.00082	<0.00072	<0.00043	<0.000016
PCB 118	0.012	0.036	0.031	0.019	0.00071
PCB 123	<0.00016	<0.00045	<0.00040	<0.00024	<0.0000090
PCB 156/157	<0.00031	<0.00090	<0.00079	<0.00047	<0.000018
PCB 167	<0.00014	<0.00042	<0.00037	<0.00022	<0.0000083
PCB 189	<0.000072	<0.00021	<0.00018	<0.00011	<0.0000041
Total Dioxins & Furans Only	<2.15	<6.20	<5.48	<3.27	<0.12

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: Emission data calculated using the full detection limit for those isomers below the analytical detection limit.

TABLE 61
Clean Harbors Sarnia
Summary of Dioxin and Furan Toxicity Equivalent Emission Data
Calculated Using Half the Detection Limit

Specific Isomer	Actual Concentration pg TEQ/m³	Dry Reference Concentration pg TEQ/Rm³*	Dry Adjusted Concentration pg TEQ/Rm³**	Wet Reference Concentration pg TEQ/Rm³*	Emission Rate ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	0.37	2.06	0.95	0.56	0.021
12378-pentachlorodibenzo-p-dioxin	0.21	0.62	0.55	0.33	0.012
123478-hexachlorodibenzo-p-dioxin	0.026	0.075	0.066	0.040	0.0015
123678-hexachlorodibenzo-p-dioxin	0.040	0.12	0.10	0.061	0.0023
123789-hexachlorodibenzo-p-dioxin	0.027	0.078	0.069	0.041	0.0016
1234678-heptachlorodibenzo-p-dioxin	0.026	0.074	0.066	0.039	0.0015
Octachlorodibenzo-p-dioxin	0.0016	0.0045	0.0040	0.0024	0.000090
2378-tetrachlorodibenzofuran	0.033	0.094	0.083	0.050	0.0019
12378-pentachlorodibenzofuran	0.013	0.037	0.032	0.019	0.00073
23478-pentachlorodibenzofuran	0.12	0.34	0.30	0.18	0.0068
123478-hexachlorodibenzofuran	0.047	0.14	0.12	0.071	0.0027
123678-hexachlorodibenzofuran	0.053	0.15	0.14	0.081	0.0031
234678-hexachlorodibenzofuran	0.10	0.29	0.26	0.15	0.0059
123789-hexachlorodibenzofuran	0.11	0.31	0.27	0.16	0.0062
1234678-heptachlorodibenzofuran	0.018	0.054	0.047	0.028	0.0011
1234789-heptachlorodibenzofuran	0.0097	0.028	0.025	0.015	0.00056
Octachlorodibenzofuran	0.00052	0.0015	0.0014	0.00080	0.000030
PCB 77	0.0018	0.0052	0.0045	0.0027	0.00010
PCB 81	0.00080	0.0023	0.0020	0.0012	0.000046
PCB 126	0.23	0.65	0.57	0.34	0.013
PCB 169	0.063	0.18	0.16	0.096	0.0036
PCB 105	0.0037	0.011	0.0093	0.0056	0.00021
PCB 114	0.00014	0.00041	0.00036	0.00022	0.0000082
PCB 118	0.012	0.036	0.031	0.019	0.00071
PCB 123	0.00012	0.00034	0.00030	0.00018	0.0000067
PCB 156/157	0.00023	0.00065	0.00056	0.00034	0.000013
PCB 167	0.000072	0.00021	0.00018	0.00011	0.0000041
PCB 189	0.000036	0.00010	0.000091	0.000054	0.0000021
Total Dioxins & Furans Only	1.21	4.48	3.08	1.84	0.069
Total Dioxins, Furans and PCBs	1.52	5.37	3.86	2.31	0.087

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: Emission data calculated using half the detection limit for those isomers below the analytical detection limit.

TABLE 62
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Emission Data
Test No. 1

Congener Group	Total Collected pg	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
Dichlorinated biphenyls	18200	1.23	3.53	3.00	1.87	0.069
Trichlorinated biphenyls	9370	0.63	1.82	1.54	0.96	0.036
Tetrachlorinated biphenyls	67700	4.56	13.1	11.1	6.95	0.26
Pentachlorinated biphenyls	90600	6.10	17.6	14.9	9.30	0.35
Hexachlorinated biphenyls	26300	1.77	5.10	4.33	2.70	0.10
Heptachlorinated biphenyls	3020	0.20	0.59	0.50	0.31	0.012
Octachlorinated biphenyls	215	0.014	0.042	0.035	0.022	0.00082
Nonachlorinated biphenyls	<52	<0.0035	<0.010	<0.0086	<0.0053	<0.00020
Decachlorinated biphenyl	<93	<0.0063	<0.018	<0.015	<0.0095	<0.00036
Total	<215550	<14.5	<41.8	<35.5	<22.1	<0.82

Dry Gas Volume Sampled (Rm^3*) :	5.159
Actual Flowrate (m^3/s) :	56.7
Dry Reference Flowrate (Rm^3/s*) :	19.7
Dry Adjusted Flowrate (Rm^3/s**) :	23.2
Wet Reference Flowrate (Rm^3/s*) :	37.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 63
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Emission Data
Test No. 2

Congener Group	Total Collected pg	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
Dichlorinated biphenyls	9960	0.66	1.89	1.68	0.99	0.038
Trichlorinated biphenyls	5950	0.39	1.13	1.00	0.59	0.022
Tetrachlorinated biphenyls	29600	1.95	5.62	4.99	2.96	0.11
Pentachlorinated biphenyls	38200	2.52	7.25	6.44	3.82	0.14
Hexachlorinated biphenyls	8560	0.57	1.62	1.44	0.86	0.032
Heptachlorinated biphenyls	570	0.038	0.11	0.096	0.057	0.0022
Octachlorinated biphenyls	<58	<0.0038	<0.011	<0.0098	<0.0058	<0.00022
Nonachlorinated biphenyls	<110	<0.0073	<0.021	<0.019	<0.011	<0.00042
Decachlorinated biphenyl	<190	<0.013	<0.036	<0.032	<0.019	<0.00072
Total	<93198	<6.15	<17.7	<15.7	<9.31	<0.35

Dry Gas Volume Sampled (Rm^3*) :	5.270
Actual Flowrate (m^3/s) :	57.2
Dry Reference Flowrate (Rm^3/s*) :	19.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.4
Wet Reference Flowrate (Rm^3/s*) :	37.8

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 64
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Emission Data
Test No. 3

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Dichlorinated biphenyls	3950	0.26	0.75	0.67	0.39	0.015
Trichlorinated biphenyls	5430	0.35	1.03	0.93	0.54	0.021
Tetrachlorinated biphenyls	31300	2.04	5.94	5.35	3.11	0.12
Pentachlorinated biphenyls	54300	3.54	10.3	9.28	5.39	0.21
Hexachlorinated biphenyls	10800	0.70	2.05	1.85	1.07	0.041
Heptachlorinated biphenyls	810	0.053	0.15	0.14	0.080	0.0031
Octachlorinated biphenyls	143	0.0093	0.027	0.024	0.014	0.00054
Nonachlorinated biphenyls	<20	<0.0013	<0.0038	<0.0034	<0.0020	<0.000076
Decachlorinated biphenyl	<8.7	<0.00057	<0.0017	<0.0015	<0.00086	<0.000033
Total	<106762	<6.96	<20.3	<18.2	<10.6	<0.41

Dry Gas Volume Sampled (Rm^3*) :	5.272
Actual Flowrate (m^3/s) :	58.2
Dry Reference Flowrate (Rm^3/s*) :	20.0
Dry Adjusted Flowrate (Rm^3/s**) :	22.2
Wet Reference Flowrate (Rm^3/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 65
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Actual Concentrations

Congener Group	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
Dichlorinated biphenyls	1.23	0.66	0.26	0.71	68.2
Trichlorinated biphenyls	0.63	0.39	0.35	0.46	32.7
Tetrachlorinated biphenyls	4.56	1.95	2.04	2.85	51.9
Pentachlorinated biphenyls	6.10	2.52	3.54	4.05	45.5
Hexachlorinated biphenyls	1.77	0.57	0.70	1.01	65.1
Heptachlorinated biphenyls	0.20	0.038	0.053	0.098	93.6
Octachlorinated biphenyls	0.014	<0.0038	0.0093	<0.0092	57.8
Nonachlorinated biphenyls	<0.0035	<0.0073	<0.0013	<0.0040	74.9
Decachlorinated biphenyl	<0.0063	<0.013	<0.00057	<0.0065	92.8
Total	<14.5	<6.15	<6.96	<9.21	50.1

TABLE 66
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Dry Reference Concentrations

Congener Group	Dry Reference Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Dichlorinated biphenyls	3.53	1.89	0.75	2.06	67.9
Trichlorinated biphenyls	1.82	1.13	1.03	1.33	32.3
Tetrachlorinated biphenyls	13.1	5.62	5.94	8.23	51.6
Pentachlorinated biphenyls	17.6	7.25	10.3	11.7	45.3
Hexachlorinated biphenyls	5.10	1.62	2.05	2.92	64.8
Heptachlorinated biphenyls	0.59	0.11	0.15	0.28	93.3
Octachlorinated biphenyls	0.042	<0.011	0.027	<0.027	57.7
Nonachlorinated biphenyls	<0.010	<0.021	<0.0038	<0.012	74.6
Decachlorinated biphenyl	<0.018	<0.036	<0.0017	<0.019	92.6
Total	<41.8	<17.7	<20.3	<26.6	49.8

* At 25°C and 1 atmosphere

TABLE 67
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Dry Adjusted Concentrations

Congener Group	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Dichlorinated biphenyls	3.00	1.68	0.67	1.78	65.3
Trichlorinated biphenyls	1.54	1.00	0.93	1.16	28.9
Tetrachlorinated biphenyls	11.1	4.99	5.35	7.16	48.2
Pentachlorinated biphenyls	14.9	6.44	9.28	10.2	42.2
Hexachlorinated biphenyls	4.33	1.44	1.85	2.54	61.6
Heptachlorinated biphenyls	0.50	0.096	0.14	0.24	90.3
Octachlorinated biphenyls	0.035	<0.0098	0.024	<0.023	55.4
Nonachlorinated biphenyls	<0.0086	<0.019	<0.0034	<0.010	75.6
Decachlorinated biphenyl	<0.015	<0.032	<0.0015	<0.016	94.0
Total	<35.5	<15.7	<18.2	<23.1	46.5

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 68
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Wet Reference Concentrations

Congener Group	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Dichlorinated biphenyls	1.87	0.99	0.39	1.09	68.4
Trichlorinated biphenyls	0.96	0.59	0.54	0.70	32.9
Tetrachlorinated biphenyls	6.95	2.96	3.11	4.34	52.2
Pentachlorinated biphenyls	9.30	3.82	5.39	6.17	45.8
Hexachlorinated biphenyls	2.70	0.86	1.07	1.54	65.4
Heptachlorinated biphenyls	0.31	0.057	0.080	0.15	93.8
Octachlorinated biphenyls	0.022	<0.0058	0.014	<0.014	58.0
Nonachlorinated biphenyls	<0.0053	<0.011	<0.0020	<0.0061	74.5
Decachlorinated biphenyl	<0.0095	<0.019	<0.00086	<0.0098	92.5
Total	<22.1	<9.31	<10.6	<14.0	50.4

* At 25°C and 1 atmosphere

TABLE 69
Clean Harbors Sarnia
Polychlorinated Biphenyl Emission Rates

Congener Group	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
Dichlorinated biphenyls	0.069	0.038	0.015	0.041	67.3
Trichlorinated biphenyls	0.036	0.022	0.021	0.026	31.5
Tetrachlorinated biphenyls	0.26	0.11	0.12	0.16	50.8
Pentachlorinated biphenyls	0.35	0.14	0.21	0.23	44.5
Hexachlorinated biphenyls	0.10	0.032	0.041	0.058	64.0
Heptachlorinated biphenyls	0.012	0.0022	0.0031	0.0056	92.6
Octachlorinated biphenyls	0.00082	<0.00022	0.00054	<0.00053	57.1
Nonachlorinated biphenyls	<0.00020	<0.00042	<0.000076	<0.00023	74.8
Decachlorinated biphenyl	<0.00036	<0.00072	<0.000033	<0.00037	92.9
Total	<0.82	<0.35	<0.41	<0.53	49.0

TABLE 70
Clean Harbors Sarnia
Summary of Polychlorinated Biphenyl Emission Data

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Dichlorinated biphenyls	0.71	2.06	1.78	1.09	0.041
Trichlorinated biphenyls	0.46	1.33	1.16	0.70	0.026
Tetrachlorinated biphenyls	2.85	8.23	7.16	4.34	0.16
Pentachlorinated biphenyls	4.05	11.7	10.2	6.17	0.23
Hexachlorinated biphenyls	1.01	2.92	2.54	1.54	0.058
Heptachlorinated biphenyls	0.098	0.28	0.24	0.15	0.0056
Octachlorinated biphenyls	<0.0092	<0.027	<0.023	<0.014	<0.00053
Nonachlorinated biphenyls	<0.0040	<0.012	<0.010	<0.0061	<0.00023
Decachlorinated biphenyl	<0.0065	<0.019	<0.016	<0.0098	<0.00037
Total	<9.21	<26.6	<23.1	<14.0	<0.53

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 71
Clean Harbors Sarnia
Blank Polychlorinated Biphenyl Analyses

Congener Group	Blank Train pg	Laboratory Blank pg
Dichlorinated biphenyls	1130	470
Trichlorinated biphenyls	2820	<23
Tetrachlorinated biphenyls	6990	28.1
Pentachlorinated biphenyls	7250	190
Hexachlorinated biphenyls	2530	138
Heptachlorinated biphenyls	242	<16
Octachlorinated biphenyls	<7.9	<12
Nonachlorinated biphenyls	<55	<87
Decachlorinated biphenyl	<110	<120
Total	<21135	<1084

"<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the total collected.

TABLE 72
Clean Harbors Sarnia
Emission Data for Chlorobenzenes and Related Chlorinated Compounds
Test No. 1

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
1,3-Dichlorobenzene	1310	88.2	254	216	134	5.00
1,4-Dichlorobenzene	204	13.7	39.5	33.6	20.9	0.78
1,2-Dichlorobenzene	1810	122	351	298	186	6.91
Total Dichlorobenzene	3324	224	644	547	341	12.7
1,3,5-trichlorobenzene	17.3	1.17	3.35	2.85	1.78	0.066
1,2,4-trichlorobenzene	392	26.4	76.0	64.5	40.2	1.50
1,2,3-trichlorobenzene	1760	119	341	290	181	6.72
Total Trichlorobenzene	2169	146	420	357	223	8.28
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	449	30.2	87.0	73.9	46.1	1.71
1,2,3,4-tetrachlorobenzene	622	41.9	121	102	63.8	2.38
Total Tetrachlorobenzene	1071	72.1	208	176	110	4.09
Pentachlorobenzene	866	58.3	168	143	88.9	3.31
Hexachlorobenzene	129	8.69	25.0	21.2	13.2	0.49
Total Chlorobenzenes	7559	509	1465	1244	776	28.9
Hexachloroethane	<14	<0.94	<2.71	<2.30	<1.44	<0.053
a,2,6-Trichlorotoluene	<14	<0.94	<2.71	<2.30	<1.44	<0.053

Dry Gas Volume Sampled (Rm³*) :	5.159
Actual Flowrate (m³/s) :	56.7
Dry Reference Flowrate (Rm³/s*) :	19.7
Dry Adjusted Flowrate (Rm³/s**) :	23.2
Wet Reference Flowrate (Rm³/s*) :	37.2

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 73
Clean Harbors Sarnia
Emission Data for Chlorobenzenes
and Related Chlorinated Compounds
Test No. 2

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
1,3-Dichlorobenzene	1050	69.3	199	177	105	3.96
1,4-Dichlorobenzene	183	12.1	34.7	30.8	18.3	0.69
1,2-Dichlorobenzene	1030	68.0	195	174	103	3.89
Total Dichlorobenzene	2263	149	429	381	226	8.55
1,3,5-trichlorobenzene	17.4	1.15	3.30	2.93	1.74	0.066
1,2,4-trichlorobenzene	461	30.4	87.5	77.7	46.1	1.74
1,2,3-trichlorobenzene	901	59.5	171	152	90.0	3.40
Total Trichlorobenzene	1379	91.1	262	233	138	5.21
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	509	33.6	96.6	85.8	50.8	1.92
1,2,3,4-tetrachlorobenzene	307	20.3	58.3	51.8	30.7	1.16
Total Tetrachlorobenzene	816	53.9	155	138	81.5	3.08
Pentachlorobenzene	402	26.5	76.3	67.8	40.2	1.52
Hexachlorobenzene	54.4	3.59	10.3	9.17	5.43	0.21
Total Chlorobenzenes	4915	324	933	829	491	18.6
Hexachloroethane	<14	<0.92	<2.66	<2.36	<1.40	<0.053
a,2,6-Trichlorotoluene	<14	<0.92	<2.66	<2.36	<1.40	<0.053

Dry Gas Volume Sampled (Rm³*) :	5.270
Actual Flowrate (m³/s) :	57.2
Dry Reference Flowrate (Rm³/s*) :	19.9
Dry Adjusted Flowrate (Rm³/s**) :	22.4
Wet Reference Flowrate (Rm³/s*) :	37.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 74
Clean Harbors Sarnia
Emission Data for Chlorobenzenes
Related Chlorinated Compounds
Test No. 3

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
1,3-Dichlorobenzene	846	55.1	160	145	84.0	3.21
1,4-Dichlorobenzene	115	7.50	21.8	19.7	11.4	0.44
1,2-Dichlorobenzene	540	35.2	102	92.3	53.6	2.05
Total Dichlorobenzene	1501	97.8	285	256	149	5.69
1,3,5-trichlorobenzene	28.7	1.87	5.44	4.90	2.85	0.11
1,2,4-trichlorobenzene	532	34.7	101	90.9	52.8	2.02
1,2,3-trichlorobenzene	895	58.3	170	153	88.9	3.40
Total Trichlorobenzene	1456	94.9	276	249	145	5.52
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	695	45.3	132	119	69.0	2.64
1,2,3,4-tetrachlorobenzene	282	18.4	53.5	48.2	28.0	1.07
Total Tetrachlorobenzene	977	63.7	185	167	97.0	3.71
Pentachlorobenzene	402	26.2	76.3	68.7	39.9	1.53
Hexachlorobenzene	58.2	3.79	11.0	9.95	5.78	0.22
Total Chlorobenzenes	4394	286	833	751	436	16.7
Hexachloroethane	<14	<0.91	<2.66	<2.39	<1.39	<0.053
a,2,6-Trichlorotoluene	<14	<0.91	<2.66	<2.39	<1.39	<0.053

Dry Gas Volume Sampled (Rm³*) :	5.272
Actual Flowrate (m³/s) :	58.2
Dry Reference Flowrate (Rm³/s*) :	20.0
Dry Adjusted Flowrate (Rm³/s**) :	22.2
Wet Reference Flowrate (Rm³/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 75
Clean Harbors Sarnia
Actual Concentrations for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
1,3-Dichlorobenzene	88.2	69.3	55.1	70.9	23.4
1,4-Dichlorobenzene	13.7	12.1	7.5	11.1	29.1
1,2-Dichlorobenzene	122	68.0	35.2	75.0	58.3
Total Dichlorobenzene	224	149	97.8	157	40.3
1,3,5-trichlorobenzene	1.17	1.15	1.87	1.39	29.6
1,2,4-trichlorobenzene	26.4	30.4	34.7	30.5	13.6
1,2,3-trichlorobenzene	119	59.5	58.3	78.8	43.7
Total Trichlorobenzene	146	91.1	94.9	111	27.8
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	30.2	33.6	45.3	36.4	21.7
1,2,3,4-tetrachlorobenzene	41.9	20.3	18.4	26.8	48.7
Total Tetrachlorobenzene	72.1	53.9	63.7	63.2	14.5
Pentachlorobenzene	58.3	26.5	26.2	37.0	49.8
Hexachlorobenzene	8.69	3.59	3.79	5.36	53.9
Total Chlorobenzenes	509	324	286	373	31.9
Hexachloroethane	<0.94	<0.92	<0.91	<0.93	1.6
a,2,6-Trichlorotoluene	<0.94	<0.92	<0.91	<0.93	1.6

TABLE 76
Clean Harbors Sarnia
Dry Reference Concentrations for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Dry Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
1,3-Dichlorobenzene	254	199	160	205	23.0
1,4-Dichlorobenzene	39.5	34.7	21.8	32.0	28.6
1,2-Dichlorobenzene	351	195	102	216	58.0
Total Dichlorobenzene	644	429	285	453	40.0
1,3,5-trichlorobenzene	3.35	3.30	5.44	4.03	30.3
1,2,4-trichlorobenzene	76.0	87.5	101	88.1	14.2
1,2,3-trichlorobenzene	341	171	170	227	43.4
Total Trichlorobenzene	420	262	276	319	27.5
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	87.0	96.6	132	105	22.4
1,2,3,4-tetrachlorobenzene	121	58.3	53.5	77.4	48.3
Total Tetrachlorobenzene	208	155	185	183	14.5
Pentachlorobenzene	168	76.3	76.3	107	49.5
Hexachlorobenzene	25.0	10.3	11.0	15.5	53.6
Total Chlorobenzenes	1465	933	833	1077	31.5
Hexachloroethane	<2.71	<2.66	<2.66	<2.68	1.2
a,2,6-Trichlorotoluene	<2.71	<2.66	<2.66	<2.68	1.2

* At 25°C and 1 atmosphere

TABLE 77
Clean Harbors Sarnia
Dry Adjusted Concentrations for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Dry Adjusted Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
1,3-Dichlorobenzene	216	177	145	179	19.9
1,4-Dichlorobenzene	33.6	30.8	19.7	28.0	26.3
1,2-Dichlorobenzene	298	174	92.3	188	55.1
Total Dichlorobenzene	547	381	256	395	36.9
1,3,5-trichlorobenzene	2.85	2.93	4.90	3.56	32.7
1,2,4-trichlorobenzene	64.5	77.7	90.9	77.7	17.0
1,2,3-trichlorobenzene	290	152	153	198	40.0
Total Trichlorobenzene	357	233	249	279	24.2
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	73.9	85.8	119	92.8	25.0
1,2,3,4-tetrachlorobenzene	102	51.8	48.2	67.4	44.9
Total Tetrachlorobenzene	176	138	167	160	12.6
Pentachlorobenzene	143	67.8	68.7	93.0	46.1
Hexachlorobenzene	21.2	9.17	9.95	13.4	50.2
Total Chlorobenzenes	1244	829	751	941	28.2
Hexachloroethane	<2.30	<2.36	<2.39	<2.35	1.9
a,2,6-Trichlorotoluene	<2.30	<2.36	<2.39	<2.35	1.9

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 78
Clean Harbors Sarnia
Wet Reference Concentrations for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Wet Reference Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
1,3-Dichlorobenzene	134	105	84.0	108	23.5
1,4-Dichlorobenzene	20.9	18.3	11.4	16.9	29.1
1,2-Dichlorobenzene	186	103	53.6	114	58.5
Total Dichlorobenzene	341	226	149	239	40.5
1,3,5-trichlorobenzene	1.78	1.74	2.85	2.12	29.8
1,2,4-trichlorobenzene	40.2	46.1	52.8	46.4	13.6
1,2,3-trichlorobenzene	181	90.0	88.9	120	43.9
Total Trichlorobenzene	223	138	145	168	28.0
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	46.1	50.8	69.0	55.3	21.9
1,2,3,4-tetrachlorobenzene	63.8	30.7	28.0	40.8	48.9
Total Tetrachlorobenzene	110	81.5	97.0	96.2	14.8
Pentachlorobenzene	88.9	40.2	39.9	56.3	50.1
Hexachlorobenzene	13.2	5.43	5.78	8.15	54.1
Total Chlorobenzenes	776	491	436	568	32.1
Hexachloroethane	<1.44	<1.40	<1.39	<1.41	1.8
a,2,6-Trichlorotoluene	<1.44	<1.40	<1.39	<1.41	1.8

* At 25°C and 1 atmosphere

TABLE 79
Clean Harbors Sarnia
Emission Rates for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
1,3-Dichlorobenzene	5.00	3.96	3.21	4.06	22.2
1,4-Dichlorobenzene	0.78	0.69	0.44	0.64	28.0
1,2-Dichlorobenzene	6.91	3.89	2.05	4.28	57.3
Total Dichlorobenzene	12.7	8.55	5.69	8.98	39.2
1,3,5-trichlorobenzene	0.07	0.07	0.11	0.08	30.9
1,2,4-trichlorobenzene	1.50	1.74	2.02	1.75	14.9
1,2,3-trichlorobenzene	6.72	3.40	3.40	4.51	42.6
Total Trichlorobenzene	8.28	5.21	5.52	6.34	26.7
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	1.71	1.92	2.64	2.09	23.1
1,2,3,4-tetrachlorobenzene	2.38	1.16	1.07	1.53	47.5
Total Tetrachlorobenzene	4.09	3.08	3.71	3.63	14.0
Pentachlorobenzene	3.31	1.52	1.53	2.12	48.7
Hexachlorobenzene	0.49	0.21	0.22	0.31	52.7
Total Chlorobenzenes	28.9	18.6	16.7	21.4	30.7
Hexachloroethane	<0.053	<0.053	<0.053	<0.053	0.6
a,2,6-Trichlorotoluene	<0.053	<0.053	<0.053	<0.053	0.6

TABLE 80
Clean Harbors Sarnia
Summary of Emission Data for Chlorobenzenes and Related Chlorinated Compounds

Specific Isomer	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
1,3-Dichlorobenzene	70.9	205	179	108	4.06
1,4-Dichlorobenzene	11.1	32.0	28.0	16.9	0.64
1,2-Dichlorobenzene	75.0	216	188	114	4.28
Total Dichlorobenzene	157	453	395	239	8.98
1,3,5-trichlorobenzene	1.39	4.03	3.56	2.12	0.080
1,2,4-trichlorobenzene	30.5	88.1	77.7	46.4	1.75
1,2,3-trichlorobenzene	78.8	227	198	120	4.51
Total Trichlorobenzene	111	319	279	168	6.34
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	36.4	105	92.8	55.3	2.09
1,2,3,4-tetrachlorobenzene	26.8	77.4	67.4	40.8	1.53
Total Tetrachlorobenzene	63.2	183	160	96.2	3.63
Pentachlorobenzene	37.0	107	93.0	56.3	2.12
Hexachlorobenzene	5.36	15.5	13.4	8.15	0.31
Total Chlorobenzenes	373	1077	941	568	21.4
Hexachloroethane	<0.93	<2.68	<2.35	<1.41	<0.053
a,2,6-Trichlorotoluene	<0.93	<2.68	<2.35	<1.41	<0.053

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 81
Clean Harbors Sarnia
Chlorobenzene and Other Related Chlorinated Compounds
Blank Analyses

Isomers and Congener Group Totals	Lab Blank Total ng	Blank Train Total ng
1,3-Dichlorobenzene	<14	<14
1,4-Dichlorobenzene	51.5	35.1
1,2-Dichlorobenzene	<14	<14
Total Dichlorobenzene	<79.5	<63.1
1,3,5-trichlorobenzene	<14	<14
1,2,4-trichlorobenzene	<14	<14
1,2,3-trichlorobenzene	<14	146
Total Trichlorobenzene	<42.0	<174
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	<14	<14
1,2,3,4-tetrachlorobenzene	<14	<14
Total Tetrachlorobenzene	<28.0	<28.0
Pentachlorobenzene	<14	<14
Hexachlorobenzene	<14	<14
Total Chlorobenzenes	<178	<293
Hexachloroethane	<14	<14
a,2,6-Trichlorotoluene	<14	<14

"<" indicates that the amount detected is less than the analytical detection limit (<MDL).
In these cases the value of the detection limit was used to calculate the total collected.

TABLE 82
Clean Harbors Sarnia
Isomer and Congener Group Analysis and Emission Data
for Chlorophenols and Related Compounds
Test No. 1

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	779	52.5	151	128	80.0	2.97
2,4 & 2,5-dichlorophenol	1374	92.5	266	226	141	5.25
3,5-dichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
2,3-dichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
3,4-dichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Total Dichlorophenols	<2363	<159	<458	<389	<243	<9.02
2,4,6-trichlorophenol	4440	299	861	731	456	17.0
2,3,6-trichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
2,3,5-trichlorophenol	580	39.1	112	95.5	59.5	2.21
2,4,5-trichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
2,3,4-trichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
3,4,5-trichlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Total Trichlorophenols	<5300	<357	<1027	<872	<544	<20.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	92.3	6.22	17.9	15.2	9.47	0.35
2,3,4,5-tetrachlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Total Tetrachlorophenols	<162	<10.9	<31.5	<26.7	<16.7	<0.62
Pentachlorophenol	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Total Chlorophenols	<7895	<532	<1530	<1300	<810	<30.1
Heptachlor	<0.28	<0.019	<0.054	<0.046	<0.029	<0.0011
Heptachlor Epoxide A	<2.6	<0.18	<0.50	<0.43	<0.27	<0.0099
Heptachlor Epoxide B	<0.33	<0.022	<0.064	<0.054	<0.034	<0.0013
Total Heptachlor	<3.21	<0.22	<0.62	<0.53	<0.33	<0.012
Oxychlorodane	<0.41	<0.028	<0.079	<0.067	<0.042	<0.0016
trans-Chlorodane	<1.9	<0.13	<0.37	<0.31	<0.20	<0.0073
cis-Chlorodane	<1.8	<0.12	<0.35	<0.30	<0.18	<0.0069
Total Chlorodane	<4.11	<0.28	<0.80	<0.68	<0.42	<0.016
Parlar-26	<2.5	<0.17	<0.48	<0.41	<0.26	<0.0095
Parlar-50	<2.2	<0.15	<0.43	<0.36	<0.23	<0.0084
Parlar-62	<2.7	<0.18	<0.52	<0.44	<0.28	<0.010
Total Toxaphene	<7.40	<0.50	<1.43	<1.22	<0.76	<0.028
Hexachlorophene	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Hexachlorobutadiene	53.4	3.60	10.4	8.79	5.48	0.20
Octachlorostyrene	<0.61	<0.041	<0.12	<0.10	<0.063	<0.0023
Tributyltin	<200	<13.5	<38.8	<32.9	<20.5	<0.76

Dry Gas Volume Sampled (Rm³*) :	5.159
Actual Flowrate (m³/s) :	56.7
Dry Reference Flowrate (Rm³/s*) :	19.7
Dry Adjusted Flowrate (Rm³/s**) :	23.2
Wet Reference Flowrate (Rm³/s*) :	37.2

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 83
Clean Harbors Sarnia
Isomer and Congener Group Analysis and Emission Data for Chlorophenols and Related Compounds
Test No. 2

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	632	41.7	120	107	63.1	2.39
2,4 & 2,5-dichlorophenol	902	59.5	171	152	90.1	3.41
3,5-dichlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
2,3-dichlorophenol	680	44.9	129	115	67.9	2.57
3,4-dichlorophenol	274	18.1	52.0	46.2	27.4	1.03
Total Dichlorophenols	<2558	<169	<485	<431	<256	<9.66
2,4,6-trichlorophenol	2700	178	512	455	270	10.2
2,3,6-trichlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
2,3,5-trichlorophenol	1660	110	315	280	166	6.27
2,4,5-trichlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
2,3,4-trichlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
3,4,5-trichlorophenol	312	20.6	59.2	52.6	31.2	1.18
Total Trichlorophenols	<4882	<322	<926	<823	<488	<18.4
2,3,5,6 & 2,3,4,6-tetrachlorophenol	197	13.0	37.4	33.2	19.7	0.74
2,3,4,5-tetrachlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
Total Tetrachlorophenols	<267	<17.6	<50.7	<45.0	<26.7	<1.01
Pentachlorophenol	<70	<4.62	<13.3	<11.8	<6.99	<0.26
Total Chlorophenols	<7777	<513	<1476	<1311	<777	<29.4
Heptachlor	<0.13	<0.0086	<0.025	<0.022	<0.013	<0.00049
Heptachlor Epoxide A	<3.4	<0.22	<0.65	<0.57	<0.34	<0.013
Heptachlor Epoxide B	<0.43	<0.028	<0.082	<0.072	<0.043	<0.0016
Total Heptachlor	<3.96	<0.26	<0.75	<0.67	<0.40	<0.015
Oxychlorodane	<0.50	<0.033	<0.095	<0.084	<0.050	<0.0019
trans-Chlorodane	<2.5	<0.17	<0.47	<0.42	<0.25	<0.0094
cis-Chlorodane	<2.4	<0.16	<0.46	<0.40	<0.24	<0.0091
Total Chlorodane	<5.40	<0.36	<1.02	<0.91	<0.54	<0.020
Parlar-26	<2.3	<0.15	<0.44	<0.39	<0.23	<0.0087
Parlar-50	<1.7	<0.11	<0.32	<0.29	<0.17	<0.0064
Parlar-62	<2.2	<0.15	<0.42	<0.37	<0.22	<0.0083
Total Toxaphene	<6.20	<0.41	<1.18	<1.05	<0.62	<0.023
Hexachlorophene	<70	<4.62	<13.3	<11.8	<6.99	<0.26
Hexachlorobutadiene	10.1	0.67	1.92	1.70	1.01	0.038
Octachlorostyrene	<0.54	<0.036	<0.10	<0.091	<0.054	<0.0020
Tributyltin	<200	<13.2	<38.0	<33.7	<20.0	<0.76

Dry Gas Volume Sampled (Rm³*) :	5.270
Actual Flowrate (m³/s) :	57.2
Dry Reference Flowrate (Rm³/s*) :	19.9
Dry Adjusted Flowrate (Rm³/s**) :	22.4
Wet Reference Flowrate (Rm³/s*) :	37.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 84
Clean Harbors Sarnia
Isomer and Congener Group Analysis and Emission Data
for Chlorophenols and Related Compounds
Test No. 3

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	362	23.6	68.7	61.9	36.0	1.37
2,4 & 2,5-dichlorophenol	522	34.0	99.0	89.2	51.8	1.98
3,5-dichlorophenol	77.3	5.04	14.7	13.2	7.68	0.29
2,3-dichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
3,4-dichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Total Dichlorophenols	<1101	<71.8	<209	<188	<109	<4.18
2,4,6-trichlorophenol	2870	187	544	490	285	10.9
2,3,6-trichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
2,3,5-trichlorophenol	1020	66.5	193	174	101	3.87
2,4,5-trichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
2,3,4-trichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
3,4,5-trichlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Total Trichlorophenols	<4170	<272	<791	<713	<414	<15.8
2,3,5,6 & 2,3,4,6-tetrachlorophenol	55.1	3.59	10.5	9.42	5.47	0.21
2,3,4,5-tetrachlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Total Tetrachlorophenols	<125	<8.15	<23.7	<21.4	<12.4	<0.47
Pentachlorophenol	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Total Chlorophenols	<5466	<356	<1037	<934	<543	<20.7
Heptachlor	<0.11	<0.0072	<0.021	<0.019	<0.011	<0.00042
Heptachlor Epoxide A	<3.0	<0.20	<0.57	<0.51	<0.30	<0.011
Heptachlor Epoxide B	<0.37	<0.024	<0.070	<0.063	<0.037	<0.0014
Total Heptachlor	<3.48	<0.23	<0.66	<0.59	<0.35	<0.013
Oxychlorodane	<0.53	<0.035	<0.10	<0.091	<0.053	<0.0020
trans-Chlorodane	<2.2	<0.14	<0.42	<0.38	<0.22	<0.0083
cis-Chlorodane	<2.1	<0.14	<0.40	<0.36	<0.21	<0.0080
Total Chlorodane	<4.83	<0.31	<0.92	<0.83	<0.48	<0.018
Parlar-26	<3.3	<0.22	<0.63	<0.56	<0.33	<0.013
Parlar-50	<2.6	<0.17	<0.49	<0.44	<0.26	<0.0099
Parlar-62	<3.2	<0.21	<0.61	<0.55	<0.32	<0.012
Total Toxaphene	<9.10	<0.59	<1.73	<1.56	<0.90	<0.035
Hexachlorophene	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Hexachlorobutadiene	61.1	3.98	11.6	10.4	6.07	0.23
Octachlorostyrene	<0.60	<0.039	<0.11	<0.10	<0.060	<0.0023
Tributyltin	<200	<13.0	<37.9	<34.2	<19.9	<0.76

Dry Gas Volume Sampled (Rm³*) :	5.272
Actual Flowrate (m³/s) :	58.2
Dry Reference Flowrate (Rm³/s*) :	20.0
Dry Adjusted Flowrate (Rm³/s**) :	22.2
Wet Reference Flowrate (Rm³/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 85
Clean Harbors Sarnia
Chlorophenol Isomer and Congener Group
and Related Compounds
Actual Concentrations

Specific Isomer	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
2,6-dichlorophenol	52.5	41.7	23.6	39.3	37.2
2,4 & 2,5-dichlorophenol	92.5	59.5	34.0	62.0	47.3
3,5-dichlorophenol	<4.71	<4.62	5.04	<4.79	4.6
2,3-dichlorophenol	<4.71	44.9	<4.56	<18.1	129
3,4-dichlorophenol	<4.71	18.1	<4.56	<9.12	85.1
Total Dichlorophenols	<159	<169	<71.8	<133	40.1
2,4,6-trichlorophenol	299	178	187	221	30.4
2,3,6-trichlorophenol	<4.71	<4.62	<4.56	<4.63	1.6
2,3,5-trichlorophenol	39.1	110	66.5	71.7	49.6
2,4,5-trichlorophenol	<4.71	<4.62	<4.56	<4.63	1.6
2,3,4-trichlorophenol	<4.71	<4.62	<4.56	<4.63	1.6
3,4,5-trichlorophenol	<4.71	20.6	<4.56	<9.96	92.5
Total Trichlorophenols	<357	<322	<272	<317	13.5
2,3,5,6 & 2,3,4,6-tetrachlorophenol	6.22	13.0	3.59	7.60	63.9
2,3,4,5-tetrachlorophenol	<4.71	<4.62	<4.56	<4.63	1.6
Total Tetrachlorophenols	<10.9	<17.6	<8.15	<12.2	39.8
Pentachlorophenol	<4.71	<4.62	<4.56	<4.63	1.6
Total Chlorophenols	<532	<513	<356	<467	20.6
Heptachlor	<0.019	<0.0086	<0.0072	<0.0115	55.3
Heptachlor Epoxide A	<0.18	<0.22	<0.20	<0.20	12.5
Heptachlor Epoxide B	<0.022	<0.028	<0.024	<0.025	12.7
Total Heptachlor	<0.22	<0.26	<0.23	<0.23	10.1
Oxychlorodane	<0.028	<0.033	<0.035	<0.032	11.5
trans-Chlorodane	<0.13	<0.17	<0.14	<0.15	12.8
cis-Chlorodane	<0.12	<0.16	<0.14	<0.14	13.5
Total Chlorodane	<0.28	<0.36	<0.31	<0.32	12.6
Parlar-26	<0.17	<0.15	<0.22	<0.18	18.4
Parlar-50	<0.15	<0.11	<0.17	<0.14	20.2
Parlar-62	<0.18	<0.15	<0.21	<0.18	17.8
Total Toxaphene	<0.50	<0.41	<0.59	<0.50	18.4
Hexachlorophene	<4.71	<4.62	<4.56	<4.63	1.6
Hexachlorobutadiene	3.60	0.67	3.98	2.75	66.0
Octachlorostyrene	<0.041	<0.036	<0.039	<0.039	7.1
Tributyltin	<13.5	<13.2	<13.0	<13.2	1.6

TABLE 86
Clean Harbors Sarnia
Chlorophenol Isomer and Congener Group and Related Compounds
Dry Reference Concentrations

Specific Isomer	Dry Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
2,6-dichlorophenol	151	120	68.7	113	36.7
2,4 & 2,5-dichlorophenol	266	171	99.0	179	46.9
3,5-dichlorophenol	<13.6	<13.3	14.7	<13.8	5.3
2,3-dichlorophenol	<13.6	129	<13.3	<52.0	128
3,4-dichlorophenol	<13.6	52.0	<13.3	<26.3	84.7
Total Dichlorophenols	<458	<485	<209	<384	39.7
2,4,6-trichlorophenol	861	512	544	639	30.1
2,3,6-trichlorophenol	<13.6	<13.3	<13.3	<13.4	1.2
2,3,5-trichlorophenol	112	315	193	207	49.3
2,4,5-trichlorophenol	<13.6	<13.3	<13.3	<13.4	1.2
2,3,4-trichlorophenol	<13.6	<13.3	<13.3	<13.4	1.2
3,4,5-trichlorophenol	<13.6	59.2	<13.3	<28.7	92.1
Total Trichlorophenols	<1027	<926	<791	<915	13.0
2,3,5,6 & 2,3,4,6-tetrachlorophenol	17.9	37.4	10.5	21.9	63.5
2,3,4,5-tetrachlorophenol	<13.6	<13.3	<13.3	<13.4	1.2
Total Tetrachlorophenols	<31.5	<50.7	<23.7	<35.3	39.3
Pentachlorophenol	<13.6	<13.3	<13.3	<13.4	1.2
Total Chlorophenols	<1530	<1476	<1037	<1348	20.1
Heptachlor	<0.054	<0.025	<0.021	<0.033	55.0
Heptachlor Epoxide A	<0.50	<0.65	<0.57	<0.57	12.3
Heptachlor Epoxide B	<0.064	<0.082	<0.070	<0.072	12.4
Total Heptachlor	<0.62	<0.75	<0.66	<0.68	9.8
Oxychlorodane	<0.079	<0.095	<0.10	<0.092	11.9
trans-Chlorodane	<0.37	<0.47	<0.42	<0.42	12.6
cis-Chlorodane	<0.35	<0.46	<0.40	<0.40	13.3
Total Chlorodane	<0.80	<1.02	<0.92	<0.91	12.5
Parlar-26	<0.48	<0.44	<0.63	<0.52	19.1
Parlar-50	<0.43	<0.32	<0.49	<0.41	20.8
Parlar-62	<0.52	<0.42	<0.61	<0.52	18.4
Total Toxaphene	<1.43	<1.18	<1.73	<1.45	19.0
Hexachlorophene	<13.6	<13.3	<13.3	<13.4	1.2
Hexachlorobutadiene	10.4	1.92	11.6	7.95	66.2
Octachlorostyrene	<0.12	<0.10	<0.11	<0.11	7.3
Tributyltin	<38.8	<38.0	<37.9	<38.2	1.2

* At 25°C and 1 atmosphere

TABLE 87
Clean Harbors Sarnia
Chlorophenol Isomer and Congener Group and Related Compounds
Dry Adjusted Concentrations

Specific Isomer	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
2,6-dichlorophenol	128	107	61.9	98.9	34.2
2,4 & 2,5-dichlorophenol	226	152	89.2	156	44.0
3,5-dichlorophenol	<11.5	<11.8	13.2	<12.2	7.4
2,3-dichlorophenol	<11.5	115	<12.0	<46.0	129
3,4-dichlorophenol	<11.5	46.2	<12.0	<23.2	85.6
Total Dichlorophenols	<389	<431	<188	<336	38.6
2,4,6-trichlorophenol	731	455	490	559	26.8
2,3,6-trichlorophenol	<11.5	<11.8	<12.0	<11.8	1.9
2,3,5-trichlorophenol	95.5	280	174	183	50.5
2,4,5-trichlorophenol	<11.5	<11.8	<12.0	<11.8	1.9
2,3,4-trichlorophenol	<11.5	<11.8	<12.0	<11.8	1.9
3,4,5-trichlorophenol	<11.5	52.6	<12.0	<25.4	93.0
Total Trichlorophenols	<872	<823	<713	<803	10.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	15.2	33.2	9.42	19.3	64.4
2,3,4,5-tetrachlorophenol	<11.5	<11.8	<12.0	<11.8	1.9
Total Tetrachlorophenols	<26.7	<45.0	<21.4	<31.0	39.9
Pentachlorophenol	<11.5	<11.8	<12.0	<11.8	1.9
Total Chlorophenols	<1300	<1311	<934	<1182	18.1
Heptachlor	<0.046	<0.022	<0.019	<0.029	51.6
Heptachlor Epoxide A	<0.43	<0.57	<0.51	<0.50	14.5
Heptachlor Epoxide B	<0.054	<0.072	<0.063	<0.063	14.3
Total Heptachlor	<0.53	<0.67	<0.59	<0.60	11.7
Oxychlorodane	<0.067	<0.084	<0.091	<0.081	14.8
trans-Chlorodane	<0.31	<0.42	<0.38	<0.37	14.8
cis-Chlorodane	<0.30	<0.40	<0.36	<0.35	15.4
Total Chlorodane	<0.68	<0.91	<0.83	<0.80	14.7
Parlar-26	<0.41	<0.39	<0.56	<0.45	21.0
Parlar-50	<0.36	<0.29	<0.44	<0.36	21.7
Parlar-62	<0.44	<0.37	<0.55	<0.45	19.5
Total Toxaphene	<1.22	<1.05	<1.56	<1.27	20.4
Hexachlorophene	<11.5	<11.8	<12.0	<11.8	1.9
Hexachlorobutadiene	8.79	1.70	10.4	6.98	66.5
Octachlorostyrene	<0.10	<0.091	<0.10	<0.098	6.2
Tributyltin	<32.9	<33.7	<34.2	<33.6	1.9

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 88
Clean Harbors Sarnia
Chlorophenol Isomer and Congener Group
and Related Compounds
Wet Reference Concentrations

Specific Isomer	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
2,6-dichlorophenol	80.0	63.1	36.0	59.7	37.2
2,4 & 2,5-dichlorophenol	141	90.1	51.8	94.3	47.4
3,5-dichlorophenol	<7.19	<6.99	7.68	<7.28	4.8
2,3-dichlorophenol	<7.19	67.9	<6.95	<27.4	128
3,4-dichlorophenol	<7.19	27.4	<6.95	<13.8	84.7
Total Dichlorophenols	<243	<256	<109	<202	40.0
2,4,6-trichlorophenol	456	270	285	337	30.7
2,3,6-trichlorophenol	<7.19	<6.99	<6.95	<7.04	1.8
2,3,5-trichlorophenol	59.5	166	101	109	49.2
2,4,5-trichlorophenol	<7.19	<6.99	<6.95	<7.04	1.8
2,3,4-trichlorophenol	<7.19	<6.99	<6.95	<7.04	1.8
3,4,5-trichlorophenol	<7.19	31.2	<6.95	<15.1	92.1
Total Trichlorophenols	<544	<488	<414	<482	13.5
2,3,5,6 & 2,3,4,6-tetrachlorophenol	9.47	19.7	5.47	11.5	63.5
2,3,4,5-tetrachlorophenol	<7.19	<6.99	<6.95	<7.04	1.8
Total Tetrachlorophenols	<16.7	<26.7	<12.4	<18.6	39.4
Pentachlorophenol	<7.19	<6.99	<6.95	<7.04	1.8
Total Chlorophenols	<810	<777	<543	<710	20.5
Heptachlor	<0.029	<0.013	<0.011	<0.018	55.5
Heptachlor Epoxide A	<0.27	<0.34	<0.30	<0.30	12.1
Heptachlor Epoxide B	<0.034	<0.043	<0.037	<0.038	12.3
Total Heptachlor	<0.33	<0.40	<0.35	<0.36	9.7
Oxychlorodane	<0.042	<0.050	<0.053	<0.048	11.4
trans-Chlorodane	<0.20	<0.25	<0.22	<0.22	12.4
cis-Chlorodane	<0.18	<0.24	<0.21	<0.21	13.1
Total Chlorodane	<0.42	<0.54	<0.48	<0.48	12.2
Parlar-26	<0.26	<0.23	<0.33	<0.27	18.7
Parlar-50	<0.23	<0.17	<0.26	<0.22	20.5
Parlar-62	<0.28	<0.22	<0.32	<0.27	18.1
Total Toxaphene	<0.76	<0.62	<0.90	<0.76	18.7
Hexachlorophene	<7.19	<6.99	<6.95	<7.04	1.8
Hexachlorobutadiene	5.48	1.01	6.07	4.19	66.1
Octachlorostyrene	<0.063	<0.054	<0.060	<0.059	7.5
Tributyltin	<20.5	<20.0	<19.9	<20.1	1.8

* At 25°C and 1 atmosphere

TABLE 89
Clean Harbors Sarnia
Chlorophenol Isomer and Congener Group and Related Compounds
Emission Rates

Specific Isomer	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
2,6-dichlorophenol	2.97	2.39	1.37	2.24	36.1
2,4 & 2,5-dichlorophenol	5.25	3.41	1.98	3.54	46.2
3,5-dichlorophenol	<0.27	<0.26	0.29	<0.27	5.8
2,3-dichlorophenol	<0.27	2.57	<0.27	<1.03	129
3,4-dichlorophenol	<0.27	1.03	<0.27	<0.52	84.9
Total Dichlorophenols	<9.02	<9.66	<4.18	<7.62	39.3
2,4,6-trichlorophenol	17.0	10.2	10.9	12.7	29.3
2,3,6-trichlorophenol	<0.27	<0.26	<0.27	<0.27	0.6
2,3,5-trichlorophenol	2.21	6.27	3.87	4.12	49.5
2,4,5-trichlorophenol	<0.27	<0.26	<0.27	<0.27	0.6
2,3,4-trichlorophenol	<0.27	<0.26	<0.27	<0.27	0.6
3,4,5-trichlorophenol	<0.27	1.18	<0.27	<0.57	92.3
Total Trichlorophenols	<20.2	<18.4	<15.8	<18.2	12.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	0.35	0.74	0.21	0.44	63.6
2,3,4,5-tetrachlorophenol	<0.27	<0.26	<0.27	<0.27	0.6
Total Tetrachlorophenols	<0.62	<1.01	<0.47	<0.70	39.4
Pentachlorophenol	<0.27	<0.26	<0.27	<0.27	0.6
Total Chlorophenols	<30.1	<29.4	<20.7	<26.8	19.5
Heptachlor	<0.0011	<0.00049	<0.00042	<0.00066	54.2
Heptachlor Epoxide A	<0.0099	<0.013	<0.011	<0.011	12.8
Heptachlor Epoxide B	<0.0013	<0.0016	<0.0014	<0.0014	12.8
Total Heptachlor	<0.012	<0.015	<0.013	<0.013	10.2
Oxychlorodane	<0.0016	<0.0019	<0.0020	<0.0018	12.6
trans-Chlorodane	<0.0073	<0.0094	<0.0083	<0.0083	13.1
cis-Chlorodane	<0.0069	<0.0091	<0.0080	<0.0080	13.7
Total Chlorodane	<0.016	<0.020	<0.018	<0.018	13.0
Parlar-26	<0.0095	<0.0087	<0.013	<0.010	19.6
Parlar-50	<0.0084	<0.0064	<0.0099	<0.0082	21.0
Parlar-62	<0.010	<0.0083	<0.012	<0.010	18.7
Total Toxaphene	<0.028	<0.023	<0.035	<0.029	19.4
Hexachlorophene	<0.27	<0.26	<0.27	<0.27	0.6
Hexachlorobutadiene	0.20	0.038	0.23	0.16	66.3
Octachlorostyrene	<0.0023	<0.0020	<0.0023	<0.0022	7.0
Tributyltin	<0.76	<0.76	<0.76	<0.76	0.6

TABLE 90
Clean Harbors Sarnia
Summary of Emission Data
for Chlorophenol Isomer and Congener Groups and Related Compounds

Specific Isomer	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	39.3	113	98.9	59.7	2.24
2,4 & 2,5-dichlorophenol	62.0	179	156	94.3	3.54
3,5-dichlorophenol	<4.79	<13.8	<12.2	<7.28	<0.27
2,3-dichlorophenol	<18.1	<52.0	<46.0	<27.4	<1.03
3,4-dichlorophenol	<9.12	<26.3	<23.2	<13.8	<0.52
Total Dichlorophenols	<133	<384	<336	<202	<7.62
2,4,6-trichlorophenol	221	639	559	337	12.7
2,3,6-trichlorophenol	<4.63	<13.4	<11.8	<7.04	<0.27
2,3,5-trichlorophenol	71.7	207	183	109	4.12
2,4,5-trichlorophenol	<4.63	<13.4	<11.8	<7.04	<0.27
2,3,4-trichlorophenol	<4.63	<13.4	<11.8	<7.04	<0.27
3,4,5-trichlorophenol	<9.96	<28.7	<25.4	<15.1	<0.57
Total Trichlorophenols	<317	<915	<803	<482	<18.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	7.60	21.9	19.3	11.5	0.44
2,3,4,5-tetrachlorophenol	<4.63	<13.4	<11.8	<7.04	<0.27
Total Tetrachlorophenols	<12.2	<35.3	<31.0	<18.6	<0.70
Pentachlorophenol	<4.63	<13.4	<11.8	<7.04	<0.27
Total Chlorophenols	<467	<1348	<1182	<710	<26.8
Heptachlor	<0.0115	<0.033	<0.029	<0.018	<0.00066
Heptachlor Epoxide A	<0.20	<0.57	<0.50	<0.30	<0.011
Heptachlor Epoxide B	<0.025	<0.072	<0.063	<0.038	<0.0014
Total Heptachlor	<0.23	<0.68	<0.60	<0.36	<0.013
Oxychlorodane	<0.032	<0.092	<0.081	<0.048	<0.0018
trans-Chlorodane	<0.15	<0.42	<0.37	<0.22	<0.0083
cis-Chlorodane	<0.14	<0.40	<0.35	<0.21	<0.0080
Total Chlorodane	<0.32	<0.91	<0.80	<0.48	<0.018
Parlar-26	<0.18	<0.52	<0.45	<0.27	<0.010
Parlar-50	<0.14	<0.41	<0.36	<0.22	<0.0082
Parlar-62	<0.18	<0.52	<0.45	<0.27	<0.010
Total Toxaphene	<0.50	<1.45	<1.27	<0.76	<0.029
Hexachlorophene	<4.63	<13.4	<11.8	<7.04	<0.27
Hexachlorobutadiene	2.75	7.95	6.98	4.19	0.16
Octachlorostyrene	<0.039	<0.11	<0.098	<0.059	<0.0022
Tributyltin	<13.2	<38.2	<33.6	<20.1	<0.76

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 91
Clean Harbors Sarnia
Chlorophenol and Related Compounds
Blank Analyses

Congener Group	Lab Blank ng	Blank Train ng
2,6-dichlorophenol	<70	<70
2,4 & 2,5-dichlorophenol	<70	<70
3,5-dichlorophenol	<70	<70
2,3-dichlorophenol	<70	<70
3,4-dichlorophenol	<70	<70
Total Dichlorophenols	<350	<350
2,4,6-trichlorophenol	<70	<70
2,3,6-trichlorophenol	<70	<70
2,3,5-trichlorophenol	<70	<70
2,4,5-trichlorophenol	<70	<70
2,3,4-trichlorophenol	<70	<70
3,4,5-trichlorophenol	<70	<70
Total Trichlorophenols	<420	<420
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<70	<70
2,3,4,5-tetrachlorophenol	<70	<70
Total Tetrachlorophenols	<140	<140
Pentachlorophenol	<70	<70
Total Chlorophenols	<980	<980
Heptachlor	<0.23	<0.14
Heptachlor Epoxide A	<2.0	<5.0
Heptachlor Epoxide B	<0.26	<0.63
Total Heptachlor	<2.49	<5.77
Oxychlorodane	<0.24	<0.66
trans-Chlorodane	<2.8	<1.5
cis-Chlorodane	<2.6	<1.4
Total Chlorodane	<5.64	<3.56
Parlar-26	<3.1	<3.1
Parlar-50	<2.1	<1.9
Parlar-62	<2.6	<2.4
Total Toxaphene	<7.80	<7.40
Hexachlorophene	<70	<70
Hexachlorobutadiene	<0.22	<0.22
Octachlorostyrene	<0.49	<0.49
Tributyltin	<200	<200

"<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the total collected.

TABLE 92
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Data
Test No. 1

Compound	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Acenaphthene	23.4	1.58	4.54	3.85	2.40	0.089
Acenaphthylene	143	9.63	27.7	23.5	14.7	0.55
Anthracene	71.2	4.80	13.8	11.7	7.31	0.27
Benzo(a)Anthracene	22.6	1.52	4.38	3.72	2.32	0.086
Benzo(b)Fluoranthene	28.6	1.93	5.54	4.71	2.94	0.11
Benzo(k)Fluoranthene	30.1	2.03	5.83	4.95	3.09	0.11
Benzo(a)fluorene	<14	<0.94	<2.71	<2.30	<1.44	<0.053
Benzo(b)fluorene	<14	<0.94	<2.71	<2.30	<1.44	<0.053
Benzo(g,h,i)Perylene	208	14.0	40.3	34.2	21.4	0.79
Benzo(a)Pyrene	24.7	1.66	4.79	4.07	2.54	0.094
Benzo(e)Pyrene	72.4	4.88	14.0	11.9	7.43	0.28
Biphenyl	473	31.9	91.7	77.9	48.6	1.81
2-Chloronaphthalene	20.7	1.39	4.01	3.41	2.12	0.079
Chrysene/Triphenylene/Benzo(b)anthracene	48.6	3.27	9.42	8.00	4.99	0.19
Coronene	172	11.6	33.3	28.3	17.7	0.66
Dibenzo(a,c/a,h)Anthracene	32.1	2.16	6.22	5.28	3.30	0.12
Dibenzo(a,e)pyrene	<70	<4.71	<13.6	<11.5	<7.19	<0.27
9,10-dimethylanthracene	<14	<0.94	<2.71	<2.30	<1.44	<0.053
7,12-Dimethylbenzo(a)anthracene	19.8	1.33	3.84	3.26	2.03	0.076
Fluoranthene	112	7.54	21.7	18.4	11.5	0.43
Fluorene	91.4	6.16	17.7	15.0	9.38	0.35
Indeno(1,2,3-cd)Pyrene	39.8	2.68	7.71	6.55	4.09	0.15
2-methylanthracene	95.5	6.43	18.5	15.7	9.80	0.36
3-Methylcholanthrene	<70	<4.71	<13.6	<11.5	<7.19	<0.27
1-Methylnaphthalene	654	44.0	127	108	67.1	2.50
2-Methylnaphthalene	554	37.3	107	91.2	56.9	2.12
1-Methylphenanthrene	<14	<0.94	<2.71	<2.30	<1.44	<0.053
9-Methylphenanthrene	48.7	3.28	9.44	8.02	5.00	0.19
Naphthalene	6140	414	1190	1011	630	23.4
Perylene	17.6	1.19	3.41	2.90	1.81	0.067
Phenanthrene	430	29.0	83.3	70.8	44.1	1.64
Picene	<70	<4.71	<13.6	<11.5	<7.19	<0.27
Pyrene	123	8.28	23.8	20.2	12.6	0.47
Quinoline	<14	<0.94	<2.71	<2.30	<1.44	<0.053
m-terphenyl	21.4	1.44	4.15	3.52	2.20	0.082
o-Terphenyl	17.9	1.21	3.47	2.95	1.84	0.068
p-terphenyl	17.6	1.19	3.41	2.90	1.81	0.067
Tetralin	192	12.9	37.2	31.6	19.7	0.73
Total	<10225	<689	<1982	<1683	<1050	<39.0

Dry Gas Volume Sampled (Rm^3*) :	5.159
Actual Flowrate (m^3/s) :	56.7
Dry Reference Flowrate (Rm^3/s*) :	19.7
Dry Adjusted Flowrate (Rm^3/s**) :	23.2
Wet Reference Flowrate (Rm^3/s*) :	37.2

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 93
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Data
Test No. 2

Compound	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Acenaphthene						
Acenaphthylene						
Anthracene						
Benzo(a)Anthracene						
Benzo(b)Fluoranthene						
Benzo(k)Fluoranthene						
Benzo(a)fluorene						
Benzo(b)fluorene						
Benzo(g,h,i)Perylene						
Benzo(a)Pyrene						
Benzo(e)Pyrene						
Biphenyl						
2-Chloronaphthalene						
Chrysene/Triphenylene/Benzo(b)anthracene	The sample went dry during the soxhlet extraction and the resulting charring of the extract caused a significantly high bias to the PAH results of this sample extract such that the results were clearly not representative of the source emissions.					
Coronene						
Dibenzo(a,c/a,h)Anthracene						
Dibenzo(a,e)pyrene						
9,10-dimethylanthracene						
7,12-Dimethylbenzo(a)anthracene						
Fluoranthene						
Fluorene						
Indeno(1,2,3-cd)Pyrene						
2-methylanthracene						
3-Methylcholanthrene						
1-Methylnaphthalene						
2-Methylnaphthalene	No Data is available for this sample.					
1-Methylphenanthrene						
9-Methylphenanthrene						
Naphthalene						
Perylene						
Phenanthrene						
Picene						
Pyrene						
Quinoline						
m-terphenyl						
o-Terphenyl						
p-terphenyl						
Tetralin						
Total						

Dry Gas Volume Sampled (Rm^3*) :	5.270
Actual Flowrate (m^3/s) :	57.2
Dry Reference Flowrate (Rm^3/s*) :	19.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.4
Wet Reference Flowrate (Rm^3/s*) :	37.8

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 94
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Data
Test No. 3

Compound	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Acenaphthene	14.9	0.97	2.83	2.55	1.48	0.057
Acenaphthylene	54.3	3.54	10.3	9.28	5.39	0.21
Anthracene	44.2	2.88	8.38	7.55	4.39	0.17
Benzo(a)Anthracene	21.1	1.38	4.00	3.61	2.10	0.080
Benzo(b)Fluoranthene	24.6	1.60	4.67	4.20	2.44	0.093
Benzo(k)Fluoranthene	30.1	1.96	5.71	5.14	2.99	0.11
Benzo(a)fluorene	33.9	2.21	6.43	5.79	3.37	0.13
Benzo(b)fluorene	<14	<0.91	<2.66	<2.39	<1.39	<0.053
Benzo(g,h,i)Perylene	59.3	3.87	11.2	10.1	5.89	0.22
Benzo(a)Pyrene	23.7	1.54	4.50	4.05	2.35	0.090
Benzo(e)Pyrene	31.6	2.06	5.99	5.40	3.14	0.12
Biphenyl	503	32.8	95.4	86.0	50.0	1.91
2-Chloronaphthalene	<14	<0.91	<2.66	<2.39	<1.39	<0.053
Chrysene/Triphenylene/Benzo(b)anthracene	46.0	3.00	8.73	7.86	4.57	0.17
Coronene	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Dibenzo(a,c/a,h)Anthracene	34.9	2.27	6.62	5.96	3.47	0.13
Dibenzo(a,e)pyrene	<70	<4.56	<13.3	<12.0	<6.95	<0.27
9,10-dimethylanthracene	<14	<0.91	<2.66	<2.39	<1.39	<0.053
7,12-Dimethylbenzo(a)anthracene	16.5	1.08	3.13	2.82	1.64	0.063
Fluoranthene	87.6	5.71	16.6	15.0	8.70	0.33
Fluorene	53.2	3.47	10.1	9.09	5.28	0.20
Indeno(1,2,3-cd)Pyrene	28.2	1.84	5.35	4.82	2.80	0.11
2-methylanthracene	67.4	4.39	12.8	11.5	6.69	0.26
3-Methylcholanthrene	<70	<4.56	<13.3	<12.0	<6.95	<0.27
1-Methylnaphthalene	347	22.6	65.8	59.3	34.5	1.32
2-Methylnaphthalene	335	21.8	63.5	57.2	33.3	1.27
1-Methylphenanthrene	18.5	1.21	3.51	3.16	1.84	0.070
9-Methylphenanthrene	23.0	1.50	4.36	3.93	2.28	0.087
Naphthalene	4630	302	878	791	460	17.6
Perylene	<14	<0.91	<2.66	<2.39	<1.39	<0.053
Phenanthrene	302	19.7	57.3	51.6	30.0	1.15
Picene	<70	<4.56	<13.3	<12.0	<6.95	<0.27
Pyrene	90.9	5.93	17.2	15.5	9.03	0.34
Quinoline	91.0	5.93	17.3	15.6	9.04	0.35
m-terphenyl	49.2	3.21	9.33	8.41	4.89	0.19
o-Terphenyl	17.0	1.11	3.22	2.91	1.69	0.064
p-terphenyl	28.1	1.83	5.33	4.80	2.79	0.11
Tetralin	173	11.3	32.8	29.6	17.2	0.66
Total	<7615	<496	<1444	<1301	<756	<28.9

Dry Gas Volume Sampled (Rm³*) :	5.272
Actual Flowrate (m³/s) :	58.2
Dry Reference Flowrate (Rm³/s*) :	20.0
Dry Adjusted Flowrate (Rm³/s**) :	22.2
Wet Reference Flowrate (Rm³/s*) :	38.2

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the emission data.

TABLE 95
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Actual Concentrations

Compound	Actual Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
Acenaphthene	1.58		0.97	1.27	33.6
Acenaphthylene	9.63		3.54	6.59	65.4
Anthracene	4.80		2.88	3.84	35.3
Benzo(a)Anthracene	1.52		1.38	1.45	7.2
Benzo(b)Fluoranthene	1.93		1.60	1.76	12.9
Benzo(k)Fluoranthene	2.03		1.96	1.99	2.3
Benzo(a)fluorene	<0.94		2.21	<1.58	56.8
Benzo(b)fluorene	<0.94		<0.91	<0.93	2.3
Benzo(g,h,i)Perylene	14.0		3.87	8.94	80.3
Benzo(a)Pyrene	1.66		1.54	1.60	5.2
Benzo(e)Pyrene	4.88		2.06	3.47	57.4
Biphenyl	31.9		32.8	32.3	2.0
2-Chloronaphthalene	1.39		<0.91	<1.15	29.5
Chrysene/Triphenylene/Benzo(b)anthracene	3.27		3.00	3.14	6.2
Coronene	11.6		<4.56	<8.07	61.5
Dibenzo(a,c/a,h)Anthracene	2.16		2.27	2.22	3.6
Dibenzo(a,e)pyrene	<4.71		<4.56	<4.64	2.3
9,10-dimethylanthracene	<0.94		<0.91	<0.93	2.3
7,12-Dimethylbenzo(a)anthracene	1.33		1.08	1.20	15.1
Fluoranthene	7.54		5.71	6.63	19.6
Fluorene	6.16		3.47	4.81	39.5
Indeno(1,2,3-cd)Pyrene	2.68		1.84	2.26	26.4
2-methylanthracene	6.43		4.39	5.41	26.6
3-Methylcholanthrene	<4.71		<4.56	<4.64	2.3
1-Methylnaphthalene	44.0		22.6	33.3	45.5
2-Methylnaphthalene	37.3		21.8	29.6	37.0
1-Methylphenanthrene	<0.94		1.21	<1.07	17.3
9-Methylphenanthrene	3.28		1.50	2.39	52.7
Naphthalene	414		302	358	22.1
Perylene	1.19		<0.91	<1.05	18.4
Phenanthrene	29.0		19.7	24.3	27.0
Picene	<4.71		<4.56	<4.64	2.3
Pyrene	8.28		5.93	7.10	23.5
Quinoline	<0.94		5.93	<3.44	103
m-terphenyl	1.44		3.21	2.32	53.7
o-Terphenyl	1.21		1.11	1.16	6.0
p-terphenyl	1.19		1.83	1.51	30.3
Tetralin	12.9		11.3	12.1	9.7
Total	<689		<496	<593	22.9

Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

TABLE 96
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Dry Reference Concentrations

Compound	Dry Reference Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	4.54		2.83	3.68	32.8
Acenaphthylene	27.7		10.3	19.0	64.8
Anthracene	13.8		8.38	11.1	34.5
Benzo(a)Anthracene	4.38		4.00	4.19	6.4
Benzo(b)Fluoranthene	5.54		4.67	5.10	12.2
Benzo(k)Fluoranthene	5.83		5.71	5.77	1.5
Benzo(a)fluorene	<2.71		6.43	<4.57	57.5
Benzo(b)fluorene	<2.71		<2.66	<2.68	1.5
Benzo(g,h,i)Perylene	40.3		11.2	25.8	79.7
Benzo(a)Pyrene	4.79		4.50	4.64	4.5
Benzo(e)Pyrene	14.0		5.99	10.0	56.8
Biphenyl	91.7		95.4	93.5	2.8
2-Chloronaphthalene	4.01		<2.66	<3.33	28.8
Chrysene/Triphenylene/Benzo(b)anthracene	9.42		8.73	9.07	5.4
Coronene	33.3		<13.3	<23.3	60.9
Dibenzo(a,c/a,h)Anthracene	6.22		6.62	6.42	4.4
Dibenzo(a,e)pyrene	<13.6		<13.3	<13.4	1.5
9,10-dimethylanthracene	<2.71		<2.66	<2.68	1.5
7,12-Dimethylbenzo(a)anthracene	3.84		3.13	3.48	14.4
Fluoranthene	21.7		16.6	19.2	18.8
Fluorene	17.7		10.1	13.9	38.8
Indeno(1,2,3-cd)Pyrene	7.71		5.35	6.53	25.6
2-methylanthracene	18.5		12.8	15.6	25.9
3-Methylcholanthrene	<13.6		<13.3	<13.4	1.5
1-Methylnaphthalene	127		65.8	96.3	44.8
2-Methylnaphthalene	107		63.5	85.5	36.3
1-Methylphenanthrene	<2.71		3.51	<3.11	18.1
9-Methylphenanthrene	9.44		4.36	6.90	52.0
Naphthalene	1190		878	1034	21.3
Perylene	3.41		<2.66	<3.03	17.6
Phenanthrene	83.3		57.3	70.3	26.2
Picene	<13.6		<13.3	<13.4	1.5
Pyrene	23.8		17.2	20.5	22.7
Quinoline	<2.71		17.3	<9.99	103
m-terphenyl	4.15		9.33	6.74	54.4
o-Terphenyl	3.47		3.22	3.35	5.2
p-terphenyl	3.41		5.33	4.37	31.0
Tetralin	37.2		32.8	35.0	8.9
Total	<1982		<1444	<1713	22.2

* At 25°C and 1 atmosphere

Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

TABLE 97
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Dry Adjusted Concentrations

Compound	Dry Adjusted Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	3.85		2.55	3.20	28.9
Acenaphthylene	23.5		9.28	16.4	61.4
Anthracene	11.7		7.55	9.64	30.6
Benzo(a)Anthracene	3.72		3.61	3.66	2.2
Benzo(b)Fluoranthene	4.71		4.20	4.46	8.0
Benzo(k)Fluoranthene	4.95		5.14	5.05	2.7
Benzo(a)fluorene	<2.30		5.79	<4.05	60.9
Benzo(b)fluorene	<2.30		<2.39	<2.35	2.7
Benzo(g,h,i)Perylene	34.2		10.1	22.2	76.8
Benzo(a)Pyrene	4.07		4.05	4.06	0.3
Benzo(e)Pyrene	11.9		5.40	8.66	53.2
Biphenyl	77.9		86.0	81.9	7.0
2-Chloronaphthalene	3.41		<2.39	<2.90	24.7
Chrysene/Triphenylene/Benzo(b)anthracene	8.00		7.86	7.93	1.2
Coronene	28.3		<12.0	<20.1	57.4
Dibenzo(a,c/a,h)Anthracene	5.28		5.96	5.62	8.6
Dibenzo(a,e)pyrene	<11.5		<12.0	<11.7	2.7
9,10-dimethylanthracene	<2.30		<2.39	<2.35	2.7
7,12-Dimethylbenzo(a)anthracene	3.26		2.82	3.04	10.2
Fluoranthene	18.4		15.0	16.7	14.7
Fluorene	15.0		9.09	12.1	34.9
Indeno(1,2,3-cd)Pyrene	6.55		4.82	5.68	21.5
2-methylanthracene	15.7		11.5	13.6	21.8
3-Methylcholanthrene	<11.5		<12.0	<11.7	2.7
1-Methylnaphthalene	108		59.3	83.5	41.0
2-Methylnaphthalene	91.2		57.2	74.2	32.3
1-Methylphenanthrene	<2.30		3.16	<2.73	22.2
9-Methylphenanthrene	8.02		3.93	5.97	48.4
Naphthalene	1011		791	901	17.2
Perylene	2.90		<2.39	<2.64	13.5
Phenanthrene	70.8		51.6	61.2	22.2
Picene	<11.5		<12.0	<11.7	2.7
Pyrene	20.2		15.5	17.9	18.6
Quinoline	<2.30		15.6	<8.93	105
m-terphenyl	3.52		8.41	5.96	57.9
o-Terphenyl	2.95		2.91	2.93	1.0
p-terphenyl	2.90		4.80	3.85	35.0
Tetralin	31.6		29.6	30.6	4.7
Total	<1683		<1301	<1492	18.1

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

TABLE 98
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Wet Reference Concentrations

Compound	Wet Reference Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	2.40		1.48	1.94	33.6
Acenaphthylene	14.7		5.39	10.0	65.4
Anthracene	7.31		4.39	5.85	35.3
Benzo(a)Anthracene	2.32		2.10	2.21	7.2
Benzo(b)Fluoranthene	2.94		2.44	2.69	13.0
Benzo(k)Fluoranthene	3.09		2.99	3.04	2.3
Benzo(a)fluorene	<1.44		3.37	<2.40	56.8
Benzo(b)fluorene	<1.44		<1.39	<1.41	2.3
Benzo(g,h,i)Perylene	21.4		5.89	13.6	80.3
Benzo(a)Pyrene	2.54		2.35	2.44	5.3
Benzo(e)Pyrene	7.43		3.14	5.29	57.4
Biphenyl	48.6		50.0	49.3	2.0
2-Chloronaphthalene	2.12		<1.39	<1.76	29.6
Chrysene/Triphenylene/Benzo(b)anthracene	4.99		4.57	4.78	6.2
Coronene	17.7		<6.95	<12.3	61.5
Dibenzo(a,c/a,h)Anthracene	3.30		3.47	3.38	3.6
Dibenzo(a,e)pyrene	<7.19		<6.95	<7.07	2.3
9,10-dimethylanthracene	<1.44		<1.39	<1.41	2.3
7,12-Dimethylbenzo(a)anthracene	2.03		1.64	1.84	15.2
Fluoranthene	11.5		8.70	10.1	19.6
Fluorene	9.38		5.28	7.33	39.5
Indeno(1,2,3-cd)Pyrene	4.09		2.80	3.44	26.4
2-methylanthracene	9.80		6.69	8.25	26.7
3-Methylcholanthrene	<7.19		<6.95	<7.07	2.3
1-Methylnaphthalene	67.1		34.5	50.8	45.5
2-Methylnaphthalene	56.9		33.3	45.1	37.0
1-Methylphenanthrene	<1.44		1.84	<1.64	17.3
9-Methylphenanthrene	5.00		2.28	3.64	52.7
Naphthalene	630		460	545	22.1
Perylene	1.81		<1.39	<1.60	18.4
Phenanthrene	44.1		30.0	37.1	27.0
Picene	<7.19		<6.95	<7.07	2.3
Pyrene	12.6		9.03	10.8	23.5
Quinoline	<1.44		9.04	<5.24	103
m-terphenyl	2.20		4.89	3.54	53.7
o-Terphenyl	1.84		1.69	1.76	6.0
p-terphenyl	1.81		2.79	2.30	30.3
Tetralin	19.7		17.2	18.4	9.7
Total	<1050		<756	<903	23.0

* At 25°C and 1 atmosphere
Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

TABLE 99
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Rates

Compound	Emission Rate				Coefficient of Variation
	Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	%
Acenaphthene	0.089		0.057	0.073	31.8
Acenaphthylene	0.55		0.21	0.38	63.9
Anthracene	0.27		0.17	0.22	33.5
Benzo(a)Anthracene	0.086		0.080	0.083	5.3
Benzo(b)Fluoranthene	0.11		0.093	0.10	11.1
Benzo(k)Fluoranthene	0.11		0.11	0.11	0.5
Benzo(a)fluorene	<0.053		0.13	<0.091	58.4
Benzo(b)fluorene	<0.053		<0.053	<0.053	0.5
Benzo(g,h,i)Perylene	0.79		0.22	0.51	79.0
Benzo(a)Pyrene	0.094		0.090	0.092	3.4
Benzo(e)Pyrene	0.28		0.12	0.20	55.9
Biphenyl	1.81		1.91	1.86	3.9
2-Chloronaphthalene	0.079		<0.053	<0.066	27.8
Chrysene/Triphenylene/Benzo(b)anthracene	0.19		0.17	0.18	4.3
Coronene	0.66		<0.27	<0.46	60.0
Dibenzo(a,c/a,h)Anthracene	0.12		0.13	0.13	5.4
Dibenzo(a,e)pyrene	<0.27		<0.27	<0.27	0.5
9,10-dimethylanthracene	<0.053		<0.053	<0.053	0.5
7,12-Dimethylbenzo(a)anthracene	0.076		0.063	0.069	13.3
Fluoranthene	0.43		0.33	0.38	17.7
Fluorene	0.35		0.20	0.28	37.8
Indeno(1,2,3-cd)Pyrene	0.15		0.11	0.13	24.6
2-methylanthracene	0.36		0.26	0.31	24.8
3-Methylcholanthrene	<0.27		<0.27	<0.27	0.5
1-Methylnaphthalene	2.50		1.32	1.91	43.8
2-Methylnaphthalene	2.12		1.27	1.69	35.3
1-Methylphenanthrene	<0.053		0.070	<0.062	19.1
9-Methylphenanthrene	0.19		0.087	0.14	51.1
Naphthalene	23.4		17.6	20.5	20.3
Perylene	0.067		<0.053	<0.060	16.6
Phenanthrene	1.64		1.15	1.39	25.2
Picene	<0.27		<0.27	<0.27	0.5
Pyrene	0.47		0.34	0.41	21.7
Quinoline	<0.053		0.35	<0.20	103
m-terphenyl	0.082		0.19	0.13	55.3
o-Terphenyl	0.068		0.064	0.066	4.1
p-terphenyl	0.067		0.11	0.087	32.1
Tetralin	0.73		0.66	0.69	7.8
Total	<39.0		<28.9	<34.0	21.1

Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

TABLE 100
Clean Harbors Sarnia
Summary of Polycyclic Aromatic Hydrocarbon Emission Data

Compound	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Acenaphthene	1.27	3.68	3.20	1.94	0.073
Acenaphthylene	6.59	19.0	16.4	10.0	0.38
Anthracene	3.84	11.1	9.64	5.85	0.22
Benzo(a)Anthracene	1.45	4.19	3.66	2.21	0.083
Benzo(b)Fluoranthene	1.76	5.10	4.46	2.69	0.10
Benzo(k)Fluoranthene	1.99	5.77	5.05	3.04	0.11
Benzo(a)fluorene	<1.58	<4.57	<4.05	<2.40	<0.091
Benzo(b)fluorene	<0.93	<2.68	<2.35	<1.41	<0.053
Benzo(g,h,i)Perylene	8.94	25.8	22.2	13.6	0.51
Benzo(a)Pyrene	1.60	4.64	4.06	2.44	0.092
Benzo(e)Pyrene	3.47	10.0	8.66	5.29	0.20
Biphenyl	32.3	93.5	81.9	49.3	1.86
2-Chloronaphthalene	<1.15	<3.33	<2.90	<1.76	<0.066
Chrysene/Triphenylene/Benzo(b)anthracene	3.14	9.07	7.93	4.78	0.18
Coronene	<8.07	<23.3	<20.1	<12.3	<0.46
Dibenzo(a,c/a,h)Anthracene	2.22	6.42	5.62	3.38	0.13
Dibenzo(a,e)pyrene	<4.64	<13.4	<11.7	<7.07	<0.27
9,10-dimethylanthracene	<0.93	<2.68	<2.35	<1.41	<0.053
7,12-Dimethylbenzo(a)anthracene	1.20	3.48	3.04	1.84	0.069
Fluoranthene	6.63	19.2	16.7	10.1	0.38
Fluorene	4.81	13.9	12.1	7.33	0.28
Indeno(1,2,3-cd)Pyrene	2.26	6.53	5.68	3.44	0.13
2-methylanthracene	5.41	15.6	13.6	8.25	0.31
3-Methylcholanthrene	<4.64	<13.4	<11.7	<7.07	<0.27
1-Methylnaphthalene	33.3	96.3	83.5	50.8	1.91
2-Methylnaphthalene	29.6	85.5	74.2	45.1	1.69
1-Methylphenanthrene	<1.07	<3.11	<2.73	<1.64	<0.062
9-Methylphenanthrene	2.39	6.90	5.97	3.64	0.14
Naphthalene	358	1034	901	545	20.5
Perylene	<1.05	<3.03	<2.64	<1.60	<0.060
Phenanthrene	24.3	70.3	61.2	37.1	1.39
Picene	<4.64	<13.4	<11.7	<7.07	<0.27
Pyrene	7.10	20.5	17.9	10.8	0.41
Quinoline	<3.44	<9.99	<8.93	<5.24	<0.20
m-terphenyl	2.32	6.74	5.96	3.54	0.13
o-Terphenyl	1.16	3.35	2.93	1.76	0.066
p-terphenyl	1.51	4.37	3.85	2.30	0.087
Tetralin	12.1	35.0	30.6	18.4	0.69
Total	<593	<1713	<1492	<903	<34.0

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 101
Clean Harbors Sarnia
Blank Polycyclic Aromatic Hydrocarbon Analyses

Compound	Blank Train ng	Laboratory Blank ng
Acenaphthene	<14	<14
Acenaphthylene	<14	<14
Anthracene	32.3	37.5
Benzo(a)Anthracene	26.3	31.9
Benzo(b)Fluoranthene	23.5	37.1
Benzo(k)Fluoranthene	27.1	44.0
Benzo(a)fluorene	<14	19.1
Benzo(b)fluorene	<14	<14
Benzo(g,h,i)Perylene	23.0	28.4
Benzo(a)Pyrene	23.7	34.9
Benzo(e)Pyrene	28.4	34.1
Biphenyl	<14	21.3
2-Chloronaphthalene	<14	<14
Chrysene/Triphenylene/Benzo(b)anthracene	50.7	71.3
Coronene	<70	<70
Dibenzo(a,c/a,h)Anthracene	30.0	47.7
Dibenzo(a,e)pyrene	<70	<70
9,10-dimethylanthracene	<14	18.3
7,12-Dimethylbenzo(a)anthracene	22.9	22.6
Fluoranthene	100	76.7
Fluorene	15.1	15.6
Indeno(1,2,3-cd)Pyrene	23.3	37.3
2-methylanthracene	31.2	44.9
3-Methylcholanthrene	<70	<70
1-Methylnaphthalene	<14	<14
2-Methylnaphthalene	20.8	<14
1-Methylphenanthrene	<14	<14
9-Methylphenanthrene	14.6	16.7
Naphthalene	99.2	21.0
Perylene	18.6	31.4
Phenanthrene	136	144
Picene	<70	<70
Pyrene	95.2	61.3
Quinoline	<14	<14
m-terphenyl	15.4	22.3
o-Terphenyl	<14	19.1
p-terphenyl	15.5	20.2
Tetralin	44.7	<14
Total	<1352	<1365

"<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the total collected.

TABLE 102
Clean Harbors Sarnia
Volatile Organic Analyses
Test No. 1

Compound	Cartridge Amount Collected			Average	Coefficient of Variation	Total Collected
	Run No. 2 Tube 2A/2B	Run No. 3 Tube 3A/3B	Run No. 4 Tube 4A/4B			
	µg	µg	µg	µg	%	µg
Benzene	1.38	2.41	2.22	2.00	27.3	6.01
Bromodichloromethane	0.39	0.67	0.66	0.57	27.2	1.72
Bromomethane	<0.09	1.15	1.82	0.99	93.0	2.96
2-Butanone	0.084	0.037	0.070	0.064	37.9	0.19
Chloroethene	<0.02	<0.02	<0.02	0	-	0
Dibromochloromethane	0.16	0.24	0.21	0.20	19.9	0.61
1,2-Dibromoethane	0.024	<0.02	0.047	0.024	99.3	0.071
Dichlorodifluoromethane	<0.02	<0.02	0.032	0.011	173	0.032
1,1-Dichloroethane	<0.01	<0.01	<0.01	0	-	0
1,1-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
Dichloromethane	0.24	0.39	0.50	0.38	33.7	1.13
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	<0.02	<0.02	<0.02	0	-	0
Ethylbenzene	<0.01	<0.01	<0.01	0	-	0
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	0.34	0.15	0.22	0.24	41.5	0.71
Styrene	0.083	0.090	0.10	0.092	10.5	0.28
Tetrachloroethene	0.13	0.14	0.16	0.14	10.3	0.43
Tetrachloromethane	0.031	0.063	0.067	0.054	36.8	0.16
Toluene	0.17	0.19	0.16	0.17	7.9	0.52
Tribromomethane	0.14	0.15	0.20	0.16	20.0	0.48
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0	-	0
Trichloroethene	0.027	0.061	0.071	0.053	43.5	0.16
Trichlorofluoromethane	<0.02	<0.02	<0.02	0	-	0
Trichloromethane	0.16	0.15	0.14	0.15	8.8	0.45
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
Xylenes (total)	0.088	0.088	0.076	0.084	8.2	0.25
Total	3.45	5.97	6.73	5.39	31.9	16.2

Dry Gas Volume Sampled (Rm^3*) :

Run No. 2	0.0211
Run No. 3	0.0211
Run No. 4	0.0215

* At 25°C and 1 atmosphere.

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). For the purpose of determining average and total analytical results for each compound, any analyte that was not detected was assigned a value of zero for calculation purposes.

TABLE 103
Clean Harbors Sarnia
Volatile Organic Analyses
Test No. 2

Compound	Cartridge Amount Collected Run No. 2 Tube 7A/7B	Run No. 3 Tube 8A/8B	Run No. 4 Tube 9A/9B	Average	Coefficient of Variation	Total Collected
	µg	µg	µg	µg	%	µg
Benzene	1.92	1.30	1.81	1.68	19.9	5.03
Bromodichloromethane	0.36	0.051	0.33	0.25	68.9	0.74
Bromomethane	1.08	0.83	1.22	1.04	18.9	3.13
2-Butanone	0.056	0.019	0.084	0.053	61.5	0.16
Chloroethene	<0.02	<0.02	<0.02	0	-	0
Dibromochloromethane	0.18	0.18	0.10	0.15	28.1	0.46
1,2-Dibromoethane	<0.02	<0.02	<0.02	0	-	0
Dichlorodifluoromethane	<0.02	<0.02	<0.02	0	-	0
1,1-Dichloroethane	<0.01	<0.01	<0.01	0	-	0
1,1-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
Dichloromethane	0.72	0.31	1.09	0.71	55.4	2.12
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	<0.02	<0.02	<0.02	0	-	0
Ethylbenzene	<0.01	<0.01	<0.01	0	-	0
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	0.24	0.14	0.44	0.27	56.4	0.81
Styrene	0.063	0.086	0.037	0.062	39.5	0.19
Tetrachloroethene	0.12	0.11	0.082	0.11	19.8	0.32
Tetrachloromethane	0.022	<0.01	0.039	0.020	96.2	0.061
Toluene	0.12	0.12	0.093	0.11	14.3	0.33
Tribromomethane	0.16	0.16	0.13	0.15	12.6	0.44
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0	-	0
Trichloroethene	0.045	0.023	0.043	0.037	32.9	0.11
Trichlorofluoromethane	<0.02	<0.02	<0.02	0	-	0
Trichloromethane	0.11	0.11	0.088	0.10	13.8	0.31
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
Xylenes (total)	0.048	0.075	<0.04	0.041	92.7	0.12
Total	5.24	3.51	5.58	4.78	23.2	14.3

Dry Gas Volume Sampled (Rm^3*) :

Run No. 2	0.0207
Run No. 3	0.0208
Run No. 4	0.0203

* At 25°C and 1 atmosphere.

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). For the purpose of determining average and total analytical results for each compound, any analyte that was not detected was assigned a value of zero for calculation purposes.

TABLE 104
Clean Harbors Sarnia
Volatile Organic Analyses
Test No. 3

Compound	Cartridge Amount Collected			Average	Coefficient of Variation	Total Collected
	Run No. 2 Tube 12A/12B	Run No. 3 Tube 13A/13B	Run No. 4 Tube 14A/14B			
	µg	µg	µg	µg	%	µg
Benzene	2.63	2.41	2.76	2.60	6.9	7.79
Bromodichloromethane	0.44	0.37	0.34	0.38	13.6	1.15
Bromomethane	1.74	1.75	1.51	1.67	8.0	5.00
2-Butanone	0.11	0.12	0.16	0.13	19.5	0.40
Chloroethene	<0.02	<0.02	0.047	0.016	173	0.047
Dibromochloromethane	0.091	0.11	0.10	0.10	10.3	0.31
1,2-Dibromoethane	<0.02	<0.02	<0.02	0	-	0
Dichlorodifluoromethane	0.031	<0.02	<0.02	0.010	173.2	0.031
1,1-Dichloroethane	<0.01	<0.01	<0.01	0	-	0
1,1-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	0	-	0
Dichloromethane	0.41	0.35	0.28	0.35	18.1	1.04
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	<0.02	<0.02	<0.02	0	-	0
Ethylbenzene	0.011	<0.01	<0.01	0.0037	173	0.011
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	0.48	0.51	0.60	0.53	11.4	1.59
Styrene	0.044	0.046	0.049	0.046	5.4	0.14
Tetrachloroethene	0.096	0.11	0.11	0.10	7.7	0.31
Tetrachloromethane	0.078	0.050	0.039	0.056	36.1	0.17
Toluene	0.090	0.11	0.15	0.12	27.5	0.35
Tribromomethane	0.11	0.11	0.11	0.11	0.5	0.33
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0	-	0
Trichloroethene	0.069	0.064	0.061	0.065	6.2	0.19
Trichlorofluoromethane	<0.02	<0.02	<0.02	0	-	0
Trichloromethane	0.11	0.099	0.098	0.10	4.3	0.30
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
Xylenes (total)	<0.04	<0.04	<0.04	0	-	0
Total	6.53	6.21	6.43	6.39	2.5	19.2

Dry Gas Volume Sampled (Rm^3*) :

Run No. 2	0.0228
Run No. 3	0.0214
Run No. 4	0.0214

* At 25°C and 1 atmosphere.

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). For the purpose of determining average and total analytical results for each compound, any analyte that was not detected was assigned a value of zero for calculation purposes.

TABLE 105
Clean Harbors Sarnia
Volatile Organic Emission Data
Test No. 1

Compound	Total Collected µg	Actual Concentration µg/m^3	Dry Reference Concentration µg/Rm^3*	Dry Adjusted Concentration µg/Rm^3**	Wet Reference Concentration µg/Rm^3*	Emission Rate mg/s
Benzene	6.01	32.4	94.4	80.5	49.6	1.86
Bromodichloromethane	1.72	9.30	27.1	23.1	14.2	0.53
Bromomethane	2.96	16.0	46.5	39.7	24.5	0.92
2-Butanone	0.19	1.03	3.00	2.56	1.58	0.059
Chloroethene	0	0	0	0	0	0
Dibromochloromethane	0.61	3.29	9.58	8.17	5.04	0.19
1,2-Dibromoethane	0.071	0.38	1.12	0.95	0.59	0.022
Dichlorodifluoromethane	0.032	0.17	0.50	0.43	0.26	0.0099
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	1.13	6.10	17.8	15.2	9.34	0.35
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0	0	0	0	0	0
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	0.71	3.83	11.2	9.53	5.87	0.22
Styrene	0.28	1.48	4.32	3.69	2.27	0.085
Tetrachloroethene	0.43	2.29	6.68	5.70	3.51	0.13
Tetrachloromethane	0.16	0.87	2.53	2.16	1.33	0.050
Toluene	0.52	2.79	8.14	6.94	4.28	0.16
Tribromomethane	0.48	2.59	7.56	6.45	3.97	0.15
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0.16	0.86	2.50	2.13	1.31	0.049
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.45	2.41	7.01	5.98	3.68	0.14
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.25	1.36	3.96	3.38	2.08	0.078
Total	16.2	87.1	254	217	133	5.00

Dry Gas Volume Sampled (Rm^3*) :	0.0636
Actual Flowrate (m^3/s) :	57.4
Dry Reference Flowrate (Rm^3/s*) :	19.7
Dry Adjusted Flowrate (Rm^3/s**) :	23.1
Wet Reference Flowrate (Rm^3/s*) :	37.5

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 106
Clean Harbors Sarnia
Volatile Organic Emission Data
Test No. 2

Compound	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Benzene	5.03	28.2	81.3	72.3	42.7	1.63
Bromodichloromethane	0.74	4.14	11.9	10.6	6.27	0.24
Bromomethane	3.13	17.6	50.7	45.1	26.6	1.02
2-Butanone	0.16	0.89	2.57	2.29	1.35	0.052
Chloroethene	0	0	0	0	0	0
Dibromochloromethane	0.46	2.58	7.45	6.63	3.91	0.15
1,2-Dibromoethane	0	0	0	0	0	0
Dichlorodifluoromethane	0	0	0	0	0	0
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	2.12	11.9	34.2	30.4	17.9	0.69
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0	0	0	0	0	0
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	0.81	4.54	13.1	11.6	6.87	0.26
Styrene	0.19	1.04	3.01	2.67	1.58	0.060
Tetrachloroethene	0.32	1.77	5.11	4.54	2.68	0.10
Tetrachloromethane	0.061	0.34	0.99	0.88	0.52	0.020
Toluene	0.33	1.87	5.40	4.80	2.83	0.11
Tribromomethane	0.44	2.46	7.10	6.31	3.73	0.14
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0.11	0.62	1.79	1.60	0.94	0.04
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.31	1.76	5.08	4.52	2.66	0.10
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.12	0.69	1.99	1.77	1.04	0.040
Total	14.3	80.3	232	206	122	4.66

Dry Gas Volume Sampled (Rm³*) :	0.0618
Actual Flowrate (m³/s) :	58.0
Dry Reference Flowrate (Rm³/s*) :	20.1
Dry Adjusted Flowrate (Rm³/s**) :	22.6
Wet Reference Flowrate (Rm³/s*) :	38.3

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 107
Clean Harbors Sarnia
Volatile Organic Emission Data
Test No. 3

Compound	Total Collected µg	Actual Concentration µg/m^3	Dry Reference Concentration µg/Rm^3*	Dry Adjusted Concentration µg/Rm^3**	Wet Reference Concentration µg/Rm^3*	Emission Rate mg/s
Benzene	7.79	40.8	119	107	62.2	2.41
Bromodichloromethane	1.15	6.02	17.6	15.8	9.19	0.36
Bromomethane	5.00	26.1	76.2	68.4	39.9	1.55
2-Butanone	0.40	2.08	6.07	5.45	3.18	0.12
Chloroethene	0.047	0.25	0.72	0.64	0.37	0.015
Dibromochloromethane	0.31	1.60	4.67	4.19	2.44	0.095
1,2-Dibromoethane	0	0	0	0	0	0
Dichlorodifluoromethane	0.031	0.16	0.47	0.42	0.25	0.0096
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	1.04	5.44	15.9	14.2	8.30	0.32
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0.011	0.058	0.17	0.15	0.088	0.0034
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	1.59	8.33	24.3	21.8	12.7	0.49
Styrene	0.14	0.73	2.12	1.90	1.11	0.043
Tetrachloroethene	0.31	1.64	4.79	4.30	2.51	0.097
Tetrachloromethane	0.17	0.87	2.55	2.29	1.33	0.052
Toluene	0.35	1.84	5.37	4.82	2.81	0.11
Tribromomethane	0.33	1.73	5.05	4.53	2.64	0.10
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0.19	1.01	2.96	2.66	1.55	0.060
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.30	1.58	4.62	4.15	2.42	0.094
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0	0	0	0	0	0
Total	19.2	100	292	263	153	5.93

Dry Gas Volume Sampled (Rm^3*) :	0.0656
Actual Flowrate (m^3/s) :	59.2
Dry Reference Flowrate (Rm^3/s*) :	20.3
Dry Adjusted Flowrate (Rm^3/s**) :	22.6
Wet Reference Flowrate (Rm^3/s*) :	38.8

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 108
Clean Harbors Sarnia
Volatile Organic Actual Concentrations

Compound	Actual Concentration			
	Test No. 1	Test No. 2	Test No. 3	Average
	µg/m³	µg/m³	µg/m³	µg/m³
Benzene	32.4	28.2	40.8	33.8
Bromodichloromethane	9.30	4.14	6.02	6.49
Bromomethane	16.0	17.6	26.1	19.9
2-Butanone	1.03	0.89	2.08	1.33
Chloroethene	0	0	0.25	0.082
Dibromochloromethane	3.29	2.58	1.60	2.49
1,2-Dibromoethane	0.38	0	0	0.13
Dichlorodifluoromethane	0.17	0	0.16	0.11
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	6.10	11.9	5.44	7.8
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0	0	0.058	0.019
Isopropylbenzene	0	0	0	0
2-Propanone	3.83	4.54	8.33	5.57
Styrene	1.48	1.04	0.73	1.08
Tetrachloroethene	2.29	1.77	1.64	1.90
Tetrachloromethane	0.87	0.34	0.87	0.69
Toluene	2.79	1.87	1.84	2.17
Tribromomethane	2.59	2.46	1.73	2.26
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0.86	0.62	1.01	0.83
Trichlorofluoromethane	0	0	0	0
Trichloromethane	2.41	1.76	1.58	1.92
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	1.36	0.69	0	0.68
Total	87.1	80.3	100	89.2

TABLE 109
Clean Harbors Sarnia
Volatile Organic Dry Reference Concentrations

Compound	Dry Reference Concentration			
	Test No. 1	Test No. 2	Test No. 3	Average
	µg/Rm^3*	µg/Rm^3*	µg/Rm^3*	µg/Rm^3*
Benzene	94.4	81.3	119	98.2
Bromodichloromethane	27.1	11.9	17.6	18.9
Bromomethane	46.5	50.7	76.2	57.8
2-Butanone	3.00	2.57	6.07	3.88
Chloroethene	0	0	0.72	0.24
Dibromochloromethane	9.58	7.45	4.67	7.23
1,2-Dibromoethane	1.12	0	0	0.37
Dichlorodifluoromethane	0.50	0	0.47	0.33
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	17.8	34.2	15.9	22.6
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0	0	0.17	0.056
Isopropylbenzene	0	0	0	0
2-Propanone	11.2	13.1	24.3	16.2
Styrene	4.32	3.01	2.12	3.15
Tetrachloroethene	6.68	5.11	4.79	5.53
Tetrachloromethane	2.53	0.99	2.55	2.02
Toluene	8.14	5.40	5.37	6.30
Tribromomethane	7.56	7.10	5.05	6.57
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	2.50	1.79	2.96	2.42
Trichlorofluoromethane	0	0	0	0
Trichloromethane	7.01	5.08	4.62	5.57
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	3.96	1.99	0	1.98
Total	254	232	292	259

* At 25°C and 1 atmosphere

TABLE 110
Clean Harbors Sarnia
Volatile Organic Dry Adjusted Concentrations

Compound	Dry Adjusted Concentration Test No. 1 µg/Rm^3*	Test No. 2 µg/Rm^3*	Test No. 3 µg/Rm^3*	Average µg/Rm^3*
Benzene	80.5	72.3	107	86.53
Bromodichloromethane	23.1	10.6	15.8	16.50
Bromomethane	39.7	45.1	68.4	51.06
2-Butanone	2.56	2.29	5.45	3.43
Chloroethene	0	0	0.64	0.21
Dibromochloromethane	8.17	6.63	4.19	6.33
1,2-Dibromoethane	0.95	0	0	0.32
Dichlorodifluoromethane	0.43	0	0.42	0.28
1,1-Dichloroethane	0	0	0	0.00
1,1-Dichloroethene	0	0	0	0.00
trans-1,2-Dichloroethene	0	0	0	0.00
Dichloromethane	15.2	30.4	14.2	19.94
1,2-Dichloropropane	0	0	0	0.00
Ethyl Acetate	0	0	0	0.00
Ethylbenzene	0	0	0.15	0.05
Isopropylbenzene	0	0	0	0.00
2-Propanone	9.53	11.6	21.8	14.33
Styrene	3.69	2.67	1.90	2.75
Tetrachloroethene	5.70	4.54	4.30	4.85
Tetrachloromethane	2.16	0.88	2.29	1.77
Toluene	6.94	4.80	4.82	5.52
Tribromomethane	6.45	6.31	4.53	5.76
1,1,1-Trichloroethane	0	0	0	0.00
Trichloroethene	2.13	1.60	2.66	2.13
Trichlorofluoromethane	0	0	0	0.00
Trichloromethane	5.98	4.52	4.15	4.88
Trichlorotrifluoroethane	0	0	0	0.00
1,2,4-Trimethylbenzene	0	0	0	0.00
1,3,5-Trimethylbenzene	0	0	0	0.00
Xylenes (total)	3.38	1.77	0	1.72
Total	217	206	263	228.38

* At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 111
Clean Harbors Sarnia
Volatile Organic Wet Reference Concentrations

Compound	Wet Reference Concentration			
	Test No. 1	Test No. 2	Test No. 3	Average
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*
Benzene	49.6	42.7	62.2	51.5
Bromodichloromethane	14.2	6.27	9.19	9.90
Bromomethane	24.5	26.6	39.9	30.3
2-Butanone	1.58	1.35	3.18	2.03
Chloroethene	0	0	0.37	0.12
Dibromochloromethane	5.04	3.91	2.44	3.80
1,2-Dibromoethane	0.59	0	0	0.20
Dichlorodifluoromethane	0.26	0	0.25	0.17
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	9.34	17.9	8.30	11.9
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0	0	0.088	0.029
Isopropylbenzene	0	0	0	0
2-Propanone	5.87	6.87	12.7	8.48
Styrene	2.27	1.58	1.11	1.65
Tetrachloroethene	3.51	2.68	2.51	2.90
Tetrachloromethane	1.33	0.52	1.33	1.06
Toluene	4.28	2.83	2.81	3.31
Tribromomethane	3.97	3.73	2.64	3.45
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	1.31	0.94	1.55	1.27
Trichlorofluoromethane	0	0	0	0
Trichloromethane	3.68	2.66	2.42	2.92
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	2.08	1.04	0	1.04
Total	133	122	153	136

* At 25°C and 1 atmosphere

TABLE 112
Clean Harbors Sarnia
Volatile Organic Emission Rates

Compound	Emission Rate			
	Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s
Benzene	1.86	1.63	2.41	1.97
Bromodichloromethane	0.53	0.24	0.36	0.38
Bromomethane	0.92	1.02	1.55	1.16
2-Butanone	0.059	0.052	0.12	0.078
Chloroethene	0	0	0.015	0
Dibromochloromethane	0.19	0.15	0.095	0.14
1,2-Dibromoethane	0.022	0	0	0.0073
Dichlorodifluoromethane	0.0099	0	0.0096	0.0065
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0.35	0.69	0.32	0.45
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0	0	0.0034	0.0011
Isopropylbenzene	0	0	0	0
2-Propanone	0.22	0.26	0.49	0.33
Styrene	0.085	0.060	0.043	0.063
Tetrachloroethene	0.13	0.10	0.097	0.11
Tetrachloromethane	0.050	0.020	0.052	0.040
Toluene	0.16	0.11	0.11	0.13
Tribromomethane	0.15	0.14	0.10	0.13
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0.049	0.04	0.060	0.048
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.14	0.10	0.094	0.11
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	0.078	0.040	0	0.039
Total	5.00	4.66	5.93	5.20

TABLE 113
Clean Harbors Sarnia
Summary of Volatile Organic Emission Data

Compound	Actual Concentration µg/m^3	Dry Reference Concentration µg/Rm^3*	Dry Adjusted Concentration µg/Rm^3*	Wet Reference Concentration µg/Rm^3*	Emission Rate mg/s
Benzene	33.8	98.2	86.5	51.5	1.97
Bromodichloromethane	6.49	18.9	16.5	9.90	0.38
Bromomethane	19.9	57.8	51.1	30.3	1.16
2-Butanone	1.33	3.88	3.43	2.03	0.078
Chloroethene	0.082	0.24	0.21	0.12	0.0048
Dibromochloromethane	2.49	7.23	6.33	3.80	0.14
1,2-Dibromoethane	0.13	0.37	0.32	0.20	0.0073
Dichlorodifluoromethane	0.11	0.33	0.28	0.17	0.0065
1,1-Dichloroethane	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0
Dichloromethane	7.8	22.6	19.9	11.9	0.45
1,2-Dichloropropane	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0
Ethylbenzene	0.019	0.056	0.050	0.029	0.0011
Isopropylbenzene	0	0	0	0	0
2-Propanone	5.57	16.2	14.3	8.48	0.33
Styrene	1.08	3.15	2.75	1.65	0.063
Tetrachloroethene	1.90	5.53	4.85	2.90	0.11
Tetrachloromethane	0.69	2.02	1.77	1.06	0.040
Toluene	2.17	6.30	5.52	3.31	0.13
Tribromomethane	2.26	6.57	5.76	3.45	0.13
1,1,1-Trichloroethane	0	0	0	0	0
Trichloroethene	0.83	2.42	2.13	1.27	0.048
Trichlorofluoromethane	0	0	0	0	0
Trichloromethane	1.92	5.57	4.88	2.92	0.11
Trichlorotrifluoroethane	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0
Xylenes (total)	0.68	1.98	1.72	1.04	0.039
Total	89.2	259	228	136	5.20

* At 25°C and 1 atmosphere

** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume

TABLE 114
Clean Harbors Sarnia
Blank Volatile Organic Analyses

Compound	Field Blank Tube 15A/15B	Trip Blank Tube 16A/16B	Method Blank
	µg	µg	µg
Benzene	<0.05	<0.05	<0.05
Bromodichloromethane	<0.01	<0.01	<0.01
Bromomethane	<0.09	<0.09	<0.09
2-Butanone	<0.01	<0.01	<0.01
Chloroethene	<0.02	<0.02	<0.02
Dibromochloromethane	<0.01	<0.01	<0.01
1,2-Dibromoethane	<0.02	<0.02	<0.02
Dichlorodifluoromethane	<0.02	<0.02	<0.02
1,1-Dichloroethane	<0.01	<0.01	<0.01
1,1-Dichloroethene	<0.01	<0.01	<0.01
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01
Dichloromethane	<0.1	<0.1	<0.1
1,2-Dichloropropane	<0.01	<0.01	<0.01
Ethyl Acetate	<0.02	<0.02	<0.02
Ethylbenzene	<0.01	<0.01	<0.01
Isopropylbenzene	<0.02	<0.02	<0.02
2-Propanone	<0.1	<0.1	<0.1
Styrene	<0.02	<0.02	<0.02
Tetrachloroethene	<0.01	<0.01	<0.01
Tetrachloromethane	<0.01	<0.01	<0.01
Toluene	<0.05	<0.05	<0.05
Tribromomethane	<0.01	<0.01	<0.01
1,1,1-Trichloroethane	<0.01	<0.01	<0.01
Trichloroethene	<0.01	<0.01	<0.01
Trichlorofluoromethane	<0.02	<0.02	<0.02
Trichloromethane	<0.01	<0.01	<0.01
Trichlorotrifluoroethane	<0.02	<0.02	<0.02
1,2,4-Trimethylbenzene	<0.02	<0.02	<0.02
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02
Xylenes (total)	<0.04	<0.04	<0.04
Total	0	0	0

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). For the purpose of determining the total analytical results for each compound, any analyte that was not detected was assigned a value of zero for calculation purposes.

TABLE 115
Clean Harbors Sarnia
DRE Compound Emission Data
Test No. 1

Run No.	Compound	Amount Collected ng	Dry Gas Volume Sampled Rm^3 *	Dry Reference Concentration $\mu g/Rm^3$ *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
2	2-Butanone	84	0.0211	3.98	19.7	0.078
	Ethyl Acetate	< 20	0.0211	<0.95	19.7	<0.019
	Tetrachloroethene	126	0.0211	5.98	19.7	0.12
	Toluene	168	0.0211	7.97	19.7	0.16
	Total Xylenes	88	0.0211	4.17	19.7	0.082
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	37	0.0211	1.76	19.7	0.035
	Ethyl Acetate	< 20	0.0211	<0.95	19.7	<0.019
	Tetrachloroethene	144	0.0211	6.84	19.7	0.13
	Toluene	188	0.0211	8.92	19.7	0.18
	Total Xylenes	88	0.0211	4.18	19.7	0.082
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	70	0.0215	3.26	19.7	0.064
	Ethyl Acetate	< 20	0.0215	<0.93	19.7	<0.018
	Tetrachloroethene	155	0.0215	7.21	19.7	0.14
	Toluene	162	0.0215	7.54	19.7	0.15
	Total Xylenes	76	0.0215	3.54	19.7	0.070
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	191	0.0636	3.00	19.7	0.059
	Ethyl Acetate	< 60	0.0636	<0.94	19.7	<0.019
	Tetrachloroethene	425	0.0636	6.68	19.7	0.13
	Toluene	518	0.0636	8.14	19.7	0.16
	Total Xylenes	252	0.0636	3.96	19.7	0.078
	1,2,4-Trichlorobenzene**	392	5.159	0.076	19.7	0.0015

* At 25°C and 1 atmosphere.

** Emission data are based on the average results from the Isokinetic Sampling Trains.

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 116
Clean Harbors Sarnia
DRE Compound Emission Data
Test No. 2

Run No.	Compound	Amount Collected ng	Dry Gas Volume Sampled Rm^3 *	Dry Reference Concentration $\mu g/Rm^3$ *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
2	2-Butanone	56	0.0207	2.70	20.1	0.054
	Ethyl Acetate	< 20	0.0207	<0.96	20.1	<0.019
	Tetrachloroethene	122	0.0207	5.88	20.1	0.12
	Toluene	122	0.0207	5.88	20.1	0.12
	Total Xylenes	48	0.0207	2.31	20.1	0.047
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	19	0.0208	0.91	20.1	0.018
	Ethyl Acetate	< 20	0.0208	<0.96	20.1	<0.019
	Tetrachloroethene	112	0.0208	5.39	20.1	0.11
	Toluene	119	0.0208	5.73	20.1	0.12
	Total Xylenes	75	0.0208	3.61	20.1	0.073
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	84	0.0203	4.13	20.1	0.083
	Ethyl Acetate	< 20	0.0203	<0.98	20.1	<0.020
	Tetrachloroethene	82	0.0203	4.03	20.1	0.081
	Toluene	93	0.0203	4.57	20.1	0.092
	Total Xylenes	< 40	0.0203	<1.97	20.1	<0.040
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	159	0.0618	2.57	20.1	0.052
	Ethyl Acetate	< 60	0.0618	<0.97	20.1	<0.019
	Tetrachloroethene	316	0.0618	5.11	20.1	0.10
	Toluene	334	0.0618	5.40	20.1	0.11
	Total Xylenes	< 163	0.0618	<2.64	20.1	<0.053
	1,2,4-Trichlorobenzene**	461	5.270	0.087	19.9	0.0017

* At 25°C and 1 atmosphere.

** Emission data are based on the average results from the Isokinetic Sampling Trains.

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 117
Clean Harbors Sarnia
DRE Compound Emission Data
Test No. 3

Run No.	Compound	Amount Collected ng	Dry Gas Volume Sampled Rm^3 *	Dry Reference Concentration µg/Rm^3 *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
2	2-Butanone	113	0.0228	4.95	20.3	0.10
	Ethyl Acetate	< 20	0.0228	<0.88	20.3	<0.018
	Tetrachloroethene	96	0.0228	4.20	20.3	0.085
	Toluene	90	0.0228	3.94	20.3	0.080
	Total Xylenes	< 40	0.0228	<1.75	20.3	<0.036
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	123	0.0214	5.75	20.3	0.12
	Ethyl Acetate	< 20	0.0214	<0.94	20.3	<0.019
	Tetrachloroethene	112	0.0214	5.24	20.3	0.11
	Toluene	109	0.0214	5.10	20.3	0.10
	Total Xylenes	< 40	0.0214	<1.87	20.3	<0.038
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	162	0.0214	7.6	20.3	0.15
	Ethyl Acetate	< 20	0.0214	<0.94	20.3	<0.019
	Tetrachloroethene	106	0.0214	4.96	20.3	0.10
	Toluene	153	0.0214	7.16	20.3	0.15
	Total Xylenes	< 40	0.0214	<1.87	20.3	<0.038
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	398	0.0656	6.07	20.3	0.12
	Ethyl Acetate	< 60	0.0656	<0.91	20.3	<0.019
	Tetrachloroethene	314	0.0656	4.79	20.3	0.097
	Toluene	352	0.0656	5.37	20.3	0.11
	Total Xylenes	< 120	0.0656	<1.83	20.3	<0.037
	1,2,4-Trichlorobenzene**	532	5.272	0.10	20.0	0.0020

* At 25°C and 1 atmosphere.
** Emission data are based on the average results from the Isokinetic Sampling Trains.

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 118
Clean Harbors Sarnia
Summary of DRE Compound Emission Rates

Compound	Average Emission Rate Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s	Coefficient of Variation %
2-Butanone	0.059	0.052	0.12	0.078	50.4
Ethyl Acetate	<0.019	<0.019	<0.019	<0.019	2.8
Tetrachloroethene	0.13	0.10	0.097	0.11	16.7
Toluene	0.16	0.11	0.11	0.13	23.6
Total Xylenes	0.078	<0.053	<0.037	<0.056	36.8
1,2,4-Trichlorobenzene	0.0015	0.0017	0.0020	0.0018	14.9

TABLE 119
Clean Harbors Sarnia
Blank Volatile Organic Analyses

Compound	Field Blank Tube 15A/15B µg	Trip Blank Tube 16A/16B µg	Method Blank µg
2-Butanone	<0.01	<0.01	<0.01
Ethyl Acetate	<0.02	<0.02	<0.02
Tetrachloroethene	<0.01	<0.01	<0.01
Toluene	<0.05	<0.05	<0.05
Total Xylenes	<0.04	<0.04	<0.04
Total	0	0	0

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit). For the purpose of determining average and total analytical results for each compound, any result that was not detected was assigned a value of zero for calculation purposes.

TABLE 120
Clean Harbors Sarnia
DRE Compound Feed Rates
Test No. 1

Feed Type	Compound	Stream Feed Rate L/min	Feed Density g/mL	Stream Feed Rate kg/s	Compound Concentration mg/kg	Compound Feed Rate g/s
Rich	2-Butanone	43.7	0.84	0.61	<2000	<1.22
	Ethyl Acetate	43.7	0.84	0.61	1200	0.73
	Tetrachloroethene	43.7	0.84	0.61	1560	0.96
	Toluene	43.7	0.84	0.61	20900	12.8
	Total Xylenes	43.7	0.84	0.61	14580	8.93
	1,2,4-Trichlorobenzene	43.7	0.84	0.61	<500	<0.31
Lean	2-Butanone	152	1.05	2.67	<1000	<2.67
	Ethyl Acetate	152	1.05	2.67	<1000	<2.67
	Tetrachloroethene	152	1.05	2.67	<100	<0.27
	Toluene	152	1.05	2.67	4050	10.8
	Total Xylenes	152	1.05	2.67	2027	5.40
	1,2,4-Trichlorobenzene	152	1.05	2.67	<500	<1.33
Emulsion	2-Butanone	13.6	0.96	0.22	<1000	<0.22
	Ethyl Acetate	13.6	0.96	0.22	<1000	<0.22
	Tetrachloroethene	13.6	0.96	0.22	220	0.048
	Toluene	13.6	0.96	0.22	5460	1.19
	Total Xylenes	13.6	0.96	0.22	4680	1.02
	1,2,4-Trichlorobenzene	13.6	0.96	0.22	<500	<0.11
Alkaline	2-Butanone	215	1.00	3.58	<1000	<3.58
	Ethyl Acetate	215	1.00	3.58	<1000	<3.58
	Tetrachloroethene	215	1.00	3.58	<100	<0.36
	Toluene	215	1.00	3.58	<100	<0.36
	Total Xylenes	215	1.00	3.58	<100	<0.36
	1,2,4-Trichlorobenzene	215	1.00	3.58	<500	<1.79
Leachate	2-Butanone	37.9	1.00	0.63	<1000	<0.63
	Ethyl Acetate	37.9	1.00	0.63	<1000	<0.63
	Tetrachloroethene	37.9	1.00	0.63	<100	<0.063
	Toluene	37.9	1.00	0.63	<100	<0.063
	Total Xylenes	37.9	1.00	0.63	<100	<0.063
	1,2,4-Trichlorobenzene	37.9	1.00	0.63	<500	<0.32
Total	2-Butanone					<8.31
	Ethyl Acetate					<7.82
	Tetrachloroethene					<1.69
	Toluene					<25.2
	Total Xylenes					<15.8
	1,2,4-Trichlorobenzene					<3.85

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 121
Clean Harbors Sarnia
DRE Compound Feed Rates
Test No. 2

Feed Type	Compound	Stream Feed Rate L/min	Feed Density g/mL	Stream Feed Rate kg/s	Compound Concentration mg/kg	Compound Feed Rate g/s
Rich	2-Butanone	35.8	0.90	0.54	<1500	<0.81
	Ethyl Acetate	35.8	0.90	0.54	<1000	<0.54
	Tetrachloroethene	35.8	0.90	0.54	790	0.42
	Toluene	35.8	0.90	0.54	13900	7.47
	Total Xylenes	35.8	0.90	0.54	8880	4.77
	1,2,4-Trichlorobenzene	35.8	0.90	0.54	<500	<0.27
Lean	2-Butanone	157	1.06	2.77	<1000	<2.77
	Ethyl Acetate	157	1.06	2.77	<1000	<2.77
	Tetrachloroethene	157	1.06	2.77	<100	<0.28
	Toluene	157	1.06	2.77	2650	7.35
	Total Xylenes	157	1.06	2.77	1139	3.16
	1,2,4-Trichlorobenzene	157	1.06	2.77	<500	<1.39
Emulsion	2-Butanone	11.5	0.93	0.18	<1000	<0.18
	Ethyl Acetate	11.5	0.93	0.18	<1000	<0.18
	Tetrachloroethene	11.5	0.93	0.18	230	0.041
	Toluene	11.5	0.93	0.18	6570	1.17
	Total Xylenes	11.5	0.93	0.18	5160	0.92
	1,2,4-Trichlorobenzene	11.5	0.93	0.18	<500	<0.089
Alkaline	2-Butanone	218	1.01	3.67	<1000	<3.67
	Ethyl Acetate	218	1.01	3.67	<1000	<3.67
	Tetrachloroethene	218	1.01	3.67	<100	<0.37
	Toluene	218	1.01	3.67	<100	<0.37
	Total Xylenes	218	1.01	3.67	<100	<0.37
	1,2,4-Trichlorobenzene	218	1.01	3.67	<500	<1.84
Leachate	2-Butanone	36.1	1.00	0.60	<1000	<0.60
	Ethyl Acetate	36.1	1.00	0.60	<1000	<0.60
	Tetrachloroethene	36.1	1.00	0.60	<100	<0.060
	Toluene	36.1	1.00	0.60	<100	<0.060
	Total Xylenes	36.1	1.00	0.60	<100	<0.060
	1,2,4-Trichlorobenzene	36.1	1.00	0.60	<500	<0.30
Total	2-Butanone					<8.03
	Ethyl Acetate					<7.76
	Tetrachloroethene					<1.17
	Toluene					<16.4
	Total Xylenes					<9.28
	1,2,4-Trichlorobenzene					<3.88

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 122
Clean Harbors Sarnia
DRE Compound Feed Rates
Test No. 3

Feed Type	Compound	Stream Feed Rate L/min	Feed Density g/mL	Stream Feed Rate kg/s	Compound Concentration mg/kg	Compound Feed Rate g/s
Rich	2-Butanone	35.5	0.91	0.54	<1500	<0.81
	Ethyl Acetate	35.5	0.91	0.54	<1000	<0.54
	Tetrachloroethene	35.5	0.91	0.54	810	0.44
	Toluene	35.5	0.91	0.54	16200	8.72
	Total Xylenes	35.5	0.91	0.54	11020	5.93
	1,2,4-Trichlorobenzene	35.5	0.91	0.54	<500	<0.27
Lean	2-Butanone	154	1.04	2.66	<1000	<2.66
	Ethyl Acetate	154	1.04	2.66	<1000	<2.66
	Tetrachloroethene	154	1.04	2.66	<100	<0.27
	Toluene	154	1.04	2.66	2330	6.20
	Total Xylenes	154	1.04	2.66	922	2.46
	1,2,4-Trichlorobenzene	154	1.04	2.66	<500	<1.33
Emulsion	2-Butanone	12.1	0.93	0.19	<1500	<0.28
	Ethyl Acetate	12.1	0.93	0.19	<1000	<0.19
	Tetrachloroethene	12.1	0.93	0.19	630	0.12
	Toluene	12.1	0.93	0.19	11700	2.19
	Total Xylenes	12.1	0.93	0.19	8740	1.63
	1,2,4-Trichlorobenzene	12.1	0.93	0.19	<500	<0.093
Alkaline	2-Butanone	224	1.01	3.77	<1000	<3.77
	Ethyl Acetate	224	1.01	3.77	<1000	<3.77
	Tetrachloroethene	224	1.01	3.77	<100	<0.38
	Toluene	224	1.01	3.77	<100	<0.38
	Total Xylenes	224	1.01	3.77	<100	<0.38
	1,2,4-Trichlorobenzene	224	1.01	3.77	<500	<1.88
Leachate	2-Butanone	38.1	1.00	0.64	<1000	<0.64
	Ethyl Acetate	38.1	1.00	0.64	<1000	<0.64
	Tetrachloroethene	38.1	1.00	0.64	<100	<0.064
	Toluene	38.1	1.00	0.64	<100	<0.064
	Total Xylenes	38.1	1.00	0.64	<100	<0.064
	1,2,4-Trichlorobenzene	38.1	1.00	0.64	<500	<0.32
Total	2-Butanone					<8.15
	Ethyl Acetate					<7.79
	Tetrachloroethene					<1.26
	Toluene					<17.5
	Total Xylenes					<10.5
	1,2,4-Trichlorobenzene					<3.89

Note: DRE compound emission data is calculated using the detection limit where none was detected (<MDL).

TABLE 123
Clean Harbors Sarnia
Destruction and Removal Efficiencies
Test No. 1

Run No.	Compound	Total Feed Rate g/s	Emission Rate mg/s	Destruction and Removal Efficiency %
2	2-Butanone	<8.31	0.078	99.9991
	Ethyl Acetate	<7.82	<0.019	99.9998
	Tetrachloroethene	<1.69	0.12	99.9930
	Toluene	<25.2	0.16	99.9994
	Total Xylenes	<15.8	0.082	99.9995
3	2-Butanone	<8.31	0.035	99.9996
	Ethyl Acetate	<7.82	<0.019	99.9998
	Tetrachloroethene	<1.69	0.13	99.9920
	Toluene	<25.2	0.18	99.9993
	Total Xylenes	<15.8	0.082	99.9995
4	2-Butanone	<8.31	0.064	99.9992
	Ethyl Acetate	<7.82	<0.018	99.9998
	Tetrachloroethene	<1.69	0.14	99.9916
	Toluene	<25.2	0.15	99.9994
	Total Xylenes	<15.8	0.070	99.9996
Total	2-Butanone	<8.31	0.059	99.9993
	Ethyl Acetate	<7.82	<0.019	99.9998
	Tetrachloroethene	<1.69	0.13	99.9922
	Toluene	<25.2	0.16	99.9994
	Total Xylenes	<15.8	0.078	99.9995
	1,2,4-Trichlorobenzene	<3.85	0.0015	100.0000

TABLE 124
Clean Harbors Sarnia
Destruction and Removal Efficiencies
Test No. 2

Run No.	Compound	Total Feed Rate g/s	Emission Rate mg/s	Destruction and Removal Efficiency %
2	2-Butanone	<8.03	0.054	99.9993
	Ethyl Acetate	<7.76	<0.019	99.9998
	Tetrachloroethene	<1.17	0.12	99.9899
	Toluene	<16.4	0.12	99.9993
	Total Xylenes	<9.28	0.047	99.9995
3	2-Butanone	<8.03	0.018	99.9998
	Ethyl Acetate	<7.76	<0.019	99.9998
	Tetrachloroethene	<1.17	0.11	99.9907
	Toluene	<16.4	0.12	99.9993
	Total Xylenes	<9.28	0.073	99.9992
4	2-Butanone	<8.03	0.083	99.9990
	Ethyl Acetate	<7.76	<0.020	99.9997
	Tetrachloroethene	<1.17	0.081	99.9931
	Toluene	<16.4	0.092	99.9994
	Total Xylenes	<9.28	<0.040	99.9996
Total	2-Butanone	<8.03	0.052	99.9994
	Ethyl Acetate	<7.76	<0.019	99.9997
	Tetrachloroethene	<1.17	0.10	99.9912
	Toluene	<16.4	0.11	99.9993
	Total Xylenes	<9.28	<0.053	99.9994
	1,2,4-Trichlorobenzene	<3.88	0.0017	100.0000

TABLE 125
Clean Harbors Sarnia
Destruction and Removal Efficiencies
Test No. 3

Run No.	Compound	Total Feed Rate g/s	Emission Rate mg/s	Destruction and Removal Efficiency %
2	2-Butanone	<8.15	0.10	99.9988
	Ethyl Acetate	<7.79	<0.018	99.9998
	Tetrachloroethene	<1.26	0.085	99.9932
	Toluene	<17.5	0.080	99.9995
	Total Xylenes	<10.5	<0.036	99.9997
3	2-Butanone	<8.15	0.12	99.9986
	Ethyl Acetate	<7.79	<0.019	99.9998
	Tetrachloroethene	<1.26	0.11	99.9916
	Toluene	<17.5	0.10	99.9994
	Total Xylenes	<10.5	<0.038	99.9996
4	2-Butanone	<8.15	0.15	99.9981
	Ethyl Acetate	<7.79	<0.019	99.9998
	Tetrachloroethene	<1.26	0.10	99.9920
	Toluene	<17.5	0.15	99.9992
	Total Xylenes	<10.5	<0.038	99.9996
Total	2-Butanone	<8.15	0.12	99.9985
	Ethyl Acetate	<7.79	<0.019	99.9998
	Tetrachloroethene	<1.26	0.097	99.9923
	Toluene	<17.5	0.11	99.9994
	Total Xylenes	<10.5	<0.037	99.9996
	1,2,4-Trichlorobenzene	<3.89	0.0020	99.9999

TABLE 126
Clean Harbors Sarnia
Summary of Destruction and Removal Efficiencies for Volatile Organic Compounds

Compound	Destruction and Removal Efficiency				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	%	%	%	%	%
2-Butanone	99.9993	99.9994	99.9985	99.9990	0.00048
Ethyl Acetate	99.9998	99.9997	99.9998	99.9998	0.0000077
Tetrachloroethene	99.9922	99.9912	99.9923	99.9919	0.00059
Toluene	99.9994	99.9993	99.9994	99.9994	0.000020
Total Xylenes	99.9995	99.9994	99.9996	99.9995	0.00011
1,2,4-Trichlorobenzene	100.0000	100.0000	99.9999	100.0000	0.0000065

TABLE 127
Clean Harbors Sarnia
Regulation 419 Dispersion Modeling Results using AERMOD for Inorganic and Semi-Volatile Organic Compounds

Contaminant	Average Emission Rate		Calculated Impingement Concentration		Allowable Impingement Concentration		Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00	g/s	0.0479	µg/m^3				
Base Case - 30 Day	1.00	g/s	0.1385	µg/m^3				
Base Case - 24 hour	1.00	g/s	0.4761	µg/m^3				
Base Case - 1 hour	1.00	g/s	1.7745	µg/m^3				
Base Case - 1/2 hour	1.00	g/s	2.1294	µg/m^3				
Particulate matter	0.27	g/s	0.13	µg/m^3	120	µg/m^3	0.11	S
Sulphur dioxide	24.6	g/s	11.7	µg/m^3	275	µg/m^3	4.26	S - 24 hour
Sulphur dioxide	24.6	g/s	43.7	µg/m^3	690	µg/m^3	6.33	S - 1 hour
Nitrogen oxides	5.35	g/s	2.55	µg/m^3	200	µg/m^3	1.27	S - 24 hour
Nitrogen oxides	5.35	g/s	9.49	µg/m^3	400	µg/m^3	2.37	S - 1 hour
Carbon monoxide	1.85	g/s	3.94	µg/m^3	6000	µg/m^3	0.066	S - 1/2 hour
Carbon dioxide	2995	g/s	1426	µg/m^3	255800	µg/m^3	0.56	SL
Hydrogen chloride	4.64	g/s	2.21	µg/m^3	20	µg/m^3	11.0	S
Fluorides (as hydrogen fluoride)	1.53	g/s	0.73	µg/m^3	0.86	µg/m^3	84.7	S - 24 hour
Fluorides (as hydrogen fluoride)	1.53	g/s	0.21	µg/m^3	0.34	µg/m^3	62.3	S - 30 day
Hydrogen bromide	0.10	g/s	0.18	µg/m^3	668	µg/m^3	0.027	G - 1 hour
Hydrogen iodide	0.048	g/s	0.023	µg/m^3	0.5	µg/m^3	4.57	SL
Hydrogen cyanide	<0.00057	g/s	0.00027	µg/m^3	8	µg/m^3	0.0034	S
Dioxins & Furans (TEQ) *	<0.12	ng TEQ/s	0.000057	pg TEQ/m^3				
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.087	ng TEQ/s	0.000041	pg TEQ/m^3	0.1	pg TEQ/m^3	0.041	S
Benzo(a)Pyrene	0.092	µg/s	0.0000000044	µg/m^3	0.00001	µg/m^3	0.044	S - Annual
Biphenyl	1.86	µg/s	0.0000033	µg/m^3	60	µg/m^3	<0.0001	G - 1 hour
2-Chloronaphthalene	<0.066	µg/s	0.000000031	µg/m^3	1	µg/m^3	<0.0001	SL
1-Methylnaphthalene	1.91	µg/s	0.00000091	µg/m^3	35.5	µg/m^3	<0.0001	SL
Naphthalene	20.5	µg/s	0.0000098	µg/m^3	22.5	µg/m^3	<0.0001	G
Quinoline	<0.20	µg/s	0.000000095	µg/m^3	0.005	µg/m^3	0.0019	SL
Terphenyls (m, o, p)	0.28	µg/s	0.00000013	µg/m^3	15	µg/m^3	<0.0001	SL
1,2-Dichlorobenzene	4.28	µg/s	0.0000076	µg/m^3	30500	µg/m^3	<0.0001	G - 1 hour
1,3-Dichlorobenzene	4.06	µg/s	0.0000019	µg/m^3	50	µg/m^3	<0.0001	SL
1,4-Dichlorobenzene	0.64	µg/s	0.00000030	µg/m^3	95	µg/m^3	<0.0001	S
1,3,5-Trichlorobenzene	0.080	µg/s	0.000000038	µg/m^3	3.6	µg/m^3	<0.0001	SL
1,2,4-Trichlorobenzene	1.75	µg/s	0.00000083	µg/m^3	400	µg/m^3	<0.0001	G
1,2,3-Trichlorobenzene	4.51	µg/s	0.0000021	µg/m^3	135	µg/m^3	<0.0001	SL
1,2,4,5-Tetrachlorobenzene	2.09	µg/s	0.0000010	µg/m^3	1	µg/m^3	0.00010	SL
1,2,3,4-Tetrachlorobenzene	1.53	µg/s	0.00000073	µg/m^3	600	µg/m^3	<0.0001	SL
Pentachlorobenzene	2.12	µg/s	0.0000010	µg/m^3	80	µg/m^3	<0.0001	SL
Hexachlorobenzene	0.31	µg/s	0.00000015	µg/m^3	0.011	µg/m^3	0.0013	SL
2,4-Dichlorophenol	3.54	µg/s	0.0000017	µg/m^3	33.5	µg/m^3	<0.0001	SL
2,6-Dichlorophenol	2.24	µg/s	0.0000011	µg/m^3	19	µg/m^3	<0.0001	SL
2,4,5-Trichlorophenol	<0.27	µg/s	0.00000013	µg/m^3	220	µg/m^3	<0.0001	SL
2,4,6-Trichlorophenol	12.7	µg/s	0.0000060	µg/m^3	1.5	µg/m^3	0.00040	SL
2,3,4,6-Tetrachlorophenol	0.44	µg/s	0.00000021	µg/m^3	0.75	µg/m^3	<0.0001	SL
Pentachlorophenol	<0.27	µg/s	0.00000013	µg/m^3	20	µg/m^3	<0.0001	G
Polychlorinated biphenyls	<0.53	µg/s	0.00000025	µg/m^3	0.15	µg/m^3	0.00017	G
Hexachlorobutadiene	0.16	µg/s	0.000000076	µg/m^3	0.225	µg/m^3	<0.0001	SL
Hexachloroethane	<0.053	µg/s	0.000000025	µg/m^3	115	µg/m^3	<0.0001	SL
Heptachlor	<0.013	µg/s	0.0000000062	µg/m^3	0.004	µg/m^3	0.00015	SL
Toxaphene	<0.029	µg/s	0.000000014	µg/m^3	0.015	µg/m^3	<0.0001	SL
Hexachlorophene	<0.27	µg/s	0.00000013	µg/m^3	0.5	µg/m^3	<0.0001	SL

S - Standard
G - Guideline
SL - Screening Level
* Calculated using the detection limit for those isomers not detected in quantities greater than the reportable detection limit.
** Calculated using half the detection limit for those isomers not detected in quantities greater than the reportable detection limit.

TABLE 128
Clean Harbors Sarnia
Regulation 419 Dispersion Modeling Results using AERMOD for Metals

Contaminant	Average Emission Rate		Calculated Impingement Concentration		Allowable Impingement Concentration		Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00	g/s	0.0479	µg/m³				
Base Case - 30 Day	1.00	g/s	0.1385	µg/m³				
Base Case - 24 hour	1.00	g/s	0.4761	µg/m³				
Aluminum	12.1	mg/s	0.0058	µg/m³	12	µg/m³	0.048	SL
Antimony	0.072	mg/s	0.000034	µg/m³	25	µg/m³	0.00014	S
Arsenic	3.43	mg/s	0.0016	µg/m³	0.3	µg/m³	0.54	G
Barium (as water soluble)	0.27	mg/s	0.00013	µg/m³	10	µg/m³	0.0013	G
Beryllium*	<0.0020	mg/s	0.00000097	µg/m³	0.01	µg/m³	0.0097	S
Boron	44.9	mg/s	0.021	µg/m³	120	µg/m³	0.018	S
Cadmium	0.023	mg/s	0.000011	µg/m³	0.025	µg/m³	0.043	S
Calcium oxide	69.3	mg/s	0.033	µg/m³	10	µg/m³	0.33	S
Chromium	0.44	mg/s	0.00021	µg/m³	0.5	µg/m³	0.042	G
Cobalt	0.0076	mg/s	0.0000036	µg/m³	0.1	µg/m³	0.0036	G
Copper	0.77	mg/s	0.00037	µg/m³	50	µg/m³	0.00074	S
Iron (as metal)	5.51	mg/s	0.0026	µg/m³	4	µg/m³	0.066	S
Lead	0.047	mg/s	0.000022	µg/m³	0.5	µg/m³	0.0045	S - 24 hour
Lead	0.047	mg/s	0.0000065	µg/m³	0.2	µg/m³	0.0033	S - 30 day
Lithium	0.060	mg/s	0.000029	µg/m³	20	µg/m³	0.00014	S
Magnesium	2.14	mg/s	0.0010	µg/m³	72	µg/m³	0.0014	SL
Manganese (as compounds)	0.27	mg/s	0.00013	µg/m³	0.4	µg/m³	0.033	G
Mercury	0.049	mg/s	0.000023	µg/m³	2	µg/m³	0.00116	S
Molybdenum	0.084	mg/s	0.000040	µg/m³	120	µg/m³	<0.0001	G
Nickel	0.11	mg/s	0.0000052	µg/m³	0.04	µg/m³	0.013	S - Annual
Phosphorus	1.94	mg/s	0.00093	µg/m³	0.5	µg/m³	0.19	SL
Potassium	32.3	mg/s	0.015	µg/m³	1	µg/m³	1.54	SL
Selenium	5.15	mg/s	0.0025	µg/m³	10	µg/m³	0.025	G
Silicon	169	mg/s	0.080	µg/m³	27	µg/m³	0.30	SL
Silver	0.0026	mg/s	0.0000012	µg/m³	1	µg/m³	0.00012	S
Sodium hydroxide	219	mg/s	0.10	µg/m³	10	µg/m³	1.04	G
Strontium	0.12	mg/s	0.000059	µg/m³	120	µg/m³	<0.0001	G
Tin	0.45	mg/s	0.00022	µg/m³	10	µg/m³	0.0022	S
Titanium	0.70	mg/s	0.00033	µg/m³	120	µg/m³	0.00028	S
Vanadium	0.016	mg/s	0.0000076	µg/m³	2	µg/m³	0.00038	S
Zinc	0.78	mg/s	0.00037	µg/m³	120	µg/m³	0.00031	S

S - Standard
G - Guideline
SL - Screening Level
* These compounds were not detected in any of the emission samples (all analytical results were <MDL).

TABLE 129
Clean Harbors Sarnia
Regulation 419 Dispersion Modeling Results using AERMOD for Volatile Organic Compounds

Contaminant	Average Emission Rate	Calculated Impingement Concentration	Allowable Impingement Concentration	Percentage of Allowable Concentration	Status of Allowable Concentration
Base Case - Annual	1.00 g/s	0.0479 µg/m³			
Base Case - 24 hour	1.00 g/s	0.4761 µg/m³			
Base Case - 1 hour	1.00 g/s	1.7745 µg/m³			
Benzene	1.97 mg/s	0.000094 µg/m³	0.45 µg/m³	0.021	S - Annual
Bromodichloromethane	0.38 mg/s	0.00018 µg/m³	350 µg/m³	<0.0001	SL
Bromomethane (methyl bromide)	1.16 mg/s	0.00055 µg/m³	1350 µg/m³	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.078 mg/s	0.000037 µg/m³	1000 µg/m³	<0.0001	S
Chloroethene (vinyl chloride)	0.0048 mg/s	0.0000023 µg/m³	1 µg/m³	0.00023	S
Dibromochloromethane	0.14 mg/s	0.000069 µg/m³	0.2 µg/m³	0.034	SL
1,2-Dibromoethane (Ethylene dibromide)	0.0073 mg/s	0.0000035 µg/m³	3 µg/m³	0.00012	G
Dichlorodifluoromethane	0.0065 mg/s	0.0000031 µg/m³	500000 µg/m³	<0.0001	G
1,1-Dichloroethane (ethylene dichloride) *	0 mg/s	0 µg/m³	165 µg/m³	<0.0001	S
1,1-Dichloroethene*	0 mg/s	0 µg/m³	10 µg/m³	<0.0001	S
trans-1,2-Dichloroethene *	0 mg/s	0 µg/m³	105 µg/m³	<0.0001	G
Dichloromethane (methylene chloride)	0.45 mg/s	0.00022 µg/m³	220 µg/m³	0.00010	G
1,2-Dichloropropane*	0 mg/s	0 µg/m³	2400 µg/m³	<0.0001	G
Ethyl Acetate *	0 mg/s	0 µg/m³	19000 µg/m³	<0.0001	G - 1 hour
Ethylbenzene	0.0011 mg/s	0.00000054 µg/m³	1000 µg/m³	<0.0001	S
Isopropylbenzene (cumene) *	0 mg/s	0 µg/m³	400 µg/m³	<0.0001	S
2-Propanone (acetone)	0.33 mg/s	0.00015 µg/m³	11880 µg/m³	<0.0001	S
Styrene	0.063 mg/s	0.000030 µg/m³	400 µg/m³	<0.0001	S
Tetrachloroethene (perchloroethylene)	0.11 mg/s	0.000053 µg/m³	360 µg/m³	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0.040 mg/s	0.000019 µg/m³	2.4 µg/m³	0.00080	S
Toluene	0.13 mg/s	0.000060 µg/m³	2000 µg/m³	<0.0001	S
Tribromomethane (bromoform)	0.13 mg/s	0.000063 µg/m³	55 µg/m³	0.00011	G
1,1,1-Trichloroethane (methyl chloroform)*	0 mg/s	0 µg/m³	115000 µg/m³	<0.0001	S
Trichloroethene	0.048 mg/s	0.000023 µg/m³	12 µg/m³	0.00019	S
Trichlorofluoromethane *	0 mg/s	0 µg/m³	6000 µg/m³	<0.0001	G
Trichloromethane (chloroform)	0.11 mg/s	0.000053 µg/m³	1 µg/m³	0.0053	S
Trichlorotrifluoroethane*	0 mg/s	0 µg/m³	800000 µg/m³	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene) *	0 mg/s	0 µg/m³	220 µg/m³	<0.0001	S
1,3,5-Trimethylbenzene *	0 mg/s	0 µg/m³	220 µg/m³	<0.0001	S
Xylenes	0.039 mg/s	0.000019 µg/m³	730 µg/m³	<0.0001	S

S - Standard
G - Guideline
SL - Screening Level

* These compounds were not detected in any of the emission samples (all analytical results were <MDL).

TABLE 130
Clean Harbors Sarnia
Physical and Elemental Analyses
Feed Samples

Rich Feed

Test No.	Heat of Combustion MJ/kg	Viscosity cps @ 25°C	Density g/mL	Organic Chlorine % wt.**	Carbon % wt.	Hydrogen % wt.	Nitrogen % wt.	Oxygen* % wt.	Sulphur % wt.	Ash % wt.
1	28.3	<100	0.84	0.43	46.48	11.51	3.04	37.90	0.39	0.68
2	29.5	<100	0.90	0.74	52.07	11.96	2.29	32.37	0.29	1.02
3	25.1	<100	0.91	0.74	52.17	10.88	1.87	33.48	0.38	1.22
Average	27.6	<100	0.88	0.64	50.24	11.45	2.40	34.58	0.35	0.97

Lean Feed

Test No.	Heat of Combustion MJ/kg	Viscosity cps @ 25°C	Density g/mL	Organic Chlorine % wt.**	Carbon % wt.	Hydrogen % wt.	Nitrogen % wt.	Oxygen* % wt.	Sulphur % wt.	Ash % wt.
1	5.20	-	1.05	1.02	9.27	10.69	0.97	74.18	0.49	4.40
2	3.37	-	1.06	0.63	9.62	10.65	0.75	73.86	0.50	4.62
3	4.72	-	1.04	0.85	9.05	10.94	0.90	74.25	0.40	4.46
Average	4.43	-	1.05	0.83	9.31	10.76	0.87	74.10	0.463	4.49

Emulsion Feed

Test No.	Heat of Combustion MJ/kg	Viscosity cps @ 25°C	Density g/mL	Organic Chlorine % wt.**	Carbon % wt.	Hydrogen % wt.	Nitrogen % wt.	Oxygen* % wt.	Sulphur % wt.	Ash % wt.
1	14.8	<100	0.96	1.27	37.20	11.04	5.69	43.72	0.45	1.90
2	19.7	<100	0.93	1.63	42.28	11.02	4.80	39.29	0.50	2.11
3	18.9	<100	0.93	1.23	36.81	11.15	4.18	45.53	0.38	1.95
Average	17.8	<100	0.94	1.38	38.76	11.07	4.89	42.85	0.44	1.99

Note: The hydrogen and oxygen results do not include the hydrogen and oxygen associated with water.

* Oxygen is determined by difference = 100-(carbon+hydrogen+nitrogen+ash+sulphur).
** Organic chlorine was not recorded on the daily incineration reports provided by Clean Harbors. Total chlorine data has been reported which includes organic and soluble chlorine.

TABLE 131
Clean Harbors Sarnia
Metal Analysis of the Liquid Feed Samples

Metal	Rich Feed mg/kg	Lean Feed mg/kg	Alkaline Feed mg/kg	Emulsion Feed mg/kg	Leachate Feed mg/kg
Aluminum	228	211	<10	137	<10
Antimony	6.9	1.32	<0.4	0.84	<0.4
Arsenic	<0.4	88.1	<0.4	<0.4	<0.4
Barium	16.1	17.2	1.11	12.7	<1
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	18.5	18.2	<10	19.3	37.5
Cadmium	0.14	3.99	<0.1	0.11	0.11
Calcium	448	1100	450	405	637
Chromium	25.2	113	<4	4.41	<4
Cobalt	1.09	1.40	<1	<1	<1
Copper	17.2	169	<2.5	28.2	<2.5
Iron	279	256	<200	356	<200
Lead	2.99	2.16	<0.1	2.50	0.13
Lithium	<1	11.4	<1	<1	5.96
Magnesium	103	274	69.0	97.4	196
Manganese	<15	64.9	<15	<15	<15
Mercury	0.042	0.31	<0.010	0.42	<0.010
Molybdenum	4.40	9.17	<1	8.79	2.27
Nickel	5.40	20.0	<0.5	5.55	2.53
Phosphorus	137	575	<100	<100	<100
Potassium	235	5020	<150	239	6710
Selenium	<2	18.9	<2	<2	<2
Silicon	119	122	<50	138	<50
Silver	0.12	<0.1	<0.1	<0.1	<0.1
Sodium	1210	9190	101	2070	16600
Strontium	2.62	3.83	2.03	2.30	4.87
Sulphur	217	2430	<100	<100	1140
Tin	36.6	38.3	<2	89.9	<2
Titanium	4.97	7.86	<1	3.63	<1
Vanadium	2.03	2.36	<1	1.13	<1
Zinc	95.2	92.8	<20	59.5	<20
Total	<3234	<19863	<1296	<3902	<25747

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the total.

TABLE 132
Clean Harbors Sarnia
Metal Analyses in Baghouse Dust Samples

Metal	Concentration mg/kg
Aluminum	6360
Antimony	101
Arsenic	1210
Barium	223
Beryllium	<0.5
Boron	169
Cadmium	65.6
Calcium	31700
Chromium	1390
Cobalt	24.6
Copper	2470
Iron	5120
Lead	49.7
Lithium	199
Magnesium	7310
Manganese	911
Mercury	5.84
Molybdenum	187
Nickel	310
Phosphorus	9660
Potassium	102000
Selenium	305
Silicon	226
Silver	2.48
Sodium	201000
Strontium	149
Sulphur	59500
Tin	787
Titanium	466
Vanadium	60.8
Zinc	1780
Total	<433743

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the total.

TABLE 133
Clean Harbors Sarnia
Dioxin and Furan Congener Group Analyses in the Feed Samples

Dioxins

Congener Group	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Tetrachlorodibenzo-p-dioxins	<1.0	71.6	<0.25	14.3
Pentachlorodibenzo-p-dioxins	7.82	112	<0.21	17.7
Hexachlorodibenzo-p-dioxins	21.0	314	<0.21	28.4
Heptachlorodibenzo-p-dioxins	86.2	1170	0.55	126
Octachlorodibenzo-p-dioxin	305	2010	2.58	442
Total	<421	3678	<3.80	628

Furans

Congener Group	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Tetrachlorodibenzofurans	15.1	186	<0.15	146
Pentachlorodibenzofurans	10.1	124	<0.16	116
Hexachlorodibenzofurans	5.12	92.7	<0.34	87.6
Heptachlorodibenzofurans	44.1	75.5	<0.16	78.3
Octachlorodibenzofuran	55.1	68.1	<0.45	67.5
Total	130	546	<1.26	495

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the averages.

TABLE 134
Clean Harbors Sarnia
Dioxin and Furan Specific Isomer Analyses in the Feed Samples

Specific Isomer	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
2378-tetrachlorodibenzo-p-dioxin	<1.0	2.54	<0.25	1.81
12378-pentachlorodibenzo-p-dioxin	<1.1	10.0	<0.21	3.91
123478-hexachlorodibenzo-p-dioxin	1.19	9.45	<0.21	2.05
123678-hexachlorodibenzo-p-dioxin	2.74	31.4	<0.19	<3.8
123789-hexachlorodibenzo-p-dioxin	2.52	19.4	<0.20	<3.1
1234678-heptachlorodibenzo-p-dioxin	52.3	657	<0.63	68.7
Octachlorodibenzo-p-dioxin	305	2010	2.58	442
2378-tetrachlorodibenzofuran	<0.99	6.85	<0.15	6.20
12378-pentachlorodibenzofuran	<1.1	6.58	<0.16	7.17
23478-pentachlorodibenzofuran	2.04	10.4	<0.13	10.9
123478-hexachlorodibenzofuran	3.08	9.55	<0.24	13.0
123678-hexachlorodibenzofuran	<1.5	8.73	<0.24	11.3
234678-hexachlorodibenzofuran	2.04	11.6	<0.24	10.1
123789-hexachlorodibenzofuran	<0.99	2.92	<0.34	3.28
1234678-heptachlorodibenzofuran	13.1	38.3	<0.14	41.9
1234789-heptachlorodibenzofuran	2.15	3.28	<0.16	5.17
Octachlorodibenzofuran	55.1	68.1	<0.45	67.5
Total	<448	2906	<6.52	<702

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit), and the value of the detection limit was used to calculate the averages.

TABLE 135
Clean Harbors Sarnia
Polychlorinated Biphenyl Analyses in
the Feed Samples

Specific Isomer	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Dichlorinated biphenyls	2490	2070	2.50	17000
Trichlorinated biphenyls	11600	4180	<0.84	28700
Tetrachlorinated biphenyls	40600	8310	<0.57	68200
Pentachlorinated biphenyls	129000	10500	1.56	302000
Hexachlorinated biphenyls	238000	24100	<0.49	486000
Heptachlorinated biphenyls	135000	17800	<0.42	257000
Octachlorinated biphenyls	29900	3330	<0.63	57300
Nonachlorinated biphenyls	2690	179	<1.3	4470
Decachlorinated biphenyl	327	162	<0.90	862
Total	589607	70631	<9.21	1221532

Note: "<" indicates that the analyte was not detected (was less than the analytical detection limit),
and the value of the detection limit was used to calculate the averages.

APPENDIX 2

Environmental Compliance Approval No. 8-1030-94-006
(29 pages)

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

Ontario

CERTIFICATE OF APPROVAL
A I.
NUMBER 8-1030-94-0C

LAIDLAW ENVIRONMENTAL SERVICES LTD.
265 N. Front Street,
Sarnia, Ontario
N7T 7X1

Located at: Part of Lot 9, Concession 10, Township of Moore, County of Lambton

You have applied in accordance with Section 9 of the Environmental Protection Act for approval of:

to operate the facility to incinerate hauled liquid industrial waste class no(s). 111-114 inclusive, 121, 122, 123, 131-135 inclusive, 141-150 inclusive, 211-213 inclusive, 221, 222, 231-233 inclusive, 241, 242, 251-25[illegible] inclusive, 261-270 inclusive, 281, 282, 311 and 321 which may bring about the emissions of air pollutants from an exhaust stack with the height of approximately 68 metres above ground, with the diameter of approximately 1.5 metres and equipped with an exhaust cone 1.22 metres in diameter in accordance with the application from Laidlaw Environmental Services Ltd. dated December 23, 1994 and supporting documentation listed in Appendix A, subject to conditions as described in Schedule I.

This certificate replaces the Certificate of Approval (Air) Number 8-1039-91-006 dated May 23, 1991.

You are hereby notified that this approval is issued subject to the following terms and conditions outlined below:

TERMS AND CONDITIONS

DEFINITIONS

1. For the purpose of this Certificate of Approval:

   a. "air pollution control system" means the entire air pollution control train consisting of a spray dryer and a baghouse as described in the Application for Certificate of Approval for Plant Modifications at Tricil (Sarnia) Limited, Corunna, Ontario by Tricil Limited dated July 15, 1981.

   b. "ash" means solid residues from the incineration process;

   c. "baghouse ash" means solids recovered from the baghouse;

   d. "°C" means degrees Celsius;

   e. "CEM" means continuous emission monitor;

f. "CEM-CSA" means Continuous Emission Monitoring Methods, Canadian Standards Method: CAN/CSA-Z223.2-M86, ISSN 0317-5669, September 1986, Canadian Standards Association;

g. "certificate" means this entire certificate of approval including its schedules issued in accordance with Section 8 of the Environmental Protection Act;

h. "company" means Laidlaw Environmental Services (Sarnia) Ltd. formerly called Tricil (Sarnia) Limited;

i. "Director" means any Ministry employee appointed by the Minister pursuant to Section 5 of the Act;

j. "District Manager" means the District Manager, Sarnia District Office of the Southwestern Region of the Ministry;

k. "facility" consists of an incinerator, storage tanks for waste and the associated piping and pumps, and air pollution control system as described in the Application for Certificate of Approval for Plant Modifications at Tricil (Sarnia) Limited, Corunna, Ontario by Tricil Limited dated July 15, 1981; and in the document titled "A Proposal to Provide Secondary Combustion Air for the L.E.S.L. Lambton Incinerator" and shown in drawings numbered D-32-2-043 and DX-03-0-192 by Four Nines, Inc.; and in the document titled Modifications to Existing Sarnia Tank Farm, Conceptual Scope of Work, February 1991, and modified to allow the introduction of vent gases from the existing storage tanks and purge gases from the centrifuge and the steam still into the combustion air plenum at the incinerator as described in the application for a certificate of approval (air) dated August 7, 1991 and supporting documentation listed in Appendix; and further modified as described in the application letter to Mr. H.O. Wigle dated November 16, 1992 and signed by Mr. Dean C. Edwardson along with a document titled: Proposal; Incineration of Intermediate Heat Value Waste and drawings by the MIG Engineering Ltd. of Sarnia, Ontario numbered 8881/8745/8562 and No. 8562;

l. "GCM-THC" means Guideline for Continuous Monitoring of Total Hydrocarbons (Draft), Ontario Ministry of the Environment;

m. "incinerator" means equipment for thermal destruction of waste as described in the Application for Certificate of Approval for Plant Modifications at Tricil (Sarnia) Limited, Corunna, Ontario by Tricil Limited dated July 15, 1981;

n. "intermediate heat value waste" means an emulsion containing rich and lean waste with a total heating value of more than 4 MJ/kg and less than 25 MJ/kg;

o. "KPa" means kiloPascals;

p. "lean waste" means waste water contaminated with small quantity of liquid organic waste with a heating value of not more than 4 MJ/Kg;

q. "lpm" means liters per minute averaged over a one minute period;

r. "Manager" means the Manager, Environmental Engineering Services Section, Science and Technology Branch, or any other person who represents and carries out the duties of the Manager, Environmental Engineering Services Section, Science and Technology Branch, as those duties relate to the conditions of this certificate;

s. "Ministry" means the Ontario Ministry of Environment and Energy;

t. "MJ/kg" means megajoules per kilogram;

u. "ppm" means parts per million by volume;

v. "Regional Director" means the Director of the Southwestern Region of the Ministry of the Environment and Energy;

w. "rich waste" means liquid organic waste with a heat value of at least 25 MJ/Kg;

x. "Source Testing Code" means the Ministry's publication ISBN 0-7748-6419-X "Source Testing Code", Version #2, Report # ARB-66-80, November 1980;

y. "U.S. opacity guideline" means Performance Specification 1 - Specifications and Test Procedures for Opacity Continuous Emission Monitoring Systems in Stationary Sources, Title 40, Part 60 under Code of Federal Regulations Ch. I, July 1, 1987 Edition.

Applicability of the Certificate

2. The company shall operate the facility and shall fulfil the requirements of this certificate in full compliance with each and every condition contained in Provisional Certificate of Approval No. A 031813 issued for a Waste Disposal Site.

Requirements

3. The conditions of this certificate are imposed pursuant to Section 8 of the *Environmental Protection Act*. The issuance of this certificate in no way abrogates the company's legal obligation to comply with all of the requirements of Ontario Regulation 346, and all other applicable legislation and regulations.

Interpretation (Severability and Conflicts)

4. a. The requirements of this certificate are severable. If any requirement of this certificate, or the application of any requirement of this certificate to any circumstance, is held invalid, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

b. In all matters requiring the interpretation and implementation of this certificate, the conditions of the certificate shall take precedence, followed in descending order by the company's application and the documentation, referred to in this certificate, which is submitted in support of this application.

Compliance

5. The company shall ensure compliance with all the terms and conditions of this certificate. Non-compliance constitutes a violation of the *Environmental Protection Act* and is grounds for enforcement.

Changes to be Reported

6. The company shall notify the District Manager in writing of any of the following changes within 30 days of the change occurring:

a. change of address of the company;

b. change of the name of the corporation where the company or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2, or 3 of O. Reg. 189, R.R.O. 1989, as amended from time to time), filed under The Corporations Information Act shall be included in the notification to the District Manager;

c. change in directors or officers of the corporation where the company or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" as referred to in clause (b);

Information

7. In the event the company provides to the Ministry information, records, documentation or notification in accordance with this certificate (for the purposes of this condition, "information"),

a. the receipt of said information by the Ministry;

b. the acceptance by the Ministry of the information's completeness accuracy; or,

c. the failure of the Ministry to prosecute the Company, or to requi the company to take any action, under this certificate or a statute or regulation in relation to said information;

shall not be construed as the approving, excusing or justifying by t Ministry of any act or omission of the company relating to sa information, amounting to non-compliance with this certificate or a statute or regulation.

Adverse Impact

8. The company shall take all reasonable steps to minimize any advers effect resulting from non-compliance with the requirements specified i this certificate including, but not limited to, such accelerated c additional monitoring as may be necessary to determine the nature an impact of the discharge in respect of which there is non-compliance.

Conditions for Ministry Order of Immediate Shutdown

9. The Regional Director may order an immediate shutdown of the facilit and the company shall comply with such an order where, in the opinion o the Regional Director upon probable grounds, a violation of an condition has resulted or may result in an adverse effect as that i described in the *Environmental Protection Act*.

SECTION 2: OPERATION AND MAINTENANCE

Operation and Maintenance

10. a. The company shall ensure that at all times, the site and facility and related fixtures, appurtenances, equipment and services which are installed or used to achieve compliance with this certificate are properly operated and maintained.

b. In furtherance of, but without limiting the generality of, the obligation imposed by subcondition a the company shall ensure that:

i. funding, staffing, training of staff, laboratory and process controls, quality assurance and quality control procedures in or in relation to the site and facility is adequate to achieve compliance with this certificate; and,

ii. equipment and material are kept on hand and in good repair for immediate use in the event of:

(1) any change in process parameters which results or potentially could result in an excursion from the operational ranges set out in condition 16 of this certificate;

(2) any fire or explosion;

(3) any discharge of a contaminant into the natural environment or interior of any building; or,

(4) any spill within the meaning of Part IX of the *Environmental Protection Act*,

and staff are trained in the use of said equipment and material and in the methods and procedures to be employed upon the occurrence of such an event.

Operating Manual

11. In furtherance of, but without limiting the generality of the obligation imposed by condition 10, the company shall operate the facility in accordance with the Operating Manual which should be made avilable to the District Manager for inspection upon request. The company shall keep the operating manual up to date through revisions undertaken from time to time so as to reflect any changes in the described operation and maintenance procedures made necessary by good engineering practice, this certificate or the requirements of the Ministry.

Due Diligence

12. The obligations imposed by the terms and conditions of this certificate of approval are obligations of due diligence.

Stack Emission Criteria

13. The Company shall operate the incinerator such that it meets all point of impingement standards in Regulation 346 and guidelines listed in Schedule A and the following emission constraints;

a. Maximum opacity of the stack gas as measured by a properly maintained opacity monitor shall not exceed 10% for more than four minutes in the aggregate in any thirty minute period.

b. Maximum concentration of residual organic matter as measured by a total hydrocarbon monitor shall not exceed 100 ppm by volume on undiluted basis, expressed as equivalent methane, being an average of ten measurements taken at approximately one minute intervals.

c. The maximum concentration of carbon monoxide (CO) in the stack gas shall not exceed 250 ppm by volume on undiluted basis, being an average of ten measurements taken at approximately one minute intervals.

d. Maximum concentration of particulate matter in the stack shall not exceed 50 mg/m^3 normalized to 11% of oxygen in dry stack gas at 25°C and 101.3 kPa.

14. Within six month following the issue date of this certificate, the company shall submit to the Regional Director a report outlining a timetable and steps it will undertake to decrease the concentrations of carbon monoxide in the stack gas to less than 100 parts per million.

Limitation on Wastes

15. The Company shall comply with limitations regarding the feeding rates of various wastes and the heat contents of these wastes as follows;

a. The maximum feeding rate of rich waste to the incinerator shall not exceed 45 lpm with a minimum heating value of 25 MJ/kg.

b. The maximum feeding rate of lean waste to the incinerator shall not exceed 170 lpm providing the heating value of waste does not exceed 4 MJ/kg.

c. The maximum feeding rate of intermediate heat value waste to the incinerator shall not exceed 20 lpm.

d. Wastes fed into the incinerator shall not contain more than 2% of organic chlorine by weight.

Detailed Operating Conditions

16. In addition to the obligations imposed by condition 13, condition 14 and condition 15, the company shall operate the incinerator at all times while wastes are fed into the incinerator as follows;

a. The company shall install and operate mixers or recirculation pumps in the designated feed tanks for lean and rich wastes, as described in Modifications to Existing Sarnia Tank Farm, Conceptual Scope of Work, January 17, 1991, prior to feeding these wastes into the incinerator.

b. 1300°C flame temperature measured accurately in the primary zone by means of auxiliary fuel control.

c. 800°C as measured by the temperature recorder TR-241 located at the exit from the incinerator by means of control of the feeding rate of lean waste.

d. The incinerator shall provide not less residual oxygen in the stack gas than 8% by volume as measured by the continuous emission monitor for oxygen.

e. Spray dryer outlet temperature shall not exceed 225°C

f. Incinerator pressure, as measured at the exit of the incinerator by a pressure indicator PI-242 shall not exceed 25 millimetres of water column for more than 5 seconds.

g. The company shall operate the incinerator to immediately cut off waste feed when any of the following occurs:

i. the temperature in the primary chamber falls below 1300°C.

ii. the exit temperature as measured in subcondition c. falls bellow 800°C.

iii. Concentration of oxygen in the stack gas as measured in subcondition "d" falls below 8%.

iv. Level of opacity in the stack gas exceeds 10% for more than four minutes in any half hour as described in subcondition "13a".

v. Concentration of organic matter in the incinerator exhaust gas exceeds 100 ppm on the average in a ten measurements taken at approximately one minute intervals.

vi. Concentration of carbon monoxide (CO) in the stack gas exceeds 250 ppm, being an average of ten measurements taken at approximately one minute intervals.

vii. Spray dryer outlet temperature exceeds 225°C.

h. The company shall shut down the incinerator in the event of;

i. Incinerator pressure, as measured in subcondition "f", exceed 25 millimetres of water.

ii. Loss of flame in the incinerator.

i. During start-up and shut-down of the incinerator, waste must not b introduced into the incinerator unless the incinerator is operatin within the conditions specified in subconditions "a" through "f inclusive;

17. Within six months following the issue date of this certificate, the company shall submit to the Regional Director a report outlining a timetable and steps which it will undertake to decrease the spray dryer outlet temperature to less than 200°C.

SECTION 3: CONTINUOUS MONITORING AND STACK TESTING

Continuous Emission and Process Monitoring

18. All CEMs presently installed on site shall be maintained and operated in accordance with the procedures described in the attached copies of CEM procedures. The monitored parameters include the following:

a. opacity;

b. stack concentrations of: sulphur dioxide, total hydrocarbons (THC), carbon monoxide and oxygen;

c. feed rates to the incinerator, temperature in the incinerator primary zone, incinerator exit temperature, incinerator exit pressure, exit spray dryer temperature, stack gas temperature and stack gas flow;

d. Continuous emission monitoring equipment and process monitoring equipment for parameters listed in subcondition a and subcondition b and subcondition c shall be equipped with continuous recording devices and with appropriate alarms for indication of exceedances of set points where applicable;

e. Audible and/or visible alarms indicating exceedances of set points will be activated at the values specified in subcondition 13 a., subcondition 13b and subcondition 13c of this certificate;

f. Continuous stack monitors shall be properly maintained and calibrated as described in the attached copies of the U.S. opacity guideline, GCM-THC and CEM-CSA and confirmed by the Manager.

Stack Testing

19. The company shall carry out stack testing annually to determine th emissions of the following;

    a. Total particulates and trace metals specified in Table 6 c Schedule B to this certificate;

    b. Volatile organic contaminants specified in Table 3 of Schedule B t this certificate;

    c. Semivolatile trace organic species specified in Tables 1, 2, 4, ar 5 of Schedule B to this certificate;

    d. Oxides of nitrogen;

    e. Sulphur dioxide;

    f. Hydrogen chloride.

20. The company shall use sampling and analytical procedures which are i agreement with the Source Testing Code and approved by the Manager;

    a. Each pollutant category listed in condition 19 shall be sampled minimum of three times to obtain three valid test samples as par of one sampling campaign;

    b. Each sampling test shall be considered a compliance test as define in the Source Testing Code.

21. In preparation for stack testing, the company shall, within the limitations imposed by the availability of waste, tank farm capacity anc time constraints, attempt to accumulate sufficient quantities of waste which are representative of waste causing highest stack emissions ir normal operation;

    a. Prior to stack testing the company shall analyze the composite samples of all wastes fed to the facility for the following: total PCBs, total dioxins and furans, hexachlorobenzene, pentachlorophenol, hexachloroethane, carbon tetrachloride and solids content in addition to all parameters listed in the company report on analyses of daily process samples titled "Incineration of Intermediate Heat Value Wastes at Tricil (Sarnia) Limited." dated 1987;

    b. A record of THC and opacity monitor readings shall be kept while incinerating wastes of known composition as per subcondition a;

c. Company shall make every effort to secure sufficient quantity o representative waste for feeding the facility during stack testing The representative waste shall be similar in composition to th waste which caused the highest THC and opacity readings in pre-tes work described in subcondition a and subcondition b;

d. Upon consulting the District Manager, the company may exceed th maximum feeding rates shown in condition 15 in the period of on month prior to and during stack tests providing the increased fee rates do not violate other terms of this certificate.

Incinerator Operation During Stack Testing

22. For the purpose and duration of stack tests only, or after obtaining the approval from the Director, the company may change the minimum temperatures in the incinerator imposed by subcondition 16b and subcondition 16c providing none of the limits imposed by condition 13 has been exceeded.

23. The Company shall call a meeting between the stack sampling consultant, the Manager and the District Manager, at least two weeks prior to tests, to discuss:

a. sampling protocol, process conditions and individual responsibilities during testing;

b. timing of tests so that witnessing can be arranged at Manager's discretion;

c. procedure for execution of a new tests in place of any compliance test which, in the opinion of the Manager or its designate, deviated significantly from the Source Testing Code.

Sampling of Process Effluents

24. The Company shall prepare three composite samples of rich waste, lean waste and baghouse ash during each stack test. The composite samples shall be analyzed for contaminants to be specified by the company and approved by the Regional Director prior to stack testing. Sampling procedure and frequency shall be determined at the meeting referred to in condition 23.

Reporting of Stack Testing Results

25. The company shall provide to the District Manager;

a. A report summarizing test results not later than 30 days after the receipt of the results from the laboratory.

b. A stack test report conforming with the requirements of the Source Testing Code and containing stack testing results, continuous monitoring data obtained during each stack sampling test, results of analyses on process samples, process data and feed rates, assessment of operation and interpretation of results not later than 90 days after the receipt of the results from the laboratory.

c. Any test including sampling and laboratory analyses which in the opinion of the Director has not been performed in accordance with the Source Testing Code or sampling methods as agreed to by the Manager, shall be repeated by the company in the shortest time practicable.

Reporting of Continuous Emission Monitoring Data

26. The company shall provide to the District Manager monthly summaries of continuous emission monitoring data; the summaries shall include average monthly values of all parameters listed subcondition 18a and subcondition 18b and the concomitant standard deviations; the number and duration of exceedances of the operational ranges listed in subcondition 13a, subcondition 13b and subcondition 13c; and reasons for exceedances and corrective actions.

The reasons for the imposition of these terms and conditions are as follows:

SECTION 1: GENERAL CONDITIONS

Definitions

1. Condition 1 is included to define special terms used throughout this certificate.

Applicability of the Certificate

2. Condition 2 is imposed to emphasize that in addition to conditions in this certificate the company shall comply with conditions contained in the Provisional Certificate of Approval A 031813 issued for a Waste Disposal Site.

Requirements

3. Condition 3 is included to emphasize that the issuance of th certificate does not diminish any other statutory and regulator obligations to which the company is subject in the construction maintenance and operation of the facility, and in particular th requirements of Regulation 346.

Interpretation (Severability and Conflict)

4. Condition 4 is included to clarify how the certificate is to be judicially interpreted and specifically, to clarify that the requirements of the certificate are severable and that they prevail over supporting documentation.

Compliance

5. Condition 5 is included to emphasize that the company is under a statutory obligation to ensure compliance with the certificate.

Changes to be Reported

6. Condition 6 is included to ensure that the Ministry records are kept accurate and current with respect to approved facility and to ensure that subsequent owners of the facility are made aware of the certificate and continue to operate the facility in compliance with it.

Information

7. Condition 7 is included to ensure that Ministry personnel, when acting in the course of their duties, will be given information and records related to the facility which are the subject of this certificate, to enable the Ministry to be assured of the company's compliance with the terms and conditions of this certificate. Subsection c is included to make the company aware that the mere provision of information in accordance with this certificate shall not exonerate it from enforcement in relation to any non-compliance disclosed by that information simply because the Ministry fails to note the non-compliance, require corrective action or prosecute.

Adverse Impact

8. Condition 8 is included to emphasize that the company has an ongoing duty to mitigate any adverse impacts resulting from non-compliance with the certificate.

Conditions for Ministry Order of Immediate Shutdown

9. Condition 9 is included to emphasize that the company will not be permitted to operate the facility in case of non-compliance with the conditions in this certificate.

SECTION 2: OPERATION AND MAINTENANCE

Operation and Maintenance

10. Condition 10 is included to ensure that the facility will be operated maintained, funded, staffed and equipped in a manner enabling complianc with the terms and conditions of this certificate, such that th environment is protected and deterioration, loss, injury or damage t any person or property is prevented.

Operating Manual

11. Condition 11 is included to ensure that the company shall follo approved operating procedures as required by this certificate and that the operating manual shall be kept up to date.

Due Diligence

12. Condition 12 is included to clarify that the terms and conditions of this certificate of approval impose a standard of due diligence and not absolute liability.

Stack Emission Criteria

13. Condition 13 is included to ensure that the facility, including air pollution control equipment, will not emit into the ambient air pollutants at rates which are higher than achievable by the facility as demonstrated by stack tests and the company's monthly reports. In the case of carbon monoxide, the two minutes interval was added to recognize that some time will be required to purge the incinerator and the air pollution control equipment after the waste feed has been cut off as required by condition 16 of the certificate.

14. Condition 14 is included to ensure that further improvements to the incineration process are made to ensure a minimum combustion efficiency of 99.9 %.

Limitation on Wastes

15. Condition 15 is included to ensure that feeding rates to the incinerator shall not exceed the values which were recorded during stack testing which in conjuction with continuous emission monitoring indicated compliance with emission limits imposed by this certificate.

Detailed Operating Conditions

16. Condition 16 is included to specify safe limits of operating parameters in normal operation and actions to be taken when these limits are not met. These limits have been achieved in operation and are considered adequate for the destruction of toxic trace organics.

17. Condition 17 is included to ensure that the company decreases th[e] temperature of the scrubber outlet so as to minimize the emissions o[f] dioxins and volatile metals such as mercury.

SECTION 3: CONTINUOUS MONITORING AND STACK TESTING

Continuous Emission and Process Monitoring

18. Condition 18 is included to ensure compliance with the requirements o[f] continuous emission and process monitoring, as applicable, imposed by condition 13, condition 15 and condition 16. This condition emphasizes that the Manager is authorized to determine whether the monitors are operated in an acceptable manner.

Stack Testing

19. Condition 19 is included to specify stack sampling which must be carried out on annual basis in order to assess air emissions from the facility. The selection of pollutants for sampling was based on waste composition, consideration of process and the results of previous stack testing at this facility.

20. Condition 20 is included to emphasize the authority of the Manager to approve sampling and analytical procedures, the required number of stack tests and the fact that every test will be considered as compliance test as described in the Source Testing Code.

21. Condition 21 is included to establish a relationship between the waste composition and stack emissions and to ensure that the emissions measured during stack testing will be representative of those process conditions which may induce highest stack emissions, as is stipulated by the definition of compliance test in the Source Testing Code.

22. Condition 22 allows the company to change the temperatures in the incinerator for testing purposes and in normal operation only after obtaining the Director's approval.

23. Condition 23 is included to enable all parties involved in testing to determine responsibilities and agree on procedures during stack testing to in order to ensure a satisfactory sampling program and accurate results.

24. Condition 24 is included to ensure that the collection of waste samples required for interpretation of stack sampling results is carried out.

Reporting

25. Condition 25 is included to ensure that the results of sampling and measurements are communicated to the Ministry so that the operation can be assessed and corrective actions initiated as soon as possible if required.

26. Condition 26 is included to ensure that the results of continuc emission measurements are communicated to the Ministry so that t operation can be assessed and corrective actions initiated as soon possible if required. The reporting shall be more comprehensive aft the installation of a new data logger has been completed.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990 c. E-19, may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provi that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary, Environmental Appeal Board, 112 St. Clair Avenue West, Suite 502, Toronto, Ontario. M4V 1N3	AND	The Director, Section 9, Environmental Protection Act, Ministry of the Environment and Energy, 250 Davisville Avenue, 3rd Floor, Toronto, Ontario. M4S 1H2

The above noted works are approved under Section 9 of the Environmental Protection Act.

DATED AT TORONTO this 19th *day of* April 1994

P. DeAngelis, P. Eng.,
Director,
Section 9,
Environmental Protection Act.

VO/pm
cc MOEE Sarnia District Manager
J. Zend, Science & Technology Branch

SCHEDULE A - POINT OF IMPINGEMENT CONCENTRATIONS

Column 1

NAME OF CONTAMINANT

Column 2

HALF HOUR AVERAGE CONCENTRATION AT POINT OF IMPINGEMENT

* Concentration is in micrograms per cubic metre of air unless noted otherwise.

** ng/cubic metre = nanograms per cubic metre

Column 1	Column 2
Aluminum Oxide	
Arsenic	100
Barium-total water soluble	1
Chromium (Di, Tri and Hexavalent forms)	30
Manganese	5
Molybdenum	7.5
Nickel	100
Phosphorous Pentachloride	5
Potassium Hydroxide	30
Selenium	28
Sodium Hydroxide	20
Silica-respirable (d≤10 micron)	28
Strontium	15
Vinyl Chloride	100
Trichlorofluoromethane	35
Trifluorotrichloroethane	18000
Methylene Chloride	2400000
Chloroform	5300
1,1,1-Trichloroethane	1500
1,2-Dichloroethane	350000
Perchloroethylene	1200
Isopropyl Benzene (Cumene)	10000
1,2,4-Trimethyl Benzene (Mesitylene)	100
Carbon Tetrachloride	500
1,2,4-Trichlorobenzene	1800
Naphthalene	100
Benzo(a)pyrene	36
Pentachlorophenol	3.3 ng/cubic metre*
Polychlorinated Biphenyls (PCBs)	60
	0.45
Polychlorinated Dibenzodioxins (PCCD's)	in pg/cubic metre - see formula
Polychlorinated Dibenzofurans (PCDF's)	in pg/cubic metre - see formula

formula: (PCDD's/450) + (PCDF's/22500) ≤ 1

SCHEDULE B - MONITORING PARAMETERS

TABLE 1: PCBs and Chlorobenzenes in Stack Samples

Octachlorostyrene
Hexachlorobenzene
1,3,5-Trichlorobenzene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
Hexachlorobutadiene
2,4,5-Trichlorobenzene
2,3,6-Trichlorobenzene
1,2,4,5-Tetrachlorobenzene
Hexachloroethane
1,2,3,5-Tetrachlorobenzene
α,2,6-Trichlorotoluene
1,2,3,4-tetrachlorobenzene
Pentachlorobenzene
Dichlorobiphenyls
Trichlorobiphenyls
Tetrachlorobiphenyls
Pentachlorobiphenyls
Hexachlorobiphenyls
Heptachlorobiphenyls
Octachlorobiphenyls
Nonachlorobiphenyls
Decachlorobiphenyl
Total PCB congeners

TABLE 2: Polychlorinated Dibenzodioxins and Polychlorinated Furans

T_4CDD	T_4CDF
P_5CDD	P_5CDF
H_6CDD	H_6CDF
H_7CDD	H_7CDF
O_8CDD	O_8CDF

2,3,7,8-T_4CDD	2,3,7,8-T_4CDF
1,2,3,7,8-P_5CDD	1,2,3,7,8-P_5CDF
1,2,3,4,7,8-H_6CDD	2,3,4,7,8-P_5CDF
1,2,3,6,7,8-H_6CDD	1,2,3,4,7,8-H_6CDF
1,2,3,7,8,9-H_6CDD	1,2,3,6,7,8-H_6CDF
1,2,3,4,6,7,8-H_7CDD	1,2,3,7,8,9-H_6CDF
	2,3,4,6,7,8-H_6CDF
	1,2,3,4,6,7,8-H_7CDF
	1,2,3,4,7,8,9-H_7CDF

SCHEDULE B - MONITORING PARAMETERS

TABLE 3: Volatile Organics in Stack Samples

Dichlorodifluoromethane
Vinyl Chloride
Bromomethane
Trichlorofluoromethane
1,1-Dichloroethene
Trichlorotrifluoroethane
Methylene chloride
trans-1,2-Dichloroethene
Chloroform
1,1,1-Trichloroethane
1,2-Dichloroethane
Benzene
1,2-Dichloropropane
Trichloroethene
Bromodichloromethane
Toluene
Dibromochloromethane
Ethylene dibromide
Tetrachloroethene
Ethylbenzene
m & p-Xylene
Bromoform
o-Xylene
Cumene
Mesitylene
Acetone
2-Butanone
Carbontetrachloride
Styrene

SCHEDULE B - MONITORING PARAMETERS

TABLE 4: PAH's in Stack Samples

Tetralin
Naphthalene
2-Methylnaphthalene
1-Methylnaphthalene
2-Chloronaphthalene
Biphenyl
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
2-Methylanthracene
o-Terphenyl
1-Methylphenanthrene
9-Methylphenanthrene
Fluoranthrene
Pyrene
9,10-Dimethylanthracene
m-Terphenyl
p-Terphenyl
Benzo (a) Fluorene
Benzo (b) Fluorene
Benzo (a) Anthracene
Triphenylene + Chrysene
Perylene
Benzo (b) Fluoranthene
Benzo (k) Fluoranthene
Benzo (e) Pyrene
Benzo (a) Pyrene
3-Methylchloranthrene
Indeno (1,2,3,c,d) Pyrene
Dibenzo (a,c) Anthracene and Dibenzo (a,h) Anthracene
Picene
Benzo (g,h,i) Perylene
Coronene
Benzo (b) Anthracene
Quinoline
Dibenzo (a,e) Pyrene

SCHEDULE B - MONITORING PARAMETERS

TABLE 5: Chlorophenols in Stack Samples

2,3-dichlorophenol
2,4-dichlorophenol
2,6-dichlorophenol
2,3,4-trichlorophenol
2,4,5-trichlorophenol
2,4,6-trichlorophenol
3,4,5-trichlorophenol
2,3,4,6-tetrachlorophenol
2,3,5,6-tetrachlorophenol
Pentachlorophenol

TABLE 6: Inorganics in Stack Samples

Boron
Barium
Calcium
Cadmium
Copper
Iron
Potassium
Magnesium
Manganese
Sodium
Nickel
Phosphorus
Lead
Strontium
Zinc
Chromium
Aluminum
Silicon
Tin
Titanium
Molybdenum
Vanadium
Sulphur
Mercury
Arsenic
Selenium
Antimony
Silver
Beryllium
Cobalt
Fluorides
Lithium

APPENDIX A

1. Application for Certificate of Approval for Plant Modifications at Tricil (Sarnia) Limited, Corunna, Ontario, submitted to the Ontario Ministry of the Environment by Tricil Limited on July 15, 1981.

2. Application for Certificate of Approval for Plant Modifications at Tricil Sarnia) Limited, Corunna, Ontario, Supplementary Information, submitted to the Ontario Ministry of the Environment by Tricil Limited on July 15, 1981.

3. "Incineration of Intermediate Heat Value Wastes at Tricil (Sarnia) Ltd.", 1987.

4. Air Emission Testing at the Tricil, Sarnia Incinerator, A Draft Report to: Tricil Limited, 89 The Queensway West, Mississauga, Ontario, F.90-43-E125 CI, January 30, 1990, Ortech International, 2395 Speakman Drive, Mississauga, Ontario.

5. Application for Certificate of Approval (Air) for the modifications to the incineration feed system received at the Approvals Branch on September 28 1990.

6. A Proposal to Provide Secondary Combustion Air for the L.E.S.L. Lambton Incinerator.

7. Drawing by the MIG Engineering Ltd. of Sarnia, Ontario No. 8881,3745,1562.

8. L.E.S.L. - Lambton Facility, S.I.P.S. Process Vent Control System (a three page description of a system).

9. Drawing no. 15-21, Site Plan.

10. Drawing no. 201-PFF-808, Fume Incineration, Piping and Instrumentation Diagram.

11. Drawing by the MIG Engineering Ltd. of Sarnia, Ontario No. 8562.

12. Modifications to Existing Sarnia Tank Farm, Conceptual Scope of Work, January 17, 1991.

13. A proposal to Provide Secondary Combustion Air for the L.E.S.L. Lambton Incinerator.

14. Drawing No. DX-03-0-192 dated January 23, 1991, and Drawing No. D-32-2-043 dated February 20, 1991 by Four Nines, Inc.

15. Application letter to Mr. H.O. Wigle dated November 16, 1992 and signed by Mr. Dean C. Edwardson.

16. Application for Certificate of Approval (Air) for the installation of a vent control system (fume incineration) to control emissions from S.I.P.S. plant storage tanks and processing equipment received at the Approvals Branch on December 2, 1991.

17. "Laidlaw Environmental Services Ltd., Lambton Facility, 1993 Stack Test Plan".

18. Application for a Certificate of Approval No. 8-1039-91, dated December 17, 1993, to increase feed rates to the existing unit and to burn wastes with an intermediate heat value (emulsion).

19. Performance Evaluation, Lambton Facility Incineration System, Volume 1, December 1993.

Ministry of the Environment | Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
WASTE/AIR
NUMBER 6547-5G5MSP

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Notice of Amendment (Notice) amends Provisional Certificate of Approval (Waste Disposal Site) No. A031813, dated January 27, 1986 and Notice, dated April 8, 1987 as well as Certificate of Approval (Air) No. 8-1030-94-006, dated April 19, 1994.

Clean Harbors Canada Inc.
4090 Telfer Road
Corunna, ON
N0N 1G0

Located: Lot 9, Concession 10
Township of Moore, County of Lambton

to permit the modification of the facility to incinerate hauled liquid industrial waste in the following manner:

(a) to add additional auxiliary waste injection ports;
(b) to provide for the addition of powdered activated carbon in the air pollution control system;
(c) to add a fume collection and incineration system to the tank farm;
(d) to increase the amount of secondary air supplied to the furnace; and
(e) to alter the feed rate limitations for the system.

all in accordance with the applications and supporting information as listed in Schedule "A" which is attached to this Notice of Amendment and forms part of this Notice of Amendment, which includes the use of the Site only for the Transfer/Processing/ Incineration of the following categories of waste:

a facility to incinerate hauled liquid industrial waste class numbers:

111 - 114 inclusive; 121, 122, 123, 131 - 135 inclusive;
141 - 150 inclusive; 211 - 213 inclusive; 221, 222,
231 - 233 inclusive; 241, 242, 251 - 254 inclusive;
261 - 270 inclusive; 281, 282, 311, and 321

This amendment also allows the removal of the baghouse bypass duct work which is no longer required.

You are hereby notified that this amendment is issued subject to the terms and conditions of the original Certificate with the following changes:

1. The company shall ensure that the combined feed of all waste streams does not exceed 245 litres per minute.

2. The Company shall optimize the operation of the Incinerator and the Air Pollution Control System by establishing appropriate waste feed mix scenarios to accommodate the variability of heating values encountered with the types of wastes that may be incinerated. The Company shall also establish an Operating Window for the Incinerator and the Air Pollution Control System, including acceptable ranges for the Baseline Parameters and all set points for the continuously monitored parameters. Such an Operating Window shall based upon operating experience and shall be refined not later than during the first Source Testing following the issuance of this amendment. The Company shall submit details of the Operating Window to the Director, Manager and the District Manager as part of the Source Testing Report.

3. The Company shall, at all times, operate the Incinerator and the Air Pollution Control Equipment within the Operating Window, unless the Director determines, in consultation with the Manager and the District Manager that the Operating Window will not, based on the source testing results, adequately guarantee compliance with the Act, O. Reg. 346 and the Performance Conditions of this Certificate.

Concentration Limits:

4. The Company shall, at all times, operate the Incinerator and the Air Pollution Control System in such a manner as to ensure that the following Performance Conditions are met:

   (a) The concentration of organic matter having a carbon content, expressed as equivalent methane, in the Main Stack expressed as a ten minute block average, shall be not more than 100 parts per million by volume on dry basis normalized to 11 percent oxygen.

   (b) The one hour block average concentration of carbon monoxide in the main stack shall be not more than 100 parts per million by volume on a dry basis normalized to 11 percent oxygen; or 110 milligrams per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(c) The concentration of suspended particulate matter in the Stack shall be not more than 20 milligrams per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(d) The opacity at the exit of the Main Stack shall be not more than:

(i) 5 percent, calculated on a 2 hour average; and

(ii) 10 percent, calculated on a 6 minute average.

(e) (i) The toxicity equivalent concentration of dioxins and furans in the Gases in the Main Stack shall be not more than 80 picograms per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(ii) The toxicity equivalent concentration of dioxins and furans shall be calculated in accordance with the International Scheme set out in Schedule 3 of the Certificate.

(f) The concentration of mercury in the Gases in the Stack shall be not more than 50 micrograms per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

Interpretation:

5. (a) The requirements of this Notice are severable. If any requirement of this Notice, or the application of any requirement of this Notice or the application of any requirement of this Notice to any circumstance, is held invalid, the application of such requirement to other circumstances and the remainder of this Notice shall not be affected thereby.

(b) In all matters requiring the interpretation and implementation of this Notice, the conditions of this Notice shall take precedence, followed in descending order by the chronological approval documents that this Notice amends.

The reasons for the imposition of these conditions are as follows:

1. The reason for Condition 1 is to limit the amount of waste that can be fed to the incinerator at any time. This Condition alters the conditions regarding Feed Rate limitations in certificates of approval numbers A031813 and 8-1030-94-006.

2. Conditions 2 and 3 address the need to optimize the operation and develop a plan for continual monitoring of the optimized operation.

3. Conditions 4. set minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, you may by written notice served upon me, the Environmental Appeal Board and the Environmental Commissioner, Environmental Bill of Rights, S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary, Environmental Appeal Board, 2300 Yonge St., 12th Fl., P.O. Box 2382 Toronto, Ontario M4P 1E4	The Environmental Commissioner, 1075 Bay Street, Suite 605 6th Floor Toronto, Ontario M5S 2W5	The Director, Sections 9 & 39, *Environmental Protection Act* Ministry of the Environment, 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.

DATED AT TORONTO this 24th *day of* day of January, 2003

Director,
(Section 9 and Section 39,)
Environmental Protection Act

c: District Manager, Sarnia

SCHEDULE "A"

This Schedule "A" forms part of Certificate (Air and Waste Disposal Site):

1. Application for a Certificate of Approval (Air), for Plant Modifications at Safety Kleen Ltd. Corunna, Ontario submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on November 27, 2000 and all supporting documentation.

2. Application for a Certificate of Approval (Air), for Plant Modifications at Safety Kleen Ltd Corunna, Ontario submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on October 31, 2001 and all supporting documentation.

3. Supplemental information on the above Applications for a Certificates of Approval (Air) submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on March 1, 2002.

4. "Operating Manual Lambton Incineration System". Chemical Services Division, Clean Harbors Canada Inc. Latest Revision May, 2002

5. "QA/QC Plan for Safety Kleen Lambton Facility" Prepared by CEM Specialties. Draft Revision 1.

APPENDIX 3

Proving Data
(17 pages)

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2349710		MIssissauga, ON L5J 2Y4
Date of Report	4-Oct-19		(905)822-4120
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: CB by LRGC/MS - Isotope dilution

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG3173580-1		L2349710-10	
Sample Size	1		1	
Sample units	sample		sample	
Moisture Content	n/a		n/a	
Matrix	QC		Media Prep	
Sampling Date	n/a		n/a	
Extraction Date	27-Sep-19		27-Sep-19	
Target Analytes	**ng/sample**		**ng/sample**	
Chlorobenzene	<10	U	<10	U
1,3-Dichlorobenzene	<10	U	<10	U
1,4-Dichlorobenzene	<10	U	<10	U
1,2-Dichlorobenzene	<10	U	<10	U
1,3,5-Trichlorobenzene	<10	U	<10	U
1,2,4-Trichlorobenzene	<10	U	<10	U
1,2,3-Trichlorobenzene	<10	U	<10	U
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<10	U	<10	U
1,2,3,4-Tetrachlorobenzene	<10	U	<10	U
Pentachlorobenzene	<10	U	<10	U
Hexachlorobenzene	<10	U	<10	U
Extraction Standards	**%Rec**		**%Rec**	
13C6-Chlorobenzene	39		64	
13C6-1,4-Dichlorobenzene	67		74	
13C6-1,2,3-Trichlorobenzene	53		57	
13C6-1,2,3,4-Tetrachlorobenzene	66		75	
13C6-Pentachlorobenzene	127		124	
13C6-Hexachlorobenzene	117		113	

U Indicates that this compound was not detected above the LOD.

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2349710		Mississauga, ON L5J 2Y4
Date of Report	4-Oct-19		CANADA
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 CLEAN HARBORS

COMMENTS: **Chlorophenols as acetate derivatives by SIM GC/MS**

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG3173580-1		L2349710-10	
Sample Size	1		1	
Sample units	sample		sample	
Moisture Content	n/a		n/a	
Matrix	QC		Media Prep	
Sampling Date	n/a		n/a	
Extraction Date	27-Sep-19		28-Sep-19	
Target Analytes	**ng/sample**		**ng/sample**	
2-Chlorophenol	<50	U	<50	U
3-Chlorophenol	<50	U	<50	U
4-Chlorophenol	<50	U	<50	U
2,6-Dichlorophenol	<50	U	<50	U
2,4/2,5-Dichlorophenol	<50	U	<50	U
3,5-Dichlorophenol	<50	U	<50	U
2,3-Dichlorophenol	<50	U	<50	U
3,4-Dichlorophenol	<50	U	<50	U
2,4,6-Trichlorophenol	<50	U	<50	U
2,3,6-Trichlorophenol	<50	U	<50	U
2,3,5-Trichlorophenol	<50	U	<50	U
2,4,5-Trichlorophenol	<50	U	<50	U
2,3,4-Trichlorophenol	<50	U	<50	U
3,4,5-Trichlorophenol	<50	U	<50	U
2,3,5,6/2,3,4,6-Tetrachlorophenol	<50	U	<50	U
2,3,4,5-Tetrachlorophenol	<50	U	<50	U
Pentachlorophenol	<50	U	<50	U
Extraction Standards	**% Rec**		**% Rec**	
13C6-4-Chlorophenol (ES)	48		43	
13C6-2,4-Dichlorophenol (ES)	51		9	
13C6-2,4,5-Trichlorophenol (ES)	51		45	
13C6-2,3,4,5-Tetrachlorophenol (ES)	64		68	
13C6-Pentachlorophenol (ES)	40		14	

U Indicates that this compound was not detected above the LOR.

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2349710		MIssissauga, ON L5J 2Y4
Date of Report	4-Oct-19		(905)822-4120
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PCDD/F by EPA M23**

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Life Sciences

Sample Analysis summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L2349710-10
Sample Size	1
Sample size units	Proof
Percent Moisture	n/a
Sample Matrix	Media Prep
Sampling Date	n/a
Extraction Date	27-Sep-19

Target Analytes	**pg**
2,3,7,8-TCDD	<1.4
1,2,3,7,8-PeCDD	<1.1
1,2,3,4,7,8-HxCDD	<2.3
1,2,3,6,7,8-HxCDD	<2.1
1,2,3,7,8,9-HxCDD	<2.1
1,2,3,4,6,7,8-HpCDD	<3.4
OCDD	<7.9
2,3,7,8-TCDF	<1.4
1,2,3,7,8-PeCDF	<2.4
2,3,4,7,8-PeCDF	<1.2
1,2,3,4,7,8-HxCDF	<1.3
1,2,3,6,7,8-HxCDF	<1.2
2,3,4,6,7,8-HxCDF	<1.3
1,2,3,7,8,9-HxCDF	<1.5
1,2,3,4,6,7,8-HpCDF	<1.8
1,2,3,4,7,8,9-HpCDF	<1.1
OCDF	<3.1
Field Spike Standards	**% Rec**
37Cl4-2,3,7,8-TCDD	NS
13C12-1,2,3,4,7,8-HxCDD	NS
13C12-2,3,4,7,8-PeCDF	NS
13C12-1,2,3,4,7,8-HxCDF	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS
Extraction Standards	
13C12-2,3,7,8-TCDD	85
13C12-1,2,3,7,8-PeCDD	89
13C12-1,2,3,6,7,8-HxCDD	77
13C12-1,2,3,4,6,7,8-HpCDD	78
13C12-OCDD	54
13C12-2,3,7,8-TCDF	90
13C12-1,2,3,7,8-PeCDF	96
13C12-1,2,3,6,7,8-HxCDF	81
13C12-1,2,3,4,6,7,8-HpCDF	98
Cleanup Standard	
13C12-1,2,3,7,8,9-HxCDF	NS
Homologue Group Totals	**pg**
Total-TCDD	<1.4
Total-PeCDD	<1.1
Total-HxCDD	4.50
Total-HpCDD	<2.3
Total-TCDF	<1.4
Total-PeCDF	<1.4
Total-HxCDF	<1.5
Total-HpCDF	<1.1
Toxic Equivalency - (WHO 2005)	
Lower Bound PCDD/F TEQ (WHO 2005)	0.00
Mid Point PCDD/F TEQ (WHO 2005)	2.22
Upper Bound PCDD/F TEQ (WHO 2005)	4.32

ALS Life Sciences

Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG3173580-1
Sample Size	1
Sample size units	Proof
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	23-Sep-19
Target Analytes	**pg**
2,3,7,8-TCDD	<6.9
1,2,3,7,8-PeCDD	<4.2
1,2,3,4,7,8-HxCDD	<6.9
1,2,3,6,7,8-HxCDD	<6.3
1,2,3,7,8,9-HxCDD	<6.5
1,2,3,4,6,7,8-HpCDD	<8.2
OCDD	<32
2,3,7,8-TCDF	<4.0
1,2,3,7,8-PeCDF	<3.3
2,3,4,7,8-PeCDF	<3.0
1,2,3,4,7,8-HxCDF	<3.9
1,2,3,6,7,8-HxCDF	<3.6
2,3,4,6,7,8-HxCDF	<3.8
1,2,3,7,8,9-HxCDF	<4.4
1,2,3,4,6,7,8-HpCDF	<3.8
1,2,3,4,7,8,9-HpCDF	<4.6
OCDF	<15
Field Spike Standards	**% Rec**
37Cl4-2,3,7,8-TCDD	NS
13C12-1,2,3,4,7,8-HxCDD	NS
13C12-2,3,4,7,8-PeCDF	NS
13C12-1,2,3,4,7,8-HxCDF	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS
Extraction Standards	
13C12-2,3,7,8-TCDD	67
13C12-1,2,3,7,8-PeCDD	70
13C12-1,2,3,6,7,8-HxCDD	61
13C12-1,2,3,4,6,7,8-HpCDD	64
13C12-OCDD	49
13C12-2,3,7,8-TCDF	70
13C12-1,2,3,7,8-PeCDF	76
13C12-1,2,3,6,7,8-HxCDF	69
13C12-1,2,3,4,6,7,8-HpCDF	79
Cleanup Standard	
13C12-1,2,3,7,8,9-HxCDF	NS
Homologue Group Totals	**pg**
Total-TCDD	<6.9
Total-PeCDD	<4.2
Total-HxCDD	<6.9
Total-HpCDD	<8.2
Total-TCDF	<4.0
Total-PeCDF	<3.3
Total-HxCDF	<4.4
Total-HpCDF	<4.6
Toxic Equivalency - (WHO 2005)	
Lower Bound PCDD/F TEQ (WHO 2005)	0.00
Mid Point PCDD/F TEQ (WHO 2005)	8.11
Upper Bound PCDD/F TEQ (WHO 2005)	16.2

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2347910		MIssissauga, ON L5J 2Y4
Date of Report	4-Oct-19		(905)822-4120
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **Chlorinated Pesticides by EPA 1699 (modified)**

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

Results in this certificate relate only to the samples as submitted to the laboratory.

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Sample Analysis summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L2349710-1
Sample Size	1
Sample size units	Sample
Percent Moisture	n/a
Sample Matrix	Media Prep
Sampling Date	n/a
Extraction Date	27-Sep-19
Target Analytes	**ng**
Hexachlorobutadiene	<0.059
1,2,4,5-Tetrachlorobenzene	<0.019
1,2,3,4-Tetrachlorobenzene	<0.021
Pentachlorobenzene	0.0732
Hexachlorobenzene	<0.017
3,4,5,6-Tetrachloroveratrole	<0.16
Pentachloroanisole	<0.23
alpha-BHC	<1.2
beta-BHC	<1.8
gamma-BHC	<1.5
delta-BHC	<1.6
Pentachloronitrobenzene	<0.47
Heptachlor	<0.14
Aldrin	<0.19
4,4'-DDNU	<0.28
Dacthal	<0.24
Chlorpyrifos	<1.4
Isodrin	<0.19
Octachlorostyrene	<0.26
Heptachlor Epoxide B	<0.20
Heptachlor Epoxide A	<1.3
Oxychlordane	<0.27
4,4'-DDMU	<5.6
trans-Chlordane	<1.0
cis-Chlordane	<1.9
trans-Nonachlor	<0.96
Dieldrin	<0.45
Endrin	<0.55
cis-Nonachlor	<0.75
Endosulfan I	<0.83
Endosulfan II	<1.4
Endosulfan Sulfate	<0.30
2,4'-DDE	<0.99
4,4'-DDE	<1.3
2,4'-DDD	<1.2
4,4'-DDD	<2.3
2,4'-DDT	<2.7
4,4'-DDT	<4.9
Endrin Aldehyde	<1.4
Endrin Ketone	<4.6
Methoxychlor	<0.47
Dicofol	<33
Mirex	<0.061
Parlar 26	<1.4
Parlar 50	<0.52
Parlar 62	<0.90
Extraction Standards	**% Rec**
Pentachlorobenzene, 13C6-	199
Hexachlorobenzene, 13C6-	233
alpha-BHC, 13C6-	99
beta-BHC, 13C6-	98
gamma-BHC, 13C6-	100
delta-BHC, 13C6-	103
Heptachlor, 13C10-	82
Oxychlordane, 13C10-	92
trans-Nonachlor, 13C10-	100
Dieldrin, 13C12-	103
Endrin, 13C12-	89
Endosulfan II, 13C9-	96
2,4'-DDE, 13C12-	95
4,4'-DDE, 13C12-	93
4,4'-DDD, 13C12-	87
4,4'-DDT, 13C12-	84
Methoxychlor, 13C12-	86
Mirex, 13C10-	109

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank
ALS Sample ID	WG3173580-1
Sample Size	1
Sample size units	sample
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	27-Sep-19

Target Analytes	ng
Hexachlorobutadiene	<0.059
1,2,4,5-Tetrachlorobenzene	<0.018
1,2,3,4-Tetrachlorobenzene	<0.019
Pentachlorobenzene	<0.024
Hexachlorobenzene	0.0930
3,4,5,6-Tetrachloroveratrole	<0.13
Pentachloroanisole	<0.30
alpha-BHC	<1.1
beta-BHC	<1.7
gamma-BHC	<1.4
delta-BHC	<1.6
Pentachloronitrobenzene	<0.44
Heptachlor	<0.13
Aldrin	<0.20
4,4'-DDNU	<0.32
Dacthal	<0.29
Chlorpyrifos	<1.4
Isodrin	<0.20
Octachlorostyrene	<0.18
Heptachlor Epoxide B	<0.18
Heptachlor Epoxide A	<1.3
Oxychlordane	<0.33
4,4'-DDMU	<7.5
trans-Chlordane	<0.95
cis-Chlordane	<0.89
trans-Nonachlor	<0.90
Dieldrin	<0.47
Endrin	<0.60
cis-Nonachlor	<1.3
Endosulfan I	<0.72
Endosulfan II	<1.6
Endosulfan Sulfate	<0.50
2,4'-DDE	<0.65
4,4'-DDE	<1.3
2,4'-DDD	<1.2
4,4'-DDD	<3.0
2,4'-DDT	<3.6
4,4'-DDT	<4.9
Endrin Aldehyde	<1.3
Endrin Ketone	<5.2
Methoxychlor	<0.51
Dicofol	<27
Mirex	<0.079
Parlar 26	<0.97
Parlar 50	<0.45
Parlar 62	<0.78

Extraction Standards	% Rec
Pentachlorobenzene, 13C6-	211
Hexachlorobenzene, 13C6-	235
alpha-BHC, 13C6-	109
beta-BHC, 13C6-	106
gamma-BHC, 13C6-	109
delta-BHC, 13C6-	110
Heptachlor, 13C10-	93
Oxychlordane, 13C10-	101
trans-Nonachlor, 13C10-	108
Dieldrin, 13C12-	109
Endrin, 13C12-	93
Endosulfan II, 13C9-	102
2,4'-DDE, 13C12-	106
4,4'-DDE, 13C12-	101
4,4'-DDD, 13C12-	97
4,4'-DDT, 13C12-	95
Methoxychlor, 13C12-	99
Mirex, 13C10-	116

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2349710		MIssissauga, ON L5J 2Y4
Date of Report	4-Oct-19		(905)822-4120
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PAH by CARB method 429 (LR option)- Isotope dilution**

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG3173580-1		L2349710-10	
Sample Size	1		1	
Sample units	Sample		Sample	
Moisture Content	n/a		n/a	
Matrix	QC		Media Prep	
Sampling Date	n/a		n/a	
Extraction Date	27-Sep-19		27-Sep-19	
Target Analytes	**ng/sample**		**ng/sample**	
Naphthalene	12.4	M,R	23.7	M,R,B
2-Methylnaphthalene	<10	U	<10	U
1-Methylnaphthalene	<10	U	<10	U
Acenaphthylene	<10	U	<10	U
Acenaphthene	<10	U	<10	U
Fluorene	19.4	R	20.0	RB
Phenanthrene	<10	U	<10	U
Anthracene	<10	U	<10	U
Fluoranthene	<10	U	<10	U
Pyrene	<10	U	<10	U
Benzo(a)Anthracene	<10	U	<10	U
Chrysene/Triphenylene	<10	U	<10	U
Benzo(b)Fluoranthene	<10	U	<10	U
Benzo(k)Fluoranthene	<10	U	<10	U
Benzo(e)Pyrene	<10	U	<10	U
Benzo(a)Pyrene	<10	U	<10	U
Perylene	<10	U	<10	U
Indeno(1,2,3-cd)Pyrene	<10	U	<10	U
Dibenzo(a,h/a,c)Anthracene	<10	U	<10	U
Benzo(g,h,i)Perylene	<10	U	<10	U
Additional Analytes				
Tetralin	30.0	M,R	<10	U
Quinoline	<10	U	<10	U
2-Chloronaphthalene	<10	U	<10	U
Biphenyl	<10	U	<10	U
o-Terphenyl	<10	U	<10	U
1-Methylphenanthrene	<10	U	<10	U
9-Methylphenanthrene	<10	U	<10	U
2-methylanthracene	<10	U	<10	U
9,10-dimethylanthracene	<10	U	<10	U
m-terphenyl	<10	U	<10	U
p-terphenyl	<10	U	<10	U
Benzo(a)fluorene	<10	U	<10	U
Benzo(b)fluorene	<10	U	<10	U
Benzo(b)anthracene	<10	U	<10	U
Benzo(j)fluoranthene	<10	U	<10	U
7,12-Dimethylbenzo(a)anthracene	<10	U	<10	U
3-Methylcholanthrene	<50	U	<50	U
Dibenz(a,j)acridine	<50	U	<50	U
7H-Dibenzo(c,g)carbazole	<50	U	<50	U
Picene	<50	U	<50	U
Dibenzo(a,e)pyrene	<50	U	<50	U
dibenzo(a,i)pyrene	<50	U	<50	U
Coronene	<50	U	<50	U
Extraction Standards	**% Rec**		**% Rec**	
Naphthalene D8	68.6	M	62.7	M
2-Methylnaphthalene-D10	81.7	M	83.3	M
Acenaphthylene D8	85.9		83.0	
Phenanthrene D10	76.1		72.0	
Anthracene-D10	79.5		71.8	
Fluoranthene D10	87.3		81.3	
Benz(a)Anthracene-D12	60.4		57.5	M
Chrysene D12	68.0		60.4	
Benzo(b)Fluoranthene-D12	82.2		78.5	
Benzo(k)Fluoranthene-D12	72.1		67.4	
Benzo(a)Pyrene D12	67.7		66.6	
Perylene D12	80.2		79.1	
Indeno(1,2,3,cd)Pyrene-D12	80.1		70.4	
Dibenz(a,h)Anthracene-D14	76.1	M	72.7	M
Benzo(g,h,i)Perylene D12	80.9		81.1	M

U Indicates that this compound was not detected above the LOD.
M Indicates that a peak has been manually integrated.
B Indicates that this compound was detected in the method blank at greater than 10% of the sample value.
R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
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Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 (905)822-4120
ALS WO#:	L2349710		
Date of Report	2-Oct-19		
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PCB Congeners by EPA 1668C**

PCB Congener Group Totals and Total PCB are a sum of detected values, including EMPC values, consistent with USEPA CLP SOW CBC1.2

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Life Sciences

Sample Analysis summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L2349710-10
Sample Size	1
Sample size units	Sample
Percent Moisture	n/a
Sample Matrix	Media Prep
Sampling Date	n/a
Extraction Date	27-Sep-19

Target Analytes	**pg/sample**
PCB-081	<0.50
PCB-077	<6.0
PCB-123	<0.63
PCB-118	<0.57
PCB-114	<0.61
PCB-105	<0.61
PCB-126	<0.62
PCB-167	<0.15
PCB-156/157	<0.20
PCB-169	<0.24
PCB-189	<0.31

Extraction Standards	**% Rec**
13C12-PCB-001	70
13C12-PCB-003	70
13C12-PCB-004	73
13C12-PCB-015	75
13C12-PCB-019	77
13C12-PCB-037	73
13C12-PCB-054	73
13C12-PCB-081	75
13C12-PCB-077	83
13C12-PCB-104	80
13C12-PCB-123	76
13C12-PCB-118	76
13C12-PCB-114	76
13C12-PCB-105	78
13C12-PCB-126	81
13C12-PCB-155	79
13C12-PCB-167	79
13C12-PCB-156/157	83
13C12-PCB-169	91
13C12-PCB-188	78
13C12-PCB-189	84
13C12-PCB-202	81
13C12-PCB-205	77
13C12-PCB-208	74
13C12-PCB-206	76
13C12-PCB-209	73

Toxic Equivalency - (WHO 2005)

Lower Bound PCB TEQ	0.00
Mid Point PCB TEQ	0.0389
Upper Bound PCB TEQ	0.0700

ALS Life sciences

Quality Control Summary Report

Sample Name	Method Blank
ALS Sample ID	WG3173580-1
Sample Size	1
Sample size units	sample
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	27-Sep-19

Target Analytes	pg/sample
PCB-081	<0.58
PCB-077	<0.61
PCB-123	<1.1
PCB-118	<1.1
PCB-114	<1.1
PCB-105	<1.2
PCB-126	<1.2
PCB-167	<0.31
PCB-156/157	<0.44
PCB-169	0.791
PCB-189	<0.64
Extraction Standards	**% Rec**
13C12-PCB-001	61
13C12-PCB-003	61
13C12-PCB-004	63
13C12-PCB-015	60
13C12-PCB-019	67
13C12-PCB-037	59
13C12-PCB-054	64
13C12-PCB-081	60
13C12-PCB-077	63
13C12-PCB-104	69
13C12-PCB-123	63
13C12-PCB-118	62
13C12-PCB-114	62
13C12-PCB-105	61
13C12-PCB-126	60
13C12-PCB-155	67
13C12-PCB-167	65
13C12-PCB-156/157	66
13C12-PCB-169	67
13C12-PCB-188	69
13C12-PCB-189	61
13C12-PCB-202	69
13C12-PCB-205	64
13C12-PCB-208	66
13C12-PCB-206	64
13C12-PCB-209	60

Toxic Equivalency - (WHO 2005)

Lower Bound PCB TEQ	0.0237
Mid Point PCB TEQ	0.0839
Upper Bound PCB TEQ	0.144

ALS Environmental
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Certificate of Analysis

ALS Project Contact:	ORT100	**Client Name:**	ORTECH Environmental
ALS Project ID:	Lynne Wrona	**Client Address:**	804 Southdown Road
ALS WO#:	L2349710		MIssissauga, ON L5J 2Y4
Date of Report	4-Oct-19		(905)822-4120
Date of Sample Receipt	18-Sep-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **VOCs via SW846 Method 5041A/8260C**

Ketone data by VOST analyses are estimated values only

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		VOST PROOF 1/2		VOST PROOF 2/2	
ALS Sample ID	WG3177614-1		L2349710-53		L2349710-54	
Sample units	sample		sample		sample	
Matrix	QC		Media Prep		Media Prep	
Sampling Date	n/a		n/a		n/a	
Extraction Date	1-Oct-19		1-Oct-19		1-Oct-19	
Target Analytes	**ug/sample**		**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	<0.02	U	<0.02	U	<0.02	U
Vinyl Chloride	<0.02	U	<0.02	U	<0.02	U
Bromomethane	<0.09	U	<0.09	U	<0.09	U
Trichlorofluoromethane	<0.02	U	<0.02	U	<0.02	U
1,1-Dichloroethene	<0.01	U	<0.01	U	<0.01	U
Acetone	<0.1	U	<0.1	U	<0.1	U
Methylene Chloride	<0.1	U	<0.1	U	<0.1	U
trans,1,2-Dichloroethene	<0.01	U	<0.01	U	<0.01	U
1,1-Dichloroethane	<0.01	U	<0.01	U	<0.01	U
2-Butanone	<0.01	U	<0.01	U	<0.01	U
Chloroform	<0.01	U	<0.01	U	<0.01	U
1,1,1-Trichloroethane	<0.01	U	<0.01	U	<0.01	U
Carbon Tetrachloride	<0.01	U	<0.01	U	<0.01	U
Benzene	<0.05	U	<0.05	U	<0.05	U
Trichloroethene	<0.01	U	<0.01	U	<0.01	U
1,2-Dichloropropane	<0.01	U	<0.01	U	<0.01	U
Bromodichloromethane	<0.01	U	<0.01	U	<0.01	U
Toluene	<0.05	U	<0.05	U	<0.05	U
Tetrachloroethene	<0.01	U	<0.01	U	<0.01	U
Chlorodibromomethane	<0.01	U	<0.01	U	<0.01	U
Ethylene Dibromide	<0.02	U	<0.02	U	<0.02	U
Ethylbenzene	<0.01	U	<0.01	U	<0.01	U
M&P-Xylene	<0.03	U	<0.03	U	<0.03	U
O-Xylene	<0.01	U	<0.01	U	<0.01	U
Styrene	<0.02	U	<0.02	U	<0.02	U
Bromoform	<0.01	U	<0.01	U	<0.01	U
Isopropylbenzene	<0.02	U	<0.02	U	<0.02	U
1,3,5-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U
1,2,4-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U
Ethyl Acetate	<0.02	U	<0.02	U	<0.02	U
Trichlorotrifluoroethane	<0.02	U	<0.02	U	<0.02	U
Field Standard	**% Rec**		**% Rec**		**% Rec**	
d10-Ethylbenzene(SPK)	69.2		78.7		97.8	
Surrogate Standards	**% Rec**		**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	96.4		73		74.9	
d8-Toluene(SURR)	109.6		64.2		64.1	
4-Bromofluorobenzene(SURR)	130.9	M	76.7		77.1	
Internal Standards	**% Rec**		**% Rec**		**% Rec**	
Bromochloromethane	80.9		108.3		114.9	
1,4-Difluorobenzene	125.9	M	106.4		113.4	
d5-Chlorobenzene	128.6	M	128.6		138.5	

U Indicates that this compound was not detected above the RL.
M Indicates that a peak has been manually integrated.

APPENDIX 4

Metals Train Field Data Sheets
(15 pages)

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	1 – PAM
Test Date	Oct 8, 2019
Test Location	Incinerator Exhaust Stack
Operator Signature	DH

Project No.:	21939
Page	1 of 5
Probe No.:	6
Meter Box No.:	Team 1
Impinger Box No.:	8

Pitot Factor	.850	
DGMCF	1.018	
Barometric Pressure	29.63	"Hg
Static Pressure	0.80	"H2O
Nozzle Size	.2535	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Particulate Gain

Filter	63.4	mg
Probe	7.4	mg

Moisture Gain

CWTR	3513.8	g
WCBDA	32.9	g

Combustion Gas Concentration

Oxygen	9.26	%
Carbon Dioxide	8.59	%
Carbon Monoxide	73.2	ppm

Measuring Device	MII Numbers
Probe / Pitot	6/S 7A
Trendicator	Team 1
Control Box	Team 1
Incline Manometer	Team 1
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	B3906

Nozzle Measurements

1 .2535
2 .2545
3 .2525
4 .2535
Average: .2535

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / ~~Teflon~~ / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: Oct 8/2019	Plant: Clean Harbors	Test No.: 1	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
1	0	773.95	1.6	.67	350	246	243	50	51	57	54	1.6	3
	3	775.93	1.5	.66	352	248	249	44	219	64	60	1.6	3
	6	777.92	1.7	.70	353	250	253	45	229	64	60	1.7	3
	9	779.88	1.6	.68	354	251	248	45	229	65	60	1.7	3.5
2	12	781.90	1.5	.66	353	251	248	45	230	67	60	1.7	3.5
	15	783.91	1.5	.66	354	253	246	46	222	68	62	1.7	3.5
	18	785.91	1.5.	.66	354	251	250	46	225	69	62	1.65	3.5
	21	787.90	1.4	.64	352	252	250	46	220	69	63	1.6	3.5
3	24	789.89	1.5	.66	355	251	250	47	213	70	63	1.6	3.5
	27	791.81	1.5	.66	355	251	242	47	207	70	64	1.7	3.5
	30	793.82	1.5	.66	354	253	242	47	202	72	64	1.7	3.5
	33	795.85	1.7	.71	354	253	250	47	211	71	64	1.8	4
4	36	797.93	1.8	.73	355	252	253	47	212	73	65	2.1	4
	39	800.12	2	.77	354	251	246	45	69	73	66	2.1	4
	42	802.44	2	.77	353	254	248	45	69	74	66	2.1	4
	45	804.69	1.9	.75	354	254	256	45	71	74	67	2.1	4
5	48	806.95	2	.77	353	252	245	45	67	74	67	2.15	4.5
	51	809.28	1.9	.76	351	253	243	46	69	75	68	2.1	4.5
	54	811.56	2.2	.81	350	252	244	47	71	75	68	2.35	5
	57	813.96	2	.78	351	253	58	49	73	75	69	2.2	5
6	60	816.31	1.8	.74	351	255	37	50	72	76	68	2.1	5

Traverse: 1			
Start Time: 9:52	Initial Leak Check: .005	cfm@ 14	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 8/2019	Plant: Clean Harbors	Test No.: 1	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time	Dry Gas Meter ft^3	Pitot ΔP "H_2O	Desired cfm	Stack Temp °F	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F	Meter Temp Inlet °F	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
	*	*	*		*			*		*	*	*	*
	63	818.58	1.9	.76	349	252	253	51	39	76	69	2.1	4.5
	66	820.86	2	.78	349	255	251	46	33	76	70	2.2	4.5
	69	823.18	2.1	.80	350	253	250	44	32	77	70	2.25	5
7	72	825.56	2	.78	350	254	251	44	40	78	71	2.2	5
	75	827.93	2	.78	355	257	244	45	34	79	73	2.2	5
	78	830.29	2	.78	349	255	237	45	63	79	72	2.2	5
	81	832.66	1.9	.76	348	257	243	45	63	79	72	2.1	5
8	84	834.97	2	.78	347	254	245	45	43	79	72	2.2	5
	87	837.33	2	.78	349	256	245	47	63	80	73	2.2	5
	90	839.69	1.9	.76	348	256	244	48	62	79	73	2.1	5
	93	842.02	2	.78	347	255	255	48	66	78	73	2.2	5
9	96	844.34	2	.78	350	256	258	48	32	79	73	2.2	5
	99	846.70	1.9	.76	349	256	243	46	32	79	74	2.1	5
	102	848.98	1.9	.76	350	259	260	45	215	79	74	2.1	5
	105	851.33	1.9	.76	350	255	235	45	246	90	74	2.1	5
10	108	853.65	1.9	.76	353	257	234	46	259	80	74	2.1	5
	111	855.95	~~1.9~~ 2	.78	59	60	68	48	266	81	76	2.2	5
	114	858.29	2	.78	56	57	63	46	264	79	74	2.2	5
	117	860.65	1.9	.76	55	57	60	47	262	80	75	2.1	5
	120	862.95											

Traverse: 1			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 11:52	Final Leak Check: .006	cfm@ 16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 8/2019	Plant:	Clean Harbors	Test No.: 1		Page 4 of 5
	Plant Location:	Corunna, Ontario	Test Location:	Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	864.30	1.6	.70	352	247	249	55	59	78	77	1.8	4
	3	866.50	1.6	.70	350	254	255	44	211	79	77	1.8	4
	6	868.69	1.6	.70	355	254	255	43	213	80	78	1.8	4
	9	870.82	1.5	.68	354	251	253	42	239	79	77	1.7	4
2	12	872.93	1.6	.70	355	256	253	42	250	79	78	1.8	4
	15	875.05	1.5	.68	355	253	249	43	250	79	78	1.7	4
	18	877.12	1.5	.68	348	255	248	43	250	79	78	1.7	4
	21	879.20	1.6	.70	340	253	248	44	249	79	78	1.8	4
3	24	881.30	1.65	.72	338	256	249	45	251	80	79	1.9	4
	27	883.54	1.6	.71	337	255	248	45	215	80	78	1.8	4
	30	885.69	1.6	.71	343	257	252	44	213	82	79	1.8	4
	33	887.83	1.6	.71	341	253	253	42	211	80	78	1.8	4
4	36	889.98	1.5	.69	346	255	251	41	221	80	78	1.7	4
	39	892.09	1.6	.71	353	254	250	42	238	82	79	1.8	4
	42	894.20	1.55	.69	349	254	250	42	212	82	78	1.75	4
	45	896.32	1.45	.67	351	256	250	41	212	82	78	1.6	4
5	48	898.42	1.6	.71	354	254	249	41	212	83	79	1.8	4
	51	900.55	1.65	.72	355	255	251	41	222	83	78	1.85	4
	54	902.72	1.8	.75	356	254	253	41	240	83	79	2	4
	57	904.99	1.7	.73	357	253	246	40	243	83	79	1.9	4.5
6	60	907.24	2	.79	55	55	46	41	247	83	78	2.2	5

Traverse: 2		Traverse:	
Start Time: 13:38	Initial Leak Check: 0.010 cfm@ 16 "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time:	Final Leak Check: cfm@ "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 8/2019	Plant: Clean Harbors	Test No.: 1	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time	Dry Gas Meter ft^3	Pitot ΔP "H_2O	Desired cfm	Stack Temp °F	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F	Meter Temp Inlet °F	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
	*	*	*		*			*		*	*	*	*
	63	909.74	2	.79	360	254	254	42	245	84	79	2.15	5
	66	911.95	2	.79	363	257	253	42	245	83	79	2.2	5
	69	914.33	2.15	.81	368	258	254	43	245	84	79	2.35	5
7	72	916.78	2	.78	371	256	253	42	245	85	80	2.2	5
	75	919.17	2	.78	372	258	253	42	244	84	79	2.2	5
	78	921.47	2	.78	374	256	253	43	241	84	79	2.2	5
	81	923.89	2	.78	372	257	243	44	239	84	80	2.2	5
8	84	926.28	2.1	.80	372	255	248	45	249	84	80	2.3	5
	87	928.67	2	.78	374	255	245	45	251	84	80	2.2	5
	90	931.15	2.1	.80	375	256	249	46	253	83	80	2.3	5
	93	933.56	2.1	.80	376	258	249	46	256	83	80	2.3	5
9	96	936.01	2	.78	372	257	255	45	250	83	80	2.2	5
	99	938.40	2.1	.80	371	255	259	43	253	83	80	2.3	5
	102	940.81	2.1	.80	368	258	257	42	212	82	79	2.3	5
	105	943.27	2	.78	368	259	252	43	239	82	80	2.2	5
10	108	945.69	2.1	.80	369	257	252	43	252	82	80	2.3	5
	111	948.14	2.1	.80	366	258	255	42	253	82	80	2.3	5
	114	950.57	2.05	.79	369	256	249	42	252	82	80	2.25	5.5
	117	953.02	2	.78	370	259	260	44	254	84	81	2.2	5
	120	955.42											

Traverse: 2			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 15:38	Final Leak Check: .008	cfm@ 15	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

ORTECH Environmental

Plant	Clean Harbors	
Plant Location	Corunna, Ontario	
Test No.:	2 PHM	
Test Date	Oct 9/2019	
Test Location	Incinerator Exhaust Stack	
Operator Signature	DH	

Project No.:	21939	
Page	1 of 5	
Probe No.:	6	
Meter Box No.:	Team 1	
Impinger Box No.:	8	

Pitot Factor	.950	
DGMCF	1.018	
Barometric Pressure	29.63	"Hg
Static Pressure	0.86	"H2O
Nozzle Size	.2535	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Particulate Gain

Filter	61.4	mg
Probe	8.6	mg

Moisture Gain

CWTR	3550.6	g
WCBDA	32.8	g

Combustion Gas Concentration

Oxygen	9.77	%
Carbon Dioxide	8.26	%
Carbon Monoxide	82.3	ppm

Measuring Device	MII Numbers
Probe / Pitot	6/57A
Trendicator	Team 1
Control Box	"
Incline Manometer	"
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	

Reading Interval	3	
Number of Ports	2	
Number of Points/Port	10	

Nozzle Measurements	
1	.2535
2	.2545
3	.2525
4	.2535
Average:	.2535

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: Oct 9/2019	Plant: Clean Harbors	Test No.: 2	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	56.44	1.7	.69	350	245	247	53	60	54	52	1.7	3
	3	58.55	1.7	.69	351	247	246	47	208	58	54	1.7	3
	6	60.62	1.7	.69	351	252	247	45	235	60	55	1.7	3
	9	62.69	1.7	.70	347	249	247	44	236	60	56	1.7	3
2	12	64.78	1.8	.72	347	249	247	44	240	60	56	1.9	3
	15	66.92	1.7	.70	347	250	246	44	238	62	57	1.8	3
	18	69.04	1.8	.72	345	253	246	45	237	63	57	1.9	3
	21	71.19	1.8	.72	345	251	246	45	238	63	57	1.95	3.5
3	24	73.40	1.85	.73	349	253	246	45	237	64	58	2	3.5
	27	75.62	2.0	.76	348	252	245	46	238	66	59	2.1	3.5
	30	77.87	2	.76	348	251	245	46	239	66	59	2.15	3.5
	33	80.19	2	.76	350	252	246	46	239	67	60	2.15	3.5
4	36	82.52	2	.76	350	254	246	47	246	68	60	2.15	4
	39	84.82	2.1	.78	349	253	247	48	240	69	61	2.25	4
	42	87.19	2.1	.79	348	252	246	49	207	70	61	2.25	4
	45	89.56	2	.77	350	254	247	45	212	70	62	2.15	4
5	48	91.90	2.05	.78	353	255	249	45	213	71	62	2.2	4
	51	94.24	2.1	.79	353	256	249	46	214	73	64	2.25	4
	54	96.62	2.1	.79	350	254	246	44	211	72	63	2.25	4
	57	99.02	2.15	.80	350	254	248	44	212	73	64	2.3	4
6	60	101.43	2	.77	353	254	246	44	244	73	65	2.15	4

Traverse: 1			
Start Time: 9:04	Initial Leak Check: .006	cfm@ 15	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 9/2019	Plant: Clean Harbors	Test No.: 2	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot Δ P "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure Δ H "H_2O	* Pump Vacuum "Hg Gauge
	63	103.82	2.1	.79	355	255	248	43	232	74	66	2.25	4
	66	106.20	2	.77	350	255	246	42	239	73	65	2.15	4
	69	108.56	2.1	.79	354	255	246	42	242	74	66	2.25	4
7	72	110.45	1.95	.76	349	255	247	43	244	74	67	2.1	4
	75	113.27	1.75	.72	350	254	247	43	246	74	67	1.9	4
	78	115.52	1.85	.74	350	256	249	44	246	74	67	2	4
	81	117.78	1.85	.74	353	255	249	46	246	75	68	2	4
8	84	120.04	1.9	.75	350	256	246	45	246	75	68	2.05	4
	87	122.32	1.95	.77	349	257	247	46	246	75	69	2.1	4
	90	124.63	1.95	.77	348	256	246	47	247	76	69	2.1	4
	93	126.94	2.05	.79	349	256	249	50	250	77	70	2.25	4
9	96	129.30	2	.78	349	257	250	53	251	77	70	2.2	4
	99	131.69	2	.78	348	255	249	55	251	77	70	2.2	4
	102	134.08	1.9	.76	349	255	250	58	250	77	71	2.1	4
	105	136.43	1.8	.76	347	255	248	49	246	78	72	2.1	4
10	108	138.78	2	.78	348	255	249	49	246	80	73	2.25	4
	111	141.14	2.05	.79	347	259	250	48	250	79	72	2.3	4.5
	114	143.57	2.0	.78	348	256	247	47	251	79	72	2.25	4.5
	117	145.99	2.0	.78	348	258	248	46	252	79	73	2.2	4.5
	120	148.45											

Traverse:	1			
Start Time:		Initial Leak Check:	cfm@	"Hg
Finish Time:	11:04	Final Leak Check: 0.004	cfm@ 14	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator :

Field Data Sheet

Date: Oct 9/2019	Plant: Clean Harbors	Test No.: 2	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	149.04	1.5	.68	336	249	246	68	115	77	75	1.7	3.5
	3	151.16	1.5	.68	335	250	251	44	211	77	75	1.7	3.5
	6	153.28	1.6	.71	335	253	253	43	211	76	75	1.8	3.5
	9	155.43	1.65	.72	335	252	251	43	239	76	75	1.85	4
2	12	157.64	1.55	.69	335	253	251	44	244	76	75	1.75	4
	15	159.81	1.5	.68	334	253	251	45	198	76	75	1.7	4
	18	161.92	1.5	.68	334	252	250	43	224	77	75	1.7	4
	21	164.02	1.6	.71	335	254	251	43	211	77	75	1.8	4
3	24	166.11	1.6	.71	339	254	250	44	210	78	75	1.8	4
	27	168.28	1.7	.73	339	253	251	43	208	78	76	1.9	4
	30	170.48	1.7	.73	341	254	250	40	211	79	76	1.9	4
	33	172.70	1.65	0.71	347	254	252	44	212	80	76	1.85	4
4	36	174.91	1.8	.75	343	253	250	44	237	79	76	2	4
	39	177.18	1.7	.73	345	252	250	43	239	80	76	1.9	4
	42	179.42	1.7	.73	350	258	249	45	243	82	77	1.9	4
	45	181.67	1.7	.73	347	255	251	44	242	80	77	1.9	4
5	48	183.91	1.8	.75	347	255	252	44	241	80	77	2	4
	51	186.19	1.9	.77	349	255	245	43	237	80	77	2.15	4
	54	188.54	1.8	.75	347	255	249	43	238	80	77	2	4
	57	190.84	1.9	.77	347	255	254	44	244	80	77	2.1	4
6	60	193.18	2	.79	348	255	251	44	243	86	77	2.2	4.5

Traverse: 2				
Start Time: 12:03	Initial Leak Check:	0.004	cfm@ 14	"Hg
Finish Time:	Final Leak Check:		cfm@	"Hg

Traverse:				
Start Time:	Initial Leak Check:		cfm @	"Hg
Finish Time:	Final Leak Check:		cfm @	"Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 9/2019	Plant: Clean Harbors	Test No.: 2	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	195.58	1.9	.77	348	256	249	43	244	81	77	2.1	4.5
	66	197.97	1.9	.77	347	253	247	44	244	81	77	2.1	4.5
	69	200.35	2.05	.80	346	255	247	46	244	81	77	~~2.2~~ 2.3	5
7	72	202.79	2.1	.81	348	254	249	46	246	81	77	2.35	5
	75	205.28	2.05	.80	345	256	249	46	247	81	78	2.3	5
	78	207.74	2.2	.83	342	256	249	47	249	81	78	2.45	5
	81	210.30	2.1	.81	343	256	252	47	211	81	78	2.35	5
8	84	212.80	2.1	.81	343	257	253	47	244	82	78	2.35	5
	87	215.31	2.1	.81	341	256	252	46	251	81	78	2.35	5
	90	217.81	2.15	.82	340	256	249	43	248	80	78	2.4	5
	93	220.33	2.05	.80	341	256	249	43	249	80	78	2.3	5
9	96	222.82	2	.79	341	256	250	42	250	80	78	2.2	5
	99	225.24	1.9	.77	343	255	252	42	248	80	78	2.1	5
	102	227.61	1.95	.78	346	257	247	43	245	80	78	2.15	5
	105	229.98	2	.79	346	254	249	42	248	80	78	2.15	5
10	108	232.37	2.1	.81	349	257	253	44	248	80	78	2.25	5
	111	234.77	2	.79	351	257	252	44	249	80	78	2.15	5
	114	237.18	1.9	.77	352	256	252	45	147	80	78	2.1	5
	117	239.54	1.9	~~.77~~	352	258	250	43	211	80	78	2.1	5
	120	241.89											

Traverse: 2				
Start Time:	Initial Leak Check: ~~.005~~	cfm@	~~16~~	"Hg
Finish Time: 14:03	Final Leak Check: .005	cfm@	16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 PaM
Test Date	Oct 10 / 2019
Test Location	Incinerator Exhaust Stack
Operator Signature	DH

Project No.:	21939	
Page	1 of 5	
Probe No.:	6	
Meter Box No.:	Team 1	
Impinger Box No.:	8	

Pitot Factor	.850	
DGMCF	1.018	
Barometric Pressure	29.59 ~~29.4~~	"Hg
Static Pressure	.75	"H2O
Nozzle Size	.2535	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Particulate Gain

Filter	63.0	mg
Probe	8.1	mg

Moisture Gain

CWTR	3595.8	g
WCBDA	35.7	g

Combustion Gas Concentration

Oxygen	9.90	%
Carbon Dioxide	8.10	%
Carbon Monoxide	86.6	ppm

Measuring Device	MII Numbers
Probe / Pitot	6 / 57A
Trendicator	Team 1
Control Box	"
Incline Manometer	"
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	

Nozzle Measurements	
1	~~.255~~ .2535
2	.2545
3	.2535
4	.2525
Average:	.2535

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: Oct. 10/19	Plant: Clean Harbors	Test No.: 3	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	145.57	1.8	.71	355	245	242	50	61	58	53	1.8	3
	3	147.72	1.9	.73	352	248	244	40	204	59	55	1.9	3
	6	149.96	1.9	.73	355	252	252	41	213	60	56	1.95	3
	9	152.08	1.95	.74	350	250	254	41	211	59	55	2	3
2	12	154.32	1.95	.75	351	249	256	39	211	59	55	2	3
	15	156.55	1.95	.74	352	244	250	40	223	59	55	2.05	3
	18	158.78	1.8	.72	352	251	246	39	225	61	56	1.85	3
	21	160.86	1.8	.72	349	250	244	40	225	61	57	1.85	3
3	24	163.10	1.9	.74	351	251	244	40	223	63	56	2	3
	27	165.30	1.9	.74	357	254	247	43	226	63	58	2	3
	30	167.48	1.95	.75	355	253	247	43	227	64	58	2.05	3
	33	169.74	2	.76	345	251	247	43	227	63	57	2.1	3
4	36	172.03	2	.76	345	252	247	43	229	65	57	2.1	3
	39	174.31	2.2	.80	345	251	240	45	229	65	58	2.3	3
	42	176.73	1.9	.74	351	253	248	48	229	64	58	2.05	3
	45	179.02	1.9	.74	353	252	248	49	230	64	59	2	3.5
5	48	181.29	1.95	.75	351	253	247	51	229	66	59	2.05	3.5
	51	183.53	2	.76	~~352~~ 353	252	247	52	230	67	59	2.1	3.5
	54	185.83	2	.76	351	51	46	54	229	67	59	2.1	3.5
	57	188.16	2.35	.83	351	250	246	58	231	67	60	2.45	3.5
6	60	190.61	2.35	.83	51	52	48	61	70	68	61	2.5	4

Traverse: 1			
Start Time: 9:03	Initial Leak Check: .006	cfm@ 16	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 10/19	Plant: Clean Harbors	Test No.: 3	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
	63	193.18	2.5	.86	351	254	250	56	77	69	61	2.6	4
	66	195.72	2.5	.86	353	253	250	53	210	70	62	2.6	4
	69	198.33	2.55	.87	354	255	251	51	230	70	62	2.65	4
7	72	200.95	2.4	.84	353	253	250	49	190	69	62	2.5	4
	75	203.49	2.5	.86	353	255	249	44	212	70	62	2.6	4
	78	206.08	2.4	.84	356	255	249	42	212	72	64	2.5	4
	81	208.64	2.4	.84	353	256	250	43	210	72	64	2.5	4
8	84	211.18	2.55	.87	355	256	247	43	236	72	65	2.65	4
	87	213.78	2.15	.80	357	256	249	44	239	73	65	2.3	4
	90	216.27	2.1	.79	356	257	249	45	242	74	65	2.2	4
	93	218.67	1.85	.74	357	256	248	47	242	74	66	2	4
9	96	220.94	2	.77	356	257	249	48	242	75	66	2.15	4
	99	223.29	2.15	.80	352	256	248	44	238	74	67	2.30	4
	102	~~22~~ 225.73	2.15	.80	350	256	248	44	241	75	67	2.3	4
	105	228.15	2	.78	349	257	251	44	243	74	67	2.15	4
10	108	230.50	1.9	.76	348	254	251	44	210	74	68	2.05	4
	111	232.81	2	.78	347	256	250	43	211	75	68	2.15	4
	114	235.16	2.1	.80	349	255	251	43	238	75	68	2.25	4
	117	237.55	2.05	.79	347	256	250	42	241	75	69	2.2	4
	120	239.95											

Traverse: 1			
Start Time: 1	Initial Leak Check:	cfm@	"Hg
Finish Time: 11:03	Final Leak Check: .004	cfm@ 15	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : OH

Field Data Sheet

Date: Oct 10/19	Plant: Clean Harbors	Test No.: 3	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	240.61	1.5	.68	346	246	244	~~46~~ 63	71	74	73	1.65	3.5
	3	242.74	1.5	.68	346	250	251	46	213	74	73	1.65	3.5
	6	244.81	1.6	.70	349	251	252	45	215	74	73	1.75	3.5
	9	246.89	1.5	.67	349	253	254	46	211	75	73	1.65	3.5
2	12	248.93	1.5	.68	349	254	252	46	211	76	73	1.65	3.5
	15	250.95	1.5	.68	350	253	251	48	234	77	74	1.65	3.5
	18	252.97	1.5	.68	351	253	249	47	234	76	74	1.65	3.5
	21	255.00	1.6	.70	350	254	250	48	237	78	74	1.75	3.5
3	24	257.07	1.6	.70	357	257	252	50	233	79	75	1.75	3.5
	27	259.21	1.75	.73	354	254	250	46	212	78	75	1.9	3.5
	30	261.39	1.6	.70	353	254	249	45	211	78	74	1.75	3.5
	33	263.55	1.6	.70	352	254	250	45	211	78	75	1.75	3.5
4	36	265.69	1.7	.72	356	254	251	44	212	78	75	1.85	3.5
	39	267.86	1.7	.72	354	251	251	45	212	78	74	1.85	3.5
	42	270.05	1.7	.72	353	253	251	44	211	78	74	1.85	3.5
	45	272.22	1.8	.74	354	253	251	44	211	78	74	2	3.5
5	48	274.45	1.75	.73	353	255	252	45	231	79	74	1.9	3.5
	51	276.68	1.9	.76	353	258	255	46	235	80	75	2.1	4
	54	278.99	1.9	.76	352	255	253	46	235	79	75	2.1	4
	57	281.32	1.85	.75	354	252	251	46	235	79	75	2.05	4
6	60	283.64	1.85	.75	350	253	251	46	236	79	75	2.05	4

Traverse: 2		Traverse:	
Start Time: 12:07	Initial Leak Check: 0.004 cfm@ 15 "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time:	Final Leak Check: cfm@ "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21939

Operator : DH

Field Data Sheet

Date: Oct 10/19	Plant: Clean Harbors	Test No.: 3	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
	63	285.94	2.05	.79	351	255	251	48	235	80	76	2.25	4
	66	288.35	2.2	.82	351	254	250	46	209	80	76	2.4	4
	69	290.87	2.1	.80	350	254	249	44	235	80	76	2.3	4
7	72	293.33	2.1	.80	349	254	248	44	237	80	76	2.3	4
	75	295.81	2.3	.84	348	253	250	45	239	80	76	2.5	4.5
	78	298.37	2.2	.82	347	256	250	44	239	80	76	2.4	4.5
	81	300.90	2.15	.81	353	258	253	47	242	81	77	2.35	4.5
8	84	303.37	2.15	.81	354	256	252	49	242	81	77	2.35	4.5
	87	305.82	2.2	.82	350	257	251	46	242	80	76	2.4	4.5
	90	308.32	1.9	.77	352	256	252	42	241	80	76	2.1	4.5
	93	310.69	1.8	.74	350	255	252	43	241	80	77	2	4.5
9	96	312.99	2.2	.82	~~345~~ 353	255	252	43	243	81	77	2.4	4.5
	99	315.45	2.3	.84	352	255	251	44	240	81	77	2.5	4.5
	102	318.0	2.35	.85	351	256	254	44	240	81	77	2.55	5
	105	320.67	2.15	.82	350	258	251	45	240	81	77	2.35	5
10	108	323.11	1.8	.75	350	255	252	45	242	81	77	2	5
	111	325.44	1.9	.77	348	256	252	44	238	81	77	2.1	5
	114	327.78	1.8	.75	349	257	251	44	237	81	77	2	4.5
	117	330.06	1.9	.77	349	257	250	44	238	81	78	2.1	4.5
	120	332.36											

Traverse: 2			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 14:07	Final Leak Check: 0.007	cfm@ 17	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939
Operator : DH

APPENDIX 5

Semi-Volatile Organics Train
Field Data sheets
(15 pages)

ORTECH Environmental

Plant	Clean Harbors	
Plant Location	Corunna, Ontario	
Test No.:	1 - SVOC	
Test Date	OCTOBER 8, 2019	
Test Location	Incinerator Exhaust Stack	
Operator Signature	D. O. [illegible]	

Project No.:	21939	
Page	1 of 5	
Probe No.:	6	
Meter Box No.:	T4	
Impinger Box No.:	8	

Pitot Factor	0.849	
DGMCF	1.006	
Barometric Pressure	29.63	"Hg
Static Pressure	0.80	"H2O
Nozzle Size	.2545	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None / Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3478.5	g
WCBDA	27.9	g

Combustion Gas Concentration

Oxygen	9.26	%
Carbon Dioxide	8.59	%
Carbon Monoxide	73.2	ppm

Site Diagram

Measuring Device	MII Numbers
Probe / Pitot	5P4
Trendicator	C0520090
Control Box	C0520090
Incline Manometer	C0520090
Comb.Gas.Analyzer	MSML
Micromanometer	—
Barometer	Env.Can
Calipers	B03906

Nozzle Measurements	
1	.2555
2	.2535
3	.2535
4	.2555
Average:	.2545

Notes:

Field Data Sheet

Date: OCT 8/19	Plant: Clean Harbors	Test No.: 1 SVOC	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	24.45	.21	.79	347	244	238	60	53	55	57	2.1	6
	3	26.74	2.0	.77	349	247	252	52	36	60	59	2.1	7.5
	6	29.01	2.1	.79	351	248	252	52	38	61	59	2.1	7.5
	9	31.29	2.0	.77	350	247	240	51	39	63	59	2.1	8
2	12	33.64	2.1	.80	350	248	252	50	40	65	60	2.2	8
	15	36.07	2.1	.80	351	248	243	50	43	66	60	2.2	8
	18	38.49	2.1	.80	351	248	249	49	44	68	62	2.2	8
	21	40.89	2.1	.80	350	248	246	49	45	69	62	2.2	8
3	24	43.29	2.1	.80	352	249	244	50	44	70	64	2.2	8
	27	45.73	2.15	.81	352	249	248	49	43	71	63	2.2	8
	30	48.21	2.15	.81	350	248	245	49	44	72	64	2.2	8
	33	50.67	2.15	.82	350	249	248	51	46	72	65	2.2	8
4	36	53.16	2.1	.81	351	247	245	50	45	73	65	2.2	8
	39	55.63	2.1	.81	350	248	248	50	46	73	65	2.2	8
	42	58.13	2.1	.81	350	248	248	50	46	73	65	2.2	8
	45	60.58	2.1	.81	350	248	254	51	47	74	66	2.2	8
5	48	63.08	2.0	.79	349	247	244	51	49	75	66	2.2	8
	51	65.57	1.95	.78	347	247	248	51	44	75	67	2.1	8
	54	67.93	2.0	.79	347	248	248	52	43	76	67	2.1	8
	57	70.31	1.95	.78	349	247	248	52	43	76	68	2.1	8
6	60	72.66	1.95	.78	349	247	248	52	43	76	68	2.1	8

RW

Traverse: 1			
Start Time: 952	Initial Leak Check: .003	cfm@ 12	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

ready to test @ 9:15 C.H has to replace nozzle
9³⁰ OK TO START

Project No.: 21939

Operator : RL

Field Data Sheet

Date: Oct 8/19	Plant: Clean Harbors	Test No.: 1 - SVOC	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	75.01	1.8	.75	347	247	241	51	44	77	69	1.9	8
	66	77.31	1.7	.73	348	248	255	51	42	78	69	1.9	8
	69	79.57	1.9	.78	348	248	252	51	42	78	69	1.9	8
7	72	81.84	1.7	.73	347	248	245	51	43	78	70	1.9	8
	75	84.10	1.6	.71	347	248	257	52	42	78	70	1.8	8
	78	86.33	1.65	.73	348	247	247	52	40	79	71	1.8	8
	81	88.54	1.6	.71	347	246	245	52	41	80	71	1.8	8
8	84	90.74	1.6	.72	345	246	245	53	42	80	71	1.8	8
	87	92.97	1.6	.72	349	248	253	54	44	80	71	1.8	8
	90	95.14	1.55	.70	347	248	246	54	54	80	72	1.8	8
	93	97.35	1.55	.70	347	248	246	54	54	80	72	1.8	8
9	96	99.54	1.6	.72	349	248	250	55	44	81	73	1.8	8
	99	101.74	1.65	.73	348	246	239	54	43	81	72	1.8	8
	102	103.95	1.55	.70	348	248	262	44	42	81	72	1.8	8
	105	106.12	1.6	.72	350	247	247	55	42	81	73	1.8	8
10	108	108.31	1.45	.68	351	246	240	55	42	82	72	1.8	8
	111	110.52	1.55	.70	350	248	255	55	42	82	73	1.7	8
	114	112.67	1.55	.70	351	245	252	55	42	82	74	1.7	8
	117	114.80	1.50	.69	352	246	258	55	43	82	74	1.7	8
	120	116.92											

Traverse: 1		Traverse:	
Start Time:	Initial Leak Check: cfm@ "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time: 1152	Final Leak Check: .01 cfm@ 16 "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21939

Operator :

Field Data Sheet

Date: Oct 8/19	Plant: Clean Harbors	Test No.: 1 500C	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
1	0	120.69	1.9	.78	355	252	251	78	72	77	77	2.1	7
	3	123.02	2.0	.80	351	253	256	63	60	79	77	2.1	8
	6	125.23	2.0	.80	352	252	254	56	59	81	78	2.1	8
	9	127.43	1.9	.78	353	252	256	55	58	82	78	2.1	8
2	12	129.80	1.85	.77	352	252	254	57	60	83	79	2.0	8
	15	137.12	1.6	.7[illegible]	351	251	254	59	62	84	78	21.8	8
	18	134.40	1.85	.78	347	256	254	60	62	85	79	2.0	8
	21	136.70	1.75	.76	342	246	253	60	64	85	79	2.0	8
3	24	139.04	1.8	.77	347	247	253	60	64	85	79	2.0	8
	27	141.34	1.8	.77	342	247	252	60	64	85	79	2.0	8
	30	143.65	1.7	.75	341	249	252	59	63	87	80	2.0	8
	33	145.95	1.7	.75	346	249	255	60	61	87	79	2.0	8
4	36	148.30	1.5	.70	350	250	256	57	61	87	80	1.8	8
	39	150.55	1.6	.72	354	250	255	57	62	87	80	1.8	8
	42	152.80	1.55	.71	35[illegible]	249	253	57	62	88	80	1.7	8
	45	154.99	1.6	.72	355	246	251	58	60	88	80	1.7	8
5	48	157.18	1.55	.71	357	247	257	62	61	88	80	1.7	8
	51	159.37	1.7	.74	356	245	256	64	63	89	80	1.7	8
	54	161.55	1.75	.76	357	248	252	64	62	89	81	2.0	8
	57	163.86	1.8	.77	360	247	255	65	63	89	81	2.0	8
6	60	166.15	1.85	.78	360	251	253	65	63	89	82	2.0	8

Traverse: 2			
Start Time: 1336	Initial Leak Check: .004	cfm@ 17	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : Dw

Field Data Sheet

Date: Oct 8/19	Plant: Clean Harbors	Test No.: 1 - SVOC	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	168.47	1.8	.77	364	245	231	66	62	89	81	2.0	8
	66	170.78	1.55	.71	368	246	246	65	60	89	81	1.8	8
	69	172.99	1.7	.74	370	245	247	65	60	89	81	1.9	8
7	72	175.24	1.7	.74	370	245	247	65	60	89	81	1.9	8
	75	177.54	1.55	.71	375	251	270	67	63	90	81	1.78	8
	78	179.66	1.6	.71	377	251	268	65	60	90	81	1.7	8
	81	181.92	1.88	.76	376	246	259	62	61	90	82	2.0	8
8	84	184.24	1.9	.76	376	246	258	62	61	90	82	2.0	8
	87	186.56	1.75	.75	376	246	259	61	61	90	82	2.0	8
	90	188.86	1.75	.75	378	246	259	61	61	90	82	2.0	8
	93	191.22	1.88	.76	375	250	259	61	61	89	83	2.0	8
9	96	193.53	1.4	.67	356	259	258	61	61	88	83	1.5	8
	99	195.65	1.5	.70	349	249	259	61	60	88	83	1.5	8
	102	197.70	1.4	.66	349	249	259	61	61	89	82	1.6	8
	105	199.79	1.4	.66	349	249	259	61	61	88	82	1.6	8
10	108	201.87	1.5	.70	349	249	256	60	60	88	82	1.6	8
	111	203.96	1.45	.69	349	251	258	60	61	89	82	1.6	8
	114	206.04	1.45	.69	349	250	257	60	59	89	82	1.6	8
	117	208.14	1.5	.70	349	255	254	60	60	89	81	1.6	8
	120	210.25											

Traverse:				
Start Time:	Initial Leak Check:	cfm@		"Hg
Finish Time: 15 36	Final Leak Check: .004	cfm@	16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : [signature]

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	2 SVOC
Test Date	October 9, 2019
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21939	
Page	1 of 5	
Probe No.:	6	
Meter Box No.:	T4	
Impinger Box No.:	8	

Pitot Factor	0.849	
DGMCF	1.006	
Barometric Pressure	29.63	"Hg
Static Pressure	.86	"H2O
Nozzle Size	.2545	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3457.8	g
WCBDA	39.3	g

Combustion Gas Concentration

Oxygen	9.77	%
Carbon Dioxide	8.26	%
Carbon Monoxide	82.3	ppm

Measuring Device	MII Numbers
Probe / Pitot	5G6
Trendicator	
Control Box	TEST
Incline Manometer	
Comb.Gas.Analyzer	1
Micromanometer	
Barometer	Env.Can
Calipers	

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Nozzle Measurements	
1	
2	
3	
4	
Average:	

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None / Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: OCT 9/19	Plant: Clean Harbors	Test No.: 2 SVOC	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	12.50	2.1	.78	356	273	243	56	52	54	54	2.1	7
	3	14.88	2.0	.76	354	245	249	54	70	57	56	2.0	14
	6	17.21	2.0	.77	354	245	249	54	63	57	56	2.0	12
	9	19.93	2.05	.78	349	262	247	64	52	59	56	2.0	~~12~~ 8
2	12	22.30	2.1	.79	349	259	244	66	45	61	56	2.0	9
	15	24.55	2.0	.77	350	262	255	66	45	62	57	2.0	9
	18	26.82	1.95	.76	347	261	255	63	45	63	58	2.0	9
	21	29.11	2.15	.81	347	260	256	60	46	65	59	2.2	10
3	24	31.48	2.1	.80	347	257	256	56	45	65	59	2.2	10
	27	33.92	2.15	.81	347	261	256	57	47	65	59	2.2	10
	30	36.36	1.9	.76	347	259	256	56	47	66	60	2.0	10
	33	38.72	1.8	.74	348	258	256	55	47	66	60	1.9	10
4	36	41.00	1.9	.76	348	258	255	55	47	67	61	2.0	10
	39	43.30	1.95	.77	349	260	255	55	47	67	61	2.0	10
	42	45.60	2.1	.80	348	260	255	55	47	67	61	2.2	10
	45	47.96	2.1	.80	349	259	259	55	46	69	62	2.2	10
5	48	50.35	2.0	.78	348	257	256	55	45	69	63	2.2	10
	51	52.76	1.95	.78	348	257	260	55	45	70	63	2.2	10
	54	55.25	2.0	.79	349	255	254	54	44	70	64	2.1	10
	57	57.54	2.1	.81	349	257	257	52	44	71	64	2.2	10
6	60	59.94	1.8	.75	349	256	256	54	47	71	65	1.9	10

Traverse: 1			
Start Time: 904	Initial Leak Check: .007	cfm@ 15	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : [signature]

Field Data Sheet

Date: Oct 9/19	Plant: Clean Harbors	Test No.: 2 SVOC	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	62.24	1.75	.74	351	259	263	53	46	71	64	1.9	10
	66	64.51	1.75	.74	351	256	256	54	46	72	65	1.9	10
	69	66.76	1.75	.74	349	257	260	53	46	73	67	1.9	10
7	72	69.04	1.75	.74	348	257	260	55	43	73	66	1.9	10
	75	71.30	1.6	.71	349	254	256	52	43	74	67	1.7	10
	78	73.50	1.6	.71	348	255	255	52	40	74	67	1.7	10
	81	75.69	1.7	.73	349	256	260	52	40	75	67	1.7	10
8	84	77.89	1.5	.69	349	256	260	52	41	76	67	1.6	9
	87	80.02	1.65	.72	348	256	260	52	41	76	67	1.8	9
	90	82.17	1.65	.72	347	256	260	52	41	76	68	1.8	9
	93	84.37	1.55	.70	347	253	259	52	41	77	69	1.7	9
9	96	86.52	1.5	.69	346	253	259	52	41	77	69	1.7	9
	99	88.67	1.5	.69	347	253	259	52	40	77	69	1.7	9
	102	90.79	1.55	.70	346	255	261	54	43	78	70	1.7	9
	105	92.93	1.5	.69	346	255	261	54	41	78	70	1.7	9
10	108	95.07	1.4	.67	345	254	256	52	44	78	70	1.5	9
	111	97.13	1.45	.68	345	253	260	52	43	79	71	1.5	9
	114	99.17	1.45	.68	346	252	257	52	41	79	71	1.5	9
	117	101.23	1.45	.68	345	252	257	52	41	79	71	1.5	9
	120	103.28											

Traverse: 1			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 1104	Final Leak Check: .005	cfm@ 16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

X

Project No.: 21939

Operator : [signature]

Field Data Sheet

Date: Oct 9/19	Plant: Clean Harbors	Test No.: 2 SVOC	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot ΔP "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure ΔH "H_2O	* Pump Vacuum "Hg Gauge
1	0	103.76	1.95	.79	339	261	258	74	46	72	73	2.1	10
	3	106.06	1.9	.78	339	263	263	48	38	74	73	2.1	10
	6	108.42	2.0	.80	336	263	262	48	39	74	73	2.2	10
	9	110.84	1.8	.76	336	263	262	49	41	75	74	2.0	10
2	12	113.22	1.85	.77	339	262	264	49	41	76	74	2.0	10
	15	115.56	1.9	.78	339	256	256	50	41	77	74	2.0	10
	18	117.92	1.8	.76	338	256	256	50	41	77	74	2.0	10
	21	120.26	1.9	.78	337	259	256	50	41	78	75	2.1	10
3	24	122.61	1.9	.79	340	260	258	50	42	79	76	2.1	10
	27	124.95	1.7	.74	340	260	257	56	40	80	76	~~2.1~~ 1.9	10
	30	127.28	1.6	.72	342	260	257	58	41	81	76	1.8	10
	33	129.55	1.9	.79	345	257	265	58	41	81	77	2.1	10
4	36	131.89	2.0	.81	345	260	272	58	43	81	77	2.2	10
	39	134.24	1.95	.80	346	254	258	59	43	82	77	2.2	10
	42	136.63	1.95	.80	345	266	266	59	44	82	77	2.2	10
	45	138.94	1.95	.80	348	259	261	59	44	82	77	2.2	10
5	48	141.36	1.9	.78	347	258	258	60	43	82	77	2.1	10
	51	143.77	2.0	.81	347	262	265	60	43	82	78	2.2	10
	54	146.23	1.9	.79	348	256	262	60	44	82	78	2.1	10
	57	148.70	1.9	.79	348	256	266	60	44	82	78	2.1	10
6	60	151.11	1.95	.80	347	261	265	61	45	82	78	2.1	10

Traverse: 1				
Start Time: 1203	Initial Leak Check: .004	cfm@	.17	"Hg
Finish Time:	Final Leak Check:	cfm@		"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : DM

Field Data Sheet

Date: Oct 9/19	Plant:	Clean Harbors	Test No.:	2 SVOC	Page 5 of 5
	Plant Location:	Corunna, Ontario	Test Location:	Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	153.62	1.9	.79	348	262	260	61	43	82	78	2.1	10
	66	156.00	1.9	.78	348	262	260	61	43	82	78	2.1	10
	69	158.44	1.95	.80	347	261	261	60	43	82	78	2.1	10
7	72	160.86	1.8	.77	347	254	259	62	45	82	79	2.1	10
	75	163.31	1.9	.79	346	250	250	60	45	82	78	2.1	10
	78	165.59	1.9	.78	346	250	251	60	45	82	78	2.1	10
	81	168.15	1.9	.79	346	252	251	59	45	82	78	2.1	10
8	84	170.56	1.75	.75	339	254	257	64	46	82	79	2.0	10
	87	172.92	1.9	.79	339	255	257	63	46	82	79	2.1	10
	90	175.26	1.8	.77	341	252	264	65	47	83	79	2.1	10
	93	177.63	1.8	.77	342	251	260	64	47	83	79	2.1	10
9	96	179.99	1.5	.70	342	254	266	67	49	83	78	1.7	10
	99	182.18	1.5	.70	342	255	265	59	48	83	78	1.7	10
	102	184.34	1.6	.72	342	251	257	59	47	84	85	1.8	10
	105	186.53	1.6	.72	341	251	252	59	47	84	78	1.8	10
10	108	188.73	1.5	.70	341	251	253	55	47	84	78	1.7	10
	111	190.88	1.45	.69	341	251	253	55	47	84	78	1.7	10
	114	193.03	1.45	.69	342	251	253	55	47	84	78	1.7	10
	117	195.20	1.45	.69	342	252	253	55	47	84	78	1.7	10
	120	197.35											

Traverse: 2			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 1403	Final Leak Check: .004	cfm@ 19	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : Del

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 SVOC
Test Date	OCTOBER 10 2019
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21939	
Page	1 of 5	
Probe No.:	6	
Meter Box No.:	74	
Impinger Box No.:	8	

Pitot Factor	0.849	
DGMCF	1.006	
Barometric Pressure	29.59	"Hg
Static Pressure	.75	"H2O
Nozzle Size	0.2545	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3489.7	g
WCBDA	17.8	g

Combustion Gas Concentration

Oxygen	9.90	%
Carbon Dioxide	8.10	%
Carbon Monoxide	86.6	ppm

Site Diagram

Measuring Device	MII Numbers
Probe / Pitot	555
Trendicator	
Control Box	T857
Incline Manometer	
Comb.Gas.Analyzer	1
Micromanometer	
Barometer	Env.Can
Calipers	

Nozzle Measurements

1 __________

2 __________

3 __________

4 __________

Average:

Notes:

Field Data Sheet

Date: OCT 10/14	Plant:	Clean Harbors	Test No.:	3 SVOC	Page 2 of 5
	Plant Location:	Corunna, Ontario	Test Location:	Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot ΔP "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure ΔH "H_2O	* Pump Vacuum "Hg Gauge
1	0	98.85	2.0	.76	354	257	258	55	46	52	53	2.0	7
	3	101.15	1.8	.72	353	256	255	49	38	55	55	1.8	8
	6	103.34	2.1	.78	355	257	256	49	39	57	56	2.1	9
	9	105.62	2.1	.79	355	249	256	48	41	59	55	2.1	9
2	12	107.95	2.15	.80	353	249	255	48	42	60	56	2.2	9
	15	110.35	2.2	.81	355	249	259	47	44	62	55	2.2	9
	18	112.74	2.2	.81	355	249	260	47	44	62	56	2.2	9
	21	115.16	2.2	.81	353	251	256	46	45	64	56	2.2	9
3	24	1175 ~~118.16~~	2.1	.79	355	251	259	46	43	65	57	2.1	9
	27	120.05	2.15	.80	355	252	259	47	43	65	57	2.2	9
	30	122.40	2.15	.80	354	250	257	47	46	66	58	2.2	9
	33	124.85	2.2	.81	354	249	254	48	43	67	57	2.2	9
4	36	127.33	2.15	.80	355	253	260	48	43	67	58	2.2	9
	39	129.80	2.2	.81	355	249	260	49	44	67	60	2.2	9
	42	132.23	2.3	.83	355	253	257	49	45	68	59	2.4	9
	45	134.74	2.3	.83	352	252	258	49	49	68	60	2.4	9
5	48	137.25	2.15	.81	353	252	256	49	49	68	60	2.2	9
	51	139.70	2.2	.82	352	253	257	51	47	69	60	2.2	9
	54	142.14	2.2	.82	352	253	257	51	47	69	60	2.2	9
	57	144.58	2.2	.82	352	252	263	52	48	70	61	2.2	9
6	60	147.04	1.8	.74	353	249	263	50	49	70	62	1.9	9

FW

Traverse: 1				
Start Time: 903 ~~9:00~~	Initial Leak Check:	.003	cfm@ 17	"Hg
Finish Time:	Final Leak Check:		cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : D O

Field Data Sheet

Date: OCT 10/18	Plant: Clean Harbors	Test No.: 3 SVOC	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
	63	149.34	1.9	.76	351	251	262	50	47	71	65	1.9	9
	66	151.61	2.0	.79	352	252	257	50	46	72	62	1.9	9
	69	153.886	2.0	.78	354	251	261	50	46	72	62	2.1	9
7	72	156.21	1.8	.74	352	251	261	50	46	72	62	1.9	9
	75	158.50	1.9	.76	354	248	257	50	48	73	64	1.9	9
	78	160.80	1.7	.72	356	246	257	50	47	74	64	1.8	9
	81	163.01	1.7	.76	354	248	261	50	47	74	64	1.8	9
8	84	165.23	1.7	.72	354	248	260	50	46	74	64	1.8	9
	87	167.45	1.7	.72	359	250	264	52	48	75	66	1.8	9
	90	169.66	1.7	.72	357	252	261	51	47	75	65	1.8	9
	93	171.84	1.7	.72	357	248	258	52	48	76	66	1.8	9
9	96	174.02	1.6	.70	354	249	261	53	50	77	67	1.7	9
	99	176.19	1.7	.73	353	246	256	52	47	77	67	1.7	9
	102	178.36	1.6	.71	350	246	258	52	46	77	68	1.7	9
	105	180.53	1.45	.67	347	248	263	51	44	78	68	1.6	9
10	108	182.60	1.45	.68	347	248	263	51	44	78	68	1.6	9
	111	184.66	1.5	.69	347	248	263	51	44	78	68	1.6	9
	114	186.72	1.45	.68	347	248	267	51	44	78	68	1.6	9
	117	188.76	1.45	.68	347	248	267	51	44	80	68	1.6	9
	120	190.81											

Traverse:			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 1103	Final Leak Check: .005	cfm@ 12	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : D.Ou

Field Data Sheet

Date: Oct 10/19	Plant: Clean Harbors	Test No.: 3 S/VC	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
1	0	191.20	2.0	.80	348	253	253	68	47	70	72	2.1	9
	3	193.47	2.0	.79	348	256	270	47	42	73	73	2.1	9
	6	195.98	2.0	.79	348	254	273	47	45	75	74	2.1	9
	9	198.15	1.95	.75	350	254	269	48	45	76	74	2.1	9
2	12	200.49	2.0	.80	349	256	264	48	45	78	73	2.1	9
	15	202.86	1.9	.76	349	255	259	50	47	79	74	2.1	9
	18	205.26	1.9	.78	352	255	263	50	46	80	74	2.1	9
	21	207.64	1.9	.78	350	255	261	50	46	80	74	2.1	9
3	24	210.03	1.9	.76	349	255	261	50	47	81	74	2.1	9
	27	212.41	1.9	.78	352	255	258	53	49	82	75	2.1	9
	30	214.80	1.85	.77	352	255	260	54	48	82	75	2.1	9
	33	217.17	1.85	.77	351	254	265	53	49	82	76	2.1	9
4	36	219.55	1.85	.77	353	254	265	52	49	82	76	2.1	9
	39	221.92	1.85	.77	353	254	265	52	49	82	76	2.1	9
	42	224.31	1.8	.76	350	254	265	54	43	83	76	2.1	9
	45	226.68	1.85	.77	350	254	260	54	43	83	76	2.1	9
5	48	229.10	1.8	.76	350	254	260	54	43	83	76	2.1	9
	51	231.43	1.85	.77	349	254	265	54	44	84	77	2.1	9
	54	233.80	1.85	.77	348	255	261	54	43	84	78	2.1	9
	57	236.12	1.8	.77	349	253	260	55	43	85	78	2.1	9
6	60	238.46	1.9	.79	349	253	260	55	43	85	78	2.1	9

Traverse: 1			
Start Time: 1207	Initial Leak Check: .005	cfm@ 10	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : D. Dileg

Field Data Sheet

Date: OCT 10/19	Plant: Clean Harbors	Test No.: 3 SVOC	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft³	* Pitot Δ P "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure Δ H "H_2O	* Pump Vacuum "Hg Gauge
	63	240.90	1.9	.79	348	256	258	56	43	85	77	2.1	9
	66	243.14	2.1	.83	348	256	258	56	43	85	77	2.3	10
	69	245.62	2.1	.83	348	256	258	56	43	85	77	2.3	10
7	72	248.16	~~2.0~~ 1.8	.77	348	255	257	55	43	85	77	2.0	9
	75	250.59	1.8	.77	349	254	264	57	50	85	78	2.0	9
	78	252.98	1.9	.79	354	254	260	55	52	85	78	2.0	9
	81	255.32	1.9	.78	354	254	264	58	56	85	78	2.0	9
8	84	257.69	1.7	.74	352	255	261	59	59	86	78	2.0	9
	87	260.05	1.7	.74	356	255	260	57	50	86	78	1.9	9
	90	262.37	1.7	.74	356	253	263	57	46	86	78	1.9	9
	93	264.67	1.7	.74	355	255	256	56	45	86	78	1.9	9
9	96	267.02	1.9	.67	350	255	258	56	45	86	78	1.6	9
	99	269.17	1.4	.67	350	250	260	56	45	86	78	1.6	9
	102	271.28	1.45	.69	349	250	264	57	44	87	79	1.6	9
	105	273.58	1.45	.69	349	251	265	57	44	87	79	1.6	9
10	108	275.46	1.4	.68	349	252	263	56	45	87	78	1.6	9
	111	277.55	1.5	.70	348	251	262	55	45	87	78	1.6	9
	114	279.63	1.4	.68	348	251	262	55	43	87	78	1.6	9
	117	281.72	1.4	.68	349	251	261	54	43	88	78	1.6	9
	120	283.91											

Traverse: 2			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 1407	Final Leak Check: .005	cfm@ 16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21939

Operator : D. [signature]

APPENDIX 6

Acid Gases Train Field Data Sheets
and Gas Volumes Sampled
(4 pages)

Clean Harbors Canada Inc. (Sarnia, ON)
Acid Gases Train Gas Volume Sampled

Test Location	Test No.	Dry Gas Meter Correction Factor	Initial Dry Gas Meter Reading litres	Final Dry Gas Meter Reading litres	Actual Volume Sampled litres	Barometric Pressure in. mercury	Average Dry Gas Meter Pressure in. water	Average Dry Gas Meter Temperature °C	Corrected Gas Volume Sampled Rm^3 *
Stack	1	1.004	96.06	217.39	121.3	29.61	6.0	25.5	0.1221
	2	1.004	2.81	125.72	122.9	29.62	6.1	24.1	0.1244
	3	1.004	12.35	133.54	121.2	29.58	6.0	23.4	0.1228

* Dry at 25°C and 1 atmosphere

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	1
Test location:	Incinerator Exhaust Stack
Date:	Oct. 8, 2019
Project No.:	21939

Measuring Device	MII Number
Control Module	VOST #2 A10117
Barometer	Env. Can.

P_{Bar}	29.61

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature Outlet °C	Meter Temperature Inlet °C	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
0	96.06	135	172	127	20		21	6.3	2
5	106.48	136	171	128	18		25	6	2
10	116.90	136	174	128	17		26	6	2
15	127.25	136	174	128	16		26	6	2
20	137.19	135	176	128	16		26	6	2
25	147.10	135	178	128	16		26	6	2
30	157.04	135	180	128	16		26	6	2
35	166.94	135	182	128	16		26	6	2
40	176.90	135	184	128	16		26	6	2
45	186.85	135	185	128	16		26	6	2
50	196.89	137	188	128	17		26	6	2
55	206.93	139	188	128	17		26	6	2
60	217.39	140	189	128	16		26	6	2

Start Time:	~~11:38~~ 14:00		
Finish Time:	15:00		
Initial Leak Check:	<0.02	Lpm @	10 " Hg
Final Leak Check:	<0.02	Lpm @	10 " Hg

DGMCF:	1.004
Sample Volume:	
Average DGM Temp:	
Average DGM ΔH:	

Comments:

Probe Purge On: @ > HALF HOUR PURGE

Off: @

~2 LPM for 60 min

Operator : CB.

Rev: May 13, 2005

ORTECH Environmental

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	2
Test location:	Incinerator Exhaust Stack
Date:	OCTOBER 9, 2019
Project No.:	21939

Measuring Device	MII Number
Control Module	VOST #2 A10117
Barometer	Env. Can.

P_{Bar}	29.62

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature Outlet °C	Meter Temperature Inlet °C	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
0	2.81	147	171	126	16		19	6.3	2
5	13.11	146	170	130	14		23	6.3	2
10	23.58	145	170	127	14		24	6.3	2
15	33.81	146	171	128	14		24	6.2	2
20	43.06	147	172	129	14		25	6.2	2
25	53.58	147	173	129	14		25	6.1	2
30	64.60	147	174	129	14		25	6.1	2
35	74.98	148	175	129	13		24	6	2
40	85.33	148	175	129	13		24	6	2
45	95.65	148	175	129	13		24	6	2
50	105.62	149	175	129	14		25	6	2
55	115.59	149	175	129	14		25	6	2
60	125.72	148	174	129	14		26	6	2

Start Time:	12:11			
Finish Time:	13:11			
Initial Leak Check:	<0.02	Lpm @	13	" Hg
Final Leak Check:	<0.02	Lpm @	12	" Hg

DGMCF:	1.004 @ 2 LPM
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	

Comments:

Probe Purge On: @ PURGED FOR 20 minutes

Off: @

~2 LPM for 60 min

Operator : CB

Rev: May 13, 2005

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	3
Test location:	Incinerator Exhaust Stack
Date:	OCTOBER 10, 2019
Project No.:	21939

Measuring Device	MII Number
Control Module	VOST #2 A10117
Barometer	Env. Can.

P_{Bar}	29.58

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature Outlet °C	Meter Temperature Inlet °C	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
0	12.35	153	175	121	17		19	6.1	2
5	22.51	154	176	130	14		23	6.0	2
10	32.67	154	175	131	14		23	6.0	2
15	42.88	154	176	131	14		23	6.0	2
20	53.14	155	176	130	15		24	6.0	2
25	63.09	155	177	130	15		24	6.0	2
30	73.02	155	178	129	15		24	6.0	2
35	82.97	155	178	129	15		24	6.0	2
40	93.16	155	177	130	15		24	6.0	2
45	103.28	155	176	130	15		24	6.0	2
50	113.33	154	176	129	15		24	6.0	2
55	123.38	154	176	129	16		24	6.0	2
60	133.54	154	176	130	16		24	6.0	2

Start Time:	12:12			
Finish Time:	13:12			
Initial Leak Check:	<0.02	Lpm @	12	" Hg
Final Leak Check:	<0.02	Lpm @	10	" Hg

DGMCF:	1.004
Sample Volume:	
Average DGM Temp:	
Average DGM ΔH:	

Comments:

Probe Purge On: @ PURGED FOR > 20 minutes

Off: @

~2 LPM for 60 min

Operator : CK

Rev: May 13, 2005

APPENDIX 7

Volatile Organics Train Field Data Sheets
and Gas Volumes Sampled
(4 pages)

Clean Harbors Canada Inc. (Sarnia, ON)
Volatile Organics Train Gas Volume Sampled

Test No.	Run No.	Tube Pair No.	Dry Gas Meter Correction Factor	Initial Dry Gas Meter Reading litres	Final Dry Gas Meter Reading litres	Actual Volume Sampled litres	Barometric Pressure in. mercury	Average Dry Gas Meter Pressure in. water	Average Dry Gas Meter Temperature °C	Corrected Gas Volume Sampled Rm^3 *
1	1	1A/1B	0.998	7.04	29.89	22.85	29.66	2.3	15.8	0.0235
	2	2A/2B	0.998	30.62	51.33	20.71	29.66	2.3	18.2	0.0211
	3	3A/3B	0.998	51.80	72.62	20.82	29.66	2.2	20.0	0.0211
	4	4A/4B	0.998	73.10	94.40	21.30	29.66	2.2	20.8	0.0215
2	1	6A/6B	0.998	18.20	38.70	20.50	29.65	2.3	13.4	0.0212
	2	7A/7B	0.998	39.10	59.38	20.28	29.65	2.3	16.8	0.0207
	3	8A/8B	0.998	60.13	80.51	20.38	29.65	2.2	17.8	0.0208
	4	9A/9B	0.998	80.97	101.09	20.12	29.65	2.3	20.2	0.0203
3	1	11A/11B	0.998	26.34	44.37	18.03	29.60	2.3	11.6	0.0187
	2	12A/12B	0.998	44.70	66.80	22.10	29.60	2.4	13.4	0.0228
	3	13A/13B	0.998	68.03	89.00	20.97	29.60	2.3	17.2	0.0214
	4	14A/14B	0.998	89.95	111.00	21.05	29.60	2.3	18.6	0.0214

* Dry at 25°C and 1 atmosphere

ORTECH Environmental

Vost Data Sheet

VOST #2

Plant: Clean Harbors	Test Condition: Compliance		
Plant Location: Corunna, ON	Test No: 1	Control Box ID: A10117	
Test location: Incinerator Exhuast Stack	DGMCF: 0.998	Operator: CB	
Date: OCT. 8, 2019	Barometric: 29.66	Project No: 21939	
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak	Field Blank Pair ID: 5A + 5B (4)	

Tube Pair 1 Start Time: 09:53		Initial Leak Check NDL@ 21"Hg			Sample ID: 1A + 1B	
Tube Pair 1 End Time: 10:13		Final Leak Check NDL@ 21 "Hg			Lab ID: L2349710-37	
Clock Time	Dry Gas Meter L	Temperatures			Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	7.04	188	175	9	13	2.3	1
5	14.30	189	176	7	15	2.3	1
10	19.25	190	176	7	17	2.3	1
15	24.55	189	176	7	17	2.3	1
20	29.89	190	176	7	17	2.3	1

Tube Pair 2 Start Time: 10:22		Initial Leak Check NDL@ 20"Hg			Sample ID: 2A + 2B		
Tube Pair 2 End Time: 10:42		Final Leak Check NDL@ 21 "Hg			Lab ID: -38		
Clock Time	Dry Gas Meter L	Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	30.62	191	176	10	16	2.3	1
5	35.94	191	176	7	18	2.3	1
10	41.26	192	175	8	18	2.3	1
15	46.30	192	176	7	20	2.3	1
20	51.33	192	174	7	19	2.2	1

Tube Pair 3 Start Time: 10:51		Initial Leak Check NDL@ 21"Hg			Sample ID: 3A + 3B		
Tube Pair 3 End Time: 11:11		Final Leak Check NDL@ 21 "Hg			Lab ID: -39		
Clock Time	Dry Gas Meter L	Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	51.80	193	174	10	18	2.2	1
5	56.94	193	173	9	20	2.2	1
10	62.11	193	173	9	21	2.2	1
15	67.37	193	174	7	21	2.3	1
20	72.62	193	173	7	20	2.3	1

Tube Pair 4 Start Time: 11:21		Initial Leak Check NDL@ 21"Hg			Sample ID: 4A + 4B		
Tube Pair 4 End Time: 11:41		Final Leak Check NDL@ 21 "Hg			Lab ID: -40		
Clock Time	Dry Gas Meter L	Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	73.10	194	173	13	18	2.2	1
5	78.16	194	174	11	20	2.2	1
10	83.23	194	174	10	22	2.2	1
15	88.86	194	175	11	22	2.2	1
20	94.40	194	176	11	22	2.2	1

Rev: Oct 22, 2014

ARCHIVE PAIR 1A + 1B

ORTECH Environmental

Vost Data Sheet

VOST #2

Plant:	Clean Harbors	Test Condition:	Compliance		
Plant Location:	Corunna, ON	Test No:	2	Control Box ID:	A1017
Test location:	Incinerator Exhuast Stack	DGMCF:	0.998	Operator:	CB
Date:	Oct. 9, 2019	Barometric:	29.65	Project No:	21939
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak			Field Blank Pair ID:	10A + 10B (4

Tube Pair 1 Start Time:	09:18	Initial Leak Check NDL @ 20 "Hg				Sample ID:	6A + 6B
Tube Pair 1 End Time:	09:38	Final Leak Check NDL @ 21 "Hg				Lab ID:	-42
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	18.20	133	172	10	10	2.3	1.5
5	23.45	134	171	6	13	2.3	2
10	28.83	135	172	7	14	2.3	2
15	33.60	137	173	6	15	2.3	2
20	38.70	138	171	7	15	2.3	2

Tube Pair 2 Start Time:	09:50	Initial Leak Check NDL @ 21 "Hg				Sample ID:	7A + 7B
Tube Pair 2 End Time:	10:10	Final Leak Check NDL @ 21 "Hg				Lab ID:	-43
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	39.10	139	173	11	14	2.3	2
5	44.33	139	173	8	16	2.3	2
10	49.36	140	174	9	18	2.3	2
15	54.40	141	174	9	18	2.3	2
20	59.38	141	174	9	18	2.3	2

Tube Pair 3 Start Time:	10:22	Initial Leak Check NDL @ 21 "Hg				Sample ID:	8A + 8B
Tube Pair 3 End Time:	10:42	Final Leak Check NDL @ 21 "Hg				Lab ID:	-44
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	60.13	141	173	11	15	2.3	2
5	65.37	142	174	10	17	2.2	2
10	70.56	142	174	9	19	2.2	2
15	75.62	142	174	9	19	2.2	2
20	80.51	142	174	9	19	2.2	2

Tube Pair 4 Start Time:	10:52	Initial Leak Check NDL @ 21 "Hg				Sample ID:	9A + 9B
Tube Pair 4 End Time:	11:12	Final Leak Check NDL @ 21 "Hg				Lab ID:	-45
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	80.97	142	174	12	18	2.3	2
5	85.22	141	174	9	20	2.3	2.5
10	90.63	140	174	9	21	2.3	2.5
15	95.84	142	172	8	21	2.3	2.5
20	101.09	143	172	8	21	2.3	2.5

Rev: Oct 22, 2014

ARCHIVE PAIR 6A + 6B

ORTECH Environmental

Vost Data Sheet

VOST 2

Plant: Clean Harbors	Test Condition: Compliance	
Plant Location: Corunna, ON	Test No: 3	Control Box ID: A10117
Test location: Incinerator Exhuast Stack	DGMCF: 0.998	Operator: CB
Date: OCT. 10, 2019	Barometric: 29.60	Project No: 21939
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak	Field Blank Pair ID: 15A + 15B (-51)

Tube Pair 1 Start Time: 09:12	Initial Leak Check NDL @ 20 "Hg	Sample ID: 11A + 11B
Tube Pair 1 End Time: 09:32	Final Leak Check NDL @ 21 "Hg	Lab ID: -47

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	26.34	128	174	8	8	2.3	2
5	30.00	131	175	12	11	2.3	2
10	34.97	132	175	14	12	2.3	2
15	39.32	134	174	14	13	2.3	2
20	44.37	140	174	11	14	2.3	2

Tube Pair 2 Start Time: 09:41	Initial Leak Check NDL @ 21 "Hg	Sample ID: 12A + 12B
Tube Pair 2 End Time: 10:01	Final Leak Check NDL @ 21 "Hg	Lab ID: -48

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	44.70	138	173	8	11	2.3	2
5	50.00	140	174	7	12	2.3	2
10	55.65	139	173	6	14	2.4	2
15	61.30	139	173	6	15	2.4	2
20	66.80	140	173	6	15	2.4	2

Tube Pair 3 Start Time: 10:12	Initial Leak Check NDL @ 21 "Hg	Sample ID: 13A + 13B
Tube Pair 3 End Time: 10:32	Final Leak Check @ "Hg	Lab ID: -49

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	68.03	139	174	9	15	2.3	2
5	73.05	139	175	8	16	2.3	2
10	78.07	139	176	7	17	2.3	2
15	83.55	140	178	7	19	2.3	2
20	89.00	141	178	7	19	2.3	2

Tube Pair 4 Start Time: 10:44	Initial Leak Check NDL @ 21 "Hg	Sample ID: 14A + 14B
Tube Pair 4 End Time: 11:04	Final Leak Check NDL @ 21 "Hg	Lab ID: -50

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	89.95	142	174	10	16	2.3	2
5	95.22	141	174	8	18	2.3	2
10	100.42	143	173	7	19	2.3	2
15	105.38	142	173	8	20	2.3	2
20	111.00	143	174	8	20	2.3	2

Rev: Oct 22, 2014

ARCHIVE FIRST PAIR (11A + 11B)

APPENDIX 8

Metals Train Recovery Data Sheets
(4 pages)

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21939 Test No. 1
Date: OCT 8/19 Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	281.1
After Act. Rinse:	371.9
Total TS1:	90.8

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	278.8
with Nitric rinse	487.7
Total TS2:	208.9

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: Q26834

CONTAINER TS3

Initial Wt:	0.6225
Final Wt:	
Gain:	
Colour:	GREY BLUE

SEAL AND LABEL TS3

.6850

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	~~645.8~~ 644.1
Initial Wt:	746.5
Final Wt:	922.7 ~~764~~
1 Gain:	176.2
Colour:	—

Impinger #2 Empty (Knock-out)	
Empty Wt:	~~712.5~~ 707.7
Final Wt:	2505.6
2 Gain:	1797.9
Colour:	—

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	~~544.4~~ 542.9
Initial Wt:	~~54~~ 640.7
Final Wt:	941.7
3 Gain:	301.1 ~~301.0~~
Colour:	—

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	~~660.0~~ 659.8
Initial Wt:	774.7
Final Wt:	979.3
4 Gain:	205.1
Colour:	—

Impinger #5 Empty	
Empty Wt:	618.5
Final Wt:	703.1
5 Gain:	~~936.3~~ 84.6
Colour:	

CONTAINER TS4 WEIGHTS	
Empty Wt:	1359.7
With Imp. 1 to 5 Soln:	5157.1
Imp. 1 to 5 Volume:	3797.4
After HNO_3 Rinse:	5157.1
Total TS4:	3797.4

Impinger 6 & 7

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	538.6
Initial Wt:	663.1
Final Wt:	672.6
6 Gain:	+ 9.5
Colour:	PURPLE

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	580.6
Initial Wt:	685.6
Final Wt:	688.7
7 Gain:	3.1
Colour:	PURPLE

CONTAINER TS5-A	
Empty Wt:	427.1
With Imp. Soln:	661.2
Imp. 6&7 Volume:	234.1
After $KMnO_4$ Rinse:	774.7
After D.I. Water Rinse:	923.7
Total TS5-A:	496.6

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	427.2
With 150 mL DI Water:	577.2
After HCl Rinse:	596.3
After D.I. Water Rinse:	718.3
Total TS5-B:	291.1

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	945.6
Final Wt:	978.5
8 Gain:	32.9
% spent :	50

Sample Batch Number	19-21939-PM-
TS1 (Probe Rinse-Acetone)	1
TS2 (Probe Rinse-0.1N HNO_3)	2
TS3 (Filter)	3
TS4 (Impinger 1,2,3,4 & 5 Sol'n-HNO_3)	4A, 4B
TS5-A (Impinger 6 & 7 Sol'n-$KMnO_4$)	5
TS5-B (Impinger 6 & 7 Rinse HCl)	6

TS1,TS2, TS5-B - 500 ml Amber Glass Bottle

TS3- Petri Dish

TS4 4 L Amber Glass Bottle

TS5-A - 1000 ml Amber Glass Bottle

432.2
1143.1

CWTR = add 1 thru 7:	3513.8 ✓ ~~3501.1~~
WCBDA= 8:	32.9

Train Loaded By: DU TSDH

Train Recovered By: DUDH

Box # 8

MT 432.2
RWM ~~1368.5~~
TRAIN IMP DUMP 936.3

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21939 | Test No. 2
Date: OCT 9 / 19 | Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	281.7
After Act. Rinse:	403.8
Total TS1:	122.1

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	279.7
with Nitric rinse	448.3
Total TS2:	

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: Q26836

CONTAINER TS3

Initial Wt:	0.648
Final Wt:	
Gain:	
Colour:	GREY BROWN

SEAL AND LABEL TS3

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	645.6
Initial Wt:	746.0
Final Wt:	918.8
1 Gain:	172.8
Colour:	—

IMP DUMP INCL

Impinger #2 Empty (Knock-out)	
Empty Wt:	711.2
Final Wt:	3577.4
2 Gain:	2866.2
Colour:	—

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	543.6
Initial Wt:	650.4
Final Wt:	897.4
3 Gain:	247.0
Colour:	—

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	660.6
Initial Wt:	763.8
Final Wt:	969.6
4 Gain:	205.8
Colour:	—

Impinger #5 Empty	
Empty Wt:	619.0
Final Wt:	668.4
5 Gain:	49.4
Colour:	—

CONTAINER TS4 WEIGHTS	
11A Empty Wt:	1360.0
With Imp. 1 to 5 Soln:	4250.3
Imp. 1 to 5 Volume:	—
After HNO_3 Rinse:	4772.3
Total TS4:	3412.3

Impinger 6 & 7

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	538.7
Initial Wt:	648.9
Final Wt:	~~701.3~~ 650.3
6 Gain:	1.4
Colour:	PURPLE

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	580.7
Initial Wt:	693.3
Final Wt:	~~55~~ 701.3
7 Gain:	8.0
Colour:	PURPLE

CONTAINER TS5-A	
Empty Wt:	430.9
With Imp. Soln:	651.4
Imp. 6&7 Volume:	~~779.9~~
After $KMnO_4$ Rinse:	779.9
After D.I. Water Rinse:	895.7
Total TS5-A:	464.8

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	424.6
With 150 mL DI Water:	538.0
After HCl Rinse:	634.8
After D.I. Water Rinse:	744.5
Total TS5-B:	319.9

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	929.5
Final Wt:	962.3
8 Gain:	32.8
% spent :	30

Sample Batch Number	19-21939-PM-
TS1 (Probe Rinse-Acetone)	8
TS2 (Probe Rinse-0.1N HNO_3)	9
TS3 (Filter)	10
TS4 (Impinger 1,2,3,4 & 5 Sol'n-HNO_3)	11A 11B
TS5-A (Impinger 6 & 7 Sol'n-$KMnO_4$)	12
TS5-B (Impinger 6 & 7 Rinse HCl)	13

TS1,TS2, TS5-B - 500 ml Amber Glass Bottle

TS3- Petri Dish

TS4 4 L Amber Glass Bottle

TS5-A - 1000 ml Amber Glass Bottle

CWTR = add 1 thru 7:	3550.6 ✓
WCBDA= 8:	32.8

Train Loaded By: DJ/DH

Train Recovered By: DJ/DH

Box # 8

~~42~~ 431.8
1400.6
968.8 11B

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21939
Date: Oct. 10 / 19

Test No. 3
Test Location: Incinerator Exhaust

Nozzle, Probe Liner / Cyclone Bypass & F.H. / Filter Housing

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	280.9
After Act. Rinse:	368.2
Total TS1:	87.3

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	278.3
with Nitric rinse	559.2
Total TS2:	280.9

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: QZ6837

CONTAINER TS3

Initial Wt:	0.6206
Final Wt:	
Gain:	
Colour:	light grey

SEAL AND LABEL TS3

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	646.3
Initial Wt:	745.2
Final Wt:	910.6
1 Gain:	165.4
Colour:	clear

Impinger #2 Empty (Knock-out)	
Empty Wt:	711.7
Final Wt:	2722.2
2 Gain:	2010.5
Colour:	clear

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	661.0
Initial Wt:	762.2
Final Wt:	979.3
3 Gain:	217.1
Colour:	clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	543.3
Initial Wt:	~~649.1~~ 769.7
Final Wt:	964.4
4 Gain:	194.7
Colour:	clear

Impinger #5 Empty	
Empty Wt:	620.7
Final Wt:	669.5
5 Gain:	48.8 ~~49.2~~
Colour:	clear

CONTAINER TS4 WEIGHTS	
Empty Wt:	1364.4
With Imp. 1 to 5 Soln:	4306.5
Imp. 1 to 5 Volume:	1942.1
After HNO_3 Rinse:	~~4734.0~~ 4858.2
Total TS4:	~~551.9~~ 3493.8

Impinger 6 & 7

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	540.5
Initial Wt:	641.1
Final Wt:	677.4
6 Gain:	36.3
Colour:	purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	581.1
Initial Wt:	709.6
Final Wt:	676.3
7 Gain:	-33.3
Colour:	purple

CONTAINER TS5-A	
Empty Wt:	430.7
With Imp. Soln:	658.1
Imp. 6&7 Volume:	227.4
After $KMnO_4$ Rinse:	769.8
After D.I. Water Rinse:	868.9
Total TS5-A:	438.2

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	426.4
With 150 mL DI Water:	581.3
After HCl Rinse:	622.4
After D.I. Water Rinse:	693.8
Total TS5-B:	267.4

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	942.3
Final Wt:	978.0
8 Gain:	35.7
% spent :	50 %

Sample Batch Number	19-21939-PM-
TS1 (Probe Rinse-Acetone)	-15
TS2 (Probe Rinse-0.1N HNO_3)	-16
TS3 (Filter)	-17
TS4 (Impinger 1,2,3,4 & 5 Sol'n-HNO_3)	-18
TS5-A (Impinger 6 & 7 Sol'n-$KMnO_4$)	-19
TS5-B (Impinger 6 & 7 Rinse HCl)	-20

TS1,TS2, TS5-B - 500 ml Amber Glass Bottle
TS3- Petri Dish

TS4 4 L Amber Glass Bottle
TS5-A - 1000 ml Amber Glass Bottle

✓

CWTR = add 1 thru 7:	~~3596.2~~ 3595.8
WCBDA= 8:	35.7

Train Loaded By: D.H / D.U.
Train Recovered By: D.H / C.B.

Box # 8

IMP. GAIN AT TRAV. CHANGE

4290
1385.3
956.3 g

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21939
Date: Oct. 10/19

Test No. Blank
Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	285.4
After Act. Rinse:	427.0
Total TS1:	141.6

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	287.2
with Nitric rinse	408.4
Total TS2:	121.2

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: Q26835

CONTAINER TS3

Initial Wt:	0.6286
Final Wt:	
Gain:	
Colour:	WHITE

SEAL AND LABEL TS3

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	644.4
Initial Wt:	764.7
Final Wt:	764.5
1 Gain:	-0.2
Colour:	CLEAR

Impinger #2 Empty (Knock-out)	
Empty Wt:	717.8
Final Wt:	~~2505.6~~ 718.8
2 Gain:	1.0
Colour:	—

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	666.3
Initial Wt:	772.1
Final Wt:	~~941.3~~ 772.6
3 Gain:	0.5
Colour:	clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	~~664.5~~ 543.3
Initial Wt:	~~769.5~~ 649.1
Final Wt:	~~979.3~~ 648.9
4 Gain:	-0.2
Colour:	clear

Impinger #5 Empty	
Empty Wt:	607.1
Final Wt:	~~703.4~~ 607.1
5 Gain:	0.0
Colour:	—

CONTAINER TS4 WEIGHTS	
Empty Wt:	423.2
With Imp. 1 to 5 Soln:	741.7
Imp. 1 to 5 Volume:	318.5
After HNO_3 Rinse:	1156.5
Total TS4:	733.3

Impinger 6 & 7

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	670.8
Initial Wt:	780.6
Final Wt:	~~793.6~~ 780.3
6 Gain:	-0.3
Colour:	purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	677.3
Initial Wt:	793.9
Final Wt:	793.6
7 Gain:	-0.3
Colour:	purple

CONTAINER TS5-A	
Empty Wt:	424.9
With Imp. Soln:	650.9
Imp. 6&7 Volume:	226.0
After $KMnO_4$ Rinse:	762.5
After D.I. Water Rinse:	859.3
Total TS5-A:	434.4

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	426.1
With 150 mL DI Water:	580.4
After HCl Rinse:	643.9
After D.I. Water Rinse:	773.2
Total TS5-B:	347.1

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	989.6
Final Wt:	990.1
8 Gain:	0.5
% spent :	—

Sample Batch Number	19-21939-PM-
TS1 (Probe Rinse-Acetone)	-22
TS2 (Probe Rinse-0.1N HNO_3)	-23
TS3 (Filter)	-24
TS4 (Impinger 1,2,3,4 & 5 Sol'n-HNO_3)	-25
TS5-A (Impinger 6 & 7 Sol'n-$KMnO_4$)	-26
TS5-B (Impinger 6 & 7 Rinse HCl)	-27

TS1,TS2, TS5-B - 500 ml Amber Glass Bottle
TS3- Petri Dish

TS4 4 L Amber Glass Bottle
TS5-A - 1000 ml Amber Glass Bottle

CWTR = add 1 thru 7:	0.5
WCBDA= 8:	0.5

Train Loaded By: DU DH
Train Recovered By: CB / DH

Box # ~~8~~ 11

ORTECH

APPENDIX 9

Particulate and Metals Analytical Reports
(16 pages)

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	Ortech Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364236		Mississauga, ON L5J 2Y4
Date of Report	4-Nov-19		Canada
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS:

Sample Particulate Analysis via Gravimetric USEPA Method 5 (TPH 21-Oct-19)

REPORT FLAGS:

J - The value is uncertain and below what can be reliably identified as positive with a ≥99% confidence limit (i.e. below the laboratory determined MDL).

LCB = Laboratory Control Blank
CVS = Continuing Verification Standard Sample (limits: ±2 in the last decimal)
LOR = Limit of Reporting

Certified by: L. Wrona

Lynne Wrona
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(8 THRU 13) TEST#2	19-21939-PM-(15 THRU 20) TEST#3	19-21939-PM-(22 THRU 27) BLANK	MB	
ALS Sample ID		L2364236-1	L2364236-2	L2364236-3	L2364236-4	L2364236-MB	
Matrix		Stack	Stack	Stack	Stack	n/a	
Analysis type		Sample	Sample	Sample	Sample	Sample	
Sampling Date/Time		8-Oct-19	9-Oct-19	10-Oct-19	10-Oct-19	n/a	
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	n/a	
PM via Gravimetric Analysis	**LOR**						
Method 5	**mg**	**mg**	**mg**	**mg**	**mg**	**mg**	
Filter Particulate Matter	0.8	63.4	61.4	63.0	1.8	<0.1	
Acetone Particulate Matter	0.4	7.4	8.6	8.1	0.6	0.1	J
	g	**g**	**g**	**g**	**g**	**g**	
Acetone Mass	0.02	90.6	121	86.4	145	33.2	

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L2364236		
Date of Report	8-Nov-19		
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS:

Metals analysed via ICP-MS Method USEPA 6020A (SA 05-Nov-19 and 07 Nov-19)
Sample Preparation via USEPA Method 29 (AB/SA 05-Nov-19 and 07-Nov-19)

ANALYST COMMENTS:

1A HNO3:

Al recoveries in the LCS and LCSD are outside ALS DQOs (found: 79, 80%, Limits: 85-115%). Data for this analyte may be biased low.

Recoveries for Al, Ca, Cu, K, and Na cannot be quantified in the MS and MSD, due to high concentrations of the target analytes in the sample, relative to the spiked amounts. This is not expected to have any impact on data quality.

1A HF:

Silicon cannot be quantified in this fraction due to the high background contribution from the total digestion of the filter matrix.

Al, Mn, Mo, and Ni observed in the method blank, at levels significantly above their LORs. Data for these elements are expected to be biased high, as a result of the filter matrix background contribution.

Al recoveries in the LCS and LCSD are outside ALS DQOs (found: 78, 79%, Limits: 85-115%). Data for this analyte may be biased low.

Recoveries for Al in the MS and MSD cannot be quantified, due to high concentrations of this analyte in the sample, relative to the spiked amount. This is not expected to have any impact on data quality.

2A:

Sn observed in the reagent blank at levels significantly above its LOR. Data for this element is expected to be biased high, as a result of this background contribution.

LCSD sample was lost during processing. LCS serves to validate the batch.

Al recovery in the LCS are outside ALS DQOs (found: 83%, Limits: 85-115%). Data for this analyte may be biased low.

Li recoveries in the MS and MSD are outside ALS DQOs (found: 66, 73%, Limits: 80-120%). This may be due to a matrix interference. Data for this analyte is likely to be biased low.

Recoveries for many target analytes cannot be quantified in the MS and MSD, due to high concentrations of the target analytes in the sample, relative to the spiked amounts. This is not expected to have any impact on data quality.

PE 8-Nov-19

LCB = Laboratory Control Blank
LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
LOR = Limit of Reporting
nq = Indicates that this value was not quantifiable.

Certified by: L. Wrona

Lynne Wrona
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(8 THRU 13) TEST#2**	**19-21939-PM-(15 THRU 20) TEST#3**	**19-21939-PM-(22 THRU 27) BLANK**	**MB**
ALS Sample ID		L2364236-1	L2364236-2	L2364236-3	L2364236-4	L2364236-MB
Matrix		Stack	Stack	Stack	Stack	n/a
Analysis Type		Sample	Sample	Sample	Sample	Sample
Sampling Date		8-Oct-19	9-Oct-19	10-Oct-19	10-Oct-19	n/a
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	n/a
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**ug**	**ug**
Front Half HNO3 Fraction 1A						
Aluminum	20	137	173	213	<	<
Antimony	0.2	5.43	5.77	7.75	<	<
Arsenic	1	85.1	77.4	77.1	<	<
Barium	5	20.5	18.2	23.1	<	<
Beryllium	0.2	<	<	<	<	<
Boron	30	<	<	<	<	<
Cadmium	0.1	3.82	4.24	5.95	<	<
Calcium	500	1330	1150	1410	<	<
Chromium	1	67.1	75.0	71.0	<	<
Cobalt	0.2	1.05	1.14	1.37	<	<
Copper	1	192	174	174	5.42	<
Iron	200	281	298	296	<	<
Lead	0.5	4.44	4.39	5.59	0.510	<
Lithium	0.5	8.97	9.15	12.8	<	<
Magnesium	10	256	246	285	<	<
Manganese	0.5	48.1	47.0	44.4	<	<
Molybdenum	0.2	10.6	10.4	11.6	<	<
Nickel	0.2	12.7	15.3	14.6	0.730	0.237
Phosphorus	100	478	450	567	<	<
Potassium	100	7660	6870	7320	<	<
Selenium	2	33.4	32.9	33.1	<	<
Silver	0.2	0.224	0.246	0.322	<	<
Sodium	30	13800	12800	14000	295	<
Strontium	0.2	5.38	5.10	6.21	<	<
Tin	0.3	37.8	39.9	39.5	0.434	<
Titanium	10	78.5	74.6	88.0	<	<
Vanadium	1	1.98	2.12	2.59	<	<
Zinc	6	151	127	123	<	<
Sulphur	10000	<	<	<	<	<
Silicon	150	597	797	483	<	<

ALS Environmental

Sample QC Summary Report

Sample Name		RB	LCS	LCS	LCSD	LCSD
ALS Sample ID		RB	LCS	LCS	LCSD	LCSD
Matrix		Stack	Stack	Stack	Stack	Stack
Analysis Type		Blank	LCS	LCS	LCS	LCS
Sampling Date		n/a	n/a	n/a	n/a	n/a
Date of Receipt		n/a	n/a	n/a	n/a	n/a
Multi-Metals via ICP-MS	**LOR**					
	ug	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HNO3 Fraction 1A						
Aluminum	20	<	95.2	79	96.2	80
Antimony	0.2	<	12.1	100	11.6	97
Arsenic	1	<	55.1	92	55.0	92
Barium	5	<	60.3	101	59.0	98
Beryllium	0.2	<	55.2	92	54.9	92
Boron	30	<	44.6	93	38.2	82
Cadmium	0.1	<	29.1	97	29.0	97
Calcium	500	<	1490	95	1480	95
Chromium	1	<	58.1	97	57.7	96
Cobalt	0.2	<	57.8	96	77.6	129
Copper	1	<	58.6	98	57.9	97
Iron	200	<	300	100	298	99
Lead	0.5	<	60.9	101	58.4	97
Lithium	0.5	<	10.6	95	10.4	94
Magnesium	10	<	280	93	274	91
Manganese	0.5	<	57.9	96	57.9	96
Molybdenum	0.2	<	29.8	99	28.9	96
Nickel	0.2	<	58.1	97	57.3	95
Phosphorus	100	<	1340	90	1390	94
Potassium	100	<	1390	94	1390	94
Selenium	2	<	57.9	97	57.1	95
Silver	0.2	<	30.0	100	29.2	97
Sodium	30	<	1410	93	1400	92
Strontium	0.2	<	57.5	96	55.8	93
Tin	0.3	<	29.5	98	29.3	98
Titanium	10	<	56.4	94	56.9	95
Vanadium	1	<	57.1	95	56.5	94
Zinc	6	<	115	95	112	93
Sulphur	10000	<	12200	96	12000	94
Silicon	150	<	2760	92	2850	95

ALS Environmental

Sample QC Summary Report

Sample Name		**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(1 THRU 6) TEST#1**
ALS Sample ID		L2364236-1	L2364236-1	MS	MS	MSD	MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date		8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HNO3 Fraction 1A							
Aluminum	20	137	135	324	nq	317	nq
Antimony	0.2	5.43	5.49	28.9	98	28.7	97
Arsenic	1	85.1	84.4	192	89	191	88
Barium	5	20.5	19.8	137	97	134	95
Beryllium	0.2	<	<	108	90	107	89
Boron	30	<	<	111	96	106	92
Cadmium	0.1	3.82	3.78	61.7	96	61.2	96
Calcium	500	1330	1340	4090	nq	4170	nq
Chromium	1	67.1	65.8	179	93	179	93
Cobalt	0.2	1.05	1.10	114	94	114	94
Copper	1	192	190	302	nq	304	nq
Iron	200	281	276	855	96	856	96
Lead	0.5	4.44	4.30	118	95	121	97
Lithium	0.5	8.97	8.90	30.8	91	30.0	87
Magnesium	10	256	250	805	92	805	92
Manganese	0.5	48.1	47.7	163	96	159	92
Molybdenum	0.2	10.6	10.5	68.2	96	67.9	96
Nickel	0.2	12.7	12.6	126	95	126	94
Phosphorus	100	478	464	3150	89	3150	89
Potassium	100	7660	7590	10600	nq	10300	nq
Selenium	2	33.4	32.6	145	93	146	94
Silver	0.2	0.224	0.241	55.6	92	54.9	91
Sodium	30	13800	13800	16300	nq	15900	nq
Strontium	0.2	5.38	5.90	121	96	119	95
Tin	0.3	37.8	37.7	95.7	97	96.0	97
Titanium	10	78.5	77.3	191	94	193	95
Vanadium	1	1.98	1.99	114	94	114	93
Zinc	6	151	148	375	93	370	91
Sulphur	10000	<	<	29400	95	29300	95
Silicon	150	597	611	8660	90	8500	88

ALS Environmental

Sample Analysis Summary Report

Sample Name		**19-21939-PM-(1 THRU 6) TEST#1**	**19-21939-PM-(8 THRU 13) TEST#2**	**19-21939-PM-(15 THRU 20) TEST#3**	**19-21939-PM-(22 THRU 27) BLANK**	**MB**
ALS Sample ID		L2364236-1	L2364236-2	L2364236-3	L2364236-4	L2364236-MB
Matrix		Stack	Stack	Stack	Stack	n/a
Analysis Type		Sample	Sample	Sample	Sample	Sample
Sampling Date		8-Oct-19	9-Oct-19	10-Oct-19	10-Oct-19	n/a
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	n/a
Multi-Metals via ICP-MS	**LOR**					
	ug	**ug**	**ug**	**ug**	**ug**	**ug**
Front Half HF Fraction 1A						
Aluminum	20	177	168	180	134	131
Antimony	0.2	1.08	1.12	2.04	<	<
Arsenic	1	7.04	8.39	6.33	<	<
Barium	5	12.0	9.41	8.78	6.50	<
Beryllium	0.2	<	<	<	<	<
Boron	30	<	<	<	<	<
Cadmium	0.1	0.329	0.478	0.722	<	<
Calcium	500	<	<	<	<	<
Chromium	1	31.5	23.4	28.0	1.31	1.07
Cobalt	0.2	0.254	0.240	0.353	<	<
Copper	1	16.9	19.2	15.2	<	<
Iron	200	<	<	<	<	<
Lead	0.5	0.557	0.690	0.654	<	<
Lithium	0.5	<	<	<	<	<
Magnesium	10	56.4	53.6	52.5	25.4	20.9
Manganese	0.5	9.39	7.95	8.29	1.50	1.52
Molybdenum	0.2	10.3	10.2	10.7	9.29	9.33
Nickel	0.2	5.54	4.86	7.66	2.47	1.69
Phosphorus	100	<	<	<	<	<
Potassium	100	516	645	439	<	<
Selenium	2	4.51	4.66	4.42	<	<
Silver	0.2	<	<	<	<	<
Sodium	30	1020	1280	933	83.1	<
Strontium	0.2	1.19	1.23	1.26	0.691	0.572
Tin	0.3	10.6	7.05	9.56	<	<
Titanium	10	44.1	34.4	48.1	<	<
Vanadium	1	<	<	<	<	<
Zinc	6	29.3	25.0	25.7	<	<
Sulphur	10000	<	<	<	<	<
Silicon	150	nq	nq	nq	nq	nq

ALS Environmental

Sample QC Summary Report

Sample Name		RB	LCS	LCS	LCSD	LCSD
ALS Sample ID		RB	LCS	LCS	LCSD	LCSD
Matrix		Stack	Stack	Stack	Stack	Stack
Analysis Type		Blank	LCS	LCS	LCS	LCS
Sampling Date		n/a	n/a	n/a	n/a	n/a
Date of Receipt		n/a	n/a	n/a	n/a	n/a
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HF Fraction 1A						
Aluminum	20	<	96.8	78	97.7	79
Antimony	0.2	<	11.4	95	11.5	96
Arsenic	1	<	53.5	89	53.7	89
Barium	5	<	61.5	102	71.6	119
Beryllium	0.2	<	49.7	83	51.2	85
Boron	30	<	<	86	33.0	94
Cadmium	0.1	<	29.0	97	28.6	95
Calcium	500	<	1410	91	1400	91
Chromium	1	<	55.6	93	55.8	93
Cobalt	0.2	<	55.8	93	56.0	93
Copper	1	<	56.8	95	56.7	95
Iron	200	<	292	97	291	97
Lead	0.5	<	57.5	96	59.6	99
Lithium	0.5	<	8.72	86	8.76	86
Magnesium	10	<	265	88	261	87
Manganese	0.5	<	55.6	93	56.4	94
Molybdenum	0.2	<	28.5	95	28.2	94
Nickel	0.2	<	58.2	97	56.2	94
Phosphorus	100	<	1310	88	1250	84
Potassium	100	<	1290	88	1330	90
Selenium	2	<	56.9	95	57.0	95
Silver	0.2	<	28.5	95	28.3	94
Sodium	30	<	1340	89	1350	89
Strontium	0.2	<	54.4	91	54.3	91
Tin	0.3	<	29.2	97	28.5	95
Titanium	10	<	54.4	91	54.2	90
Vanadium	1	<	54.5	91	54.9	92
Zinc	6	<	113	94	123	102
Sulphur	10000	<	10700	93	11000	95
Silicon	150	nq	nq	nq	nq	nq

ALS Environmental

Sample QC Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2364236-1	L2364236-1	MS	MS	MSD	MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date		8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HF Fraction 1A							
Aluminum	20	177	178	349	nq	344	nq
Antimony	0.2	1.08	1.12	24.9	99	24.7	99
Arsenic	1	7.04	6.91	114	89	113	88
Barium	5	12.0	11.3	122	91	124	93
Beryllium	0.2	<	<	97.7	81	97.4	81
Boron	30	<	<	87.3	85	85.1	83
Cadmium	0.1	0.329	0.294	58.9	98	58.8	97
Calcium	500	<	<	2900	91	2910	91
Chromium	1	31.5	30.8	142	92	142	92
Cobalt	0.2	0.254	0.237	112	93	112	93
Copper	1	16.9	16.5	130	94	129	94
Iron	200	<	<	701	94	724	97
Lead	0.5	0.557	0.527	119	99	118	98
Lithium	0.5	<	<	18.3	80	18.2	80
Magnesium	10	56.4	52.9	578	87	567	85
Manganese	0.5	9.39	9.08	122	94	122	94
Molybdenum	0.2	10.3	10.2	68.4	97	67.1	95
Nickel	0.2	5.54	5.34	118	94	117	93
Phosphorus	100	<	<	2530	84	2520	83
Potassium	100	516	498	3080	85	3060	85
Selenium	2	4.51	4.62	121	97	121	97
Silver	0.2	<	<	58.3	97	57.6	96
Sodium	30	1020	993	3660	88	3580	85
Strontium	0.2	1.19	1.16	111	92	112	93
Tin	0.3	10.6	10.6	70.3	100	69.5	98
Titanium	10	44.1	43.6	150	89	150	88
Vanadium	1	<	<	109	91	109	90
Zinc	6	29.3	28.5	254	93	252	93
Sulphur	10000	<	<	21900	86	21300	84
Silicon	150	nq	nq	nq	nq	nq	nq

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Sample Analysis Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(8 THRU 13) TEST#2	19-21939-PM-(15 THRU 20) TEST#3	19-21939-PM-(22 THRU 27) BLANK
ALS Sample ID		L2364236-1	L2364236-2	L2364236-3	L2364236-4
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample
Sampling Date		8-Oct-19	9-Oct-19	10-Oct-19	10-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**ug**
Back Half (HNO3 / H2O2) Fraction 2A					
Aluminum	5	3540	1490	4040	32.5
Antimony	0.1	8.72	12.1	12.7	0.201
Arsenic	0.2	863	487	1100	0.202
Barium	0.5	28.6	37.2	56.6	2.07
Beryllium	0.1	<	0.679	0.823	<
Boron	10	13000	8860	13600	87.8
Cadmium (111)	0.05	0.294	1.70	0.274	1.79
Calcium	100	16000	7260	12000	546
Chromium (52)	0.15	19.5	11.7	19.5	4.31
Cobalt	0.1	0.666	0.376	0.585	0.190
Copper (63)	0.3	7.16	5.13	6.71	10.7
Iron (57)	15	1540	733	1210	63.9
Lead	0.05	4.71	7.95	8.33	2.06
Lithium	0.25	2.75	5.19	8.68	<
Magnesium	5	297	230	373	35.3
Manganese	0.15	13.5	19.9	18.1	3.94
Molybdenum	0.1	1.07	0.450	1.03	0.143
Nickel	0.1	7.37	7.50	9.50	7.09
Phosphorus	25	41.5	<	<	<
Potassium	100	658	540	882	290
Selenium (77)	1	1830	798	1330	<
Silver	0.1	0.495	0.240	0.523	<
Sodium	20	25900	11100	21900	455
Strontium	0.1	27.1	19.4	31.4	1.18
Tin	0.1	69.0	72.9	70.5	16.8
Titanium (50)	1	88.2	34.7	63.5	1.53
Vanadium	0.1	0.854	2.06	2.95	0.147
Zinc (66)	3	38.0	46.5	53.0	81.0
Sulphur	3000	3130000	2880000	3070000	<
Silicon	75	66500	25600	39400	115

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Sample QC Summary Report

Sample Name		RB	LCS	LCS
ALS Sample ID		RB	LCSD	LCSD
Matrix		Stack	Stack	Stack
Analysis Type		Blank	LCS	LCS
Sampling Date		n/a	n/a	n/a
Date of Receipt		n/a	n/a	n/a

Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**% Rec**
Back Half (HNO3 / H2O2) Fraction 2A				
Aluminum	5	<	50.5	83
Antimony	0.1	<	5.91	98
Arsenic	0.2	<	27.3	91
Barium	0.5	<	28.7	96
Beryllium	0.1	<	27.8	93
Boron	10	<	34.7	115
Cadmium	0.05	<	14.3	95
Calcium	100	<	717	95
Chromium	0.15	<	28.7	96
Cobalt	0.1	<	28.6	95
Copper	0.3	<	29.2	97
Iron	15	<	145	96
Lead	0.05	<	29.4	98
Lithium	0.25	<	5.46	94
Magnesium	5	<	143	95
Manganese	0.15	<	28.8	96
Molybdenum	0.1	<	14.5	97
Nickel	0.1	<	28.6	95
Phosphorus	25	<	667	90
Potassium	100	<	697	93
Selenium	1	<	28.2	94
Silver	0.1	<	14.6	97
Sodium	20	<	696	93
Strontium	0.1	<	29.3	98
Tin	0.1	4.32	14.8	99
Titanium	1	<	28.2	94
Vanadium	0.1	<	28.2	94
Zinc	3	<	55.6	93
Sulphur	3000	<	6850	93
Silicon	75	<	1320	88

ALS Environmental

Sample QC Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2364236-1	L2364236-1	MS	MS	MSD	MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date		8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Back Half (HNO3 / H2O2) Fraction 2A							
Aluminum	5	3540	3520	3600	nq	3660	nq
Antimony	0.1	8.72	8.88	21.4	106	20.8	101
Arsenic	0.2	863	890	954	nq	946	nq
Barium	0.5	28.6	28.5	82.9	90	84.5	93
Beryllium	0.1	<	<	47.2	79	48.2	80
Boron	10	13000	11600	11500	nq	12100	nq
Cadmium	0.05	0.294	0.315	29.9	99	29.7	98
Calcium	100	16000	15300	16700	nq	17000	nq
Chromium	0.15	19.5	20.0	74.1	91	74.2	91
Cobalt	0.1	0.666	0.729	55.6	92	55.6	91
Copper	0.3	7.16	7.49	64.4	95	63.9	95
Iron	15	1540	1560	1830	96	1830	98
Lead	0.05	4.71	4.76	63.1	97	62.5	96
Lithium	0.25	2.75	1.95	10.7	66	11.5	73
Magnesium	5	297	301	557	nq	556	nq
Manganese	0.15	13.5	13.9	66.7	89	67.6	90
Molybdenum	0.1	1.07	1.06	29.5	95	29.2	94
Nickel	0.1	7.37	7.70	62.9	93	62.2	91
Phosphorus	25	41.5	37.7	1350	87	1330	86
Potassium	100	658	668	1900	nq	1910	nq
Selenium	1	1830	1860	1950	nq	1920	nq
Silver	0.1	0.495	0.477	29.0	95	28.5	93
Sodium	20	25900	26200	26900	nq	27500	nq
Strontium	0.1	27.1	26.9	85.0	97	82.0	92
Tin	0.1	69.0	70.7	101	107	101	106
Titanium	1	88.2	88.8	142	nq	142	nq
Vanadium	0.1	0.854	0.867	54.7	90	54.7	90
Zinc	3	38.0	39.7	150	93	150	93
Sulphur	3000	3130000	3120000	4590000	nq	4660000	nq
Silicon	75	66500	65500	67800	nq	70000	nq

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	Ortech Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L2364236		
Date of Report	6-Nov-19		
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS:

Sample Preparation via USEPA Method 29 (AB 01,04,05-NOV-2019)
Mercury Analysis via CVAA using Method USEPA 7470A (AB 04,05-NOV-2019)

LOR = Limit of Reporting
LCB = Laboratory Control Blank (limits: <LOR)
LCS = Laboratory Control Sample (limits: hivol, solids: 85-115%, stack: 90-110%)
MS = Matrix Spike Sample (limits: 75-125%)
RPD = Relative Percent Difference (limits: <20%)
CCV/CVS = Calibration Verification Standard (limits: 85-115%)

Certified by: L. Wrona
Lynne Wrona
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(8 THRU 13) TEST#2	19-21939-PM-(15 THRU 20) TEST#3	19-21939-PM-(22 THRU 27) BLANK
ALS Sample ID		L2364236-1	L2364236-2	L2364236-3	L2364236-4
Matrix		Stack	Stack	Stack	Stack
Analysis type		Sample	Sample	Sample	Sample
Sampling Date/Time		8-Oct-19	9-Oct-19	10-Oct-19	10-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Mercury via CVAA	LOR				
Method 29	ug	ug	ug	ug	ug
Analytical Fraction 1B (Nitric)	0.015	0.540	0.519	0.615	<0.015
Analytical Fraction 1B	0.015	0.0690	0.0606	0.0678	<0.015
Analytical Fraction 2B	0.050	11.2	12.1	11.0	<0.361
Analytical Fraction 3B	0.025	<0.0275	<0.025	<0.025	<0.025
Analytical Fraction 3C	0.25	0.480	0.816	1.06	<0.2

ALS Environmental

Sample QC Summary Report

Sample Name		**LCB**	**LCS**	**LCS**	**LCSD**	**LCSD**
ALS Sample ID		LCB	LCS	LCS	LCSD	LCSD
Analysis type		Method Blank	Blank Spike	Blank Spike	Blank Spike Dup	Blank Spike Dup
Sampling Date/Time		N/A	N/A	N/A	N/A	N/A
Date of Receipt		N/A	N/A	N/A	N/A	N/A
Mercury via CVAA	**LOR**					
Method 29	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Analytical Fraction 1B (Nitric)	0.015	<0.015	0.287	95%	0.289	96%
Analytical Fraction 1B	0.015	<0.015	0.287	95%	0.288	95%
Analytical Fraction 2B	0.050	<0.35	6.73	96%	6.75	96%
Analytical Fraction 3B	0.025	<0.025	0.484	96%	0.481	96%
Analytical Fraction 3C	0.25	<0.25	4.90	97%	4.91	98%

ALS Environmental

Sample QC Summary Report

Sample Name		19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1	19-21939-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2364236-1	L2364236-1DUP	L2364236-1MS	L2364236-1MS	L2364236-1MSD	L2364236-1MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date/Time		8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Date of Receipt		11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Mercury via CVAA	**LOR**						
Method 29	**ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Analytical Fraction 1B (Nitric)	0.015	0.540	0.543	0.846	102%	0.873	111%
Analytical Fraction 1B	0.015	0.0690	0.0693	0.360	97%	0.363	98%
Analytical Fraction 2B	0.050	11.2	11.3	51.9	89%	51.4	88%
Analytical Fraction 3B	0.025	<0.0275	<0.0275	0.502	91%	0.504	91%
Analytical Fraction 3C	0.250	0.480	0.472	4.32	96%	4.32	96%

APPENDIX 10

Semi-Volatile Organics Train
Recovery Data Sheets
(4 pages)

Semi-Volatile Organics Train Recovery Data Sheet

Client : Clean Habors
Project No.: 21939
Sample Batch No.: 19-21939-SVOC-

Test No.: 1
Test Date: Oct. 8 / 2019
Test Location: Incinerator Stack

Sample ID -1 — Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser — CONTAINER TS1

Empty Wt:	430.6
After Acetone/ Hexane Rinse:	812.2
Total TS1:	381.6

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID -2 — Filter — CONTAINER TS2

Colour: light grey

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID -3 — XAD-II Trap — CONTAINER TS3

Initial Wt:	675.0
Final Wt:	699.8
1 Gain:	24.8
Colour:	white

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID -4 — Impingers 1, 2 & 3 — CONTAINER TS4

Impinger #1 Jumbo K.O.	
Empty Wt:	768.4
Final Wt:	3191.3
2 Gain:	2422.9
Colour:	clear

Impinger #2 Ethylene Glycol	
Empty Wt:	653.6
Initial Wt:	783.8
Final Wt:	833.8
3 Gain:	50.0 ~~180.2~~
Colour:	clear

Impinger #3 Empty	
Empty Wt:	519.6
Final Wt:	520.1
4 Gain:	0.5
Colour:	clear

Container TS4 Weights	
Empty Wt:	1352.9
With Imp Soln:	4897.9
Imp Volume:	3544.0
After ~100g H_2O Rinse:	5076.7
Total TS4:	3722.8

CWTR = 1 + 2 + 3 + 4: 3478.5 ~~3608.7~~ ✓

WCBDA=5: 27.9

1412.8
432.5
+ 980.3 (all gain)

Sample ID -5 — Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers — CONTAINER TS5

Empty Wt:	432.5
After Acetone Rinse:	588.1
Acetone Rinse Gain:	155.6
After Hexane Rinse:	737.0
Hexane Rinse Gain:	148.9
Total TS5:	304.5

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Impinger Box ID: 6

Impinger 4 Silica Gel — CONTAINER TS6 (Impinger)

Initial Wt:	921.8
Final Wt:	949.7
5 Gain:	27.9
% Spent:	50 %

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	D
Trap ID:	#2
HPLC Batch No.:	ALS ULTRA PURE
Ethylene Gylcol Batch No.:	189285
Hexane Batch No.:	104691
Acetone Batch No.:	104761

Train Loaded By: CB/TS
Train Recovered By: CB.

TS1, TS4, TS5 - 1L Amber Glass Bottle
TS2 - Glass Petri Dish
TS3 - Glass Trap

Semi-Volatile Organics Train Recovery Data Sheet

Client : Clean Habors
Project No.: 21939
Sample Batch No.: 19-21939-SVOC-

Test No.: 2
Test Date: Oct. 9, 2019
Test Location: Incinerator Stack

Sample ID -6 — Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	431.4
After Acetone/ Hexane Rinse:	754.6
Total TS1:	322.2

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID -7 — Filter

CONTAINER TS2

Colour:	light grey

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID -8 — XAD-II Trap

CONTAINER TS3

Initial Wt:	~~[illegible]~~ 684.6
Final Wt:	703.4
1 Gain:	18.9
Colour:	white

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID -9 — Impingers 1, 2 & 3

CONTAINER TS4

Impinger #1 Jumbo K.O.	
Empty Wt:	708.7
Final Wt:	3146.1
2 Gain:	2437.4
Colour:	clear

Impinger #2 Ethylene Glycol	
Empty Wt:	691.7
Initial Wt:	793.8
Final Wt:	854.6
3 Gain:	60.8
Colour:	clear

Impinger #3 Empty	
Empty Wt:	653.3
Final Wt:	655.3
4 Gain:	2.0
Colour:	clear

Container TS4 Weights	
Empty Wt:	1360.1
With Imp Soln:	4886.5
Imp Volume:	3526.4
After ~100g H_2O Rinse:	5042.7
Total TS4:	3682.6

CWTR = 1 + 2 + 3 + 4:	3457.8

WCBDA=5:	39.3

Sample ID -10 — Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	433.5
After Acetone Rinse:	581.7
Acetone Rinse Gain:	—
After Hexane Rinse:	~~653.5~~ 715.5
Hexane Rinse Gain:	—
Total TS5:	282.0

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Impinger Box ID: 12

Impinger 4 Silica Gel

CONTAINER TS6 (Impinger)

Initial Wt:	838.7
Final Wt:	878.0
5 Gain:	39.3
% Spent:	50%

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	B
Trap ID:	#1 #4
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	189285
Hexane Batch No.:	104691
Acetone Batch No.:	104761

Train Loaded By: CB/JS
Train Recovered By: CB

TS1, TS4, TS5 - 1L Amber Glass Bottle
TS2 - Glass Petri Dish
TS3 - Glass Trap

TRAV. #1 GAIN

1370.6
- 431.8
938.8 g

Revision: June 19, 2014

ORTECH Environmental

Semi-Volatile Organics Train Recovery Data Sheet

Client :	Clean Habors
Project No.:	21939
Sample Batch No.:	19-21939-SVOC-

Test No.:	3
Test Date:	OCT 10 /19
Test Location:	Incinerator Stack

Sample ID 11

Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	431.8
After Acetone/ Hexane Rinse:	780.2
Total TS1:	348.4

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID 12

Filter

CONTAINER TS2

Colour:	GREY

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID 13

XAD-II Trap

CONTAINER TS3

	Initial Wt:	673.0
	Final Wt:	681.9
1	Gain:	8.9
	Colour:	WHITE

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID 14

Impingers 1, 2 & 3

CONTAINER TS4

	Impinger #1 Jumbo K.O.	
	Empty Wt:	722.9
	Final Wt:	4165.2
2	Gain:	3442.3
	Colour:	–

	Impinger #2 Ethylene Glycol	
	Empty Wt:	533.8
	Initial Wt:	644.8
	Final Wt:	682.9
3	Gain:	38.1 ~~149.1~~
	Colour:	–

	Impinger #3 Empty	
	Empty Wt:	547.9
	Final Wt: -	548.3
4	Gain:	0.4
	Colour:	–

Container TS4 Weights	
Empty Wt:	1356.0
With Imp Soln:	4939.1
Imp Volume:	3583.1
After ~100g H_2O Rinse:	5081.7
Total TS4:	3725.7

3489.7 ✓

CWTR = 1 + 2 + 3 + 4:	~~3600.7~~
WCBDA=5:	17.8

Sample ID 15

Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	432.7
After Acetone Rinse:	–
Acetone Rinse Gain:	–
After Hexane Rinse:	686.3
Hexane Rinse Gain:	~~[illegible]~~
Total TS5:	253.6

~~Use 100 - 150g acetone total &~~
~~100-150g of hexane total for rinses~~

Impinger Box ID: 4

Impinger 4 Silica Gel

CONTAINER TS6 (Impinger)

	Initial Wt:	912.1
	Final Wt:	929.9
5	Gain:	17.8
	% Spent:	20

TS1, TS4, TS5 - 1L Amber Glass Bottle
TS2 - Glass Petri Dish
TS3 - Glass Trap

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	A
Trap ID:	#6
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	189285
Hexane Batch No.:	104691
Acetone Batch No.:	104761

Train Loaded By: CB / TS
Train Recovered By: DW

430.8
1376.6
ADDED TO JUMBO

Revision: June 19, 2014

ORTECH Environmental

Semi-Volatile Organics Train Recovery Data Sheet

Client :	Clean Habors
Project No.:	21939
Sample Batch No.:	19-21939-SVOC-

Test No.:	Blank
Test Date:	Oct. 9, 2019
Test Location:	Incinerator Stack

Sample ID -16

Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	429.2
After Acetone/ Hexane Rinse:	674.7
Total TS1:	245.5

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID -17

Filter

CONTAINER TS2

Colour:	white

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID -18

XAD-II Trap

675.7

CONTAINER TS3

	Initial Wt:	~~675.7~~ ~~684.6~~
	Final Wt:	667.4
1	Gain:	-8.3
	Colour:	white

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID -19

Impingers 1, 2 & 3

CONTAINER TS4

	Impinger #1 Jumbo K.O.	
	Empty Wt:	715.9
	Final Wt:	716.2
2	Gain:	0.3
	Colour:	empty

	Impinger #2 Ethylene Glycol	
	Empty Wt:	587.5
	Initial Wt:	699.9
	Final Wt:	701.0
3	Gain:	~~0~~ 1.1
	Colour:	clear

	Impinger #3 Empty	
	Empty Wt:	649.2
	Final Wt:	649.2
4	Gain:	0.0
	Colour:	empty

Container TS4 Weights	
Empty Wt:	426.6
With Imp Soln:	530.5
Imp Volume:	103.9
After ~100g H_2O Rinse:	725.6
Total TS4:	299.0

-7.3

CWTR = 1 + 2 + 3 + 4:	~~9.9~~
WCBDA=5:	8.7

Sample ID -20

Back-Half Rinses
Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	426.6
After Acetone Rinse:	578.2
Acetone Rinse Gain:	151.6
After Hexane Rinse:	739.4
Hexane Rinse Gain:	161.2
Total TS5:	312.8

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Impinger Box ID: 2

Impinger 4
Silica Gel

CONTAINER TS6 (Impinger)

	Initial Wt:	915.2
	Final Wt:	923.9
5	Gain:	8.7
	% Spent:	—

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	C
Trap ID:	~~#4~~ #1
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	189285
Hexane Batch No.:	104691
Acetone Batch No.:	104961

Train Loaded By: CB/TS
Train Recovered By: CB

TS1, TS4, TS5 - 1L Amber Glass Bottle
TS2 - Glass Petri Dish
TS3 - Glass Trap

APPENDIX 11

Semi-Volatile Organics Analytical Reports
(77 pages)

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report	13-Nov-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PCDD/F by EPA M23**

The Extraction (internal) Standard recoveries of the sample "19-21939-SVOC-(6 THRU 10) TEST#2" (lab ID L2364245-2) were all below the method acceptance criteria. The sample native (and Field/Sampling) compounds calculated by Isotope Dilution against 13C-labeled standards of similar molecular composition, are inherently recovery corrected so no impact to the quantification of detected compounds is expected, though this recovery loss did produce elevated Estimated Detection Limits.

Certified by:

Bradley Reimer
GC/MS Laboratory Senior Technical Specialist

ALS Life Sciences

Sample Analysis summary Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	**19-21939-SVOC-(6 THRU 10) TEST#2**	**19-21939-SVOC-(11 THRU 15) TEST#3**	**19-21939-SVOC-(16 THRU 20) BLANK**
ALS Sample ID	L2364245-1	L2364245-2	L2364245-3	L2364245-4
Sample Size	1	1	1	1
Sample size units	sample	sample	sample	sample
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19
Extraction Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Target Analytes	pg	pg	pg	pg
2,3,7,8-TCDD	<5.2	<25	<3.6	<3.1
1,2,3,7,8-PeCDD	<2.9	<15	<1.6	<1.7
1,2,3,4,7,8-HxCDD	<3.8	<17	<2.9	<1.6
1,2,3,6,7,8-HxCDD	5.97	<16	<8.5	<1.5
1,2,3,7,8,9-HxCDD	<3.8	<18	<2.9	<1.6
1,2,3,4,6,7,8-HpCDD	28.6	<42	67.1	<4.1
OCDD	44.4	<180	102	<5.0
2,3,7,8-TCDF	<5.6	<21	<3.1	<2.5
1,2,3,7,8-PeCDF	<8.3	<15	7.56	2.80
2,3,4,7,8-PeCDF	<8.8	<16	<11	<1.7
1,2,3,4,7,8-HxCDF	<5.5	<20	8.57	<1.3
1,2,3,6,7,8-HxCDF	<6.9	<19	11.3	<1.3
2,3,4,6,7,8-HxCDF	9.65	<20	26.7	<1.3
1,2,3,7,8,9-HxCDF	9.18	<54	12.6	<3.1
1,2,3,4,6,7,8-HpCDF	24.2	<34	42.9	<0.96
1,2,3,4,7,8,9-HpCDF	<5.6	<44	19.6	<0.93
OCDF	<9.7	<81	34.5	3.21
Field Spike Standards	% Rec	% Rec	% Rec	% Rec
37Cl4-2,3,7,8-TCDD	92	81	86	84
13C12-1,2,3,4,7,8-HxCDD	92	78	87	80
13C12-2,3,4,7,8-PeCDF	114	120	104	105
13C12-1,2,3,4,7,8-HxCDF	99	80	91	88
13C12-1,2,3,4,7,8,9-HpCDF	100	66	93	91
Extraction Standards				
13C12-2,3,7,8-TCDD	46	9	80	72
13C12-1,2,3,7,8-PeCDD	50	7	84	76
13C12-1,2,3,6,7,8-HxCDD	52	5	91	83
13C12-1,2,3,4,6,7,8-HpCDD	56	3	99	83
13C12-OCDD	55	2	101	80
13C12-2,3,7,8-TCDF	46	11	81	73
13C12-1,2,3,7,8-PeCDF	44	8	76	69
13C12-1,2,3,6,7,8-HxCDF	46	5	82	71
13C12-1,2,3,4,6,7,8-HpCDF	51	3	94	79
Cleanup Standard				
13C12-1,2,3,7,8,9-HxCDF	46	45	69	57
Homologue Group Totals	pg	pg	pg	pg
Total-TCDD	16.9	72.5	45.3	<3.1
Total-PeCDD	35.2	<15	34.6	<1.7
Total-HxCDD	104	<18	174	<1.6
Total-HpCDD	57.1	49.5	142	<1.3
Total-TCDF	103	166	80.4	<2.5
Total-PeCDF	49.0	<15	49.3	2.80
Total-HxCDF	43.5	<24	107	<1.6
Total-HpCDF	31.0	<44	79.6	<0.93
Toxic Equivalency - (WHO 2005)				
Lower Bound PCDD/F TEQ (WHO 2005)	3.02	0.00	7.48	0.0850
Mid Point PCDD/F TEQ (WHO 2005)	11.9	37.9	14.8	3.66
Upper Bound PCDD/F TEQ (WHO 2005)	16.6	65.0	17.7	6.88

ALS Life Sciences

Quality Control Summary Report

Sample Name	**Method Blank**	**Laboratory Control Sample**
ALS Sample ID	WG3189120-1	WG3189120-2
Sample Size	1	1
Sample size units	sample	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	22-Oct-19	22-Oct-19
Target Analytes	**pg**	**% Rec**
2,3,7,8-TCDD	<6.0	90
1,2,3,7,8-PeCDD	<3.4	97
1,2,3,4,7,8-HxCDD	<4.1	85
1,2,3,6,7,8-HxCDD	<3.8	113
1,2,3,7,8,9-HxCDD	<4.1	115
1,2,3,4,6,7,8-HpCDD	<2.9	93
OCDD	<2.7	98
2,3,7,8-TCDF	<4.7	87
1,2,3,7,8-PeCDF	<3.4	99
2,3,4,7,8-PeCDF	<3.1	89
1,2,3,4,7,8-HxCDF	<2.5	89
1,2,3,6,7,8-HxCDF	<2.4	120
2,3,4,6,7,8-HxCDF	<2.5	108
1,2,3,7,8,9-HxCDF	3.19	113
1,2,3,4,6,7,8-HpCDF	<2.0	106
1,2,3,4,7,8,9-HpCDF	<2.6	108
OCDF	<3.1	97
Field Spike Standards	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	NS	NS
13C12-1,2,3,4,7,8-HxCDD	NS	NS
13C12-2,3,4,7,8-PeCDF	NS	NS
13C12-1,2,3,4,7,8-HxCDF	NS	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS	NS
Extraction Standards		
13C12-2,3,7,8-TCDD	46	66
13C12-1,2,3,7,8-PeCDD	46	73
13C12-1,2,3,6,7,8-HxCDD	48	74
13C12-1,2,3,4,6,7,8-HpCDD	54	85
13C12-OCDD	58	88
13C12-2,3,7,8-TCDF	47	70
13C12-1,2,3,7,8-PeCDF	44	68
13C12-1,2,3,6,7,8-HxCDF	44	70
13C12-1,2,3,4,6,7,8-HpCDF	52	78
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	40	57
Homologue Group Totals	**pg**	
Total-TCDD	<6.0	
Total-PeCDD	<3.4	
Total-HxCDD	<4.1	
Total-HpCDD	<2.9	
Total-TCDF	<4.7	
Total-PeCDF	<3.4	
Total-HxCDF	3.19	
Total-HpCDF	<2.6	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.319	
Mid Point PCDD/F TEQ (WHO 2005)	6.78	
Upper Bound PCDD/F TEQ (WHO 2005)	13.2	

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	8-Oct-19	
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19	
Analysis Method	EPA M23	Sample Size	1	sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A08
Run Date	29-Oct-19 19:03
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<5.2	5.2	U		35
1,2,3,7,8-PeCDD	1	32.02	<2.9	2.9	M,U	2.8	180
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<3.8	3.8	U		180
1,2,3,6,7,8-HxCDD	0.1	34.21	5.97	3.5	M,J		180
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<3.8	3.8	U		180
1,2,3,4,6,7,8-HpCDD	0.01	35.81	28.6	3.2	J		180
OCDD	0.0003	37.25	44.4	2.4	M,J		350
2,3,7,8-TCDF	0.1	26.43	<5.6	5.6	M,U		35
1,2,3,7,8-PeCDF	0.03	30.98	<8.3	4.9	M,J,R	8.3	180
2,3,4,7,8-PeCDF	0.3	31.68	<8.8	4.4	M,J,R	8.8	180
1,2,3,4,7,8-HxCDF	0.1	33.64	<5.5	4.2	M,J,R	5.5	180
1,2,3,6,7,8-HxCDF	0.1	33.72	<6.9	4.0	M,J,R	6.9	180
2,3,4,6,7,8-HxCDF	0.1	34.06	9.65	4.3	M,J		180
1,2,3,7,8,9-HxCDF	0.1	34.50	9.18	5.1	M,J,B		180
1,2,3,4,6,7,8-HpCDF	0.01	35.26	24.2	1.4	M,J		180
1,2,3,4,7,8,9-HpCDF	0.01	36.06	<5.6	1.8	M,J,R	5.6	180
OCDF	0.0003	37.33	<9.7	1.9	M,J,R	9.7	350

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.34	92	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.15	92	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.76	114	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.63	99	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	36.04	100	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.31	46	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.99	50	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.21	52	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.81	56	25-130
13C12-OCDD	28000	37.24	55	25-130
13C12-2,3,7,8-TCDF	14000	26.40	46	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.97	44	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.71	46	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.25	51	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	21000	34.47	46	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**	**LQL**
Total-TCDD	1	16.9	5.2	35
Total-PeCDD	1	35.2	2.9	180
Total-HxCDD	2	104	3.8	180
Total-HpCDD	2	57.1	3.2	180
Total-TCDF	8	103	5.6	35
Total-PeCDF	3	49.0	4.9	180
Total-HxCDF	4	43.5	5.1	180
Total-HpCDF	2	31.0	1.8	180

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	3.02
Mid Point PCDD/F TEQ (WHO 2005)	11.9
Upper Bound PCDD/F TEQ (WHO 2005)	16.6

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(6 THRU 10) TEST#2**	Sampling Date	9-Oct-19
ALS Sample ID	L2364245-2	Extraction Date	22-Oct-19
Analysis Method	EPA M23	Sample Size	1 sample
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	7

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A09
Run Date	29-Oct-19 19:46
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<25	25	U		35
1,2,3,7,8-PeCDD	1	NotFnd	<15	15	U		180
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<17	17	U		180
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<16	16	U		180
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<18	18	U		180
1,2,3,4,6,7,8-HpCDD	0.01	35.81	<42	37	M,J,R	42	180
OCDD	0.0003	37.25	<180	110	M,J,R	180	350
2,3,7,8-TCDF	0.1	NotFnd	<21	21	U		35
1,2,3,7,8-PeCDF	0.03	NotFnd	<15	15	U		180
2,3,4,7,8-PeCDF	0.3	31.78	<16	14	M,J,R	16	180
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<20	20	U		180
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<19	19	U		180
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<20	20	U		180
1,2,3,7,8,9-HxCDF	0.1	34.49	<54	24	M,J,R	54	180
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<34	34	U		180
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<44	44	U		180
OCDF	0.0003	NotFnd	<81	81	U		350

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.34	81	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.16	78	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.77	120	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.64	80	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	36.05	66	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.31	9	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.99	7	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.21	5	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.81	3	25-130
13C12-OCDD	28000	37.25	2	25-130
13C12-2,3,7,8-TCDF	14000	26.41	11	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.97	8	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.71	5	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.26	3	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	21000	34.47	45	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	1	72.5	25		35
Total-PeCDD	0	<15	15	U	180
Total-HxCDD	0	<18	18	U	180
Total-HpCDD	1	49.5	37		180
Total-TCDF	2	166	21		35
Total-PeCDF	0	<15	15	U	180
Total-HxCDF	0	<24	24	U	180
Total-HpCDF	0	<44	44	U	180

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.00
Mid Point PCDD/F TEQ (WHO 2005)	37.9
Upper Bound PCDD/F TEQ (WHO 2005)	65.0

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19
Analysis Method	EPA M23	Sample Size	1 sample
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	7

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A10
Run Date	29-Oct-19 20:29
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<3.6	3.6	U		35
1,2,3,7,8-PeCDD	1	NotFnd	<1.6	1.6	U		180
1,2,3,4,7,8-HxCDD	0.1	34.16	<2.9	2.9	M,U	2.0	180
1,2,3,6,7,8-HxCDD	0.1	34.22	<8.5	2.7	M,J,R	8.5	180
1,2,3,7,8,9-HxCDD	0.1	34.35	<2.9	2.9	M,U	2.9	180
1,2,3,4,6,7,8-HpCDD	0.01	35.82	67.1	1.8	J		180
OCDD	0.0003	37.26	102	1.9	J		350
2,3,7,8-TCDF	0.1	26.44	<3.1	2.8	M,J,R	3.1	35
1,2,3,7,8-PeCDF	0.03	30.98	7.56	2.1	M,J		180
2,3,4,7,8-PeCDF	0.3	31.68	<11	1.9	M,J,R	11	180
1,2,3,4,7,8-HxCDF	0.1	33.65	8.57	2.2	M,J		180
1,2,3,6,7,8-HxCDF	0.1	33.72	11.3	2.1	M,J		180
2,3,4,6,7,8-HxCDF	0.1	34.07	26.7	2.2	M,J		180
1,2,3,7,8,9-HxCDF	0.1	34.49	12.6	2.6	M,J,B		180
1,2,3,4,6,7,8-HpCDF	0.01	35.27	42.9	1.4	M,J		180
1,2,3,4,7,8,9-HpCDF	0.01	36.06	19.6	1.8	M,J		180
OCDF	0.0003	37.34	34.5	1.9	M,J		350

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.34	86	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.16	87	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.77	104	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.64	91	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	36.05	93	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.31	80	40-130
13C12-1,2,3,7,8-PeCDD	14000	32.00	84	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.21	91	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.81	99	25-130
13C12-OCDD	28000	37.25	101	25-130
13C12-2,3,7,8-TCDF	14000	26.41	81	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.97	76	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.71	82	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.26	94	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	21000	34.48	69	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**	
Total-TCDD	1	45.3	3.6	35
Total-PeCDD	2	34.6	1.6	180
Total-HxCDD	2	174	2.9	180
Total-HpCDD	2	142	1.8	180
Total-TCDF	8	80.4	2.8	35
Total-PeCDF	5	49.3	2.1	180
Total-HxCDF	8	107	2.6	180
Total-HpCDF	3	79.6	1.8	180

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	7.48
Mid Point PCDD/F TEQ (WHO 2005)	14.8
Upper Bound PCDD/F TEQ (WHO 2005)	17.7

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19	
Analysis Method	EPA M23	Sample Size	1	sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A07
Run Date	29-Oct-19 18:19
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<3.1	3.1	U		35
1,2,3,7,8-PeCDD	1	NotFnd	<1.7	1.7	U		180
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<1.6	1.6	U		180
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<1.5	1.5	U		180
1,2,3,7,8,9-HxCDD	0.1	34.35	<1.6	1.6	M,U	0.87	180
1,2,3,4,6,7,8-HpCDD	0.01	35.81	<4.1	1.3	M,J,R	4.1	180
OCDD	0.0003	37.24	<5.0	1.7	M,J,R	5.0	350
2,3,7,8-TCDF	0.1	NotFnd	<2.5	2.5	U		35
1,2,3,7,8-PeCDF	0.03	30.98	2.80	1.8	M,J		180
2,3,4,7,8-PeCDF	0.3	NotFnd	<1.7	1.7	U		180
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<1.3	1.3	U		180
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<1.3	1.3	U		180
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<1.3	1.3	U		180
1,2,3,7,8,9-HxCDF	0.1	34.49	<3.1	1.6	M,J,R	3.1	180
1,2,3,4,6,7,8-HpCDF	0.01	35.27	<0.96	0.72	M,J,R	0.96	180
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.93	0.93	U		180
OCDF	0.0003	37.33	3.21	1.9	M,J		350

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.34	84	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.15	80	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.76	105	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.64	88	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	36.05	91	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.31	72	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.99	76	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.21	83	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.81	83	25-130
13C12-OCDD	28000	37.24	80	25-130
13C12-2,3,7,8-TCDF	14000	26.40	73	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.97	69	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.71	71	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.25	79	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	21000	34.47	57	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		**LQL**
Total-TCDD	0	<3.1	3.1	U	35
Total-PeCDD	0	<1.7	1.7	U	180
Total-HxCDD	0	<1.6	1.6	U	180
Total-HpCDD	0	<1.3	1.3	U	180
Total-TCDF	0	<2.5	2.5	U	35
Total-PeCDF	1	2.80	1.8		180
Total-HxCDF	0	<1.6	1.6	U	180
Total-HpCDF	0	<0.93	0.93	U	180

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.0850
Mid Point PCDD/F TEQ (WHO 2005)	3.66
Upper Bound PCDD/F TEQ (WHO 2005)	6.88

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	
ALS Sample ID	WG3189120-1	Extraction Date	22-Oct-19	
Analysis Method	EPA M23	Sample Size	1	sample
Analysis Type	Blank	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A06
Run Date	29-Oct-19 17:36
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<6.0	6.0	U		35
1,2,3,7,8-PeCDD	1	NotFnd	<3.4	3.4	U		180
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<4.1	4.1	U		180
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<3.8	3.8	U		180
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<4.1	4.1	U		180
1,2,3,4,6,7,8-HpCDD	0.01	NotFnd	<2.9	2.9	U		180
OCDD	0.0003	37.25	<2.7	2.5	M,J,R	2.7	350
2,3,7,8-TCDF	0.1	NotFnd	<4.7	4.7	U		35
1,2,3,7,8-PeCDF	0.03	NotFnd	<3.4	3.4	U		180
2,3,4,7,8-PeCDF	0.3	NotFnd	<3.1	3.1	U		180
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<2.5	2.5	U		180
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<2.4	2.4	U		180
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<2.5	2.5	U		180
1,2,3,7,8,9-HxCDF	0.1	34.48	3.19	3.1	M,J		180
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<2.0	2.0	U		180
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<2.6	2.6	U		180
OCDF	0.0003	NotFnd	<3.1	3.1	U		350

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD			NS	
13C12-1,2,3,4,7,8-HxCDD			NS	
13C12-2,3,4,7,8-PeCDF			NS	
13C12-1,2,3,4,7,8-HxCDF			NS	
13C12-1,2,3,4,7,8,9-HpCDF			NS	
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.31	46	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.99	46	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.21	48	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.81	54	25-130
13C12-OCDD	28000	37.25	58	25-130
13C12-2,3,7,8-TCDF	14000	26.41	47	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.97	44	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.71	44	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.26	52	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	21000	34.48	40	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<6.0	6.0	U	35
Total-PeCDD	0	<3.4	3.4	U	180
Total-HxCDD	0	<4.1	4.1	U	180
Total-HpCDD	0	<2.9	2.9	U	180
Total-TCDF	0	<4.7	4.7	U	35
Total-PeCDF	0	<3.4	3.4	U	180
Total-HxCDF	1	3.19	3.1		180
Total-HpCDF	0	<2.6	2.6	U	180

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.319
Mid Point PCDD/F TEQ (WHO 2005)	6.78
Upper Bound PCDD/F TEQ (WHO 2005)	13.2

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NS	Indicates that this compound was not spiked.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a	
ALS Sample ID	WG3189120-2	Extraction Date	22-Oct-19	
Analysis Method	EPA M23	Sample Size	1	n/a
Analysis Type	LCS	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
30-Oct-2019

Run Information	**Run 1**
Filename	9-191029A02
Run Date	29-Oct-19 14:45
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-9 DB5ms UST470132H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	1400	27.35	90	70-130	
1,2,3,7,8-PeCDD	7000	32.03	97	70-130	
1,2,3,4,7,8-HxCDD	7000	34.17	85	70-130	
1,2,3,6,7,8-HxCDD	7000	34.22	113	70-130	
1,2,3,7,8,9-HxCDD	7000	34.35	115	70-130	
1,2,3,4,6,7,8-HpCDD	7000	35.82	93	70-130	
OCDD	14000	37.26	98	70-130	
2,3,7,8-TCDF	1400	26.46	87	70-130	
1,2,3,7,8-PeCDF	7000	30.99	99	70-130	
2,3,4,7,8-PeCDF	7000	31.79	89	70-130	
1,2,3,4,7,8-HxCDF	7000	33.65	89	70-130	
1,2,3,6,7,8-HxCDF	7000	33.72	120	70-130	
2,3,4,6,7,8-HxCDF	7000	34.07	108	70-130	
1,2,3,7,8,9-HxCDF	7000	34.49	113	70-130	
1,2,3,4,6,7,8-HpCDF	7000	35.27	106	70-130	
1,2,3,4,7,8,9-HpCDF	7000	36.06	108	70-130	
OCDF	14000	37.34	97	70-130	
Field Spike Standards	**pg**		**% Rec**	**Limits**	
37Cl4-2,3,7,8-TCDD			NS		
13C12-1,2,3,4,7,8-HxCDD			NS		
13C12-2,3,4,7,8-PeCDF			NS		
13C12-1,2,3,4,7,8-HxCDF			NS		
13C12-1,2,3,4,7,8,9-HpCDF			NS		
Extraction Standards					
13C12-2,3,7,8-TCDD	14000	27.34	66	40-130	
13C12-1,2,3,7,8-PeCDD	14000	32.02	73	40-130	
13C12-1,2,3,6,7,8-HxCDD	14000	34.22	74	40-130	
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.82	85	25-130	
13C12-OCDD	28000	37.25	88	25-130	
13C12-2,3,7,8-TCDF	14000	26.43	70	40-130	
13C12-1,2,3,7,8-PeCDF	14000	30.98	68	40-130	
13C12-1,2,3,6,7,8-HxCDF	14000	33.72	70	40-130	
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.26	78	25-130	
Cleanup Standard	**pg**				
13C12-1,2,3,7,8,9-HxCDF	21000	34.49	57	40-130	

NS Indicates that this compound was not spiked.

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report Revision	18-Nov-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PCB Congeners by EPA 1668C**

PCB Congener Group Totals and Total PCB are a sum of detected values, including EMPC values, consistent with USEPA CLP SOW CBC1.2

*** REVISED REPORT ***

This report supersedes all prior reports for the above-noted workorder and test. The report has been revised as follows:
The decachlorobiphenyl result and the total nonachlorobiphenyl result is now included in the homologue group totals, as requested.
SK 18-Nov-19

*** ORIGINAL COMMENTS ***

The Extraction (internal) Standard recoveries of the sample "19-21939-SVOC-(6 THRU 10) TEST#2" (lab ID L2364245-2) were all below expected levels though all (besides 13C-PCB-209) passed method acceptance criteria. The sample native (and Field/Sampling) compounds calculated by Isotope Dilution against 13C-labeled standards of similar molecular composition, are inherently recovery corrected so no impact to the quantification of detected compounds is expected, though this recovery loss did produce elevated Estimated Detection Limits.
BR 13-Nov-19

Certified by: L. Wrona

Lynne Wrona
Account Manager

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	19-21939-SVOC-(1 THRU 5) TEST#1	19-21939-SVOC-(6 THRU 10) TEST#2	19-21939-SVOC-(11 THRU 15) TEST#3	19-21939-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2364245-1	L2364245-2	L2364245-3	L2364245-4
Sample Size	1	1	1	1
Sample size units	Sample	Sample	Sample	Sample
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19
Extraction Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Target Analytes	pg	pg	pg	pg
PCB-081	<65	<140	<36	<15
PCB-077	454	<360	178	2280
PCB-123	<53	116	<69	<13
PCB-118	9350	3860	5560	627
PCB-114	<220	<100	<110	<14
PCB-105	2730	1210	1600	<170
PCB-126	<74	<110	<21	<40
PCB-167	<75	<91	<52	<15
PCB-156/157	209	<130	<130	<18
PCB-169	<39	<130	<22	<15
PCB-189	<16	<85	<7.7	<6.7
Extraction Standards	% Rec	% Rec	% Rec	% Rec
13C12-PCB-081	40	11	65	129
13C12-PCB-077	44	11	67	123
13C12-PCB-123	44	12	65	127
13C12-PCB-118	43	12	64	121
13C12-PCB-114	41	12	62	124
13C12-PCB-105	41	12	64	121
13C12-PCB-126	38	13	64	114
13C12-PCB-167	45	15	78	92
13C12-PCB-156/157	45	13	76	112
13C12-PCB-169	47	13	87	110
13C12-PCB-189	44	12	92	90
Field Spike Standards				
13C12-PCB-031	105	120	96	91
13C12-PCB-095	102	107	85	98
13C12-PCB-153	123	97	85	76
Cleanup Standards				
13C12-PCB-028	46	40	56	95
13C12-PCB-111	47	38	59	88
13C12-PCB-178	48	47	70	67

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Sample Analysis Summary Report

Sample Name	19-21939-SVOC-(1 THRU 5) TEST#1	19-21939-SVOC-(6 THRU 10) TEST#2	19-21939-SVOC-(11 THRU 15) TEST#3	19-21939-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2364245-1	L2364245-2	L2364245-3	L2364245-4
Sample Size	1	1	1	1
Sample size units	Sample	Sample	Sample	Sample
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19
Extraction Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Target Analytes	**pg**	**pg**	**pg**	**pg**
Homologue Group Totals				
Total DiCB	18200	9960	3950	1130
Total TriCB	9370	5950	5430	2820
Total TetraCB	67700	29600	31300	6990
Total PentaCB	90600	38200	54300	7250
Total HexaCB	26300	8560	10800	2530
Total HeptaCB	3020	570	810	242
Total OctaCB	215	<58	143	<7.9
Total NonaCB	<52	<110	<20	<55
DecaCB	<93	<190	<8.7	<110
Toxic Equivalency - (WHO 2005)				
Lower Bound PCB TEQ	0.414	0.156	0.233	0.247
Mid Point PCB TEQ	8.42	7.67	1.63	4.48
Upper Bound PCB TEQ	9.01	15.1	3.01	4.71

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Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG3189120-1
Sample Size	1
Sample size units	Blank
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	22-Oct-19

Target Analytes	**pg**
PCB-081	<15
PCB-077	<15
PCB-123	<22
PCB-118	<87
PCB-114	<22
PCB-105	<36
PCB-126	<27
PCB-167	<15
PCB-156/157	<15
PCB-169	<13
PCB-189	<16
Extraction Standards	**% Rec**
13C12-PCB-081	63
13C12-PCB-077	66
13C12-PCB-123	65
13C12-PCB-118	65
13C12-PCB-114	68
13C12-PCB-105	68
13C12-PCB-126	59
13C12-PCB-167	60
13C12-PCB-156/157	76
13C12-PCB-169	81
13C12-PCB-189	68
Field Spike Standards	
13C12-PCB-031	NS
13C12-PCB-095	NS
13C12-PCB-153	NS
Cleanup Standards	
13C12-PCB-028	60
13C12-PCB-111	31
13C12-PCB-178	27

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Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG3189120-1
Sample Size	1
Sample size units	Blank
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	22-Oct-19

Target Analytes	**pg**
Homologue Group Totals	
Total DiCB	470
Total TriCB	<23
Total TetraCB	28.1
Total PentaCB	190
Total HexaCB	138
Total HeptaCB	<16
Total OctaCB	<12
Total NonaCB	<87
DecaCB	<120
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.00
Mid Point PCB TEQ	1.55
Upper Bound PCB TEQ	3.10

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Sample Analysis Summary Report

Sample Name	**Laboratory Control Sample**
ALS Sample ID	WG3189120-2
Sample Size	1
Sample size units	n/a
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	22-Oct-19

Target Analytes	**% Rec**
PCB-081	101
PCB-077	103
PCB-123	102
PCB-118	98
PCB-114	104
PCB-105	96
PCB-126	100
PCB-167	89
PCB-156/157	94
PCB-169	93
PCB-189	107
Extraction Standards	**% Rec**
13C12-PCB-081	56
13C12-PCB-077	62
13C12-PCB-123	66
13C12-PCB-118	70
13C12-PCB-114	67
13C12-PCB-105	68
13C12-PCB-126	62
13C12-PCB-167	70
13C12-PCB-156/157	68
13C12-PCB-169	70
13C12-PCB-189	66
Field Spike Standards	
13C12-PCB-031	NS
13C12-PCB-095	NS
13C12-PCB-153	NS
Cleanup Standards	
13C12-PCB-028	46
13C12-PCB-111	57
13C12-PCB-178	61

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	8-Oct-19	
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A24
Run Date	29-Oct-19 04:47
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.78	<65	65	M,U	23	180
PCB-077	0.0001	22.06	454	69			180
PCB-123	0.00003	NotFnd	<53	53	U		180
PCB-118	0.00003	23.25	9350	49			180
PCB-114	0.00003	23.55	<220	54	R	220	180
PCB-105	0.00003	23.89	2730	55			180
PCB-126	0.1	25.49	<74	64	J,R	74	180
PCB-167	0.00003	26.42	<75	34	J,R	75	180
PCB-156/157	0.00003	27.02	209	41	J		350
PCB-169	0.03	NotFnd	<39	39	U		180
PCB-189	0.00003	NotFnd	<16	16	U		180

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	14000	8.81	34	5-145	
13C12-PCB-003	14000	10.35	36	5-145	
13C12-PCB-004	14000	10.51	36	5-145	
13C12-PCB-015	14000	14.20	44	5-145	
13C12-PCB-019	14000	12.50	31	5-145	
13C12-PCB-037	14000	18.15	47	5-145	
13C12-PCB-054	14000	14.35	38	5-145	
13C12-PCB-081	14000	21.75	40	10-145	
13C12-PCB-077	14000	22.05	44	10-145	
13C12-PCB-104	14000	17.45	48	10-145	
13C12-PCB-123	14000	23.07	44	10-145	
13C12-PCB-118	14000	23.23	43	10-145	R
13C12-PCB-114	14000	23.52	41	10-145	
13C12-PCB-105	14000	23.86	41	10-145	
13C12-PCB-126	14000	25.48	38	10-145	
13C12-PCB-155	14000	20.48	11	10-145	
13C12-PCB-167	14000	26.40	45	10-145	
13C12-PCB-156/157	28000	27.02	45	10-145	
13C12-PCB-169	14000	28.70	47	10-145	R
13C12-PCB-188	14000	23.49	15	10-145	
13C12-PCB-189	14000	29.98	44	10-145	
13C12-PCB-202	14000	26.27	16	10-145	R
13C12-PCB-205	14000	31.38	53	10-145	
13C12-PCB-208	14000	29.72	12	10-145	
13C12-PCB-206	14000	32.47	44	10-145	
13C12-PCB-209	14000	33.61	7	10-145	
Field Spike Standards					
13C12-PCB-031	10000	15.74	105	70-130	
13C12-PCB-095	10000	19.05	102	70-130	
13C12-PCB-153	10000	24.18	123	70-130	
Cleanup Standards					
13C12-PCB-028	16333	15.91	46	5-145	
13C12-PCB-111	16333	22.01	47	10-145	
13C12-PCB-178	16333	25.06	48	10-145	

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	8-Oct-19		
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19		Approved:
Analysis Method	EPA 1668C	Sample Size	1	Sample	*N Ashtari*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Stack	Split Ratio	7		01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A24
Run Date	29-Oct-19 04:47
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
Homologue Group Totals							
Total DiCB			18200	67	J		1400
Total TriCB			9370	25	J		1400
Total TetraCB			67700	16	J		2800
Total PentaCB			90600	17	J		2800
Total HexaCB			26300	25	J		2800
Total HeptaCB			3020	16	J		1400
Total OctaCB			215	12	J		1400
Total NonaCB			<52	52	U		700
DecaCB			<93	93	U		700
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.414				
Mid Point PCB TEQ			8.42				
Upper Bound PCB TEQ			9.01				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(6 THRU 10) TEST#2**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-2	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A25
Run Date	29-Oct-19 05:29
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
PCB-081	0.0003	NotFnd	<140	140	U		180
PCB-077	0.0001	22.07	<360	150	M,R	360	180
PCB-123	0.00003	23.09	116	100	M,J		180
PCB-118	0.00003	23.26	3860	86			180
PCB-114	0.00003	NotFnd	<100	100	U		180
PCB-105	0.00003	23.90	1210	92			180
PCB-126	0.1	NotFnd	<110	110	U		180
PCB-167	0.00003	NotFnd	<91	91	U		180
PCB-156/157	0.00003	NotFnd	<130	130	U		350
PCB-169	0.03	NotFnd	<130	130	U		180
PCB-189	0.00003	NotFnd	<85	85	U		180

Extraction Standards	pg	Time	% Rec	Limits	
13C12-PCB-001	14000	8.83	10	5-145	
13C12-PCB-003	14000	10.37	8	5-145	R
13C12-PCB-004	14000	10.54	10	5-145	
13C12-PCB-015	14000	14.20	13	5-145	
13C12-PCB-019	14000	12.51	9	5-145	
13C12-PCB-037	14000	18.17	12	5-145	
13C12-PCB-054	14000	14.36	10	5-145	
13C12-PCB-081	14000	21.76	11	10-145	R
13C12-PCB-077	14000	22.06	11	10-145	R
13C12-PCB-104	14000	17.46	15	10-145	
13C12-PCB-123	14000	23.08	12	10-145	
13C12-PCB-118	14000	23.25	12	10-145	
13C12-PCB-114	14000	23.55	12	10-145	
13C12-PCB-105	14000	23.88	12	10-145	
13C12-PCB-126	14000	25.48	13	10-145	R
13C12-PCB-155	14000	20.49	11	10-145	
13C12-PCB-167	14000	26.41	15	10-145	
13C12-PCB-156/157	28000	27.03	13	10-145	
13C12-PCB-169	14000	28.71	13	10-145	
13C12-PCB-188	14000	23.50	12	10-145	R
13C12-PCB-189	14000	29.99	12	10-145	
13C12-PCB-202	14000	26.28	13	10-145	
13C12-PCB-205	14000	31.39	16	10-145	
13C12-PCB-208	14000	29.73	12	10-145	
13C12-PCB-206	14000	32.48	14	10-145	
13C12-PCB-209	14000	33.62	5	10-145	
Field Spike Standards					
13C12-PCB-031	10000	15.75	120	70-130	
13C12-PCB-095	10000	19.06	107	70-130	
13C12-PCB-153	10000	24.19	97	70-130	
Cleanup Standards					
13C12-PCB-028	16333	15.92	40	5-145	
13C12-PCB-111	16333	22.02	38	10-145	
13C12-PCB-178	16333	25.07	47	10-145	

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(6 THRU 10) TEST#2**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-2	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A25
Run Date	29-Oct-19 05:29
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
Homologue Group Totals							
Total DiCB			9960	230	J		1400
Total TriCB			5950	140	J		1400
Total TetraCB			29600	75	J		2800
Total PentaCB			38200	57	J		2800
Total HexaCB			8560	73	J		2800
Total HeptaCB			570	85	J		1400
Total OctaCB			<58	58	U		1400
Total NonaCB			<110	110	U		700
DecaCB			<190	190	U		700
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.156				
Mid Point PCB TEQ			7.67				
Upper Bound PCB TEQ			15.1				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19	
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A26
Run Date	29-Oct-19 06:11
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.78	<36	36	M,U	23	180
PCB-077	0.0001	22.06	178	39	M		180
PCB-123	0.00003	23.08	<69	19	M,J,R	69	180
PCB-118	0.00003	23.26	5560	17			180
PCB-114	0.00003	23.55	<110	19	J,R	110	180
PCB-105	0.00003	23.90	1600	19			180
PCB-126	0.1	NotFnd	<21	21	U		180
PCB-167	0.00003	26.42	<52	20	J,R	52	180
PCB-156/157	0.00003	27.03	<130	26	J,R	130	350
PCB-169	0.03	NotFnd	<22	22	U		180
PCB-189	0.00003	NotFnd	<7.7	7.7	U		180

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	14000	8.83	46	5-145	
13C12-PCB-003	14000	10.37	48	5-145	
13C12-PCB-004	14000	10.52	45	5-145	
13C12-PCB-015	14000	14.20	54	5-145	
13C12-PCB-019	14000	12.51	38	5-145	
13C12-PCB-037	14000	18.16	70	5-145	
13C12-PCB-054	14000	14.36	44	5-145	
13C12-PCB-081	14000	21.76	65	10-145	
13C12-PCB-077	14000	22.06	67	10-145	
13C12-PCB-104	14000	17.46	71	10-145	
13C12-PCB-123	14000	23.08	65	10-145	
13C12-PCB-118	14000	23.25	64	10-145	
13C12-PCB-114	14000	23.54	62	10-145	
13C12-PCB-105	14000	23.88	64	10-145	
13C12-PCB-126	14000	25.49	64	10-145	
13C12-PCB-155	14000	20.50	72	10-145	
13C12-PCB-167	14000	26.41	78	10-145	
13C12-PCB-156/157	28000	27.03	76	10-145	
13C12-PCB-169	14000	28.70	87	10-145	R
13C12-PCB-188	14000	23.50	80	10-145	
13C12-PCB-189	14000	29.99	92	10-145	
13C12-PCB-202	14000	26.28	71	10-145	
13C12-PCB-205	14000	31.39	79	10-145	
13C12-PCB-208	14000	29.73	72	10-145	
13C12-PCB-206	14000	32.48	79	10-145	
13C12-PCB-209	14000	33.62	69	10-145	
Field Spike Standards					
13C12-PCB-031	10000	15.75	96	70-130	
13C12-PCB-095	10000	19.06	85	70-130	
13C12-PCB-153	10000	24.19	85	70-130	
Cleanup Standards					
13C12-PCB-028	16333	15.92	56	5-145	
13C12-PCB-111	16333	22.02	59	10-145	
13C12-PCB-178	16333	25.07	70	10-145	

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Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19		
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19		Approved:
Analysis Method	EPA 1668C	Sample Size	1	Sample	*N Ashtari*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Stack	Split Ratio	7		01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A26
Run Date	29-Oct-19 06:11
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
Homologue Group Totals							
Total DiCB			3950	41	J		1400
Total TriCB			5430	28	J		1400
Total TetraCB			31300	25	J		2800
Total PentaCB			54300	14	J		2800
Total HexaCB			10800	12	J		2800
Total HeptaCB			810	7.7	J		1400
Total OctaCB			143	7.4	J		1400
Total NonaCB			<20	20	U		700
DecaCB			<8.7	8.7	U		700
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.233				
Mid Point PCB TEQ			1.63				
Upper Bound PCB TEQ			3.01				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A23
Run Date	29-Oct-19 04:05
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	NotFnd	<15	15	U		180
PCB-077	0.0001	22.07	2280	17			180
PCB-123	0.00003	NotFnd	<13	13	U		180
PCB-118	0.00003	23.26	627	14			180
PCB-114	0.00003	NotFnd	<14	14	U		180
PCB-105	0.00003	23.90	<170	14	J,R	170	180
PCB-126	0.1	25.49	<40	17	J,R	40	180
PCB-167	0.00003	NotFnd	<15	15	U		180
PCB-156/157	0.00003	27.03	<18	15	J,R	18	350
PCB-169	0.03	NotFnd	<15	15	U		180
PCB-189	0.00003	NotFnd	<6.7	6.7	U		180

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.84	54	5-145
13C12-PCB-003	14000	10.37	86	5-145
13C12-PCB-004	14000	10.52	83	5-145
13C12-PCB-015	14000	14.20	102	5-145
13C12-PCB-019	14000	12.51	80	5-145
13C12-PCB-037	14000	18.16	117	5-145
13C12-PCB-054	14000	14.36	92	5-145
13C12-PCB-081	14000	21.76	129	10-145
13C12-PCB-077	14000	22.06	123	10-145
13C12-PCB-104	14000	17.46	75	10-145
13C12-PCB-123	14000	23.08	127	10-145
13C12-PCB-118	14000	23.25	121	10-145
13C12-PCB-114	14000	23.55	124	10-145
13C12-PCB-105	14000	23.89	121	10-145
13C12-PCB-126	14000	25.48	114	10-145
13C12-PCB-155	14000	20.49	17	10-145
13C12-PCB-167	14000	26.41	92	10-145
13C12-PCB-156/157	28000	27.03	112	10-145
13C12-PCB-169	14000	28.70	110	10-145
13C12-PCB-188	14000	23.50	21	10-145
13C12-PCB-189	14000	29.99	90	10-145
13C12-PCB-202	14000	26.28	21	10-145
13C12-PCB-205	14000	31.39	82	10-145
13C12-PCB-208	14000	29.73	16	10-145
13C12-PCB-206	14000	32.48	49	10-145
13C12-PCB-209	14000	33.62	8	10-145
Field Spike Standards				
13C12-PCB-031	10000	15.75	91	70-130
13C12-PCB-095	10000	19.07	98	70-130
13C12-PCB-153	10000	24.19	76	70-130
Cleanup Standards				
13C12-PCB-028	16333	15.92	95	5-145
13C12-PCB-111	16333	22.02	88	10-145
13C12-PCB-178	16333	25.07	67	10-145

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Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A23
Run Date	29-Oct-19 04:05
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
Homologue Group Totals							
Total DiCB			1130	24	J		1400
Total TriCB			2820	13	J		1400
Total TetraCB			6990	4.6	J		2800
Total PentaCB			7250	7.4	J		2800
Total HexaCB			2530	12	J		2800
Total HeptaCB			242	6.7	J		1400
Total OctaCB			<7.9	7.9	U		1400
Total NonaCB			<55	55	U		700
DecaCB			<110	110	U		700
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.247				
Mid Point PCB TEQ			4.48				
Upper Bound PCB TEQ			4.71				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ: Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

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Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a		Approved:
ALS Sample ID	WG3189120-1	Extraction Date	22-Oct-19		*N Ashtari*
Analysis Method	EPA 1668C	Sample Size	1	Blank	--e-signature--
Analysis Type	Blank	Percent Moisture	n/a		01-Nov-2019
Sample Matrix	QC	Split Ratio	7		

Run Information	**Run 1**
Filename	5-191027A18
Run Date	29-Oct-19 00:34
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	NotFnd	<15	15	U		180
PCB-077	0.0001	NotFnd	<15	15	U		180
PCB-123	0.00003	NotFnd	<22	22	U		180
PCB-118	0.00003	23.26	<87	22	J,R	87	180
PCB-114	0.00003	NotFnd	<22	22	U		180
PCB-105	0.00003	23.89	<36	21	M,J,R	36	180
PCB-126	0.1	NotFnd	<27	27	U		180
PCB-167	0.00003	NotFnd	<15	15	U		180
PCB-156/157	0.00003	NotFnd	<15	15	U		350
PCB-169	0.03	NotFnd	<13	13	U		180
PCB-189	0.00003	NotFnd	<16	16	U		180

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	14000	8.83	50	5-145	
13C12-PCB-003	14000	10.37	50	5-145	
13C12-PCB-004	14000	10.52	52	5-145	
13C12-PCB-015	14000	14.21	56	5-145	
13C12-PCB-019	14000	12.51	47	5-145	
13C12-PCB-037	14000	18.17	66	5-145	
13C12-PCB-054	14000	14.37	56	5-145	
13C12-PCB-081	14000	21.77	63	10-145	
13C12-PCB-077	14000	22.06	66	10-145	
13C12-PCB-104	14000	17.47	38	10-145	
13C12-PCB-123	14000	23.08	65	10-145	
13C12-PCB-118	14000	23.25	65	10-145	
13C12-PCB-114	14000	23.55	68	10-145	
13C12-PCB-105	14000	23.89	68	10-145	
13C12-PCB-126	14000	25.49	59	10-145	
13C12-PCB-155	14000	20.50	8	10-145	
13C12-PCB-167	14000	26.41	60	10-145	
13C12-PCB-156/157	28000	27.03	76	10-145	
13C12-PCB-169	14000	28.71	81	10-145	R
13C12-PCB-188	14000	23.50	10	10-145	
13C12-PCB-189	14000	30.00	68	10-145	
13C12-PCB-202	14000	26.28	12	10-145	
13C12-PCB-205	14000	31.41	53	10-145	
13C12-PCB-208	14000	29.73	9	10-145	
13C12-PCB-206	14000	32.49	29	10-145	
13C12-PCB-209	14000	33.64	6	10-145	R
Field Spike Standards					
13C12-PCB-031			NS		
13C12-PCB-095			NS		
13C12-PCB-153			NS		
Cleanup Standards					
13C12-PCB-028	16333	15.93	60	5-145	
13C12-PCB-111	16333	22.03	31	10-145	
13C12-PCB-178	16333	25.08	27	10-145	

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	
ALS Sample ID	WG3189120-1	Extraction Date	22-Oct-19	
Analysis Method	EPA 1668C	Sample Size	1	Blank
Analysis Type	Blank	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	7	

Approved:
N Ashtari
--e-signature--
01-Nov-2019

Run Information	**Run 1**
Filename	5-191027A18
Run Date	29-Oct-19 00:34
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
Homologue Group Totals							
Total DiCB			470	63	J		1400
Total TriCB			<23	23	U		1400
Total TetraCB			28.1	11	J		2800
Total PentaCB			190	13	J		2800
Total HexaCB			138	13	J		2800
Total HeptaCB			<16	16	U		1400
Total OctaCB			<12	12	U		1400
Total NonaCB			<87	87	U		700
DecaCB			<120	120	U		700
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.00				
Mid Point PCB TEQ			1.55				
Upper Bound PCB TEQ			3.10				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ: Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

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Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a	Approved:
ALS Sample ID	WG3189120-2	Extraction Date	22-Oct-19	*N Ashtari*
Analysis Method	EPA 1668C	Sample Size	1 n/a	--e-signature--
Analysis Type	LCS	Percent Moisture	n/a	01-Nov-2019
Sample Matrix	QC	Split Ratio	7	

Run Information	**Run 1**
Filename	5-191027A16
Run Date	28-Oct-19 23:10
Final Volume	25 ul
Dilution Factor	1
Analysis Units	% Rec
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
PCB-001	7000	8.84	118	60-135	
PCB-003	7000	10.38	117	60-135	
PCB-004	7000	10.54	101	60-135	
PCB-015	7000	14.22	109	60-135	
PCB-019	7000	12.53	117	60-135	
PCB-037	7000	18.19	108	60-135	
PCB-054	7000	14.39	113	60-135	
PCB-081	7000	21.79	101	60-135	
PCB-077	7000	22.08	103	60-135	
PCB-104	7000	17.48	102	60-135	
PCB-123	7000	23.09	102	60-135	
PCB-118	7000	23.27	98	60-135	
PCB-114	7000	23.56	104	60-135	
PCB-105	7000	23.90	96	60-135	
PCB-126	7000	25.51	100	60-135	
PCB-155	7000	20.52	104	60-135	
PCB-167	7000	26.42	89	60-135	
PCB-156/157	14000	27.05	94	60-135	
PCB-169	7000	28.72	93	60-135	
PCB-188	7000	23.52	99	60-135	
PCB-189	7000	30.01	107	60-135	
PCB-202	7000	26.30	106	60-135	
PCB-205	7000	31.42	89	60-135	
PCB-208	7000	29.75	109	60-135	
PCB-206	7000	32.50	102	60-135	
PCB-209	7000	33.67	113	60-135	
Extraction Standards		**Time**	**% Rec**	**Limits**	
13C12-PCB-001	14000	8.84	43	15-145	
13C12-PCB-003	14000	10.37	42	15-145	
13C12-PCB-004	14000	10.52	45	15-145	
13C12-PCB-015	14000	14.21	45	15-145	
13C12-PCB-019	14000	12.51	36	15-145	
13C12-PCB-037	14000	18.17	50	15-145	
13C12-PCB-054	14000	14.37	45	15-145	
13C12-PCB-081	14000	21.78	56	40-145	
13C12-PCB-077	14000	22.07	62	40-145	
13C12-PCB-104	14000	17.47	62	40-145	
13C12-PCB-123	14000	23.08	66	40-145	
13C12-PCB-118	14000	23.26	70	40-145	
13C12-PCB-114	14000	23.55	67	40-145	
13C12-PCB-105	14000	23.89	68	40-145	
13C12-PCB-126	14000	25.49	62	40-145	
13C12-PCB-155	14000	20.50	25	40-145	
13C12-PCB-167	14000	26.41	70	40-145	
13C12-PCB-156/157	28000	27.04	68	40-145	R
13C12-PCB-169	14000	28.71	70	40-145	
13C12-PCB-188	14000	23.51	30	40-145	
13C12-PCB-189	14000	30.00	66	40-145	
13C12-PCB-202	14000	26.29	40	40-145	
13C12-PCB-205	14000	31.41	75	40-145	
13C12-PCB-208	14000	29.73	29	40-145	
13C12-PCB-206	14000	32.49	73	40-145	
13C12-PCB-209	14000	33.64	20	40-145	
Field Spike Standards					
13C12-PCB-031			NS		
13C12-PCB-095			NS		
13C12-PCB-153			NS		
Cleanup Standards					
13C12-PCB-028	16333	15.94	46	15-145	
13C12-PCB-111	16333	22.03	57	40-145	
13C12-PCB-178	16333	25.08	61	40-145	

R Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report	26-Nov-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **CB by LRGC/MS - Isotope dilution**

The trap for the field blank, "19-21939-SVOC-(16 THRU 20) BLANK", was received broken with as much as a third of the XAD2 captured in a polyethylene bag. The absence of field spike recoveries is likely due to a loss of XAD from the portion of XAD2 where the chlorobenzene spike was added.

A bias to low 1,3,5-trichlorobenzene and to high 1,2,4-trichlorobenzene was observed in the laboratory control sample (LCS). This appears to be derived from a discrimination or different recovery behavior with these targets relative to the assigned internal standard of 13C6-1,2,3-Trichlorobenzene. A similar low and high bias on these 1,3,5-trichlorobenzene and 1,2,4-trichlorobenzene targets is likely within the field samples too.

Certified by: RA McLeod

Ron McLeod. Ph.D.
Technical Director

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		19-21939-SVOC-(1 THRU 5) TEST#1		19-21939-SVOC-(6 THRU 10) TEST#2		19-21939-SVOC-(11 THRU 15) TEST#3		19-21939-SVOC-(16 THRU 20) BLANK		Laboratory Control Sample (350ng)	
ALS Sample ID	WG3189120-1		L2364245-1		L2364245-2		L2364245-3		L2364245-4		WG3189120-2	
Sample Size	1		1		1		1		1		1	
Sample units	sample		sample		sample		sample		sample		n/a	
Moisture Content	n/a		n/a		n/a		n/a		n/a		n/a	
Matrix	QC		Stack		Stack		Stack		Stack		QC	
Sampling Date	n/a		8-Oct-19		9-Oct-19		10-Oct-19		9-Oct-19		n/a	
Extraction Date	22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19	
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**% Recovery**	
1,3-Dichlorobenzene	<14	U	1310		1050		846		<14	U	106	
1,4-Dichlorobenzene	51.5		204	M	183	M	115	M	35.1		95	
1,2-Dichlorobenzene	<14	U	1810	M	1030	M	540	M	<14	U	127	M
1,3,5-Trichlorobenzene	<14	U	17.3		17.4	M	28.7		<14	U	28	
1,2,4-Trichlorobenzene	<14	U	392		461		532		<14	U	209	
1,2,3-Trichlorobenzene	<14	U	1760	M,R	901	M,R	895	M,R	146	M	122	
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<14	U	449		509		695		<14	U	113	
1,2,3,4-Tetrachlorobenzene	<14	U	622		307		282		<14	U	126	
Pentachlorobenzene	<14	U	886		402		402		<14	U	114	
Hexachlorobenzene	<14	U	129		54.4		58.2		<14	U	104	
Hexachloroethane	<14	U	<14	U	<14	U	<14	U	<14	U		
a,2,6-Trichlorotoluene	<14	U	<14	U	<14	U	<14	U	<14	U		
Field Sampling Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**	
1-Bromo-2,3-Dichlorobenzene	NS		121		85		88		NR		NS	
Extraction Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**	
13C6-1,4-Dichlorobenzene	2		6		5		27		2		11	
13C6-1,2,3-Trichlorobenzene	13		29		13		43		24		39	
13C6-1,2,3,4-Tetrachlorobenzene	20		9		10		17		20		55	
13C6-Pentachlorobenzene	18		9		11		18		23		56	
13C6-Hexachlorobenzene	41		14		13		21		39		70	

U	Indicates that this compound was not detected above the LOD.
M	Indicates that a peak has been manually integrated.
NS	Indicates that this compound was not spiked in.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NR	Indicates that this compound was not recovered.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**		Sampling Date	n/a
ALS Sample ID	WG3189120-1		Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS			
Analysis Type	Blank			
Sample Matrix	QC			
Sample Size	1	sample		
Percent Moisture	n/a			
Split Ratio	7			

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**	
Filename	19112108.D	
Run Date	11/21/2019 6:41	
Final Volume	1	mL
Dilution Factor	1	
Analysis Units	ng/sample	
Instrument	MSD-2	
Column	HP-5MS UST460651	

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		NotFnd	<14	U
1,4-Dichlorobenzene		6.86	51.5	
1,2-Dichlorobenzene		NotFnd	<14	U
1,3,5-Trichlorobenzene		NotFnd	<14	U
1,2,4-Trichlorobenzene		NotFnd	<14	U
1,2,3-Trichlorobenzene		NotFnd	<14	U
1,2,3,5/1,2,4,5-Tetrachlorobenzen		NotFnd	<14	U
1,2,3,4-Tetrachlorobenzene		NotFnd	<14	U
Pentachlorobenzene		NotFnd	<14	U
Hexachlorobenzene		NotFnd	<14	U
Hexachloroethane		NotFnd	<14	U
a,2,6-Trichlorotoluene		NotFnd	<14	U
Extraction Standards			**%Rec**	
13C6-1,4-Dichlorobenzene	350	6.86	2	M
13C6-1,2,3-Trichlorobenzene	350	9.27	13	
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	20	
13C6-Pentachlorobenzene	350	12.32	18	
13C6-Hexachlorobenzene	350	13.96	41	

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	8-Oct-19
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**
Filename	19112110.D
Run Date	11/21/2019 7:23
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS UST460651

Target Analytes		**Ret. Time**	**Concentration ng/sample**		**Flags**
1,3-Dichlorobenzene		6.77	1310		
1,4-Dichlorobenzene		6.86	204	M	
1,2-Dichlorobenzene		7.15	1810	M	
1,3,5-Trichlorobenzene		8.33	17.3		
1,2,4-Trichlorobenzene		8.86	392		
1,2,3-Trichlorobenzene		9.26	1760	M	R
1,2,3,5/1,2,4,5-Tetrachlorobenzen		10.48	449		
1,2,3,4-Tetrachlorobenzene		10.98	622		
Pentachlorobenzene		12.32	886		
Hexachlorobenzene		13.96	129		
Hexachloroethane		NotFnd	<14	U	
a,2,6-Trichlorotoluene		NotFnd	<14	U	
Field Sampling Standards	**ng spiked**		**%Rec**		
1-Bromo-2,3-Dichlorobenzene	350	9.89	121		
Extraction Standards			**%Rec**		
13C6-1,4-Dichlorobenzene	350	6.86	6		
13C6-1,2,3-Trichlorobenzene	350	9.26	29		
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	9		
13C6-Pentachlorobenzene	350	12.32	9		
13C6-Hexachlorobenzene	350	13.96	14		

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(6 THRU 10) TEST#2**		Sampling Date	9-Oct-19
ALS Sample ID	L2364245-2		Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS			
Analysis Type	sample			
Sample Matrix	Stack			
Sample Size	1	sample		
Percent Moisture	n/a			
Split Ratio	7			

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**
Filename	19112111.D
Run Date	11/21/2019 7:44
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS UST460651

Target Analytes		**Ret. Time**	**Concentration ng/sample**		**Flags**
1,3-Dichlorobenzene		6.77	1050		
1,4-Dichlorobenzene		6.86	183	M	
1,2-Dichlorobenzene		7.15	1030	M	
1,3,5-Trichlorobenzene		8.34	17.4	M	
1,2,4-Trichlorobenzene		8.86	461		
1,2,3-Trichlorobenzene		9.26	901	M	R
1,2,3,5/1,2,4,5-Tetrachlorobenzen		10.49	509		
1,2,3,4-Tetrachlorobenzene		10.98	307		
Pentachlorobenzene		12.33	402		
Hexachlorobenzene		13.96	54.4		
Hexachloroethane		NotFnd	<14	U	
a,2,6-Trichlorotoluene		NotFnd	<14	U	
Field Sampling Standards	**ng spiked**		**%Rec**		
1-Bromo-2,3-Dichlorobenzene	350	9.90	85		
Extraction Standards			**%Rec**		
13C6-1,4-Dichlorobenzene	350	6.86	5		
13C6-1,2,3-Trichlorobenzene	350	9.26	13		
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	10		
13C6-Pentachlorobenzene	350	12.32	11		
13C6-Hexachlorobenzene	350	13.96	13		

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**
Filename	19112112.D
Run Date	11/21/2019 8:04
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS UST460651

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		6.77	846	
1,4-Dichlorobenzene		6.86	115 M	
1,2-Dichlorobenzene		7.15	540 M	
1,3,5-Trichlorobenzene		8.33	28.7	
1,2,4-Trichlorobenzene		8.86	532	
1,2,3-Trichlorobenzene		9.26	895 M	R
1,2,3,5/1,2,4,5-Tetrachlorobenzen		10.48	695	
1,2,3,4-Tetrachlorobenzene		10.98	282	
Pentachlorobenzene		12.32	402	
Hexachlorobenzene		13.96	58.2	
Hexachloroethane		NotFnd	<14	U
a,2,6-Trichlorotoluene		NotFnd	<14	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-Dichlorobenzene	350	9.89	88	
Extraction Standards			**%Rec**	
13C6-1,4-Dichlorobenzene	350	6.86	27	
13C6-1,2,3-Trichlorobenzene	350	9.26	43	
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	17	
13C6-Pentachlorobenzene	350	12.32	18	
13C6-Hexachlorobenzene	350	13.96	21	

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	9-Oct-19
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**
Filename	19112109.D
Run Date	11/21/2019 7:02
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS UST460651

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		NotFnd	<14	U
1,4-Dichlorobenzene		6.86	35.1	
1,2-Dichlorobenzene		NotFnd	<14	U
1,3,5-Trichlorobenzene		NotFnd	<14	U
1,2,4-Trichlorobenzene		NotFnd	<14	U
1,2,3-Trichlorobenzene		9.26	146 M	
1,2,3,5/1,2,4,5-Tetrachlorobenzen		NotFnd	<14	U
1,2,3,4-Tetrachlorobenzene		NotFnd	<14	U
Pentachlorobenzene		NotFnd	<14	U
Hexachlorobenzene		NotFnd	<14	U
Hexachloroethane		NotFnd	<14	U
a,2,6-Trichlorotoluene		NotFnd	<14	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-Dichlorobenzene	350	NotFnd	0 M	R
Extraction Standards			**%Rec**	
13C6-1,4-Dichlorobenzene	350	6.86	2 M	
13C6-1,2,3-Trichlorobenzene	350	9.26	24	
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	20	
13C6-Pentachlorobenzene	350	12.32	23	
13C6-Hexachlorobenzene	350	13.96	39	

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG3189120-2	Extraction Date	22-Oct-19
Analysis Method	SIM GC/MS		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 n/a		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
Andrew Reid
--e-signature--
21-Nov-2019

Run Information	**Run 1**
Filename	19112106.D
Run Date	11/21/2019 6:00
Final Volume	1 mL
Dilution Factor	1
Analysis Units	% Rec
Instrument	MSD-2
Column	HP-5MS UST460651

Target Analytes	**ug spiked**	**Ret. Time**	**% Recovery**	**Flags**
1,3-Dichlorobenzene	350	6.78	106	
1,4-Dichlorobenzene	350	6.86	95	
1,2-Dichlorobenzene	350	7.16	127 M	
1,3,5-Trichlorobenzene	350	8.34	28	
1,2,4-Trichlorobenzene	350	8.87	209	
1,2,3-Trichlorobenzene	350	9.27	122	
1,2,3,5/1,2,4,5-Tetrachlorobenzen	350	10.49	113	
1,2,3,4-Tetrachlorobenzene	350	10.98	126	
Pentachlorobenzene	350	12.33	114	
Hexachlorobenzene	350	13.96	104	

Extraction Standards			**%Rec**
13C6-1,4-Dichlorobenzene	350	6.86	11
13C6-1,2,3-Trichlorobenzene	350	9.27	39
13C6-1,2,3,4-Tetrachlorobenzene	350	10.98	55
13C6-Pentachlorobenzene	350	12.32	56
13C6-Hexachlorobenzene	350	13.96	70

M Indicates that a peak has been manually integrated.

ALS Environmental

1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report	27-Nov-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **Chlorophenols as acetate derivatives by SIM GC/MS**

Chlorophenol recoveries on the field blank were generally poor. No chlorophenols were observed in either the field nor the laboratory method blank. Therefore despite the low recoveries in the field blank, there is no evidence for a lab or field processing bias to the test sample data.

Chlorophenol analysis is based upon a double extraction of neutral and then acidified dichloromethane on the filter and XAD2 solids.
The acidification step helps to ensure maxiumum recoveries of acidic phenols from the XAD2 and filter matrix.
On L2364245-2 the sample extract went dry on the first DCM extraction since the soxhlet side arm plugged with XAD2. For this reason there were losses of targets and extraction standards on this sample in the first DCM extraction phase.
Normally the losses on the native targets are compensated through istope dilution technique through the losses of the labelled extraction/internal standard used for quantification.
In the absence of a significant chlorine source, it is unlikely that there was creation of chlorophenols when the extract went dry.
However, it is noted that the pattern of chlorophenols is somewhat different in the L2364245-2 sample relative to the other test samples.

Data has been recovery corrected relative to the extraction standard that tracks the native recovery most favorably as determined by LCS recoveries. For example, not all monochlorophenols recover similar to single labelled mono-chlorophenol, 13C6-4-Chlorophenol. Therefore 3-chlorophenol is recovery corrected relative to 13C6-2,4,5-trichlorophenol since these two targets have similar recovery behavior.

Certified by:

Ron McLeod, PhD
Director, Air Toxics and Special Chemistries, Life Sciences

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method/Media Blank	19-21939-SVOC-(1 THRU 5) TEST#1	19-21939-SVOC-(6 THRU 10) TEST#2	19-21939-SVOC-(11 THRU 15) TEST#3	19-21939-SVOC-(16 THRU 20) BLANK	Laboratory Control Sample
ALS Sample ID	WG3189120-1	L2364245-1	L2364245-2	L2364245-3	L2364245-4	WG3189120-2
Sample Size	1	1	1	1	1	1
Sample units	sample	sample	sample	sample	sample	n/a
Moisture Content	n/a	n/a	n/a	n/a	n/a	n/a
Matrix	QC	Stack	Stack	Stack	Stack	QC
Sampling Date	n/a	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19	n/a
Extraction Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Target Analytes	**ng/sample**	**ng/sample**	**ng/sample**	**ng/sample**	**ng/sample**	**% Recovery**
2-Chlorophenol	<70 U	1600 M	<70 U	1210 M	<70 U	146 M,R
3-Chlorophenol	<70 U	521 M	<70 U	349 M	<70 U	96 M
4-Chlorophenol	<70 U	1290 M	<70 U	548 M	<70 U	96 M
2,6-Dichlorophenol	<70 U	779 M	632 M,R	362 M,R	<70 U	61 M
2,4/2,5-Dichlorophenol	<70 U	1374 R	902 M,R	522 M	<70 U	73 M
3,5-Dichlorophenol	<70 U	<70 U	<70 U	77.3 M	<70 U	114 M
2,3-Dichlorophenol	<70 U	<70 U	680 M	<70 U	<70 U	168 M,R
3,4-Dichlorophenol	<70 U	<70 U	274 M	<70 U	<70 U	95
2,4,6-Trichlorophenol	<70 U	4440	2700	2870 M	<70 U	14 M
2,3,6-Trichlorophenol	<70 U	<70 U	<70 U	<70 U	<70 U	109 M
2,3,5-Trichlorophenol	<70 U	580 R	1660	1020 R	<70 U	140 M
2,4,5-Trichlorophenol	<70 U	<70 U	<70 U	<70 U	<70 U	107
2,3,4-Trichlorophenol	<70 U	<70 U	<70 U	<70 U	<70 U	84
3,4,5-Trichlorophenol	<70 U	<70 U	312 M,R	<70 U	<70 U	121
2,3,5,6/2,3,4,6-Tetrachlorophenol	<70 U	92.3 M	197 M,R	55.1 M	<70 U	95
2,3,4,5-Tetrachlorophenol	<70 U	<70 U	<70 U	<70 U	<70 U	108
Pentachlorophenol	<70 U	<70 U	<70 U	<70 U	<70 U	104 M
Hexachlorophene	<70 U	<70 U	<70 U	<70 U	<70 U	ns
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C6-4-Chlorophenol (ES)	82	85	67	80	8 M	19
13C6-2,4-Dichlorophenol (ES)	95	92	78	100	1 M	18
13C6-2,4,5-Trichlorophenol (ES)	81	71	57	79	20	48
13C6-2,3,4,5-Tetrachlorophenol (ES)	91	72	53 R	77 R	42 R	66 R
13C6-Pentachlorophenol (ES)	56	28 M	20 M	23 M	2 M	10 M

U Indicates that this compound was not detected above the LOR.
M Indicates that a peak has been manually integrated.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
ns Not spiked

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report	26-Nov-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **Chlorinated Pesticides by EPA 1699 (modified)**
Tributyltins by GC/FPD following extract Grignard dervatization

Labelled internal standards were added to the raw extract before instrumental analysis. Effective extraction of the samples is demonstrated by the good recoveries of other SVOC targets such as PCDD/F.

Organotins were analyzed at the ALS Kelso laboratory

Certified by: [signature]

Ron McLeod, PhD
Director, Air Toxics and Special Chemistries, Life Sciences

ALS Life Sciences

Sample Analysis summary Report

Sample Name	19-21939-SVOC-(1 THRU 5) TEST#1	19-21939-SVOC-(6 THRU 10) TEST#2	19-21939-SVOC-(11 THRU 15) TEST#3	19-21939-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2364245-1	L2364245-2	L2364245-3	L2364245-4
Sample Size	1	1	1	1
Sample size units	sample	sample	sample	sample
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19
Extraction Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Target Analytes	**ng**	**ng**	**ng**	**ng**
Hexachlorobutadiene	53.4	10.1	61.1	<0.22
Heptachlor	<0.28	<0.13	<0.11	<0.14
Octachlorostyrene	<0.61	<0.54	<0.60	<0.49
Oxychlordane	<0.41	<0.50	<0.53	<0.66
trans-Chlordane	<1.9	<2.5	<2.2	<1.5
cis-Chlordane	<1.8	<2.4	<2.1	<1.4
trans-Nonachlor	<1.8	<2.4	<2.1	<1.4
cis-Nonachlor	<0.98	<1.8	<1.2	<1.9
Parlar 26	<2.5	<2.3	<3.3	<3.1
Parlar 50	<2.2	<1.7	<2.6	<1.9
Parlar 62	<2.7	<2.2	<3.2	<2.4
Tri-n-butyltin	<200	<200	<200	<200
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
alpha-BHC, 13C6-	89	87	93	90
Heptachlor, 13C10-	82	79	79	75
Oxychlordane, 13C10-	94	92	91	88
trans-Nonachlor, 13C10-	93	90	91	89
Dieldrin, 13C12-	94	92	95	95
Endrin, 13C12-	84	76	73	79
Endosulfan II, 13C9-	89	86	85	83
Mirex, 13C10-	97	92	101	98

ALS Life Sciences

Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG3189120-1
Sample Size	1
Sample size units	sample
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	22-Oct-2019

Target Analytes	**ng**
Hexachlorobutadiene	<0.22
Heptachlor	<0.23
Octachlorostyrene	<0.49
Oxychlordane	<0.24
trans-Chlordane	<2.8
cis-Chlordane	<2.6
trans-Nonachlor	<2.6
cis-Nonachlor	<1.8
Parlar 26	<3.1
Parlar 50	<2.1
Parlar 62	<2.6
Tri-n-butyltin	<200
Extraction Standards	**% Rec**
alpha-BHC, 13C6-	89
Heptachlor, 13C10-	72
Oxychlordane, 13C10-	89
trans-Nonachlor, 13C10-	87
Dieldrin, 13C12-	95
Endrin, 13C12-	59
Endosulfan II, 13C9-	56
Mirex, 13C10-	98

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	8-Oct-19	
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19	
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
25-Nov-2019

Run Information	**Run 1**
Filename	9-191121C25
Run Date	22-Nov-19 15:11
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-9 HP5MS UST709916H

Target Analytes		**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Hexachlorobutadiene		6.97	31.5	0.16			14
Heptachlor		18.23	<0.28	0.16	M,J,R	0.28	14
Octachlorostyrene		NotFnd	<0.61	0.61	U		14
Oxychlordane		NotFnd	<0.41	0.41	U		14
trans-Chlordane		NotFnd	<1.9	1.9	U		14
cis-Chlordane		NotFnd	<1.8	1.8	U		14
trans-Nonachlor		NotFnd	<1.8	1.8	U		14
cis-Nonachlor		NotFnd	<0.98	0.98	U		14
Parlar 26		NotFnd	<2.5	2.5	U		14
Parlar 50		NotFnd	<2.2	2.2	U		14
Parlar 62		NotFnd	<2.7	2.7	U		14
Extraction Standards	**ng**						
alpha-BHC, 13C6-	350	11.90	89	5-120			
Heptachlor, 13C10-	700	18.20	82	5-120			
Oxychlordane, 13C10-	700	20.51	94	23-135			
trans-Nonachlor, 13C10-	700	21.79	93	14-136			
Dieldrin, 13C12-	350	22.31	94	40-151			
Endrin, 13C12-	700	22.95	84	35-155			
Mirex, 13C10-	350	27.05	97	5-120			

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(6 THRU 10) TEST#2**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-2	Extraction Date	22-Oct-19	
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
25-Nov-2019

Run Information	**Run 1**
Filename	9-191121C26
Run Date	22-Nov-19 15:48
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-9 HP5MS UST709916H

Target Analytes		**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Hexachlorobutadiene		6.98	7.68	0.17	J		14
Heptachlor		18.20	<0.13	0.13	M,U	0.094	14
Octachlorostyrene		NotFnd	<0.54	0.54	U		14
Oxychlordane		NotFnd	<0.50	0.50	U		14
trans-Chlordane		NotFnd	<2.5	2.5	U		14
cis-Chlordane		NotFnd	<2.4	2.4	U		14
trans-Nonachlor		NotFnd	<2.4	2.4	U		14
cis-Nonachlor		NotFnd	<1.8	1.8	U		14
Parlar 26		NotFnd	<2.3	2.3	U		14
Parlar 50		NotFnd	<1.7	1.7	U		14
Parlar 62		NotFnd	<2.2	2.2	U		14
Extraction Standards	**ng**						
alpha-BHC, 13C6-	350	11.90	87	5-120			
Heptachlor, 13C10-	700	18.21	79	5-120			
Oxychlordane, 13C10-	700	20.51	92	23-135			
trans-Nonachlor, 13C10-	700	21.79	90	14-136			
Dieldrin, 13C12-	350	22.32	92	40-151			
Endrin, 13C12-	700	22.95	76	35-155			
Mirex, 13C10-	350	27.04	92	5-120			

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19		Approved:
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19		*Ella Gdyczynski*
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		25-Nov-2019
Sample Matrix	Stack	Split Ratio	7		

Run Information	**Run 1**
Filename	9-191121C27
Run Date	22-Nov-19 16:20
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-9 HP5MS UST709916H

Target Analytes		**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Hexachlorobutadiene		6.97	33.8	0.18			14
Heptachlor		18.21	<0.11	0.093	M,J,R	0.11	14
Octachlorostyrene		NotFnd	<0.60	0.60	U		14
Oxychlordane		NotFnd	<0.53	0.53	U		14
trans-Chlordane		NotFnd	<2.2	2.2	U		14
cis-Chlordane		NotFnd	<2.1	2.1	U		14
trans-Nonachlor		NotFnd	<2.1	2.1	U		14
cis-Nonachlor		NotFnd	<1.2	1.2	U		14
Parlar 26		NotFnd	<3.3	3.3	U		14
Parlar 50		NotFnd	<2.6	2.6	U		14
Parlar 62		NotFnd	<3.2	3.2	U		14
Extraction Standards	**ng**						
alpha-BHC, 13C6-	350	11.90	93	5-120			
Heptachlor, 13C10-	700	18.20	79	5-120			
Oxychlordane, 13C10-	700	20.51	91	23-135			
trans-Nonachlor, 13C10-	700	21.79	91	14-136			
Dieldrin, 13C12-	350	22.31	95	40-151			
Endrin, 13C12-	700	22.95	73	35-155			
Mirex, 13C10-	350	27.04	101	5-120			

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	9-Oct-19	
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19	
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
Ella Gdyczynski
--e-signature--
25-Nov-2019

Run Information	**Run 1**
Filename	9-191121C24
Run Date	22-Nov-19 14:38
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-9 HP5MS UST709916H

Target Analytes		**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Hexachlorobutadiene		NotFnd	<0.12	0.12	U		14
Heptachlor		18.22	<0.14	0.087	M,J,R	0.14	14
Octachlorostyrene		NotFnd	<0.49	0.49	U		14
Oxychlordane		NotFnd	<0.66	0.66	U		14
trans-Chlordane		NotFnd	<1.5	1.5	U		14
cis-Chlordane		NotFnd	<1.4	1.4	U		14
trans-Nonachlor		NotFnd	<1.4	1.4	U		14
cis-Nonachlor		NotFnd	<1.9	1.9	U		14
Parlar 26		NotFnd	<3.1	3.1	U		14
Parlar 50		NotFnd	<1.9	1.9	U		14
Parlar 62		NotFnd	<2.4	2.4	U		14
Extraction Standards	**ng**						
alpha-BHC, 13C6-	350	11.91	90	5-120			
Heptachlor, 13C10-	700	18.22	75	5-120			
Oxychlordane, 13C10-	700	20.52	88	23-135			
trans-Nonachlor, 13C10-	700	21.80	89	14-136			
Dieldrin, 13C12-	350	22.33	95	40-151			
Endrin, 13C12-	700	22.96	79	35-155			
Mirex, 13C10-	350	27.06	98	5-120			

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	
ALS Sample ID	WG3189120-1	Extraction Date	22-Oct-2019	Approved:
Analysis Method	EPA 1699 (mod)	Sample Size	1 sample	*Ella Gdyczynski*
Analysis Type	Blank	Percent Moisture	n/a	--e-signature--
Sample Matrix	QC	Split Ratio	7	25-Nov-2019

Run Information	**Run 1**
Filename	9-191121C23
Run Date	22-Nov-19 14:02
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-9 HP5MS UST709916H

Target Analytes		Ret. Time	Conc. ng	EDL ng	Flags	EMPC ng	LQL
Hexachlorobutadiene		NotFnd	<0.11	0.11	U		14
Heptachlor		18.34	<0.23	0.23	M,U	0.22	14
Octachlorostyrene		NotFnd	<0.49	0.49	U		14
Oxychlordane		NotFnd	<0.24	0.24	U		14
trans-Chlordane		NotFnd	<2.8	2.8	U		14
cis-Chlordane		NotFnd	<2.6	2.6	U		14
trans-Nonachlor		NotFnd	<2.6	2.6	U		14
cis-Nonachlor		NotFnd	<1.8	1.8	U		14
Parlar 26		NotFnd	<3.1	3.1	U		14
Parlar 50		NotFnd	<2.1	2.1	U		14
Parlar 62		NotFnd	<2.6	2.6	U		14
Extraction Standards	**ng**						
alpha-BHC, 13C6-	350	11.99	89	5-120			
Heptachlor, 13C10-	700	18.30	72	5-120			
Oxychlordane, 13C10-	700	20.61	89	23-135			
trans-Nonachlor, 13C10-	700	21.89	87	14-136			
Dieldrin, 13C12-	350	22.42	95	40-151			
Endrin, 13C12-	700	23.06	59	35-155			
Mirex, 13C10-	350	27.13	98	5-120			

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the EDL.

EMPC Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364245		Mississauga, ON
Date of Report Revision	3-Dec-19		L5J 2Y4
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PAH by CARB method 429 (LR option)- Isotope dilution**
Revised Report: Invalid PAH Test 2 Data Removed

The Test 2 sample went dry during soxhlet extraction and the resulting charring of the extract caused a significantly high bias to the PAH results of this sample extract such that the results were clearly not representative of the source emissions.

Certified by: R.A. McLeod

Ron McLeod, PhD
Director, Air Toxics and Special Chemistries, Life Sciences

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method/Media Blank		19-21939-SVOC- (1 THRU 5) TEST#1		19-21939-SVOC- (11 THRU 15) TEST#3		19-21939-SVOC- (16 THRU 20) BLANK		Laboratory Control Sample	
ALS Sample ID	WG3189120-1		L2364245-1		L2364245-3		L2364245-4		WG3189120-2	
Sample Size	1		1		1		1		1	
Sample units	sample		sample		sample		sample		n/a	
Moisture Content	n/a		n/a		n/a		n/a		n/a	
Matrix	QC		Stack		Stack		Stack		QC	
Sampling Date	n/a		8-Oct-19		10-Oct-19		9-Oct-19		n/a	
Extraction Date	22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19	
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**%**	
Naphthalene	21.0	M	6140	M	4630		99.2	M	94	
2-Methylnaphthalene	<14	U	554		335		20.8	M	83	
1-Methylnaphthalene	<14	U	654		347		<14	U	97	
Acenaphthylene	<14	U	143	R	54.3	M	<14	U	82	
Acenaphthene	<14	U	23.4	R	14.9	R	<14	U	88	
Fluorene	15.6		91.4	R	53.2	R	15.1	M	74	
Phenanthrene	144		430		302		136		93	
Anthracene	37.5	M	71.2	M	44.2	M	32.3	M	74	M
Fluoranthene	76.7		112		87.6		100		70	
Pyrene	61.3		123		90.9	M	95.2		73	
Benzo(a)Anthracene	31.9	M,R	22.6	R	21.1	M	26.3	M,R	65	
Chrysene/Triphenylene/Benzo(b)anthracene	71.3	M	48.6	M	46.0	M	50.7	M	86	M
Benzo(b)Fluoranthene	37.1	M	28.6	M	24.6	M,R	23.5	M,R	58	
Benzo(k)Fluoranthene	44.0	M	30.1	M	30.1	M	27.1	M	74	M
Benzo(e)Pyrene	34.1	M,R	72.4	M	31.6		28.4	M	68	
Benzo(a)Pyrene	34.9	M	24.7	M	23.7	M	23.7	M	57	M
Perylene	31.4	M	17.6	M	<14	U	18.6	M	68	M
Indeno(1,2,3-cd)Pyrene	37.3	M	39.8	M,R	28.2	M	23.3	M,R	62	
Dibenzo(a,c/a,h)Anthracene	47.7	M	32.1	M	34.9	M	30.0	M	79	M
Benzo(g,h,i)Perylene	28.4	M	208	M	59.3	M	23.0	M	60	M
Additional Analytes										
Tetralin	<14	U	192		173		44.7	M	NS	
Quinoline	<14	U	<14	U	91.0	M,R	<14	U	NS	
2-Chloronaphthalene	<14	U	20.7		<14	U	<14	U	NS	
Biphenyl	21.3		473		503		<14	U	NS	
o-Terphenyl	19.1		17.9		17.0		<14	U	NS	
1-Methylphenanthrene	<14	U	<14	U	18.5	M,R	<14	U	NS	
9-Methylphenanthrene	16.7		48.7		23.0	M	14.6		NS	
2-methylanthracene	44.9		95.5		67.4	M	31.2		NS	
9,10-dimethylanthracene	18.3	M	<14	U	<14	U	<14	U	NS	
m-terphenyl	22.3		21.4		49.2	R	15.4		NS	
p-terphenyl	20.2		17.6		28.1	R	15.5		NS	
Benzo(a)fluorene	19.1		<14	U	33.9	M	<14	U	NS	
Benzo(b)fluorene	<14	U	<14	U	<14	U	<14	U	NS	
7,12-Dimethylbenzo(a)anthracene	22.6	M	19.8	M	16.5	M,R	22.9	M	NS	
3-Methylcholanthrene	<70	U	<70	U	<70	U	<70	U	NS	
Picene	<70	U	<70	U	<70	U	<70	U	NS	
Dibenzo(a,e)pyrene	<70	U	<70	U	<70	U	<70	U	NS	
Coronene	<70	U	172	M	<70	U	<70	U	NS	
Field Sampling Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
1-Methylnaphthalene-D10	NS		122	M	136	M	96		NS	
Fluorene D10	NS		99		95		94		NS	
Terphenyl D14(Surr.)	NS		96		101		90		NS	
Extraction Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Naphthalene D8	66		46		42		73		65	M
2-Methylnaphthalene-D10	76		67		57		89		87	
Acenaphthylene D8	75		74		81		74		70	
Phenanthrene D10	66		68		47		67		62	
Anthracene-D10	78	M	70	M	59	M	75	M	76	M
Fluoranthene D10	94		95		84		92		84	
Benz(a)Anthracene-D12	79		76		85		69		70	
Chrysene D12	99	M	100	M	88	M	92	M	89	M
Benzo(b)Fluoranthene-D12	104		95		99		105		91	
Benzo(k)Fluoranthene-D12	109	M	106	M	101	M	109	M	98	M
Benzo(a)Pyrene D12	94		79		83	M	91		87	
Perylene D12	117	M	93	M	97	M	114	M	107	M
Indeno(1,2,3,cd)Pyrene-D12	98	M	79	M	73	M	85	M	95	
Dibenz(a,h)Anthracene-D14	98	M	84	M	85	M	99	M	96	M
Benzo(g,h,i)Perylene D12	120	M	104	M	100	M	117	M	115	M

U Indicates that this compound was not detected above the LOD.
M Indicates that a peak has been manually integrated.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NS Indicates that this compound was not added.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method/Media Blank**	Sampling Date	n/a
ALS Sample ID	WG3189120-1	Extraction Date	22-Oct-19
Analysis Method	PAH by CARB 429		
Analysis Type	blank		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG3189120

Approved:
S. Jin
--e-signature--
27-Nov-2019

Run Information	**Run 1**
Filename	19102559.D
Run Date	10/26/2019 18:26
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-5
Column	HP5-MS UST279461H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	2.77	21.0 M	
2-Methylnaphthalene	3.37	<14	U
1-Methylnaphthalene	3.48	<14	U
Acenaphthylene	4.49	<14	U
Acenaphthene	NotFnd	<14	U
Fluorene	5.70	15.6	
Phenanthrene	7.85	144	
Anthracene	7.97	37.5 M	
Fluoranthene	11.21	76.7	
Pyrene	11.85	61.3	
Benzo(a)Anthracene	15.76	31.9 M	R
Chrysene	15.87	71.3 M	
Benzo(b)Fluoranthene	19.09	37.1 M	
Benzo(k)Fluoranthene	19.13	44.0 M	
Benzo(e)Pyrene	19.81	34.1 M	R
Benzo(a)Pyrene	19.95	34.9 M	
Chrysene/Perylene/Benzo(b)anth	20.19	31.4 M	
Indeno(1,2,3-cd)Pyrene	23.43	37.3 M	
Dibenzo(a,c/a,h)Anthracene	23.62	47.7 M	
Benzo(g,h,i)Perylene	24.31	28.4 M	
Additional Analytes			
Tetralin	2.65	<14	U
Quinoline	NotFnd	<14	U
2-Chloronaphthalene	3.92	<14	U
Biphenyl	3.91	21.3	
o-Terphenyl	9.11	19.1	
1-Methylphenanthrene	9.40	<14	U
9-Methylphenanthrene	9.51	16.7	
2-methylanthracene	9.58	44.9	
9,10-dimethylanthracene	12.09	18.3 M	
m-terphenyl	12.27	22.3	
p-terphenyl	12.75	20.2	
Benzo(a)fluorene	13.06	19.1	
Benzo(b)fluorene	13.26	<14	U
7,12-Dimethylbenzo(a)anthracen	19.18	22.6 M	
3-Methylcholanthrene	NotFnd	<70	U
Picene	NotFnd	<70	U
Dibenzo(a,e)pyrene	NotFnd	<70	U
Coronene	NotFnd	<70	U

Field Sampling Standards	**ng spiked**	**% Rec**
1-Methylnaphthalene-D10		NS
Fluorene D10		NS
Terphenyl D14(Surr.)		NS

Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	2.76	65.7	50-150
2-Methylnaphthalene-D10	700	3.33	75.6	50-150
Acenaphthylene D8	700	4.47	74.5	50-150
Phenanthrene D10	700	7.79	66.3	50-150
Anthracene-D10	700	7.92	78.4 M	50-150
Fluoranthene D10	700	11.15	94.2	50-150
Benz(a)Anthracene-D12	700	15.69	79.4	50-150
Chrysene D12	700	15.79	98.9 M	50-150
Benzo(b)Fluoranthene-D12	700	19.01	104.0	50-150
Benzo(k)Fluoranthene-D12	700	19.09	109.0 M	50-150
Benzo(a)Pyrene D12	700	19.88	93.9	50-150
Perylene D12	700	20.10	116.8 M	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.34	97.6 M	50-150
Dibenz(a,h)Anthracene-D14	700	23.50	97.7 M	50-150
Benzo(g,h,i)Perylene D12	700	24.20	120.4 M	50-150

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NS Indicates that this compound was not added.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(1 THRU 5) TEST#1**	Sampling Date	08-Oct-19 00:00
ALS Sample ID	L2364245-1	Extraction Date	22-Oct-19
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG3189120

Approved:
S. Jin
--e-signature--
27-Nov-2019

Run Information	**Run 1**
Filename	19102561.D
Run Date	10/26/2019 19:37
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-5
Column	HP5-MS UST279461H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	2.76	6140 M	
2-Methylnaphthalene	3.37	554	
1-Methylnaphthalene	3.48	654	
Acenaphthylene	4.49	143	R
Acenaphthene	4.78	23.4	R
Fluorene	5.69	91.4	R
Phenanthrene	7.85	430	
Anthracene	7.96	71.2 M	
Fluoranthene	11.21	112	
Pyrene	11.85	123	
Benzo(a)Anthracene	15.76	22.6	R
Chrysene	15.87	48.6 M	
Benzo(b)Fluoranthene	19.08	28.6 M	
Benzo(k)Fluoranthene	19.10	30.1 M	
Benzo(e)Pyrene	19.81	72.4 M	
Benzo(a)Pyrene	19.96	24.7 M	
Chrysene/Perylene/Benzo(b)anth	20.19	17.6 M	
Indeno(1,2,3-cd)Pyrene	23.44	39.8 M	R
Dibenzo(a,c/a,h)Anthracene	23.61	32.1 M	
Benzo(g,h,i)Perylene	24.30	208 M	
Additional Analytes			
Tetralin	2.64	192	
Quinoline	NotFnd	<14	U
2-Chloronaphthalene	3.92	20.7	
Biphenyl	3.90	473	
o-Terphenyl	9.11	17.9	
1-Methylphenanthrene	NotFnd	<14	U
9-Methylphenanthrene	9.51	48.7	
2-methylanthracene	9.58	95.5	
9,10-dimethylanthracene	12.08	<14	U
m-terphenyl	12.27	21.4	
p-terphenyl	12.74	17.6	
Benzo(a)fluorene	13.06	<14	U
Benzo(b)fluorene	13.26	<14	U
7,12-Dimethylbenzo(a)anthracen	19.17	19.8 M	
3-Methylcholanthrene	NotFnd	<70	U
Picene	NotFnd	<70	U
Dibenzo(a,e)pyrene	NotFnd	<70	U
Coronene	29.18	172 M	

Field Sampling Standards	**ng spiked**		**% Rec**	
1-Methylnaphthalene-D10	500	3.44	121.6 M	
Fluorene D10	500	5.64	99	
Terphenyl D14(Surr.)	500	12.67	96.4	
Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	2.75	45.5	50-150
2-Methylnaphthalene-D10	700	3.33	66.5	50-150
Acenaphthylene D8	700	4.47	74.0	50-150
Phenanthrene D10	700	7.79	68.0	50-150
Anthracene-D10	700	7.92	69.9 M	50-150
Fluoranthene D10	700	11.15	95.3	50-150
Benz(a)Anthracene-D12	700	15.69	76.2	50-150
Chrysene D12	700	15.79	99.6 M	50-150
Benzo(b)Fluoranthene-D12	700	19.01	95.2	50-150
Benzo(k)Fluoranthene-D12	700	19.09	105.6 M	50-150
Benzo(a)Pyrene D12	700	19.89	78.5	50-150
Perylene D12	700	20.11	93.0 M	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.35	78.5 M	50-150
Dibenz(a,h)Anthracene-D14	700	23.50	84.1 M	50-150
Benzo(g,h,i)Perylene D12	700	24.20	103.8 M	50-150

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(11 THRU 15) TEST#3**	Sampling Date	10-Oct-19 00:00
ALS Sample ID	L2364245-3	Extraction Date	22-Oct-19
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG3189120

Approved:
S. Jin
--e-signature--
27-Nov-2019

Run Information	**Run 1**
Filename	19102563.D
Run Date	10/26/2019 20:48
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-5
Column	HP5-MS UST279461H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	2.76	4630	
2-Methylnaphthalene	3.36	335	
1-Methylnaphthalene	3.47	347	
Acenaphthylene	4.49	54.3 M	
Acenaphthene	4.78	14.9	R
Fluorene	5.69	53.2	R
Phenanthrene	7.85	302	
Anthracene	7.96	44.2 M	
Fluoranthene	11.20	87.6	
Pyrene	11.84	90.9 M	
Benzo(a)Anthracene	15.74	21.1 M	
Chrysene	15.86	46.0 M	
Benzo(b)Fluoranthene	19.08	24.6 M	R
Benzo(k)Fluoranthene	19.12	30.1 M	
Benzo(e)Pyrene	19.81	31.6	
Benzo(a)Pyrene	19.96	23.7 M	
Chrysene/Perylene/Benzo(b)anth	20.18	<14	U
Indeno(1,2,3-cd)Pyrene	23.43	28.2 M	
Dibenzo(a,c/a,h)Anthracene	23.60	34.9 M	
Benzo(g,h,i)Perylene	24.32	59.3 M	
Additional Analytes			
Tetralin	2.64	173	
Quinoline	3.05	91.0 M	R
2-Chloronaphthalene	3.92	<14	U
Biphenyl	3.90	503	
o-Terphenyl	9.11	17.0	
1-Methylphenanthrene	9.39	18.5 M	R
9-Methylphenanthrene	9.51	23.0 M	
2-methylanthracene	9.57	67.4 M	
9,10-dimethylanthracene	12.09	<14	U
m-terphenyl	12.24	49.2	R
p-terphenyl	12.72	28.1	R
Benzo(a)fluorene	13.04	33.9 M	
Benzo(b)fluorene	13.24	<14	U
7,12-Dimethylbenzo(a)anthracen	19.17	16.5 M	R
3-Methylcholanthrene	NotFnd	<70	U
Picene	NotFnd	<70	U
Dibenzo(a,e)pyrene	NotFnd	<70	U
Coronene	29.15	<70	U

Field Sampling Standards	**ng spiked**		**% Rec**	
1-Methylnaphthalene-D10	500	3.44	136.4 M	
Fluorene D10	500	5.63	94.9	
Terphenyl D14(Surr.)	500	12.65	101.2	
Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	2.75	42.3	50-150
2-Methylnaphthalene-D10	700	3.33	57.4	50-150
Acenaphthylene D8	700	4.47	80.5	50-150
Phenanthrene D10	700	7.79	46.9	50-150
Anthracene-D10	700	7.92	58.9 M	50-150
Fluoranthene D10	700	11.15	84.3	50-150
Benz(a)Anthracene-D12	700	15.68	84.8	50-150
Chrysene D12	700	15.79	87.9 M	50-150
Benzo(b)Fluoranthene-D12	700	19.01	99.0	50-150
Benzo(k)Fluoranthene-D12	700	19.09	100.7 M	50-150
Benzo(a)Pyrene D12	700	19.88	83.3 M	50-150
Perylene D12	700	20.10	97.0 M	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.34	73.0 M	50-150
Dibenz(a,h)Anthracene-D14	700	23.48	84.5 M	50-150
Benzo(g,h,i)Perylene D12	700	24.21	99.7 M	50-150

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-SVOC-(16 THRU 20) BLANK**	Sampling Date	09-Oct-19 00:00
ALS Sample ID	L2364245-4	Extraction Date	22-Oct-19
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG3189120

Approved:
S. Jin
--e-signature--
27-Nov-2019

Run Information	**Run 1**
Filename	19102560.D
Run Date	10/26/2019 19:01
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-5
Column	HP5-MS UST279461H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	2.77	99.2 M	
2-Methylnaphthalene	3.37	20.8 M	
1-Methylnaphthalene	3.48	<14	U
Acenaphthylene	4.49	<14	U
Acenaphthene	4.78	<14	U
Fluorene	5.69	15.1 M	
Phenanthrene	7.85	136	
Anthracene	7.96	32.3 M	
Fluoranthene	11.21	100	
Pyrene	11.85	95.2	
Benzo(a)Anthracene	15.77	26.3 M	R
Chrysene	15.87	50.7 M	
Benzo(b)Fluoranthene	19.09	23.5 M	R
Benzo(k)Fluoranthene	19.15	27.1 M	
Benzo(e)Pyrene	19.82	28.4 M	
Benzo(a)Pyrene	19.97	23.7 M	
Chrysene/Perylene/Benzo(b)anth	20.19	18.6 M	
Indeno(1,2,3-cd)Pyrene	23.44	23.3 M	R
Dibenzo(a,c/a,h)Anthracene	23.62	30.0 M	
Benzo(g,h,i)Perylene	24.32	23.0 M	
Additional Analytes			
Tetralin	2.65	44.7 M	
Quinoline	NotFnd	<14	U
2-Chloronaphthalene	3.92	<14	U
Biphenyl	3.91	<14	U
o-Terphenyl	9.11	<14	U
1-Methylphenanthrene	NotFnd	<14	U
9-Methylphenanthrene	9.51	14.6	
2-methylanthracene	9.58	31.2	
9,10-dimethylanthracene	12.09	<14	U
m-terphenyl	12.27	15.4	
p-terphenyl	12.74	15.5	
Benzo(a)fluorene	13.08	<14	U
Benzo(b)fluorene	13.29	<14	U
7,12-Dimethylbenzo(a)anthracen	19.18	22.9 M	
3-Methylcholanthrene	NotFnd	<70	U
Picene	NotFnd	<70	U
Dibenzo(a,e)pyrene	NotFnd	<70	U
Coronene	NotFnd	<70	U

Field Sampling Standards	**ng spiked**		**% Rec**	**Limits**
1-Methylnaphthalene-D10	500	3.44	95.8	
Fluorene D10	500	5.64	94.2	
Terphenyl D14(Surr.)	500	12.67	90.4	
Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	2.76	73.2	50-150
2-Methylnaphthalene-D10	700	3.34	88.5	50-150
Acenaphthylene D8	700	4.47	74.3	50-150
Phenanthrene D10	700	7.79	67.3	50-150
Anthracene-D10	700	7.92	75.0 M	50-150
Fluoranthene D10	700	11.15	92.3	50-150
Benz(a)Anthracene-D12	700	15.69	69.1	50-150
Chrysene D12	700	15.79	91.9 M	50-150
Benzo(b)Fluoranthene-D12	700	19.02	104.5	50-150
Benzo(k)Fluoranthene-D12	700	19.10	109.0 M	50-150
Benzo(a)Pyrene D12	700	19.89	91.3	50-150
Perylene D12	700	20.11	113.9 M	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.35	85.1 M	50-150
Dibenz(a,h)Anthracene-D14	700	23.51	98.5 M	50-150
Benzo(g,h,i)Perylene D12	700	24.21	117.1 M	50-150

M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the MDL.

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**		Sampling Date	n/a
ALS Sample ID	WG3189120-2		Extraction Date	22-Oct-19
Analysis Method	PAH by CARB 429			
Analysis Type	LCS			
Sample Matrix	QC			
Sample Size	1	n/a		
Percent Moisture	n/a			
Split Ratio	7		Workgroup	WG3189120

Approved:
S. Jin
--e-signature--
27-Nov-2019

Run Information	**Run 1**
Filename	19102557.D
Run Date	10/26/2019 17:14
Final Volume	1 mL
Dilution Factor	1
Analysis Units	%Rec
Instrument	MSD-5
Column	HP5-MS UST279461H

Target Analytes	**ug spiked**	**Ret. Time**	**%**	**Flags**	**Limits**
Naphthalene	700	2.77	93.8		50-150
2-Methylnaphthalene	700	3.37	82.9		50-150
1-Methylnaphthalene	700	3.48	97		50-150
Acenaphthylene	700	4.49	82.4		50-150
Acenaphthene	700	4.78	87.6		50-150
Fluorene	700	5.69	73.9		50-150
Phenanthrene	700	7.85	93.1		50-150
Anthracene	700	7.96	73.7 M		50-150
Fluoranthene	700	11.21	70.3		50-150
Pyrene	700	11.84	72.6		50-150
Benzo(a)Anthracene	700	15.76	65.2		50-150
Chrysene	700	15.87	86.3 M		50-150
Benzo(b)Fluoranthene	700	19.07	57.6		50-150
Benzo(k)Fluoranthene	700	19.14	73.6 M		50-150
Benzo(e)Pyrene	700	19.80	68.1		50-150
Benzo(a)Pyrene	700	19.95	57.4 M		50-150
Chrysene/Perylene/Benzo(b)anth	700	20.18	67.9 M		50-150
Indeno(1,2,3-cd)Pyrene	700	23.43	61.6		50-150
Dibenzo(a,c/a,h)Anthracene	700	23.60	78.5 M		50-150
Benzo(g,h,i)Perylene	700	24.30	60.4 M		50-150

Field Sampling Standards	**ng spiked**	**% Rec**
1-Methylnaphthalene-D10		NS
Fluorene D10		NS
Terphenyl D14(Surr.)		NS

Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	2.75	65.2 M	30-150
2-Methylnaphthalene-D10	700	3.33	86.8	30-150
Acenaphthylene D8	700	4.47	70.3	30-150
Phenanthrene D10	700	7.80	62.1	50-150
Anthracene-D10	700	7.92	75.7 M	50-150
Fluoranthene D10	700	11.15	83.5	50-150
Benz(a)Anthracene-D12	700	15.69	70.2	50-150
Chrysene D12	700	15.79	88.6 M	50-150
Benzo(b)Fluoranthene-D12	700	19.02	91.4	50-150
Benzo(k)Fluoranthene-D12	700	19.09	97.5 M	50-150
Benzo(a)Pyrene D12	700	19.89	87.2	30-150
Perylene D12	700	20.11	106.5 M	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.34	95.0	50-150
Dibenz(a,h)Anthracene-D14	700	23.49	96.4 M	50-150
Benzo(g,h,i)Perylene D12	700	24.20	115.4 M	50-150

M Indicates that a peak has been manually integrated.

NS Indicates that this compound was not added.

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2367170		Mississauga, ON L5J 2Y4
Date of Report	15-Nov-19		Canada
Date of Sample Receipt	17-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **Select PCB Congeners by EPA 1668C**

PCB Congener Group Totals and Total PCB as a sum of detected values, including EMPC values, consistent with USEPA CLP SOW CBC1.2

Results have been reported from an effective 1/20 split for the extract due to target levels and interferences causing localized suppression.
For the samples 19-21939-RC-4 RICH FEED and 19-21939-EC-4 EMULSION FEED, the results for some PCB congeners have been determined via the analysis of sample extracts that have received further dilution.

Certified by: [signature]

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	19-21939-RC-4 RICH FEED	19-21939-LC-4 LEAN FEED	19-21939-AC-4 ALKALINE FEED	19-21939-EC-4 EMULSION FEED
ALS Sample ID	L2367170-1	L2367170-2	L2367170-3	L2367170-4
Sample Size	20.44	20.45	20.06	20.27
Sample size units	g	g	g	g
Percent Moisture	66.9%	87.7%	99.5%	70.2%
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	n/a	n/a	n/a	n/a
Extraction Date	4-Nov-19	4-Nov-19	4-Nov-19	4-Nov-19
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**
PCB-081	<6.8	<5.3	<1.2	<22
PCB-077	140	75.9	<1.0	569
PCB-123	220	<19	<1.5	519
PCB-118	16700	1200	<1.4	37700
PCB-114	395	<28	<1.5	1110
PCB-105	6800	456	<1.6	16800
PCB-126	<10	17.6	<1.7	51.5
PCB-167	1380	96.8	<0.91	2750
PCB-156/157	4180	318	<1.2	9110
PCB-169	<80	<4.0	<0.90	<180
PCB-189	455	42.4	<0.45	1010
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-PCB-001	50	27	61	17
13C12-PCB-003	56	27	62	38
13C12-PCB-004	44	41	58	28
13C12-PCB-015	64	34	54	42
13C12-PCB-019	39	29	45	28
13C12-PCB-037	30	40	72	34
13C12-PCB-054	29	29	45	23
13C12-PCB-081	24	36	61	36
13C12-PCB-077	35	36	70	37
13C12-PCB-104	32	34	57	9
13C12-PCB-123	33	34	69	16
13C12-PCB-118	32	33	67	18
13C12-PCB-114	31	35	67	18
13C12-PCB-105	31	35	66	29
13C12-PCB-126	32	41	67	31
13C12-PCB-155	43	11	58	63
13C12-PCB-167	28	39	65	48
13C12-PCB-156/157	28	35	61	36
13C12-PCB-169	32	40	74	34
13C12-PCB-188	45	16	65	63
13C12-PCB-189	40	45	77	43
13C12-PCB-202	51	21	65	61
13C12-PCB-205	32	36	61	58
13C12-PCB-208	44	12	59	53
13C12-PCB-206	30	35	61	55
13C12-PCB-209	31	5	38	54
Cleanup Standards				
13C12-PCB-028	114	100	68	82
13C12-PCB-111	111	82	63	21
13C12-PCB-178	86	96	65	17

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	19-21939-RC-4 RICH FEED	19-21939-LC-4 LEAN FEED	19-21939-AC-4 ALKALINE FEED	19-21939-EC-4 EMULSION FEED
ALS Sample ID	L2367170-1	L2367170-2	L2367170-3	L2367170-4
Sample Size	20.44	20.45	20.06	20.27
Sample size units	g	g	g	g
Percent Moisture	66.9%	87.7%	99.5%	70.2%
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	n/a	n/a	n/a	n/a
Extraction Date	4-Nov-19	4-Nov-19	4-Nov-19	4-Nov-19
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**
Homologue Group Totals				
Total MonoCB	4170	13100	3.50	15600
Total DiCB	2490	2070	2.50	17000
Total TriCB	11600	4180	<0.84	28700
Total TetraCB	40600	8310	<0.57	68200
Total PentaCB	129000	10500	1.56	302000
Total HexaCB	238000	24100	<0.49	486000
Total HeptaCB	135000	17800	<0.42	257000
Total OctaCB	29900	3330	<0.63	57300
Total NonaCB	2690	179	<1.3	4470
DecaCB	327	162	<0.90	862
Total PCB	594000	83700	7.56	1240000
Toxic Equivalency - (WHO 2005)				
Lower Bound PCB TEQ	0.918	1.83	0.00	7.28
Mid Point PCB TEQ	4.32	1.89	0.0989	12.7
Upper Bound PCB TEQ	4.32	1.95	0.198	12.7

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank
ALS Sample ID	WG3194521-1
Sample Size	20.14
Sample size units	g
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	4-Nov-19

Target Analytes	**pg/g**
PCB-081	<0.54
PCB-077	<0.53
PCB-123	<0.41
PCB-118	<0.40
PCB-114	<0.39
PCB-105	<0.37
PCB-126	<0.39
PCB-167	<0.26
PCB-156/157	<0.32
PCB-169	<0.24
PCB-189	<0.25
Extraction Standards	**% Rec**
13C12-PCB-001	54
13C12-PCB-003	70
13C12-PCB-004	61
13C12-PCB-015	89
13C12-PCB-019	71
13C12-PCB-037	101
13C12-PCB-054	74
13C12-PCB-081	89
13C12-PCB-077	99
13C12-PCB-104	89
13C12-PCB-123	87
13C12-PCB-118	82
13C12-PCB-114	86
13C12-PCB-105	91
13C12-PCB-126	92
13C12-PCB-155	105
13C12-PCB-167	103
13C12-PCB-156/157	107
13C12-PCB-169	128
13C12-PCB-188	114
13C12-PCB-189	111
13C12-PCB-202	111
13C12-PCB-205	107
13C12-PCB-208	116
13C12-PCB-206	105
13C12-PCB-209	146
Cleanup Standards	
13C12-PCB-028	102
13C12-PCB-111	105
13C12-PCB-178	120

ALS Life Sciences

Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG3194521-1
Sample Size	20.14
Sample size units	g
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	4-Nov-19

Target Analytes	**pg/g**
Homologue Group Totals	
Total MonoCB	<0.54
Total DiCB	<1.2
Total TriCB	1.13
Total TetraCB	1.47
Total PentaCB	0.885
Total HexaCB	0.741
Total HeptaCB	0.412
Total OctaCB	<0.20
Total NonaCB	<0.56
DecaCB	<0.10
Total PCB	4.64
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.00
Mid Point PCB TEQ	0.0232
Upper Bound PCB TEQ	0.0465

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Laboratory Control Sample
ALS Sample ID	WG3194521-2
Sample Size	1
Sample size units	n/a
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	4-Nov-19

Target Analytes	% Rec
PCB-001	100
PCB-003	100
PCB-004	104
PCB-015	113
PCB-019	100
PCB-037	100
PCB-054	96
PCB-081	100
PCB-077	101
PCB-104	92
PCB-123	96
PCB-118	102
PCB-114	102
PCB-105	107
PCB-126	86
PCB-155	103
PCB-167	95
PCB-156/157	97
PCB-169	95
PCB-188	89
PCB-189	83
PCB-202	103
PCB-205	91
PCB-208	95
PCB-206	99
PCB-209	106
Extraction Standards	**% Rec**
13C12-PCB-001	59
13C12-PCB-003	64
13C12-PCB-004	56
13C12-PCB-015	54
13C12-PCB-019	58
13C12-PCB-037	62
13C12-PCB-054	59
13C12-PCB-081	56
13C12-PCB-077	58
13C12-PCB-104	61
13C12-PCB-123	61
13C12-PCB-118	58
13C12-PCB-114	56
13C12-PCB-105	56
13C12-PCB-126	62
13C12-PCB-155	58
13C12-PCB-167	64
13C12-PCB-156/157	61
13C12-PCB-169	67
13C12-PCB-188	69
13C12-PCB-189	73
13C12-PCB-202	68
13C12-PCB-205	61
13C12-PCB-208	61
13C12-PCB-206	60
13C12-PCB-209	33
Cleanup Standards	
13C12-PCB-028	77
13C12-PCB-111	58
13C12-PCB-178	72

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Sample Analysis Report

Sample Name	**19-21939-RC-4 RICH FEED**	Sampling Date	n/a
ALS Sample ID	L2367170-1	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	20.44 g
Analysis Type	Sample	Percent Moisture	66.9%
Sample Matrix	Stack	Split Ratio	20

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**	**Run 2**
Filename	5-191108A21	5-191114A11
Run Date	09-Nov-19 06:31	14-Nov-19 23:21
Final Volume	25 ul	25 uL
Dilution Factor	1	5
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	21.78	<6.8	6.8	M,U	6.8	24						
PCB-077	0.0001	22.07	140	4.1			24						
PCB-123	0.00003	23.08	220	7.0			24						
PCB-118	0.00003	23.25	16700	5.9	M		24						
PCB-114	0.00003	23.54	395	6.6			24						
PCB-105	0.00003	23.89	6800	7.1			24						
PCB-126	0.1	25.49	<10	7.2	M,J,R	10	24						
PCB-167	0.00003							26.47	1380	14			120
PCB-156/157	0.00003							27.08	4180	20			240
PCB-169	0.03							28.78	<80	14	M,J,R	80	120
PCB-189	0.00003							30.05	455	7.2			120

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**		**Time**	**% Rec**	**Limits**	
13C12-PCB-001	2000	8.85	50	5-145	M,R				
13C12-PCB-003	2000	10.42	56	5-145	M				
13C12-PCB-004	2000	10.63	44	5-145	M				
13C12-PCB-015	2000	14.29	64	5-145					
13C12-PCB-019	2000	12.61	39	5-145	M,R				
13C12-PCB-037	2000	18.19	30	5-145	M				
13C12-PCB-054	2000	14.44	29	5-145					
13C12-PCB-081	2000	21.76	24	10-145					
13C12-PCB-077	2000	22.06	35	10-145	R				
13C12-PCB-104	2000	17.48	32	10-145					
13C12-PCB-123	2000	23.07	33	10-145					
13C12-PCB-118	2000	23.23	32	10-145	R				
13C12-PCB-114	2000	23.52	31	10-145	R				
13C12-PCB-105	2000	23.88	31	10-145					
13C12-PCB-126	2000	25.47	32	10-145					
13C12-PCB-155	2000					20.55	43	10-145	
13C12-PCB-167	2000					26.46	28	10-145	R
13C12-PCB-156/157	4000					27.08	28	10-145	R
13C12-PCB-169	2000					28.76	32	10-145	R
13C12-PCB-188	2000					23.55	45	10-145	R
13C12-PCB-189	2000					30.04	40	10-145	
13C12-PCB-202	2000					26.32	51	10-145	
13C12-PCB-205	2000					31.46	32	10-145	R
13C12-PCB-208	2000					29.77	44	10-145	
13C12-PCB-206	2000					32.54	30	10-145	R
13C12-PCB-209	2000					33.68	31	10-145	
Cleanup Standards									
13C12-PCB-028	2000	15.97	114	5-145	R				
13C12-PCB-111	2000	22.01	111	10-145					
13C12-PCB-178	2000	25.06	86	10-145	R				

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Sample Analysis Report

Sample Name	**19-21939-RC-4 RICH FEED**	Sampling Date	n/a	Approved:
ALS Sample ID	L2367170-1	Extraction Date	4-Nov-19	*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	20.44 g	--e-signature--
Analysis Type	Sample	Percent Moisture	66.9%	
Sample Matrix	Stack	Split Ratio	20	15-Nov-2019

Run Information	**Run 1**	**Run 2**
Filename	5-191108A21	5-191114A11
Run Date	09-Nov-19 06:31	14-Nov-19 23:21
Final Volume	25 ul	25 uL
Dilution Factor	1	5
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
Homologue Group Totals													
Total MonoCB			4170	6.2	J		98						
Total DiCB			2490	11	J		200						
Total TriCB			11600	1.4	J		200						
Total TetraCB			40600	1.5	J		390						
Total PentaCB			129000	1.1	J		390						
Total HexaCB			238000	6.3	J		390						
Total HeptaCB			135000	6.3	J		200						
Total OctaCB			29900	4.2	J		200						
Total NonaCB			2690	7.5	J		98						
DecaCB			327	4.5	J		98						
Total PCB			594000		J		780						
Toxic Equivalency - (WHO 2005)													
Lower Bound PCB TEQ			0.918										
Mid Point PCB TEQ			4.32										
Upper Bound PCB TEQ			4.32										

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ: Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

Sample Analysis Report

Sample Name	**19-21939-LC-4 LEAN FEED**	Sampling Date	n/a
ALS Sample ID	L2367170-2	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	20.45 g
Analysis Type	Sample	Percent Moisture	87.7%
Sample Matrix	Stack	Split Ratio	20

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**
Filename	5-191108A23
Run Date	09-Nov-19 07:55
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	21.74	<5.3	5.3	M,U	5.0	24
PCB-077	0.0001	22.05	75.9	5.3	M		24
PCB-123	0.00003	23.04	<19	4.7	M,J,R	19	24
PCB-118	0.00003	23.22	1200	4.2			24
PCB-114	0.00003	23.51	<28	4.5	M,R	28	24
PCB-105	0.00003	23.86	456	4.2	M		24
PCB-126	0.1	25.53	17.6	4.1	M,J		24
PCB-167	0.00003	26.38	96.8	3.6			24
PCB-156/157	0.00003	26.99	318	5.4			49
PCB-169	0.03	28.66	<4.0	4.0	M,U	3.7	24
PCB-189	0.00003	29.95	42.4	2.1	M		24

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	2000	8.83	27	5-145	M
13C12-PCB-003	2000	10.37	27	5-145	M,R
13C12-PCB-004	2000	10.54	41	5-145	R
13C12-PCB-015	2000	14.23	34	5-145	R
13C12-PCB-019	2000	12.55	29	5-145	M,R
13C12-PCB-037	2000	18.14	40	5-145	R
13C12-PCB-054	2000	14.39	29	5-145	
13C12-PCB-081	2000	21.73	36	10-145	
13C12-PCB-077	2000	22.04	36	10-145	
13C12-PCB-104	2000	17.44	34	10-145	
13C12-PCB-123	2000	23.04	34	10-145	R
13C12-PCB-118	2000	23.21	33	10-145	
13C12-PCB-114	2000	23.50	35	10-145	
13C12-PCB-105	2000	23.85	35	10-145	
13C12-PCB-126	2000	25.47	41	10-145	R
13C12-PCB-155	2000	20.46	11	10-145	
13C12-PCB-167	2000	26.38	39	10-145	
13C12-PCB-156/157	4000	26.99	35	10-145	
13C12-PCB-169	2000	28.66	40	10-145	
13C12-PCB-188	2000	23.46	16	10-145	
13C12-PCB-189	2000	29.95	45	10-145	
13C12-PCB-202	2000	26.24	21	10-145	
13C12-PCB-205	2000	31.35	36	10-145	
13C12-PCB-208	2000	29.67	12	10-145	
13C12-PCB-206	2000	32.42	35	10-145	R
13C12-PCB-209	2000	33.58	5	10-145	R
Cleanup Standards					
13C12-PCB-028	2000	15.91	100	5-145	R
13C12-PCB-111	2000	21.98	82	10-145	
13C12-PCB-178	2000	25.04	96	10-145	

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Sample Analysis Report

Sample Name	**19-21939-LC-4 LEAN FEED**	Sampling Date	n/a	
ALS Sample ID	L2367170-2	Extraction Date	4-Nov-19	Approved:
Analysis Method	EPA 1668C	Sample Size	20.45 g	*E. Sabljic*
Analysis Type	Sample	Percent Moisture	87.7%	--e-signature--
Sample Matrix	Stack	Split Ratio	20	15-Nov-2019

Run Information	**Run 1**
Filename	5-191108A23
Run Date	09-Nov-19 07:55
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
Homologue Group Totals							
Total MonoCB			13100	2.8	J		98
Total DiCB			2070	3.8	J		200
Total TriCB			4180	1.8	J		200
Total TetraCB			8310	1.5	J		390
Total PentaCB			10500	1.9	J		390
Total HexaCB			24100	1.5	J		390
Total HeptaCB			17800	2.1	J		200
Total OctaCB			3330	2.0	J		200
Total NonaCB			179	5.8	J		98
DecaCB			162	9.0	J		98
Total PCB			83700		J		780
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			1.83				
Mid Point PCB TEQ			1.89				
Upper Bound PCB TEQ			1.95				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	**19-21939-AC-4 ALKALINE FEED**	Sampling Date	n/a
ALS Sample ID	L2367170-3	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	20.06 g
Analysis Type	Sample	Percent Moisture	99.5%
Sample Matrix	Stack	Split Ratio	20

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**
Filename	5-191108A24
Run Date	09-Nov-19 08:37
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<1.2	1.2	U		25
PCB-077	0.0001	NotFnd	<1.0	1.0	U		25
PCB-123	0.00003	NotFnd	<1.5	1.5	U		25
PCB-118	0.00003	NotFnd	<1.4	1.4	U		25
PCB-114	0.00003	NotFnd	<1.5	1.5	U		25
PCB-105	0.00003	NotFnd	<1.6	1.6	U		25
PCB-126	0.1	NotFnd	<1.7	1.7	U		25
PCB-167	0.00003	NotFnd	<0.91	0.91	U		25
PCB-156/157	0.00003	NotFnd	<1.2	1.2	U		50
PCB-169	0.03	NotFnd	<0.90	0.90	U		25
PCB-189	0.00003	NotFnd	<0.45	0.45	U		25

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	2000	8.81	61	5-145	R
13C12-PCB-003	2000	10.35	62	5-145	R
13C12-PCB-004	2000	10.49	58	5-145	R
13C12-PCB-015	2000	14.19	54	5-145	
13C12-PCB-019	2000	12.48	45	5-145	R
13C12-PCB-037	2000	18.14	72	5-145	
13C12-PCB-054	2000	14.34	45	5-145	
13C12-PCB-081	2000	21.73	61	10-145	
13C12-PCB-077	2000	22.04	70	10-145	
13C12-PCB-104	2000	17.43	57	10-145	
13C12-PCB-123	2000	23.03	69	10-145	
13C12-PCB-118	2000	23.21	67	10-145	
13C12-PCB-114	2000	23.50	67	10-145	
13C12-PCB-105	2000	23.85	66	10-145	
13C12-PCB-126	2000	25.45	67	10-145	
13C12-PCB-155	2000	20.45	58	10-145	
13C12-PCB-167	2000	26.36	65	10-145	
13C12-PCB-156/157	4000	26.99	61	10-145	
13C12-PCB-169	2000	28.66	74	10-145	
13C12-PCB-188	2000	23.45	65	10-145	R
13C12-PCB-189	2000	29.94	77	10-145	
13C12-PCB-202	2000	26.23	65	10-145	
13C12-PCB-205	2000	31.33	61	10-145	
13C12-PCB-208	2000	29.68	59	10-145	
13C12-PCB-206	2000	32.42	61	10-145	
13C12-PCB-209	2000	33.55	38	10-145	
Cleanup Standards					
13C12-PCB-028	2000	15.90	68	5-145	R
13C12-PCB-111	2000	21.98	63	10-145	
13C12-PCB-178	2000	25.04	65	10-145	R

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Sample Analysis Report

Sample Name	**19-21939-AC-4 ALKALINE FEED**	Sampling Date	n/a	Approved:
ALS Sample ID	L2367170-3	Extraction Date	4-Nov-19	*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	20.06 g	--e-signature--
Analysis Type	Sample	Percent Moisture	99.5%	
Sample Matrix	Stack	Split Ratio	20	15-Nov-2019

Run Information	**Run 1**
Filename	5-191108A24
Run Date	09-Nov-19 08:37
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
Homologue Group Totals							
Total MonoCB			3.50	0.60	J		100
Total DiCB			2.50	1.8	J		200
Total TriCB			<0.84	0.84	U		200
Total TetraCB			<0.57	0.57	U		400
Total PentaCB			1.56	0.62	J		400
Total HexaCB			<0.49	0.49	U		400
Total HeptaCB			<0.42	0.42	U		200
Total OctaCB			<0.63	0.63	U		200
Total NonaCB			<1.3	1.3	U		100
DecaCB			<0.90	0.90	U		100
Total PCB			7.56		J		800
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.00				
Mid Point PCB TEQ			0.0989				
Upper Bound PCB TEQ			0.198				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	**19-21939-EC-4 EMULSION FEED**	Sampling Date	n/a	Approved:
ALS Sample ID	L2367170-4	Extraction Date	4-Nov-19	*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	20.27 g	--e-signature--
Analysis Type	Sample	Percent Moisture	70.2%	15-Nov-2019
Sample Matrix	Stack	Split Ratio	20	

Run Information	**Run 1**	**Run 2**
Filename	5-191108A25	5-191114A12
Run Date	09-Nov-19 09:19	15-Nov-19 00:03
Final Volume	25 ul	25 uL
Dilution Factor	1	5
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B	HRMS5 SPBOCTYL65972-02B

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg/g	EDL pg/g	Flags	EMPC pg/g	LQL	Ret. Time	Conc. pg/g	EDL pg/g	Flags	EMPC pg/g	LQL
PCB-081	0.0003	21.78	<22	5.2	M,J,R	22	25						
PCB-077	0.0001	22.08	569	5.4			25						
PCB-123	0.00003	23.09	519	29			25						
PCB-118	0.00003	23.26	37700	22	M		25						
PCB-114	0.00003	23.56	1110	23			25						
PCB-105	0.00003	23.91	16800	16			25						
PCB-126	0.1	25.54	51.5	16	M		25						
PCB-167	0.00003							26.49	2750	14			120
PCB-156/157	0.00003							27.11	9110	23			250
PCB-169	0.03							28.82	<180	22	M,R	180	120
PCB-189	0.00003							30.11	1010	8.1			120

Extraction Standards	pg	Time	% Rec	Limits	Flags	Time	% Rec	Limits	Flags
13C12-PCB-001	2000	8.83	17	5-145	M				
13C12-PCB-003	2000	10.35	38	5-145	M				
13C12-PCB-004	2000	10.52	28	5-145	M				
13C12-PCB-015	2000	14.20	42	5-145					
13C12-PCB-019	2000	12.51	28	5-145	M,R				
13C12-PCB-037	2000	18.15	34	5-145	R				
13C12-PCB-054	2000	14.37	23	5-145					
13C12-PCB-081	2000	21.77	36	10-145					
13C12-PCB-077	2000	22.06	37	10-145					
13C12-PCB-104	2000	17.46	9	10-145					
13C12-PCB-123	2000	23.08	16	10-145					
13C12-PCB-118	2000	23.25	18	10-145	R				
13C12-PCB-114	2000	23.55	18	10-145					
13C12-PCB-105	2000	23.90	29	10-145					
13C12-PCB-126	2000	25.52	31	10-145	R				
13C12-PCB-155	2000					20.55	63	10-145	
13C12-PCB-167	2000					26.49	48	10-145	
13C12-PCB-156/157	4000					27.11	36	10-145	
13C12-PCB-169	2000					28.79	34	10-145	R
13C12-PCB-188	2000					23.55	63	10-145	
13C12-PCB-189	2000					30.10	43	10-145	R
13C12-PCB-202	2000					26.34	61	10-145	R
13C12-PCB-205	2000					31.52	58	10-145	
13C12-PCB-208	2000					29.80	53	10-145	
13C12-PCB-206	2000					32.64	55	10-145	R
13C12-PCB-209	2000					33.78	54	10-145	
Cleanup Standards									
13C12-PCB-028	2000	15.92	82	5-145	R				
13C12-PCB-111	2000	22.02	21	10-145					
13C12-PCB-178	2000	25.08	17	10-145	R				

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Sample Analysis Report

Sample Name	**19-21939-EC-4 EMULSION FEED**	Sampling Date	n/a
ALS Sample ID	L2367170-4	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	20.27 g
Analysis Type	Sample	Percent Moisture	70.2%
Sample Matrix	Stack	Split Ratio	20

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**	**Run 2**
Filename	5-191108A25	5-191114A12
Run Date	09-Nov-19 09:19	15-Nov-19 00:03
Final Volume	25 ul	25 uL
Dilution Factor	1	5
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
Homologue Group Totals													
Total MonoCB			15600	3.1	J		99						
Total DiCB			17000	4.1	J		200						
Total TriCB			28700	2.1	J		200						
Total TetraCB			68200	1.6	J		390						
Total PentaCB			302000	3.0	J		390						
Total HexaCB			486000	3.5	J		390						
Total HeptaCB			257000	4.2	J		200						
Total OctaCB			57300	4.0	J		200						
Total NonaCB			4470	5.1	J		99						
DecaCB			862	4.1	J		99						
Total PCB			1240000		J		790						
Toxic Equivalency - (WHO 2005)													
Lower Bound PCB TEQ			7.28										
Mid Point PCB TEQ			12.7										
Upper Bound PCB TEQ			12.7										

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	Approved:
ALS Sample ID	WG3194521-1	Extraction Date	4-Nov-19	*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	20.14 g	--e-signature--
Analysis Type	Blank	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	1	15-Nov-2019

Run Information	**Run 1**
Filename	5-191113B13
Run Date	14-Nov-19 00:10
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<0.54	0.54	U		1.2
PCB-077	0.0001	NotFnd	<0.53	0.53	U		1.2
PCB-123	0.00003	NotFnd	<0.41	0.41	U		1.2
PCB-118	0.00003	23.27	<0.40	0.38	J,R	0.40	1.2
PCB-114	0.00003	NotFnd	<0.39	0.39	U		1.2
PCB-105	0.00003	NotFnd	<0.37	0.37	U		1.2
PCB-126	0.1	NotFnd	<0.39	0.39	U		1.2
PCB-167	0.00003	NotFnd	<0.26	0.26	U		1.2
PCB-156/157	0.00003	NotFnd	<0.32	0.32	U		2.5
PCB-169	0.03	NotFnd	<0.24	0.24	U		1.2
PCB-189	0.00003	NotFnd	<0.25	0.25	U		1.2

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	2000	8.84	54	5-145	
13C12-PCB-003	2000	10.40	70	5-145	M,R
13C12-PCB-004	2000	10.54	61	5-145	M
13C12-PCB-015	2000	14.24	89	5-145	M
13C12-PCB-019	2000	12.54	71	5-145	R
13C12-PCB-037	2000	18.19	101	5-145	
13C12-PCB-054	2000	14.40	74	5-145	
13C12-PCB-081	2000	21.79	89	10-145	
13C12-PCB-077	2000	22.09	99	10-145	
13C12-PCB-104	2000	17.48	89	10-145	
13C12-PCB-123	2000	23.09	87	10-145	
13C12-PCB-118	2000	23.26	82	10-145	
13C12-PCB-114	2000	23.56	86	10-145	
13C12-PCB-105	2000	23.90	91	10-145	
13C12-PCB-126	2000	25.51	92	10-145	
13C12-PCB-155	2000	20.50	105	10-145	
13C12-PCB-167	2000	26.41	103	10-145	
13C12-PCB-156/157	4000	27.04	107	10-145	
13C12-PCB-169	2000	28.71	128	10-145	R
13C12-PCB-188	2000	23.50	114	10-145	
13C12-PCB-189	2000	29.99	111	10-145	
13C12-PCB-202	2000	26.28	111	10-145	
13C12-PCB-205	2000	31.39	107	10-145	
13C12-PCB-208	2000	29.72	116	10-145	
13C12-PCB-206	2000	32.48	105	10-145	
13C12-PCB-209	2000	33.61	146	10-145	

Cleanup Standards				
13C12-PCB-028	2000	15.95	102	5-145
13C12-PCB-111	2000	22.03	105	10-145
13C12-PCB-178	2000	25.07	120	10-145

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Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a
ALS Sample ID	WG3194521-1	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	20.14 g
Analysis Type	Blank	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**
Filename	5-191113B13
Run Date	14-Nov-19 00:10
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
Homologue Group Totals							
Total MonoCB			<0.54	0.54	U		5.0
Total DiCB			<1.2	1.2	U		9.9
Total TriCB			1.13	0.34	J		9.9
Total TetraCB			1.47	0.35	J		20
Total PentaCB			0.885	0.22	J		20
Total HexaCB			0.741	0.14	J		20
Total HeptaCB			0.412	0.18	J		9.9
Total OctaCB			<0.20	0.20	U		9.9
Total NonaCB			<0.56	0.56	U		5.0
DecaCB			<0.10	0.10	U		5.0
Total PCB			4.64		J		40
Toxic Equivalency - (WHO 2005)							
Lower Bound PCB TEQ			0.00				
Mid Point PCB TEQ			0.0232				
Upper Bound PCB TEQ			0.0465				

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG3194521-2	Extraction Date	4-Nov-19
Analysis Method	EPA 1668C	Sample Size	1 n/a
Analysis Type	LCS	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
15-Nov-2019

Run Information	**Run 1**
Filename	5-191108A18
Run Date	09-Nov-19 04:24
Final Volume	25 ul
Dilution Factor	1
Analysis Units	% Rec
Instrument - Column	HRMS5 SPBOCTYL65972-02B

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
PCB-001	1000	8.84	100	60-135	
PCB-003	1000	10.38	100	60-135	
PCB-004	1000	10.52	104	60-135	
PCB-015	1000	14.21	113	60-135	
PCB-019	1000	12.51	100	60-135	
PCB-037	1000	18.16	100	60-135	
PCB-054	1000	14.37	96	60-135	
PCB-081	1000	21.75	100	60-135	
PCB-077	1000	22.06	101	60-135	
PCB-104	1000	17.45	92	60-135	
PCB-123	1000	23.05	96	60-135	
PCB-118	1000	23.22	102	60-135	
PCB-114	1000	23.52	102	60-135	
PCB-105	1000	23.86	107	60-135	
PCB-126	1000	25.47	86	60-135	
PCB-155	1000	20.48	103	60-135	
PCB-167	1000	26.39	95	60-135	
PCB-156/157	2000	27.01	97	60-135	
PCB-169	1000	28.68	95	60-135	
PCB-188	1000	23.48	89	60-135	
PCB-189	1000	29.96	83	60-135	
PCB-202	1000	26.26	103	60-135	
PCB-205	1000	31.36	91	60-135	
PCB-208	1000	29.69	95	60-135	
PCB-206	1000	32.44	99	60-135	R
PCB-209	1000	33.59	106	60-135	

Extraction Standards		**Time**	**% Rec**	**Limits**	
13C12-PCB-001	2000	8.83	59	15-145	
13C12-PCB-003	2000	10.38	64	15-145	R
13C12-PCB-004	2000	10.52	56	15-145	
13C12-PCB-015	2000	14.20	54	15-145	
13C12-PCB-019	2000	12.50	58	15-145	R
13C12-PCB-037	2000	18.15	62	15-145	
13C12-PCB-054	2000	14.35	59	15-145	
13C12-PCB-081	2000	21.73	56	40-145	
13C12-PCB-077	2000	22.04	58	40-145	
13C12-PCB-104	2000	17.44	61	40-145	
13C12-PCB-123	2000	23.04	61	40-145	R
13C12-PCB-118	2000	23.22	58	40-145	
13C12-PCB-114	2000	23.51	56	40-145	
13C12-PCB-105	2000	23.85	56	40-145	
13C12-PCB-126	2000	25.46	62	40-145	
13C12-PCB-155	2000	20.46	58	40-145	
13C12-PCB-167	2000	26.38	64	40-145	
13C12-PCB-156/157	4000	26.99	61	40-145	
13C12-PCB-169	2000	28.67	67	40-145	R
13C12-PCB-188	2000	23.46	69	40-145	
13C12-PCB-189	2000	29.95	73	40-145	
13C12-PCB-202	2000	26.24	68	40-145	
13C12-PCB-205	2000	31.35	61	40-145	
13C12-PCB-208	2000	29.68	61	40-145	
13C12-PCB-206	2000	32.43	60	40-145	
13C12-PCB-209	2000	33.56	33	40-145	

Cleanup Standards					
13C12-PCB-028	2000	15.91	77	15-145	R
13C12-PCB-111	2000	21.99	58	40-145	
13C12-PCB-178	2000	25.04	72	40-145	

R — Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.

ALS Life Sciences
1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2367170		MIssissauga, ON L5J 2Y4
Date of Report	19-Nov-19		Canada
Date of Sample Receipt	17-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **PCDD/F by EPA 1613B via Isotope Dilution**

All results have been reported on an as-received (wet-weight) basis.

Due to the amount of co-extracted matrix material, the results have been reported from the analysis of a one-tenth portion of the sample.

Certified by: Kennedy

Steve Kennedy, C.Chem.
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	19-21939-RC-4 RICH FEED	19-21939-LC-4 LEAN FEED	19-21939-AC-4 ALKALINE FEED	19-21939-EC-4 EMULSION FEED
ALS Sample ID	L2367170-1	L2367170-2	L2367170-3	L2367170-4
Sample Size	20.44	20.45	20.06	20.27
Sample size units	g	g	g	g
Percent Moisture	66.9%	87.7%	99.5%	70.2%
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	n/a	n/a	n/a	n/a
Extraction Date	4-Nov-19	4-Nov-19	4-Nov-19	4-Nov-19
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**
2,3,7,8-TCDD	<1.0	2.54	<0.25	1.81
1,2,3,7,8-PeCDD	<1.1	10.0	<0.21	3.91
1,2,3,4,7,8-HxCDD	1.19	9.45	<0.21	2.05
1,2,3,6,7,8-HxCDD	2.74	31.4	<0.19	<3.8
1,2,3,7,8,9-HxCDD	2.52	19.4	<0.20	<3.1
1,2,3,4,6,7,8-HpCDD	52.3	657	<0.63	68.7
OCDD	305	2010	2.58	442
2,3,7,8-TCDF	<0.99	6.85	<0.15	6.20
1,2,3,7,8-PeCDF	<1.1	6.58	<0.16	7.17
2,3,4,7,8-PeCDF	2.04	10.4	<0.13	10.9
1,2,3,4,7,8-HxCDF	3.08	9.55	<0.24	13.0
1,2,3,6,7,8-HxCDF	<1.5	8.73	<0.24	11.3
2,3,4,6,7,8-HxCDF	2.04	11.6	<0.24	10.1
1,2,3,7,8,9-HxCDF	<0.99	2.92	<0.34	3.28
1,2,3,4,6,7,8-HpCDF	13.1	38.3	<0.14	41.9
1,2,3,4,7,8,9-HpCDF	2.15	3.28	<0.16	5.17
OCDF	55.1	68.1	<0.45	67.5
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	34	50	114	41
13C12-1,2,3,7,8-PeCDD	32	45	122	41
13C12-1,2,3,4,7,8-HxCDD	22	40	100	32
13C12-1,2,3,6,7,8-HxCDD	28	46	113	34
13C12-1,2,3,4,6,7,8-HpCDD	32	50	116	39
13C12-OCDD	32	48	103	36
13C12-2,3,7,8-TCDF	28	41	96	33
13C12-1,2,3,7,8-PeCDF	30	47	110	37
13C12-2,3,4,7,8-PeCDF	30	45	114	38
13C12-1,2,3,4,7,8-HxCDF	33	46	105	37
13C12-1,2,3,6,7,8-HxCDF	24	45	109	35
13C12-2,3,4,6,7,8-HxCDF	28	45	108	34
13C12-1,2,3,7,8,9-HxCDF	23	41	93	30
13C12-1,2,3,4,6,7,8-HpCDF	32	48	112	36
13C12-1,2,3,4,7,8,9-HpCDF	37	54	116	41
Cleanup Standard				
37Cl4-2,3,7,8-TCDD (Cleanup)	101	116	96	93
Homologue Group Totals	**pg/g**	**pg/g**	**pg/g**	**pg/g**
Total-TCDD	<1.0	71.6	<0.25	14.3
Total-PeCDD	7.82	112	<0.21	17.7
Total-HxCDD	21.0	314	<0.21	28.4
Total-HpCDD	86.2	1170	0.548	126
Total-TCDF	15.1	186	<0.15	146
Total-PeCDF	10.1	124	<0.16	116
Total-HxCDF	5.12	92.7	<0.34	87.6
Total-HpCDF	44.1	75.5	<0.16	78.3
Toxic Equivalency - (WHO 2005)				
Lower Bound PCDD/F TEQ (WHO 2005)	2.55	33.5	0.000774	15.1
Mid Point PCDD/F TEQ (WHO 2005)	4.43	33.5	0.351	15.8
Upper Bound PCDD/F TEQ (WHO 2005)	5.03	33.5	0.695	15.8

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Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG3194521-1	WG3194521-2
Sample Size	5.00	1
Sample size units	g	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	4-Nov-19	4-Nov-19

Target Analytes	pg/g	% Rec
2,3,7,8-TCDD	<0.88	82
1,2,3,7,8-PeCDD	<0.46	95
1,2,3,4,7,8-HxCDD	<0.48	97
1,2,3,6,7,8-HxCDD	<0.45	103
1,2,3,7,8,9-HxCDD	<0.46	107
1,2,3,4,6,7,8-HpCDD	<0.49	101
OCDD	1.26	92
2,3,7,8-TCDF	<0.51	98
1,2,3,7,8-PeCDF	<0.45	103
2,3,4,7,8-PeCDF	<0.35	91
1,2,3,4,7,8-HxCDF	<0.28	99
1,2,3,6,7,8-HxCDF	<0.25	90
2,3,4,6,7,8-HxCDF	<0.26	96
1,2,3,7,8,9-HxCDF	<0.39	108
1,2,3,4,6,7,8-HpCDF	<0.33	107
1,2,3,4,7,8,9-HpCDF	<0.42	85
OCDF	<0.74	84
Extraction Standards	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	122	91
13C12-1,2,3,7,8-PeCDD	128	98
13C12-1,2,3,4,7,8-HxCDD	130	78
13C12-1,2,3,6,7,8-HxCDD	145	96
13C12-1,2,3,4,6,7,8-HpCDD	145	90
13C12-OCDD	131	93
13C12-2,3,7,8-TCDF	108	80
13C12-1,2,3,7,8-PeCDF	122	89
13C12-2,3,4,7,8-PeCDF	120	92
13C12-1,2,3,4,7,8-HxCDF	128	82
13C12-1,2,3,6,7,8-HxCDF	145	103
13C12-2,3,4,6,7,8-HxCDF	134	93
13C12-1,2,3,7,8,9-HxCDF	115	75
13C12-1,2,3,4,6,7,8-HpCDF	146	99
13C12-1,2,3,4,7,8,9-HpCDF	139	92
Cleanup Standard		
37Cl4-2,3,7,8-TCDD (Cleanup)	111	82
Homologue Group Totals	**pg/g**	
Total-TCDD	<0.88	
Total-PeCDD	<0.46	
Total-HxCDD	<0.48	
Total-HpCDD	<0.49	
Total-TCDF	<0.51	
Total-PeCDF	<0.45	
Total-HxCDF	<0.39	
Total-HpCDF	<0.42	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.000378	
Mid Point PCDD/F TEQ (WHO 2005)	0.890	
Upper Bound PCDD/F TEQ (WHO 2005)	1.78	

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Sample Analysis Report

Sample Name	**19-21939-RC-4 RICH FEED**	Sampling Date	n/a	
ALS Sample ID	L2367170-1	Extraction Date	4-Nov-19	
Analysis Method	EPA 1613B	Sample Size	20.44	g
Analysis Type	Sample	Percent Moisture	66.9%	
Sample Matrix	Stack	Split Ratio	10	

Approved:
T.Patterson
--e-signature--
19-Nov-2019

Run Information	**Run 1**
Filename	7-191113A06
Run Date	13-Nov-19 14:45
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<1.0	1.0	U		2.4
1,2,3,7,8-PeCDD	1	32.14	<1.1	0.43	M,J,R	1.1	12
1,2,3,4,7,8-HxCDD	0.1	34.14	1.19	0.58	M,J		12
1,2,3,6,7,8-HxCDD	0.1	34.20	2.74	0.33	M,J		12
1,2,3,7,8,9-HxCDD	0.1	34.31	2.52	0.43	M,J		12
1,2,3,4,6,7,8-HpCDD	0.01	35.79	52.3	0.50			12
OCDD	0.0003	37.28	305	0.82			24
2,3,7,8-TCDF	0.1	27.02	<0.99	0.99	M,U		2.4
1,2,3,7,8-PeCDF	0.03	31.17	<1.1	0.49	M,J,R	1.1	12
2,3,4,7,8-PeCDF	0.3	31.89	2.04	0.40	M,J		12
1,2,3,4,7,8-HxCDF	0.1	33.66	3.08	0.64	M,J		12
1,2,3,6,7,8-HxCDF	0.1	33.73	<1.5	0.74	M,J,R	1.5	12
2,3,4,6,7,8-HxCDF	0.1	34.06	2.04	0.65	M,J		12
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.99	0.99	U		12
1,2,3,4,6,7,8-HpCDF	0.01	35.24	13.1	0.36			12
1,2,3,4,7,8,9-HpCDF	0.01	36.03	2.15	0.39	J		12
OCDF	0.0003	37.38	55.1	0.53			24

Extraction Standards	**pg**		**% Rec**	**Limits**	
13C12-2,3,7,8-TCDD	2000	27.95	34	25-164	
13C12-1,2,3,7,8-PeCDD	2000	32.12	32	25-181	
13C12-1,2,3,4,7,8-HxCDD	2000	34.14	22	32-141	
13C12-1,2,3,6,7,8-HxCDD	2000	34.19	28	28-130	R
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.78	32	23-140	
13C12-OCDD	4000	37.28	32	17-157	
13C12-2,3,7,8-TCDF	2000	27.01	28	24-169	
13C12-1,2,3,7,8-PeCDF	2000	31.15	30	24-185	
13C12-2,3,4,7,8-PeCDF	2000	31.88	30	21-178	
13C12-1,2,3,4,7,8-HxCDF	2000	33.65	33	26-152	
13C12-1,2,3,6,7,8-HxCDF	2000	33.72	24	26-123	
13C12-2,3,4,6,7,8-HxCDF	2000	34.04	28	29-147	
13C12-1,2,3,7,8,9-HxCDF	2000	34.45	23	28-136	
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.23	32	28-143	
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.03	37	26-138	
Cleanup Standard	**pg**				
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.96	101	35-197	

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0	<1.0	1.0	U	2.4
Total-PeCDD	5	7.82	0.43		12
Total-HxCDD	5	21.0	0.58		12
Total-HpCDD	2	86.2	0.50		12
Total-TCDF	6	15.1	0.99		2.4
Total-PeCDF	5	10.1	0.49		12
Total-HxCDF	2	5.12	0.99		12
Total-HpCDF	3	44.1	0.39		12

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	2.55
Mid Point PCDD/F TEQ (WHO 2005)	4.43
Upper Bound PCDD/F TEQ (WHO 2005)	5.03

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-LC-4 LEAN FEED**	Sampling Date	n/a	
ALS Sample ID	L2367170-2	Extraction Date	4-Nov-19	Approved:
Analysis Method	EPA 1613B	Sample Size	20.45 g	*T.Patterson*
Analysis Type	Sample	Percent Moisture	87.7%	--e-signature--
Sample Matrix	Stack	Split Ratio	10	19-Nov-2019

Run Information	**Run 1**
Filename	7-191113A08
Run Date	13-Nov-19 16:10
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
2,3,7,8-TCDD	1	27.90	2.54	0.66	M		2.4
1,2,3,7,8-PeCDD	1	32.05	10.0	0.53	M,J		12
1,2,3,4,7,8-HxCDD	0.1	34.10	9.45	1.1	J		12
1,2,3,6,7,8-HxCDD	0.1	34.15	31.4	0.88			12
1,2,3,7,8,9-HxCDD	0.1	34.27	19.4	0.95			12
1,2,3,4,6,7,8-HpCDD	0.01	35.76	657	0.75			12
OCDD	0.0003	37.25	2010	0.75			24
2,3,7,8-TCDF	0.1	26.99	6.85	0.64	M		2.4
1,2,3,7,8-PeCDF	0.03	31.12	6.58	0.90	M,J		12
2,3,4,7,8-PeCDF	0.3	31.84	10.4	0.77	J		12
1,2,3,4,7,8-HxCDF	0.1	33.60	9.55	0.77	J		12
1,2,3,6,7,8-HxCDF	0.1	33.68	8.73	0.73	J		12
2,3,4,6,7,8-HxCDF	0.1	34.00	11.6	0.71	J		12
1,2,3,7,8,9-HxCDF	0.1	34.44	2.92	0.98	J		12
1,2,3,4,6,7,8-HpCDF	0.01	35.20	38.3	0.45			12
1,2,3,4,7,8,9-HpCDF	0.01	36.01	3.28	0.53	J		12
OCDF	0.0003	37.34	68.1	0.44			24

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.89	50	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.04	45	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.09	40	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.14	46	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.75	50	23-140
13C12-OCDD	4000	37.25	48	17-157
13C12-2,3,7,8-TCDF	2000	26.96	41	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.10	47	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.83	45	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.60	46	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.67	45	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	33.99	45	29-147
13C12-1,2,3,7,8,9-HxCDF	2000	34.41	41	28-136
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.19	48	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.00	54	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.92	116	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**	**LQL**
Total-TCDD	11	71.6	0.66	2.4
Total-PeCDD	6	112	0.53	12
Total-HxCDD	7	314	1.1	12
Total-HpCDD	2	1170	0.75	12
Total-TCDF	15	186	0.64	2.4
Total-PeCDF	11	124	0.90	12
Total-HxCDF	9	92.7	0.98	12
Total-HpCDF	3	75.5	0.53	12

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	33.5
Mid Point PCDD/F TEQ (WHO 2005)	33.5
Upper Bound PCDD/F TEQ (WHO 2005)	33.5

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M Indicates that a peak has been manually integrated.

J Indicates that a target analyte was detected below the calibrated range.

LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	**19-21939-AC-4 ALKALINE FEED**	Sampling Date	n/a	Approved:
ALS Sample ID	L2367170-3	Extraction Date	4-Nov-19	T.Patterson
Analysis Method	EPA 1613B	Sample Size	20.06 g	--e-signature--
Analysis Type	Sample	Percent Moisture	99.5%	19-Nov-2019
Sample Matrix	Stack	Split Ratio	10	

Run Information	**Run 1**
Filename	7-191113A09
Run Date	13-Nov-19 16:52
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.25	0.25	U		2.5
1,2,3,7,8-PeCDD	1	NotFnd	<0.21	0.21	U		12
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.21	0.21	U		12
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.19	0.19	U		12
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.20	0.20	U		12
1,2,3,4,6,7,8-HpCDD	0.01	35.76	<0.63	0.18	M,J,R	0.63	12
OCDD	0.0003	37.26	2.58	0.14	M,J,B		25
2,3,7,8-TCDF	0.1	NotFnd	<0.15	0.15	U		2.5
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.16	0.16	U		12
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.13	0.13	U		12
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.24	0.24	U		12
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.24	0.24	U		12
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.24	0.24	U		12
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.34	0.34	U		12
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.14	0.14	U		12
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.16	0.16	U		12
OCDF	0.0003	37.34	<0.45	0.15	M,J,R	0.45	25

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.89	114	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.04	122	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.09	100	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.13	113	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.75	116	23-140
13C12-OCDD	4000	37.25	103	17-157
13C12-2,3,7,8-TCDF	2000	26.96	96	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.09	110	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.82	114	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.60	105	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.66	109	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	33.99	108	29-147
13C12-1,2,3,7,8,9-HxCDF	2000	34.41	93	28-136
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.19	112	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.00	116	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.90	96	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0	<0.25	0.25	U	2.5
Total-PeCDD	0	<0.21	0.21	U	12
Total-HxCDD	0	<0.21	0.21	U	12
Total-HpCDD	1	0.548	0.18		12
Total-TCDF	0	<0.15	0.15	U	2.5
Total-PeCDF	0	<0.16	0.16	U	12
Total-HxCDF	0	<0.34	0.34	U	12
Total-HpCDF	0	<0.16	0.16	U	12

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.000774
Mid Point PCDD/F TEQ (WHO 2005)	0.351
Upper Bound PCDD/F TEQ (WHO 2005)	0.695

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Sample Analysis Report

Sample Name	**19-21939-EC-4 EMULSION FEED**	Sampling Date	n/a
ALS Sample ID	L2367170-4	Extraction Date	4-Nov-19
Analysis Method	EPA 1613B	Sample Size	20.27 g
Analysis Type	Sample	Percent Moisture	70.2%
Sample Matrix	Stack	Split Ratio	10

Approved:
T.Patterson
--e-signature--
19-Nov-2019

Run Information	**Run 1**
Filename	7-191113A10
Run Date	13-Nov-19 17:34
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
2,3,7,8-TCDD	1	27.90	1.81	0.63	M,J		2.5
1,2,3,7,8-PeCDD	1	32.06	3.91	0.28	M,J		12
1,2,3,4,7,8-HxCDD	0.1	34.12	2.05	1.1	M,J		12
1,2,3,6,7,8-HxCDD	0.1	34.17	<3.8	0.92	M,J,R	3.8	12
1,2,3,7,8,9-HxCDD	0.1	34.28	<3.1	0.98	M,J,R	3.1	12
1,2,3,4,6,7,8-HpCDD	0.01	35.77	68.7	0.61			12
OCDD	0.0003	37.27	442	0.81			25
2,3,7,8-TCDF	0.1	26.99	6.20	0.59	M		2.5
1,2,3,7,8-PeCDF	0.03	31.13	7.17	0.32	J		12
2,3,4,7,8-PeCDF	0.3	31.85	10.9	0.27	J		12
1,2,3,4,7,8-HxCDF	0.1	33.62	13.0	0.69			12
1,2,3,6,7,8-HxCDF	0.1	33.68	11.3	0.76	J		12
2,3,4,6,7,8-HxCDF	0.1	34.02	10.1	0.77	J		12
1,2,3,7,8,9-HxCDF	0.1	34.45	3.28	0.97	J		12
1,2,3,4,6,7,8-HpCDF	0.01	35.21	41.9	0.54	M		12
1,2,3,4,7,8,9-HpCDF	0.01	36.02	5.17	0.57	J		12
OCDF	0.0003	37.36	67.5	0.53			25

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.90	41	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.05	41	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.10	32	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.15	34	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.76	39	23-140
13C12-OCDD	4000	37.26	36	17-157
13C12-2,3,7,8-TCDF	2000	26.98	33	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.12	37	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.84	38	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.61	37	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.68	35	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	34.01	34	29-147
13C12-1,2,3,7,8,9-HxCDF	2000	34.43	30	28-136
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.21	36	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.01	41	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.92	93	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**	
Total-TCDD	6	14.3	0.63	2.5
Total-PeCDD	5	17.7	0.28	12
Total-HxCDD	3	28.4	1.1	12
Total-HpCDD	2	126	0.61	12
Total-TCDF	14	146	0.59	2.5
Total-PeCDF	11	116	0.32	12
Total-HxCDF	8	87.6	0.97	12
Total-HpCDF	4	78.3	0.57	12

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	15.1
Mid Point PCDD/F TEQ (WHO 2005)	15.8
Upper Bound PCDD/F TEQ (WHO 2005)	15.8

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	
ALS Sample ID	WG3194521-1	Extraction Date	4-Nov-19	Approved:
Analysis Method	EPA 1613B	Sample Size	5.00 g	*T.Patterson*
Analysis Type	Blank	Percent Moisture	n/a	--e-signature--
Sample Matrix	QC	Split Ratio	10	19-Nov-2019

Run Information	**Run 1**
Filename	7-191113A05
Run Date	13-Nov-19 14:03
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<0.88	0.88	U		10
1,2,3,7,8-PeCDD	1	NotFnd	<0.46	0.46	U		50
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.48	0.48	U		50
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.45	0.45	U		50
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.46	0.46	U		50
1,2,3,4,6,7,8-HpCDD	0.01	NotFnd	<0.49	0.49	U		50
OCDD	0.0003	37.26	1.26	0.48	M,J		100
2,3,7,8-TCDF	0.1	NotFnd	<0.51	0.51	U		10
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.45	0.45	U		50
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.35	0.35	U		50
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.28	0.28	U		50
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.25	0.25	U		50
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.26	0.26	U		50
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<0.39	0.39	U		50
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.33	0.33	U		50
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.42	0.42	U		50
OCDF	0.0003	37.33	<0.74	0.58	M,J,R	0.74	100

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	2000	27.89	122	25-164
13C12-1,2,3,7,8-PeCDD	2000	32.04	128	25-181
13C12-1,2,3,4,7,8-HxCDD	2000	34.09	130	32-141
13C12-1,2,3,6,7,8-HxCDD	2000	34.14	145	28-130
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.75	145	23-140
13C12-OCDD	4000	37.25	131	17-157
13C12-2,3,7,8-TCDF	2000	26.96	108	24-169
13C12-1,2,3,7,8-PeCDF	2000	31.10	122	24-185
13C12-2,3,4,7,8-PeCDF	2000	31.83	120	21-178
13C12-1,2,3,4,7,8-HxCDF	2000	33.60	128	26-152
13C12-1,2,3,6,7,8-HxCDF	2000	33.67	145	26-123
13C12-2,3,4,6,7,8-HxCDF	2000	33.99	134	29-147
13C12-1,2,3,7,8,9-HxCDF	2000	34.41	115	28-136
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.19	146	28-143
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.00	139	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.90	111	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0	<0.88	0.88	U	10
Total-PeCDD	0	<0.46	0.46	U	50
Total-HxCDD	0	<0.48	0.48	U	50
Total-HpCDD	0	<0.49	0.49	U	50
Total-TCDF	0	<0.51	0.51	U	10
Total-PeCDF	0	<0.45	0.45	U	50
Total-HxCDF	0	<0.39	0.39	U	50
Total-HpCDF	0	<0.42	0.42	U	50

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.000378
Mid Point PCDD/F TEQ (WHO 2005)	0.890
Upper Bound PCDD/F TEQ (WHO 2005)	1.78

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a	
ALS Sample ID	WG3194521-2	Extraction Date	4-Nov-19	
Analysis Method	EPA 1613B	Sample Size	1	n/a
Analysis Type	LCS	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	10	

Approved:
T.Patterson
--e-signature--
19-Nov-2019

Run Information	**Run 1**
Filename	7-191113A02
Run Date	13-Nov-19 11:26
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	200	27.92	82	67-158	
1,2,3,7,8-PeCDD	1000	32.06	95	70-142	
1,2,3,4,7,8-HxCDD	1000	34.12	97	70-164	
1,2,3,6,7,8-HxCDD	1000	34.17	103	76-134	
1,2,3,7,8,9-HxCDD	1000	34.30	107	64-162	
1,2,3,4,6,7,8-HpCDD	1000	35.79	101	70-140	
OCDD	2000	37.30	92	78-144	
2,3,7,8-TCDF	200	27.01	98	75-158	
1,2,3,7,8-PeCDF	1000	31.13	103	80-134	
2,3,4,7,8-PeCDF	1000	31.85	91	68-160	
1,2,3,4,7,8-HxCDF	1000	33.62	99	72-134	
1,2,3,6,7,8-HxCDF	1000	33.69	90	84-130	
2,3,4,6,7,8-HxCDF	1000	34.02	96	70-156	
1,2,3,7,8,9-HxCDF	1000	34.44	108	78-130	
1,2,3,4,6,7,8-HpCDF	1000	35.23	107	82-122	
1,2,3,4,7,8,9-HpCDF	1000	36.04	85	78-138	
OCDF	2000	37.39	84	63-170	
Extraction Standards	**pg**		**% Rec**	**Limits**	
13C12-2,3,7,8-TCDD	2000	27.90	91	20-175	
13C12-1,2,3,7,8-PeCDD	2000	32.05	98	21-227	
13C12-1,2,3,4,7,8-HxCDD	2000	34.11	78	21-193	
13C12-1,2,3,6,7,8-HxCDD	2000	34.16	96	25-163	R
13C12-1,2,3,4,6,7,8-HpCDD	2000	35.78	90	26-166	
13C12-OCDD	4000	37.29	93	13-138	
13C12-2,3,7,8-TCDF	2000	26.98	80	22-152	
13C12-1,2,3,7,8-PeCDF	2000	31.12	89	21-192	
13C12-2,3,4,7,8-PeCDF	2000	31.84	92	13-328	
13C12-1,2,3,4,7,8-HxCDF	2000	33.62	82	19-202	
13C12-1,2,3,6,7,8-HxCDF	2000	33.69	103	21-159	
13C12-2,3,4,6,7,8-HxCDF	2000	34.01	93	17-205	
13C12-1,2,3,7,8,9-HxCDF	2000	34.43	75	22-176	
13C12-1,2,3,4,6,7,8-HpCDF	2000	35.22	99	21-158	
13C12-1,2,3,4,7,8,9-HpCDF	2000	36.03	92	20-186	
Cleanup Standard	**pg**				
37Cl4-2,3,7,8-TCDD (Cleanup)	40	27.92	82	31-191	

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

APPENDIX 12

Acid Gases Train Recovery Data Sheet
(1 page)

ORTECH Environmental Recovery & Sample Log
Method 26
Incinerator Stack

L2364256

Client: Clean Harbors Sarnia
Job/Report Number: 21939
Received By:
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21939 - J2643

Test Number	ORTECH Sample ID 19-21939-M26-	Date Sampled	Contents of Impingers	Initial Volume (ml)	Final Volume (ml)	Gain (ml)	H_2O Rinse (ml)	Total Sample Volume (ml)	Analysis
1	1	OCT 8/19	0.1N H2SO4	30.0	109	79	11	120	Halides
	2	"	0.1N NaOH	15.0	15	0	10	25	Cyanide
2	3	OCT 9/19	0.1N H2SO4	30.0	110	80	10	120	Halides
	4	OCT 9/19	0.1N NaOH	15.0	14.5	-0.5	10.5	25	Cyanide
3	5	OCT 10/19	0.1N H2SO4	30.0	110	80	10	120	Halides
	6	OCT 10/19	0.1N NaOH	15.0	15.0	0.0	10	25.	Cyanide
Blank	7	OCT 9/19	0.1N H2SO4	30.0	30.0	0.0	20.0	50.0	Halides
	8	OCT 9/19	0.1N NaOH	15.0	15.0	0.0	10.0	25.0	Cyanide

Impinger 1 empty, Imp 2+3 30ml split 0.1n H2SO4, Imp 4 empty, Imp 5 15ml 0.1n NaOH, Imp 6 Si Gel

Relinquished by: [signature] Date: OCT 11/19

Relinquished to: Aaron Burton Date: 11-oct-2019 9:40 16:4

APPENDIX 13

Acid Gases Analytical Reports
(10 pages)

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2364256		MIssissauga, ON L5J 2Y4
Date of Report	24-Oct-19		Canada
Date of Sample Receipt	11-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS:

F as HF Anion Analysed via Ion Chromatography USEPA Method 26A (GN 18-Oct-19)
Cl as HCl Anion Analysed via Ion Chromatography USEPA Method 26A (GN 18-Oct-19)
Br as HBr Anion Analysed via Ion Chromatography USEPA Method 26A (GN 18-Oct-19)
I as HI Anion Analysed via Ion Chromatography USEPA Method 26A (23-Oct-19)

LOR = Limit of Reporting
LCB = Laboratory Control Blank (limits: <LOR)
LCS = Laboratory Control Sample (limits: 90-110%)
MS = Matrix Spike Sample (limits: 90-110%, NH_3: 85-115%)
RPD = Relative Percent Difference (limits: <20% for sample duplicate, <10% for duplicate injection)
CVS = Calibration Verification Standard (limits: 90-110%)

Certified by: L. Wrona

Lynne Wrona
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name	19-21939-M26-1 TEST#1	19-21939-M26-3 TEST#2	19-21939-M26-5 TEST#3	19-21939-M26-7 BLANK
ALS Sample ID	L2364256-1	L2364256-3	L2364256-5	L2364256-7
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Sample	Sample	Sample
Sampling Date/Time	8-Oct-19	9-Oct-19	10-Oct-19	9-Oct-19
Date of Receipt	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Ion Chromatography Analysis				
USEPA Method 26A	**mg**	**mg**	**mg**	**mg**
Total F^- as HF (ave)	12.2	14.0	2.20	<0.0730
Analysis 1	12.2	14.1	2.18	<0.0730
Analysis 2	12.2	13.9	2.23	<0.0730
Total Cl^- as HCl (ave)	29.5	36.2	20.0	<0.107
Analysis 1	29.5	36.4	20.2	<0.107
Analysis 2	29.5	35.9	19.8	<0.107
Total Br^- as HBr (ave)	0.673	0.681	0.491	<0.0895
Analysis 1	0.670	0.682	0.487	<0.0895
Analysis 2	0.676	0.680	0.496	<0.0895
Total I^- as HI (ave)	0.446	0.371	0.0799	<0.00524

ALS Environmental

Sample QC Summary Report

Sample Name	**LCB**	**LCS**	**LCS**
ALS Sample ID	LCB	LCS	LCS
Matrix	Stack	Stack	Stack
Analysis type	Method Blank	Blank Spike	Blank Spike
Sampling Date/Time	n/a	n/a	n/a
Date of Receipt	n/a	n/a	n/a

Ion Chromatography Analysis			
USEPA Method 26A	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	<0.00702	0.0560	95%
Analysis 1	<0.00702	0.0552	
Analysis 2	<0.00702	0.0568	
Total Cl^- as HCl (ave)	<0.0103	0.0727	91%
Analysis 1	<0.0103	0.0716	
Analysis 2	<0.0103	0.0738	
Total Br^- as HBr (ave)	<0.0339	0.234	91%
Analysis 1	<0.0339	0.231	
Analysis 2	<0.0339	0.238	
Total I^- as HI (ave)	<0.000504	0.0695	92%

ALS Environmental

Sample QC Summary Report

Sample Name	19-21939-M26-1 TEST#1	19-21939-M26-1 TEST#1	19-21939-M26-1 TEST#1	19-21939-M26-1 TEST#1
ALS Sample ID	L2364256-1	L2364256-1DUP	L2364256-1MS	L2364256-1MS
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date/Time	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Date of Receipt	11-Oct-19	11-Oct-19	11-Oct-19	11-Oct-19
Ion Chromatography Analysis				
USEPA Method 26A	**mg**	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	12.2	12.3	25.3	100%
Analysis 1	12.2	12.3	25.5	
Analysis 2	12.2	12.3	25.0	
Total Cl^- as HCl (ave)	29.5	29.6	48.3	98%
Analysis 1	29.5	29.6	48.9	
Analysis 2	29.5	29.6	47.8	
Total Br^- as HBr (ave)	0.673	0.682	7.26	105%
Analysis 1	0.670	0.682	7.38	
Analysis 2	0.676	0.683	7.15	
Total I^- as HI (ave)	0.446	0.463	2.35	101%

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 11-OCT-19
Report Date: 29-OCT-19 14:38 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2364256
Project P.O. #: 21939-J2643
Job Reference: 21939 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

L. Wrona
Lynne Wrona, M.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2364256-2 19-21939-M26-2 TEST#1 Sampled By: Client on 08-OCT-19 Matrix: Stack **Miscellaneous Parameters**							
Cyanide, Total	<10	RRR	10	ug	23-OCT-19	25-OCT-19	R4888083
Note: Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity). Parameter Exceeded Recommended Holding Time Prior to Analysis Sample was Preserved at the laboratory							
L2364256-4 19-21939-M26-4 TEST#2 Sampled By: Client on 09-OCT-19 Matrix: Stack **Miscellaneous Parameters**							
Cyanide, Total	<0.1	RRR	0.10	ug	23-OCT-19	24-OCT-19	R4888083
Note: Sample was Preserved at the laboratory Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity). Parameter Exceeded Recommended Holding Time Prior to Analysis							
L2364256-6 19-21939-M26-6 TEST#3 Sampled By: Client on 10-OCT-19 Matrix: Stack **Miscellaneous Parameters**							
Cyanide, Total	<0.1	RRR	0.10	ug	23-OCT-19	24-OCT-19	R4888083
Note: Sample was Preserved at the laboratory Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity). Parameter Exceeded Recommended Holding Time Prior to Analysis							
L2364256-8 19-21939-M26-8 BLANK Sampled By: Client on 09-OCT-19 Matrix: Stack **Miscellaneous Parameters**							
Cyanide, Total	<0.1	RRR	0.10	ug	23-OCT-19	24-OCT-19	R4888083
Note: Sample was Preserved at the laboratory Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-WT	Misc.	Air volume (L)	DATA ENTRY
CN-TOT-WT	Impinger	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L2364256 Report Date: 29-OCT-19

Client: ORTECH Environmental
804 Southdown Road
Mississauga ON L5J 2Y4

Contact: Chris Belore

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	Impinger							
Batch R4888083								
WG3192142-3 DUP		**L2364256-2**						
Cyanide, Total		<10	<10	RPD-NA	ug	N/A	25	25-OCT-19
WG3192142-2 LCS								
Cyanide, Total			100.5		%		70-130	24-OCT-19
Cyanide, Total			0.251		ug		70-130	24-OCT-19
WG3192142-1 MB								
Cyanide, Total			<0.1		ug		0.02	24-OCT-19
WG3192142-4 MS		**L2364256-2**						
Cyanide, Total			N/A	MS-B	%		-	25-OCT-19
Cyanide, Total			5.66		ug		-	25-OCT-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Cyanides							
Cyanide, Total							
	2	08-OCT-19	25-OCT-19 00:00	14	17	days	EHT
	4	09-OCT-19	24-OCT-19 00:00	14	15	days	EHT
	8	09-OCT-19	24-OCT-19 00:00	14	15	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2364256 were received on 11-OCT-19 09:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

APPENDIX 14

Volatile Organics Analytical Reports
and DRE Compound Analysis in Feeds Report
(14 pages)

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	ORT100	**Client Name:**	ORTECH Environmental
ALS Project ID:	Lynne Wrona	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L2365333		
Date of Report	31-Oct-19		
Date of Sample Receipt	15-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS: **VOCs via SW846 Method 5041A/8260C**

Ketone data by VOST analyses are estimated values only

A bias to low chlorobenzene-d5 internal standard recoveries on selected samples appears to relate to co-eluting chemical interferences. Field spike recoveries are biased low likely due to similar interferences.
Two samples have a benzene response slightly above 20% greater than the 2 ug upper calibration range and those two data points have been 'E' flagged as an estimated value. Since these were only ~30% above the calibrated range, this range exceedance should have only minimal impact on the data quality.

Certified by: R.A. McLeod

Ron McLeod, Ph.D.
Technical Director

ALS Environmental

Sample Analysis Summary Report

Sample Name	19-21939-VOST-2A/2B PAIR#2 TEST#1		19-21939-VOST-3A/3B PAIR#3 TEST#1		19-21939-VOST-4A/4B PAIR#4 TEST#1		19-21939-VOST-7A/7B PAIR#2 TEST#2		19-21939-VOST-8A/8B PAIR#3 TEST#2		19-21939-VOST-9A/9B PAIR#4 TEST#2	
ALS Sample ID	L2365333-2		L2365333-3		L2365333-4		L2365333-7		L2365333-8		L2365333-9	
Sample units	sample		sample		sample		sample		sample		sample	
Matrix	VOST		VOST		VOST		VOST		VOST		VOST	
Sampling Date	8-Oct-19		8-Oct-19		8-Oct-19		9-Oct-19		9-Oct-19		9-Oct-19	
Extraction Date	22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19	
Target Analytes	**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	<0.02	U	<0.02	U	0.032		<0.02	U	<0.02	U	<0.02	U
Vinyl Chloride	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Bromomethane	<0.09	U	1.15		1.82		1.08		0.832		1.22	
Trichlorofluoromethane	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,1-Dichloroethene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Acetone	0.343		0.149		0.219		0.237		0.137		0.436	
Methylene Chloride	0.243		0.393		0.496		0.716		0.309		1.09	
trans,1,2-Dichloroethene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
1,1-Dichloroethane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
2-Butanone	0.084		0.037		0.07		0.056		0.019		0.084	
Chloroform	0.162		0.148		0.136		0.113		0.113		0.088	
1,1,1-Trichloroethane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Carbon Tetrachloride	0.031		0.063		0.067		0.022		<0.01	U	0.039	
Benzene	1.38		2.41		2.22		1.92		1.30		1.81	
Trichloroethene	0.027		0.061		0.071		0.045		0.023		0.043	
1,2-Dichloropropane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Bromodichloromethane	0.394		0.668		0.662		0.358		0.051		0.33	
Toluene	0.168		0.188		0.162		0.122		0.119		0.093	
Tetrachloroethene	0.126		0.144		0.155		0.122		0.112		0.082	
Chlorodibromomethane	0.16		0.24		0.21		0.175		0.182		0.104	
Ethylene Dibromide	0.024	R	<0.02	U	0.047	R	<0.02	U	<0.02	U	<0.02	U
Ethylbenzene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
M&P-Xylene	0.066		0.067		0.058		0.037		0.057		<0.03	U
O-Xylene	0.022		0.021		0.018		0.011		0.018		<0.01	U
Styrene	0.083		0.09		0.102		0.063		0.086		0.037	
Bromoform	0.137		0.147		0.197		0.156		0.158		0.125	
Isopropylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,3,5-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,2,4-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Ethyl Acetate	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Trichlorotrifluoroethane	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Field Standard	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d10-Ethylbenzene(SPK)	57.8		63.6		62		63.7		58.7		53	
Surrogate Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	94	R	101.5	M	105.6	M,R	134.4	M,R	107	M	111.7	R
d8-Toluene(SURR)	126.3		112.8		110.3		109.1		115.2		76.8	
4-Bromofluorobenzene(SURR)	76.2		68.5		99.8		86.1		92.3		67.4	
Internal Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Bromochloromethane	86.5		64.8		82.4		88.7		71.5		108.9	
1,4-Difluorobenzene	73.5		40.5	ML	52.8		65		75.7		86.4	
d5-Chlorobenzene	52.3		26.8	L	44.7	L	51.3		26.3	L	119.9	

U Indicates that this compound was not detected above the RL.
M Indicates that a peak has been manually integrated.

L Indicates this value is below the control limit.

E Indicates Estimated value. Instrument response exceeds instrument calibration range of 1.0 ug.

ALS Environmental

Sample Analysis Summary Report

Sample Name	19-21939-VOST-12A/12B PAIR#2 TEST#3		19-21939-VOST-13A/13B PAIR#3 TEST#3		19-21939-VOST-14A/14B PAIR#4 TEST#3		19-21939-VOST-15A/15B FIELD BLANK TEST#3		19-21939-VOST-16A/16B TRIP BLANK	
ALS Sample ID	L2365333-12		L2365333-13		L2365333-14		L2365333-15		L2365333-16	
Sample units	sample		sample		sample		sample		sample	
Matrix	VOST		VOST		VOST		VOST		VOST	
Sampling Date	10-Oct-19		10-Oct-19		10-Oct-19		10-Oct-19		10-Oct-19	
Extraction Date	22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19		22-Oct-19	
Target Analytes	**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	0.031		<0.02	U	<0.02	U	<0.02	U	<0.02	U
Vinyl Chloride	<0.02	U	<0.02	U	0.047	R	<0.02	U	<0.02	U
Bromomethane	1.74		1.75		1.51		<0.09	U	<0.09	U
Trichlorofluoromethane	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,1-Dichloroethene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Acetone	0.483		0.511		0.599		<0.1	U	<0.1	U
Methylene Chloride	0.406		0.353		0.281		<0.1	U	<0.1	U
trans,1,2-Dichloroethene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
1,1-Dichloroethane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
2-Butanone	0.113		0.123		0.162		<0.01	U	<0.01	U
Chloroform	0.106		0.099		0.098		<0.01	U	<0.01	U
1,1,1-Trichloroethane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Carbon Tetrachloride	0.078		0.05		0.039		<0.01	U	<0.01	U
Benzene	2.63	E	2.41		2.76	E	<0.05	U	<0.05	U
Trichloroethene	0.069		0.064		0.061		<0.01	U	<0.01	U
1,2-Dichloropropane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Bromodichloromethane	0.443		0.365		0.344		<0.01	U	<0.01	U
Toluene	0.09		0.109		0.153		<0.05	U	<0.05	U
Tetrachloroethene	0.096		0.112		0.106		<0.01	U	<0.01	U
Chlorodibromomethane	0.091		0.112		0.103		<0.01	U	<0.01	U
Ethylene Dibromide	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Ethylbenzene	0.011		<0.01	U	<0.01	U	<0.01	U	<0.01	U
M&P-Xylene	<0.03	U	<0.03	U	<0.03	U	<0.03	U	<0.03	U
O-Xylene	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Styrene	0.044		0.046		0.049		<0.02	U	<0.02	U
Bromoform	0.11		0.111		0.11		<0.01	U	<0.01	U
Isopropylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,3,5-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
1,2,4-Trimethylbenzene	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Ethyl Acetate	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Trichlorotrifluoroethane	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Field Standard	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d10-Ethylbenzene(SPK)	48.6		53.8		55.6		55.4		41.2	
Surrogate Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	100.4	M	105.9	M,R	89.6	M,R	74.2		78.9	
d8-Toluene(SURR)	72.9		84.1		83.5		82.9		80.9	
4-Bromofluorobenzene(SURR)	66.3		64.2		68.7		86		83.2	
Internal Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Bromochloromethane	114.1		102.3		85.5		94		125.9	
1,4-Difluorobenzene	79.9		84.5		79.8	M	131.7		169.9	
d5-Chlorobenzene	125.8		107.4		108.1		153		198.6	

U Indicates that this compound was not detected above the RL.
M Indicates that a peak has been manually integrated.

L Indicates this value is below the control limit.

E Indicates Estimated value. Instrument response exceeds instrument calibration range of 1.0 ug.

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		Laboratory Control Sample	
ALS Sample ID	WG3197305-1		WG3197305-2	
Sample units	sample		n/a	
Matrix	QC		QC	
Sampling Date	n/a		n/a	
Extraction Date	22-Oct-19		22-Oct-19	
Target Analytes	**ug/sample**		**% Rec**	
Dichlorodifluoromethane	<0.02	U	101.4	
Vinyl Chloride	<0.02	U	88.2	M
Bromomethane	<0.09	U	82.7	
Trichlorofluoromethane	<0.02	U	88.5	
1,1-Dichloroethene	<0.01	U	96.4	
Acetone	<0.1	U	113.2	
Methylene Chloride	<0.1	U	104	
trans,1,2-Dichloroethene	<0.01	U	104.9	M
1,1-Dichloroethane	<0.01	U	99.4	
2-Butanone	<0.01	U	117.7	
Chloroform	<0.01	U	88.8	
1,1,1-Trichloroethane	<0.01	U	108.7	
Carbon Tetrachloride	<0.01	U	108	
Benzene	<0.05	U	98.6	
Trichloroethene	<0.01	U	117	
1,2-Dichloropropane	<0.01	U	115.8	
Bromodichloromethane	<0.01	U	118.9	
Toluene	<0.05	U	85.6	
Tetrachloroethene	<0.01	U	97.7	
Chlorodibromomethane	<0.01	U	107.4	
Ethylene Dibromide	<0.02	U	121.9	
Ethylbenzene	<0.01	U	91.4	
M&P-Xylene	<0.03	U	83	
O-Xylene	<0.01	U	81.3	
Styrene	<0.02	U	84.6	
Bromoform	<0.01	U	117.7	
Isopropylbenzene	<0.02	U	84.6	
1,3,5-Trimethylbenzene	<0.02	U	104.5	
1,2,4-Trimethylbenzene	<0.02	U	92.1	
Ethyl Acetate	<0.02	U		
Trichlorotrifluoroethane	<0.02	U		
Field Standard	**% Rec**		**% Rec**	
d10-Ethylbenzene(SPK)	61.3		118.6	
Surrogate Standards	**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	76.9		100.4	
d8-Toluene(SURR)	80.6		109	
4-Bromofluorobenzene(SURR)	83.9		100.6	
Internal Standards	**% Rec**		**% Rec**	
Bromochloromethane	107.5		74.6	
1,4-Difluorobenzene	143.3		96.1	
d5-Chlorobenzene	168.2		103.8	

U Indicates that this compound was not detected above the RL.
M Indicates that a peak has been manually integrated.

L Indicates this value is below the control limit.

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 17-OCT-19
Report Date: 31-OCT-19 14:02 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2367176
Project P.O. #: NOT SUBMITTED
Job Reference: 21939 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

L. Wrona

Lynne Wrona, M.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367176-1 19-21939-FR-3 RICH FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	1200		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	2970		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	11000		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<2000	DLQ	2000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	3580		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	1560		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	20900	DLHC	200	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-2 19-21939-FL-3 LEAN FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	390		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	1520		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	507		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	4050		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-3 19-21939-FE-3 EMULSION FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	980		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	3370		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	1310		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	220		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	5460		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-4 19-21939-FA-3 ALKALINE FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367176-4 19-21939-FA-3 ALKALINE FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-5 19-21939-LW-3 LEACHATE FEED TEST#1							
Sampled By: Client on 08-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-6 19-21939-FR-8 RICH FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	1880		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	6150		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1500	DLQ	1500	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	2730		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	790		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	13900		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-7 19-21939-FL-8 LEAN FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367176-7 19-21939-FL-8 LEAN FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
Ethylbenzene	220		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	852		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	287		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	2650		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-8 19-21939-FE-8 EMULSION FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	1080		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	3730		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	1430		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	230		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	6570		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-9 19-21939-FA-8 ALKALINE FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-10 19-21939-LW-8 LEACHATE FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367176-10 19-21939-LW-8 LEACHATE FEED TEST#2							
Sampled By: Client on 09-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-11 19-21939-FR-13 RICH FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	2260		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	8000		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1500	DLQ	1500	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	3020		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	810		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	16200		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-12 19-21939-FL-13 LEAN FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	180		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	689		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	233		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	2330		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-13 19-21939-FE-13 EMULSION FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	1770		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	6560		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1500	DLQ	1500	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	2180		40	mg/kg	25-OCT-19	31-OCT-19	R4890533

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367176-13 19-21939-FE-13 EMULSION FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
Tetrachloroethylene	630		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	11700		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-14 19-21939-FA-13 ALKALINE FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
L2367176-15 19-21939-LW-13 LEACHATE FEED TEST#3							
Sampled By: Client on 10-OCT-19							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	25-OCT-19	31-OCT-19	R4890533
1,2-Dichlorobenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethyl Acetate	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
Ethylbenzene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
m+p-Xylenes	<60		60	mg/kg	25-OCT-19	31-OCT-19	R4890533
Methyl Ethyl Ketone	<1000		1000	mg/kg	25-OCT-19	31-OCT-19	R4890533
o-Xylene	<40		40	mg/kg	25-OCT-19	31-OCT-19	R4890533
Tetrachloroethylene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Toluene	<100		100	mg/kg	25-OCT-19	31-OCT-19	R4890533
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	-	%	25-OCT-19	31-OCT-19	R4890533

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
SDO:RNA	Surrogate diluted out:% recovery not available

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
VOC-FEED-WT	Soil	Volatile Organic Compounds	SW846 8260

An subsample of the sample is extracted in methanol and analyzed by headspace-GC/MS using internal standard quantitation.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L2367176 Report Date: 31-OCT-19

Client: ORTECH Environmental
804 Southdown Road
Mississauga ON L5J 2Y4

Contact: Chris Belore

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-FEED-WT	Soil							
Batch R4890533								
WG3201998-3 DUP		**L2367176-1**						
1,2,4-Trichlorobenzene		<500	<500	RPD-NA	mg/kg	N/A	50	31-OCT-19
1,2-Dichlorobenzene		<100	<100	RPD-NA	mg/kg	N/A	50	31-OCT-19
Ethyl Acetate		1200	1100		mg/kg	8.9	50	31-OCT-19
Ethylbenzene		2970	3130		mg/kg	5.3	50	31-OCT-19
m+p-Xylenes		11000	11600		mg/kg	5.3	50	31-OCT-19
Methyl Ethyl Ketone		<2000	<2000	RPD-NA	mg/kg	N/A	50	31-OCT-19
o-Xylene		3580	3730		mg/kg	4.1	50	31-OCT-19
Tetrachloroethylene		1560	1670		mg/kg	7.1	50	31-OCT-19
Toluene		20900	22200		mg/kg	6.1	50	31-OCT-19
WG3201998-1 MB								
1,2,4-Trichlorobenzene			<500		mg/kg		500	31-OCT-19
1,2-Dichlorobenzene			<100		mg/kg		100	31-OCT-19
Ethyl Acetate			<1000		mg/kg		1000	31-OCT-19
Ethylbenzene			<100		mg/kg		100	31-OCT-19
m+p-Xylenes			<60		mg/kg		60	31-OCT-19
Methyl Ethyl Ketone			<1000		mg/kg		1000	31-OCT-19
o-Xylene			<40		mg/kg		40	31-OCT-19
Tetrachloroethylene			<100		mg/kg		100	31-OCT-19
Toluene			<100		mg/kg		100	31-OCT-19
Surrogate: 1,4-Difluorobenzene			N/A	SDO:RNA	%		-	31-OCT-19
Surrogate: 4-Bromofluorobenzene			N/A	SDO:RNA	%		-	31-OCT-19

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
SDO:RNA	Surrogate diluted out:% recovery not available

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Volatile Organic Compounds							
Volatile Organic Compounds							
	1	08-OCT-19	25-OCT-19 19:12	7	17	days	EHTR
	2	08-OCT-19	25-OCT-19 19:15	7	17	days	EHTR
	3	08-OCT-19	25-OCT-19 19:16	7	17	days	EHTR
	4	08-OCT-19	25-OCT-19 19:17	7	17	days	EHTR
	5	08-OCT-19	25-OCT-19 19:18	7	17	days	EHTR
	6	09-OCT-19	25-OCT-19 19:19	7	16	days	EHTR
	7	09-OCT-19	25-OCT-19 19:20	7	16	days	EHTR
	8	09-OCT-19	25-OCT-19 19:21	7	16	days	EHTR
	9	09-OCT-19	25-OCT-19 19:22	7	16	days	EHTR
	10	09-OCT-19	25-OCT-19 19:23	7	16	days	EHTR
	11	10-OCT-19	25-OCT-19 19:24	7	15	days	EHTR
	12	10-OCT-19	25-OCT-19 19:25	7	15	days	EHTR
	13	10-OCT-19	25-OCT-19 19:26	7	15	days	EHTR
	14	10-OCT-19	25-OCT-19 19:27	7	15	days	EHTR
	15	10-OCT-19	25-OCT-19 19:28	7	15	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2367176 were received on 17-OCT-19 13:35.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

APPENDIX 15

Feed and Baghouse Dust Metals Analytical Report
(9 pages)

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Lynne Wrona	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2367163		Mississauga, ON L5J 2Y4
Date of Report	31-Oct-19		Canada
Date of Sample Receipt	17-Oct-19	**Client Contact:**	Chris Belore
		Client Project ID:	21939 Clean Harbors

COMMENTS:

Metals analysed via ICP-MS Method USEPA 6020A (SA 29-Oct-19)
Sample Preparation via Hotblock Digestion for Metals in Soils USEPA 200.2 (SA 29-Oct-19)

ANALYST COMMENTS:

LCS recoveries for Si cannot be quantified, as the sample was not spiked for this analyte.

MS recoveries for Si show an overall low bias. This may be due to a matrix interference, or incomplete extraction of this element into solution. Data for this analyte may be biased low.

Al recovery in the MS cannot be quantified due to a high level of this analyte in the sample, relative to the spiked amount. This is not expected to indicate any impact on data quality. **PE 31-Oct-19**

LCB = Laboratory Control Blank
LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
LOR = Limit of Reporting
nq = not quantifiable due to native levels in the sample

Certified by: L. Wrona
Lynne Wrona
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name	LOR	19-21939-RC-1 RICH FEED	19-21939-LC-1 LEAN FEED	19-21939-AC-1 ALKALINE FEED	19-21939-EC-1 EMULSION FEED	19-21939-BDC-1 BAGHOUSE DUST	19-21939-LWC-1 LEACHATE FEED
ALS Sample ID		L2367163-1	L2367163-2	L2367163-3	L2367163-4	L2367163-5	L2367163-6
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample	Sample	Sample
Sampling Date		n/a	n/a	n/a	n/a	n/a	n/a
Date of Receipt		17-Oct-19	17-Oct-19	17-Oct-19	17-Oct-19	17-Oct-19	17-Oct-19
Multi-Metals via ICP-MS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum	10	228	211	<	137	6360	<
Antimony	0.4	6.87	1.32	<	0.842	101	<
Arsenic	0.4	<	88.1	<	<	1210	<
Barium	1	16.1	17.2	1.11	12.7	223	<
Beryllium	0.5	<	<	<	<	<	<
Boron	10	18.5	18.2	<	19.3	169	37.5
Cadmium	0.1	0.139	3.99	<	0.105	65.6	0.106
Calcium	50	448	1100	450	405	31700	637
Chromium	4	25.2	113	<	4.41	1390	<
Cobalt	1	1.09	1.40	<	<	24.6	<
Copper	2.5	17.2	169	<	28.2	2470	<
Iron	200	279	256	<	356	5120	<
Lead	0.1	2.99	2.16	<	2.50	49.7	0.130
Lithium	1	<	11.4	<	<	199	5.96
Magnesium	15	103	274	69.0	97.4	7310	196
Manganese	15	<	64.9	<	<	911	<
Molybdenum	1	4.40	9.17	<	8.79	187	2.27
Nickel	0.5	5.40	20.0	<	5.55	310	2.53
Phosphorus	100	137	575	<	<	9660	<
Potassium	150	235	5020	<	239	102000	6710
Selenium	2	<	18.9	<	<	305	<
Silver	0.1	0.124	<	<	<	2.48	<
Sodium	10	1210	9190	101	2070	201000	16600
Strontium	2	2.62	3.83	2.03	2.30	149	4.87
Tin	2	36.6	38.3	<	89.9	787	<
Titanium	1	4.97	7.86	<	3.63	466	<
Vanadium	1	2.03	2.36	<	1.13	60.8	<
Zinc	20	95.2	92.8	<	59.5	1780	<
Sulfur	100	217	2430	<	<	59500	1140
Silicon	50	119	122	<	138	226	<

ALS Environmental

Sample QC Summary Report

Sample Name		RB	LCS	LCS
ALS Sample ID		RB	LCS	LCS
Matrix		Solid	Solid	Solid
Analysis Type		Blank	LCS	LCS
Sampling Date		n/a	n/a	n/a
Date of Receipt		n/a	n/a	n/a

Multi-Metals via ICP-MS	**LOR mg/kg**	**mg/kg**	**mg/kg**	**% Rec**
Solids				
Aluminum	10	<	64.8	95
Antimony	0.4	<	7.20	108
Arsenic	0.4	<	35.0	105
Barium	1	<	37.4	112
Beryllium	0.5	<	34.3	103
Boron	10	<	41.9	102
Cadmium	0.1	<	19.4	116
Calcium	50	<	932	112
Chromium	4	<	36.9	111
Cobalt	1	<	37.0	111
Copper	2.5	<	36.7	111
Iron	200	<	<	116
Lead	0.1	<	37.4	112
Lithium	1	<	6.21	108
Magnesium	15	<	182	109
Manganese	15	<	37.7	113
Molybdenum	1	<	17.9	108
Nickel	0.5	<	36.5	110
Phosphorus	100	<	860	105
Potassium	150	<	891	110
Selenium	2	<	34.6	104
Silver	0.1	<	17.7	106
Sodium	10	<	877	105
Strontium	2	<	34.5	104
Tin	2	<	20.2	121
Titanium	1	<	36.9	110
Vanadium	1	<	36.8	111
Zinc	20	<	70.2	105
Sulfur	100	<	14100	112
Silicon	50	<	<	nq

ALS Environmental

Sample QC Summary Report

Sample Name		19-21939-RC-1 RICH FEED	19-21939-RC-1 RICH FEED	19-21939-RC-1 RICH FEED	19-21939-RC-1 RICH FEED
ALS Sample ID		L2367163-1	L2367163-1	MS	MS
Matrix		Solid	Solid	Solid	Solid
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date		n/a	n/a	n/a	n/a
Date of Receipt		17-Oct-19	17-Oct-19	17-Oct-19	17-Oct-19
Multi-Metals via ICP-MS	**LOR mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**% Rec**
Solids					
Aluminum	10	228	230	354	nq
Antimony	0.4	6.87	6.67	12.8	88
Arsenic	0.4	<	<	27.8	82
Barium	1	16.1	16.5	47.1	93
Beryllium	0.5	<	<	27.5	82
Boron	10	18.5	18.6	45.8	81
Cadmium	0.1	0.139	0.129	15.5	92
Calcium	50	448	408	1170	86
Chromium	4	25.2	24.2	54.5	87
Cobalt	1	1.09	1.08	30.4	88
Copper	2.5	17.2	16.9	47.6	91
Iron	200	279	273	437	94
Lead	0.1	2.99	2.75	32.6	89
Lithium	1	<	<	5.63	87
Magnesium	15	103	99.7	253	89
Manganese	15	<	<	36.9	89
Molybdenum	1	4.40	4.20	18.8	86
Nickel	0.5	5.40	5.57	36.0	92
Phosphorus	100	137	176	874	88
Potassium	150	235	230	953	86
Selenium	2	<	<	27.5	82
Silver	0.1	0.124	0.131	14.2	84
Sodium	10	1210	1160	1880	80
Strontium	2	2.62	2.14	30.4	83
Tin	2	36.6	37.5	55.7	113
Titanium	1	4.97	4.58	36.0	93
Vanadium	1	2.03	2.06	31.5	88
Zinc	20	95.2	92.0	154	87
Sulfur	100	217	259	12900	84
Silicon	50	119	120	1480	45

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 17-OCT-19
Report Date: 31-OCT-19 13:44 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2367163
Project P.O. #: NOT SUBMITTED
Job Reference: 21939 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

L. Wrona
Lynne Wrona, M.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2367163-1 19-21939-RC-1 RICH FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.042		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057
L2367163-2 19-21939-LC-1 LEAN FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.308		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057
L2367163-3 19-21939-AC-1 ALKALINE FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	<0.010		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057
L2367163-4 19-21939-EC-1 EMULSION FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.416		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057
L2367163-5 19-21939-BDC-1 BAGHOUSE DUST Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	5.84		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057
L2367163-6 19-21939-LWC-1 LEACHATE FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	<0.010		0.010	mg/kg wwt	30-OCT-19	30-OCT-19	R4891057

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-7471A-CVAA-BU	Solid	Mercury in Solids	METHOD 7471A

Samples are digested at high temperature in an open vessel using strongly oxidizing, and acidic reagents. Mercury is reduced in the instrument, and released as a vapour. This vapour passes between a lamp and detector and the results quantified relative to calibration standards.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
BU	ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L2367163 Report Date: 31-OCT-19

Client: ORTECH Environmental
804 Southdown Road
Mississauga ON L5J 2Y4

Contact: Chris Belore

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-7471A-CVAA-BU	Solid							
Batch R4891057								
WG3206288-3 DUP		**L2367163-5**						
Mercury (Hg)		5.84	5.95		mg/kg wwt	1.9	20	30-OCT-19
WG3206288-2 LCS								
Mercury (Hg)			101.0		%		85-115	30-OCT-19
WG3206288-1 MB								
Mercury (Hg)			<0.010		mg/kg wwt		0.01	30-OCT-19
WG3206288-4 MS		**L2367163-5**						
Mercury (Hg)			N/A	MS-B	%		-	30-OCT-19

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

APPENDIX 16

Master Sample Log/Chains of Custody Forms
(7 pages)

ORTECH Environmental Sample Log
Particulate and Metals Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21939
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21939 - J2643

ORTECH Sample ID 19-21939-PM-	Sample Date	Sample Description	Hazardous Material	Sample Analysis
1		Test 1 Probe Rinse Acetone	Acetone	Particulate & Metals
2		Test 1 Probe Rinse Nitric	0.1N Nitric	Metals
3		Test 1 Filter	Particulate	Particulate & Metals
4		Test 1 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
5		Test 1 Impinger 6, 7 Solution	Acid. KMnO4	Metals
6		Test 1 Impinger 6, 7 Rinse	8N HCl	Metals
8		Test 2 Probe Rinse Acetone	Acetone	Particulate & Metals
9		Test 2 Probe Rinse Nitric	0.1N Nitric	Metals
10		Test 2 Filter	Particulate	Particulate & Metals
11		Test 2 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
12		Test 2 Impinger 6, 7 Solution	Acid. KMnO4	Metals
13		Test 2 Impinger 6, 7 Rinse	8N HCl	Metals
15		Test 3 Probe Rinse Acetone	Acetone	Particulate & Metals
16		Test 3 Probe Rinse Nitric	0.1N Nitric	Metals
17		Test 3 Filter	Particulate	Particulate & Metals
18		Test 3 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
19		Test 3 Impinger 6, 7 Solution	Acid. KMnO4	Metals
20		Test 3 Impinger 6, 7 Rinse	8N HCl	Metals
22		Blank Probe Rinse Acetone	Acetone	Particulate & Metals
23		Blank Probe Rinse Nitric	0.1N Nitric	Metals
24		Blank Filter	Particulate	Particulate & Metals
25		Blank Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
26		Blank Impinger 6, 7 Solution	Acid. KMnO4	Metals
27		Blank Impinger 6, 7 Rinse	8N HCl	Metals

Relinquished By: [signature] Date: OCT 11/19

Relinquished To: AARON BURTON Date: 11-oct-2019 9:40

ORTECH

ORTECH Environmental Sample Log
Semi-Volatile Organics Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21939
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21939 - J2643

ORTECH Sample ID 19-21939-SVOC-	Sample Date	Sample Description	Hazardous Material	Sample Analysis
1		Test 1 Probe Rinse	Hexane/Acetone	SVOC
2		Test 1 Filter	Particulate	SVOC
3		Test 1 XAD-II Trap	N.A.	SVOC
4		Test 1 Impinger Solution	Ethylene Glycol	SVOC
5		Test 1 Impinger Rinse	Hexane/Acetone	SVOC
6		Test 2 Probe Rinse	Hexane/Acetone	SVOC
7		Test 2 Filter	Particulate	SVOC
8		Test 2 XAD-II Trap	N.A.	SVOC
9		Test 2 Impinger Solution	Ethylene Glycol	SVOC
10		Test 2 Impinger Rinse	Hexane/Acetone	SVOC
11		Test 3 Probe Rinse	Hexane/Acetone	SVOC
12		Test 3 Filter	Particulate	SVOC
13		Test 3 XAD-II Trap	N.A.	SVOC
14		Test 3 Impinger Solution	Ethylene Glycol	SVOC
15		Test 3 Impinger Rinse	Hexane/Acetone	SVOC
16		Blank Probe Rinse	Hexane/Acetone	SVOC
17		Blank Filter	Particulate	SVOC
18		Blank XAD-II Trap	N.A.	SVOC
19		Blank Impinger Solution	Ethylene Glycol	SVOC
20		Blank Impinger Rinse	Hexane/Acetone	SVOC

Relinquished By: OCT 11/19 Date: [signature]

Relinquished To: AARON BURTON Date: 11-oct-2019 9:40

ORTECH Environmental Recovery & Sample Log

Method 26

Incinerator Stack

Client: Clean Harbors Sarnia
Job/Report Number: 21939
Received By:
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21939 - J2643

Test Number	ORTECH Sample ID 19-21939-M26-	Date Sampled	Contents of Impingers	Initial Volume (ml)	Final Volume (ml)	Gain (ml)	H_2O Rinse (ml)	Total Sample Volume (ml)	Analysis
1	1	OCT 8/19	0.1N H2SO4	30.0	109	79	11	120	Halides
	2	"	0.1N NaOH	15.0	15	0	10	25	Cyanide
2	3	OCT 9/19	0.1N H2SO4	30.0	110	80	10	120	Halides
	4	OCT 9/19	0.1N NaOH	15.0	14.5	-0.5	10.5	25	Cyanide
3	5	OCT 10/19	0.1N H2SO4	30.0	110	80	10	120	Halides
	6	OCT 10/19	0.1N NaOH	15.0	15.0	0.0	10	25.	Cyanide
Blank	7	OCT 9/19	0.1N H2SO4	30.0	30.0	0.0	20.0	50.0	Halides
	8	OCT 9/19	0.1N NaOH	15.0	15.0	0.0	10.0	25.0	Cyanide

Impinger 1 empty, Imp 2+3 30ml split 0.1n H2SO4, Imp 4 empty, Imp 5 15ml 0.1n NaOH, Imp 6 Si Gel

Relinquished by: [signature] Date: OCT 11/19

Relinquished to: AARON BURTON Date: 11-oct-2019 9:40

ORTECH Consulting Inc.
Project # 21939
Vost Sample List
Clean Harbors Sarnia

Test Number	ORTECH Sample ID 19-21939-VOST-	Sample Date	Sample Description	Sample Analysis
1	1A/1B	8-Oct-19	Tenax and Tenax/Charcoal (Pair 1)	Archive
1	2A/2B	8-Oct-19	Tenax and Tenax/Charcoal (Pair 2)	VOCs
1	3A/3B	8-Oct-19	Tenax and Tenax/Charcoal (Pair 3)	VOCs
1	4A/4B	8-Oct-19	Tenax and Tenax/Charcoal (Pair 4)	VOCs
1	5A/5B	8-Oct-19	Field Blank	Archive
2	6A/6B	9-Oct-19	Tenax and Tenax/Charcoal (Pair 1)	Archive
2	7A/7B	9-Oct-19	Tenax and Tenax/Charcoal (Pair 2)	VOCs
2	8A/8B	9-Oct-19	Tenax and Tenax/Charcoal (Pair 3)	VOCs
2	9A/9B	9-Oct-19	Tenax and Tenax/Charcoal (Pair 4)	VOCs
2	10A/10B	9-Oct-19	Field Blank	Archive
3	11A/11B	10-Oct-19	Tenax and Tenax/Charcoal (Pair 1)	Archive
3	12A/12B	10-Oct-19	Tenax and Tenax/Charcoal (Pair 2)	VOCs
3	13A/13B	10-Oct-19	Tenax and Tenax/Charcoal (Pair 3)	VOCs
4	14A/14B	10-Oct-19	Tenax and Tenax/Charcoal (Pair 4)	VOCs
3	15A/15B	10-Oct-19	Field Blank	VOCs
Trip Blank	16A/16B	10-Oct-19	Trip Blank	VOCs

* Archived samples to be held for future reference

Custody Relinquished by: CHRIS BELORE Date: Oct. 15, 2019

Custody Received by: Lynne Wrona Date: October 15, 2019 16:30

0.95°C

Clean Harbors Lambton
ORTECH Project # 21939
Process Samples
Sample List for Petro Labs

PO: 21939 - J2651

Test Number	Test Date	ORTECH Sample Identification	Sample Description
1	oct 8, 2019	19- 21939- FR-4	Rich Feed (250 ml bottle)
1		19- 21939- FL-4	Lean Feed (250 ml bottle)
1		19- 21939- FE-4	Emulsion Feed (250 ml bottle)
2	oct 9, 2019	19- 21939- FR-9	Rich Feed (250 ml bottle)
2		19- 21939- FL-9	Lean Feed (250 ml bottle)
2		19- 21939- FE-9	Emulsion Feed (250 ml bottle)
3	oct 10, 2019	19- 21939- FR-14	Rich Feed (250 ml bottle)
3		19- 21939- FL-14	Lean Feed (250 ml bottle)
3		19- 21939- FE-14	Emulsion Feed (250 ml bottle)

Custody Relinquished by: [signature] Date: Oct 17, 2019

Custody Received by: [signature] Date:

Clean Harbors Lambton
ORTECH Project # 21939
Process Samples
Sample List for ALS Metals Analysis

L2367163

ORTECH Sample Identification			Sample Description
19-	21939-	RC-1	Rich Feed (500 ml bottle)
19-	21939-	LC-1	Lean Feed (500 ml bottle)
19-	21939-	AC-1	Alkaline Feed (500 ml bottle)
19-	21939-	EC-1	Emulsion Feed (500 ml bottle)
19-	21939-	BDC-1	Baghouse Dust (500 ml bottle)
19-	21939-	LWC-1	Leachate Feed (500 ml bottle)

Custody Relinquished by: [signature] Date: Oct 17, 2019

Custody Received by: AARON BURTON Date: 17-oct-2019

13:35 18.5°C

ORTECH

Clean Harbors Lambton
ORTECH Project # 21939
Process Samples
Sample List for ALS DRE Analysis

L2367176

Test Number	Test Date	ORTECH Sample Identification		Sample Description
1	oct 8, 2019	19- 21939-	FR-3	Rich Feed (250 ml bottle)
1		19- 21939-	FL-3	Lean Feed (250 ml bottle)
1		19- 21939-	FE-3	Emulsion Feed (250 ml bottle)
1		19- 21939-	FA-3	Alkaline Feed (250 ml bottle)
1		19- 21939-	LW-3	Leachate Feed (250 ml bottle)
2	oct 9, 2019	19- 21939-	FR-8	Rich Feed (250 ml bottle)
2		19- 21939-	FL-8	Lean Feed (250 ml bottle)
2		19- 21939-	FE-8	Emulsion Feed (250 ml bottle)
2		19- 21939-	FA-8	Alkaline Feed (250 ml bottle)
2		19- 21939-	LW-8	Leachate Feed (250 ml bottle)
3	oct 10, 2019	19- 21939-	FR-13	Rich Feed (250 ml bottle)
3		19- 21939-	FL-13	Lean Feed (250 ml bottle)
3		19- 21939-	FE-13	Emulsion Feed (250 ml bottle)
3		19- 21939-	FA-13	Alkaline Feed (250 ml bottle)
3		19- 21939-	LW-13	Leachate Feed (250 ml bottle)

Custody Relinquished by: [signature] Date: oct 17, 2019

Custody Received by: AARON AULTON Date: 17-oct-2019

13:35

18.5°C

APPENDIX 17

Internal QA/QC Tables
(5 pages)

TABLE 1
Clean Harbors Sarnia
Equipment Calibration Details

Item	Recommended Acceptable Limits	Results	QA/QC Status
Nozzle- Metals Train	for n=4 measurements high-low <0.10 mm	average= 0.2535 inches	Acceptable
Nozzle- Semi-Volatile Organics Train	for n=4 measurements high-low <0.10 mm	average= 0.2545 inches	Acceptable
S-Type Pitot #S7A (COE20112) Metals Train	coefficient typically 0.84 ± 0.04	0.850	Acceptable
S-Type Pitot #SP4 (B04011) Semi-Volatile Organics Train	coefficient typically 0.84 ± 0.04	0.849	Acceptable
Inclined Manometer # TEAM1 (COE20094) Metals Train	percentage difference within 5%	-0.8% to 0.5%	Acceptable
Inclined Manometer # TEAM4 (COE20090) Semi-Volatile Organics Train	percentage difference within 5%	-2.2% to 3.1%	Acceptable
Thermocouples	± 1.5% over the range	± 0.80% for type "K" wire	Acceptable
Aneroid Barometer	± 0.015 in. Hg before testing	within acceptable limit	Acceptable
Acculab V-1200 Balance	± 0.1g (the readability)	< 1% for range used	Acceptable
Acculab V-6000 Balance	± 0.5g (the readability)	< 1% for range used	Acceptable
Inclined Manometer # TEAM1 (COE20094) Metals Train	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 1.018	Acceptable
Dry Gas Meter VOST2 (A10117) Acid Gases/VOST Trains	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 1.004 (2 lpm) DGMCF: 0.998 (1 lpm)	Acceptable
Inclined Manometer # TEAM4 (COE20090) Semi-Volatile Organics Train	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 1.006	Acceptable
Trendicator (COE20094)	±1.5% of actual value	-0.4% to 1.4%	Acceptable
Trendicator (COE20090)	±1.5% of actual value	0% to 1.0%	Acceptable
Trendicator (A10117) (temperature readout)	±1.5% of actual value	-0.8% to 0.5%	Acceptable
Digimatic Calipers (B03906)	Calibrated annually to manufacturers specifications		Acceptable

Note: Calibration of the thermocouples, balances and digimatic calipers are performed externally, to manufacturers specifications.

TABLE 2
Clean Harbors Sarnia
Percent Isokineticity Summary

Metals Trains

Test No.	Recommended Acceptable Limits	Average Isokineticity %	Number of Non-Isokinetic Readings	Non-Isokinetic Readings as a Percentage of the Total %	QA/QC Status
1	100 ± 10%	102.6	1	1.3	Acceptable
2	100 ± 10%	102.4	0	0	Acceptable
3	100 ± 10%	101.9	0	0	Acceptable

Semi-Volatile Organics Trains

Test No.	Recommended Acceptable Limits	Average Isokineticity %	Number of Non-Isokinetic Readings	Non-Isokinetic Readings as a Percentage of the Total %	QA/QC Status
1	100 ± 10%	101.2	0	0	Acceptable
2	100 ± 10%	102.3	1	1.3	Acceptable
3	100 ± 10%	101.7	1	1.3	Acceptable

TABLE 3
Clean Harbors Sarnia
Manual Sampling Train Leak Check Summary

Test Type	Test No.	Recommended Acceptable Limit	Traverse #1 Leak Checks Initial ft^3	Traverse #1 Leak Checks Final ft^3	Traverse #2 Leak Checks Initial ft^3	Traverse #2 Leak Checks Final ft^3	QA/QC Status
Metals Trains	1	$\leq$0.02 scfm or 4% of sampling rate, whichever is less	0.005 @ 14"Hg	0.006 @ 16"Hg	0.010 @ 16"Hg	0.008 @ 15"Hg	Acceptable
	2		0.006 @ 15"Hg	0.004 @ 14"Hg	0.004 @ 14"Hg	0.005 @ 16"Hg	Acceptable
	3		0.006 @ 16"Hg	0.004 @ 15"Hg	0.004 @ 15"Hg	0.007 @ 17"Hg	Acceptable
Semi-Volatile Organics Trains	1	$\leq$0.02 scfm or 4% of sampling rate, whichever is less	0.003 @ 12"Hg	0.010 @ 16"Hg	0.004 @ 17"Hg	0.004 @ 16"Hg	Acceptable
	2		0.007 @ 13"Hg	0.005 @ 16"Hg	0.004 @ 17"Hg	0.004 @ 19"Hg	Acceptable
	3		0.003 @ 17"Hg	0.005 @ 12"Hg	0.005 @ 10"Hg	0.005 @ 16"Hg	Acceptable

TABLE 4
Clean Harbors Sarnia
ORTECH CEM Daily Zero and Calibration Drift Summary

Test No.	Analyzer	Recommended Acceptable Limits	Zero Drift %	Calibration Drift %	QA/QC Status
1	SO_2	± 3% of span	1.00	0.20	Acceptable
	O_2	"	0.44	1.04	Acceptable
	CO_2	"	0.50	0.45	Acceptable
	CO	"	0.10	0.26	Acceptable
	NOx	"	0.31	0.96	Acceptable
	THC	"	-0.15	-1.6	Acceptable
2	SO_2	± 3% of span	1.00	0.09	Acceptable
	O_2	"	0.12	0.52	Acceptable
	CO_2	"	0.40	1.15	Acceptable
	CO	"	0.75	1.79	Acceptable
	NOx	"	0.32	1.24	Acceptable
	THC	"	0	-1.4	Acceptable
3	SO_2	± 3% of span	0.90	0.15	Acceptable
	O_2	"	0.56	0.12	Acceptable
	CO_2	"	0	0.35	Acceptable
	CO	"	0.40	2.40	Acceptable
	NOx	"	0.20	0.80	Acceptable
	THC	"	-0.6	2.8	Acceptable

TABLE 5
Clean Harbors Sarnia
ORTECH CEM Bias Check Summary

Test No.	Analyzer	Analyzer Range	Recommended Acceptable Limits	Initial System Bias Zero %	Initial System Bias Span %	Final System Bias Zero %	Final System Bias Span %	QA/QC Status
1	SO_2	1100 ppm	± 5% of span	0	-0.08	1.00	-0.28	Acceptable
	O_2	25%	"	0.92	0.24	0.48	-0.80	Acceptable
	CO_2	20%	"	0	1.25	0.50	1.70	Acceptable
	CO	100 ppm	"	0.32	0.16	0.42	0.42	Acceptable
	NOx	260 ppm	"	0	-1.00	0.31	-1.96	Acceptable
	THC	100 ppm	"	0.3	1.5	-	-	Acceptable
2	SO_2	1100 ppm	± 5% of span	-0.03	0.08	0.97	-0.01	Acceptable
	O_2	25%	"	0.88	0	0.76	-0.52	Acceptable
	CO_2	20%	"	0.10	-0.05	0.50	-1.20	Acceptable
	CO	100 ppm	"	-0.20	-0.27	0.55	1.52	Acceptable
	NOx	260 ppm	"	0	0.04	0.32	-1.20	Acceptable
	THC	100 ppm	"	0.7	0.5	-	-	Acceptable
3	SO_2	1100 ppm	± 5% of span	-0.03	-0.18	0.87	-0.03	Acceptable
	O_2	25%	"	0.76	-0.32	1.32	-0.20	Acceptable
	CO_2	20%	"	0	-0.90	0	-1.25	Acceptable
	CO	100 ppm	"	0.40	0.24	0.80	-2.16	Acceptable
	NOx	260 ppm	"	0	-0.60	0.20	0.20	Acceptable
	THC	100 ppm	"	0.3	0.5	-	-	Acceptable

APPENDIX 18

Equipment Calibration Data
(12 pages)

ORTECH Environmental
Pitot Tube Calibration

Date	February 20, 2019
Probe/Pitot ID	S7A
Mil Number	COE20112
Calibrated Against	B02911
Cp standard	0.99948
Calibration Procedure	93-T62-SP-012

Calibration Facility	ORTECH Consulting Inc.
Calibrated By	Dan Turton
Signature	
Reviewed/Accepted By	

$$Cp = Cpstd * \sqrt{\frac{Pstd}{Ps}}$$

Configuration	Wind Tunnel Velocity m/s	Velocity Head Standard Pitot in. H_2O Pstd	Velocity Head S-Type Pitot in. H_2O Ps	S-Type Pitot Coefficient Cp_s	Deviation From The Mean
With Nozzle	7.33	0.130	0.180	0.849	0.0006
(0.25")	8.86	0.190	0.265	0.846	0.0037
	11.50	0.320	0.440	0.852	0.0023
	13.79	0.460	0.640	0.847	0.0027
	15.55	0.585	0.800	0.855	0.0047
			Mean	0.850	0.0028

Without Nozzle	7.04	0.120	0.165	0.852	0.0042
	8.98	0.195	0.270	0.849	0.0012
	10.95	0.290	0.410	0.841	0.0076
	13.49	0.440	0.600	0.856	0.0078
	14.94	0.540	0.760	0.842	0.0057
			Mean	0.848	0.0053

Note: Pitots must always be used in the orientation that they are calibrated in (marked F for front and B for back).

Acceptance Criteria:
The Cp of Standard Pitots must be in the range of 0.99 ±0.01.
For Stausscheibe (S-Type) Pitots refer to the measurement criteria as specified in Method 2 of the Ontario Source Testing Code. If the pitot meets these measurement requirements it is assigned a Cp of 0.84. Otherwise, calculate the absolute differences between the average pitot tube coefficient and the coefficient obtained for each of the wind tunnel settings. The average of these differences must not exceed 0.01. Otherwise, the calibration must be repeated. (Environment Canada Reference Method EPS 1/RM/8, Section 6).

ORTECH Environmental
Pitot Tube Calibration

Date	February 21, 2019
Probe/Pitot ID	SP4
MII Number	B04011
Calibrated Against	B02911
Cp standard	0.99948
Calibration Procedure	93-T62-SP-012

Calibration Facility	ORTECH Consulting Inc.
Calibrated By	Dan Turton
Signature	
Reviewed/Accepted By	

$$Cp = Cpstd \ * \sqrt{\frac{Pstd}{Ps}}$$

Configuration	Wind Tunnel Velocity m/s	Velocity Head Standard Pitot in. H_2O Pstd	Velocity Head S-Type Pitot in. H_2O Ps	S-Type Pitot Coefficient Cp_s	Deviation From The Mean
With Nozzle	7.33	0.130	0.180	0.849	0.0008
(0.25")	9.09	0.200	0.280	0.845	0.0039
	11.32	0.310	0.430	0.849	0.0000
	13.79	0.460	0.640	0.847	0.0013
	15.62	0.590	0.810	0.853	0.0044
			Mean	0.849	0.0021
Without Nozzle	7.33	0.130	0.180	0.849	0.0009
	9.43	0.215	0.300	0.846	0.0023
	11.68	0.330	0.455	0.851	0.0027
	13.94	0.470	0.650	0.850	0.0014
	16.14	0.630	0.880	0.846	0.0028
			Mean	0.848	0.0020

Note: Pitots must always be used in the orientation that they are calibrated in (marked F for front and B for back).

Acceptance Criteria:
The Cp of Standard Pitots must be in the range of 0.99 ±0.01.
For Stausscheibe (S-Type) Pitots refer to the measurement criteria as specified in Method 2 of the Ontario Source Testing Code. If the pitot meets these measurement requirements it is assigned a Cp of 0.84. Otherwise, calculate the absolute differences between the average pitot tube coefficient and the coefficient obtained for each of the wind tunnel settings. The average of these differences must not exceed 0.01. Otherwise, the calibration must be repeated. (Environment Canada Reference Method EPS 1/RM/8, Section 6).

ORTECH Environmental
Dry Gas Meter Calibration Data

Calibration Procedure	03 - J004
Meter Number	Team 1
Date	August 12, 2019
Barometric Pressure	29.71
System Leak Check	< .001 cfm @ 25.5 "Hg

MII NUMBERS	
DGM	COE 20094
Gasometer	A01463
Barometer	COE 20028

Calibrated By	JB
Signature	
Reviewed and Accepted By	

$ft^3 =$ cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ {}^oF+460}{Tstd\ {}^oF+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

Make sure to inspect pump before each calibration

Gasometer Reading cm			Gasometer Volume	Gasometer Temperature	DGM Reading ft^3		DGM Volume	DGM Average Temperature	DGM Pressure	DGM Outlet	DGM Calibration Factor	Time
Initial	Final	cm	ft^3	°C	Initial	Final	ft^3	°F	in. H_2O	°F		min.
69.90	4.70	65.20	3.067	23.5	372.649	375.652	3.003	73	0.8	72	1.017	6
70.60	5.60	65.00	3.058	23.5	375.652	378.644	2.992	74	0.8	73	1.019	6
71.00	6.20	64.80	3.048	23.0	378.644	381.629	2.985	74.5	0.8	73	1.021	6
71.00	6.40	64.60	3.039	23.0	381.629	384.604	2.975	74.5	1.95	73	1.019	4
70.50	4.80	65.70	3.090	23.0	384.604	387.645	3.041	74.5	1.95	73	1.013	4
70.20	5.60	64.60	3.039	23.0	387.645	390.624	2.979	75	1.95	74	1.018	4
70.30	5.40	64.90	3.053	23.0	390.624	393.613	2.989	75	3.45	74	1.016	3
70.20	5.40	64.80	3.048	23.0	396.626	399.601	2.975	75.5	3.45	74	1.020	3
70.60	5.80	64.80	3.048	23.0	399.601	402.586	2.985	75.5	3.45	74	1.016	3

DGMCF AVERAGE: 1.018

BEFORE: 1.001

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05, otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

ORTECH Environmental
Manometer Calibration Data

Date	August 12, 2019	Calibrated By	JB
Manometer Number	Team 1	Signature	
Manometer MII Number	COE 20094	Reviewed/Accepted By	
Calibrated Against	Omega HHP		
MII Number	B02679		
Calibration Procedure	03 - J010		

Back Leg

Manometer Scale $''H_20$	Manometer Reading $''H_2O$		Reference Manometer Reading $''H_2O$	Percent Difference %
	Before Adjustment	After Adjustment		
	0.210		0.209	-0.5
0-1.0	0.430		0.432	0.5
	0.830		0.829	-0.1
	2.10		2.09	-0.5
1.0-10.0	5.10		5.06	-0.8
	9.30		9.26	-0.4

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer - Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

Acceptance Criteria:
The manometer being calibrated must be within ± 5.0% of the Standard value at each reading. Otherwise, the manometer must be repaired and/or adjusted as necessary and recalibrated prior to use. Manometers must be capable of measuring velocity pressure to within 0.005 $''H_2O$ on the 0 to 1 inch scale, and 0.05 $''H_2O$ on the 1 to 10 inch scales.
(Environment Canada Reference Method 1/RM/8, Section 2)

ORTECH Environmental
Trendicator Calibration

Calibration Procedure	03 - J005
Trendicator Type	Team 1
MII	COE 20094
Date	August 12, 2019
Calibrated By	JB
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°F)	Tredicator Display Value		Percent Difference
	Before Adjustment (°F)	After Adjustment (°F)	(%)
32	32		0.0
70	69		1.4
100	99		1.0
200	200		0.0
250	251		-0.4
300	301		-0.3
400	400		0.0
500	500		0.0
600	600		0.0
700	700		0.0
800	800		0.0
900	900		0.0
1000	1000		0.0
1100	1100		0.0
1200	1201		-0.1
1250	1250		0.0

$$\% \text{ Difference} = \frac{\text{(micromite - after adjustment reading)}}{\text{micromite}} \times 100$$

Acceptance Criteria:
'Trendicator display must read within ± 1.5%, and ± 3 degrees F of the micromite value at each output. O the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use.
(MOE Source Testing Code, Version #2, Method 5)

ORTECH Environmental
Dry Gas Meter Calibration Data

Calibration Procedure	03 - J004
Meter Number	Team 4
Date	August 9, 2019
Barometric Pressure	29.47
System Leak Check	< 0.001 cfm @ 26 "Hg

MII NUMBERS	
DGM	COE 20090
Gasometer	A01463
Barometer	COE20028

Calibrated By	JB
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \cdot \frac{Tdgm\ ^{\circ}F+460}{Tstd\ ^{\circ}F+460} \cdot \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg + DGMPressure/13.6)}$$

Make sure to inspect pump before each calibration

Gasometer Reading cm			Gasometer Volume	Gasometer Temperature	DGM Reading ft^3		DGM Volume	DGM Average Temperature	DGM Pressure	DGM Outlet	DGM Calibration	Time
Initial	Final	cm	ft^3	°C	Initial	Final	ft^3	°F	in. H_2O	°F	Factor	min.
71.00	8.00	63.00	2.963	22.5	145.636	148.600	2.964	74	0.76	72	1.001	6
70.60	7.30	63.30	2.978	22.5	148.600	151.565	2.965	73	0.76	72	1.003	6
70.80	7.90	62.90	2.959	22.5	151.565	154.529	2.964	74.5	0.76	73	1.000	6
70.90	8.20	62.70	2.949	22.5	154.529	157.462	2.933	75	1.8	73	1.006	4
71.10	8.50	62.60	2.945	22.5	157.462	160.387	2.925	76	1.8	73	1.009	4
70.10	7.80	62.30	2.931	22.5	160.387	163.325	2.938	77	1.8	74	1.001	4
70.80	5.40	65.40	3.076	22.5	163.325	166.366	3.041	77.5	3.4	74	1.013	3
70.80	5.90	64.90	3.053	22.5	166.366	169.387	3.021	78	3.4	74	1.012	3
71.00	6.00	65.00	3.058	22.5	169.387	172.414	3.027	78	3.4	74	1.012	3

DGMCF AVERAGE: 1.006

BEFORE: 0.999

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05, otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

ORTECH Environmental
Manometer Calibration Data

Date	August 9, 2019	Calibrated By	JB
Manometer Number	Team 4	Signature	
Manometer MII Number	COE 20090	Reviewed/Accepted By	
Calibrated Against	Omega HHP		
MII Number	B02679		
Calibration Procedure	03 - J010		

Front Leg

Manometer Scale $"H_20$	Manometer Reading $"H_2O$ Before Adjustment	After Adjustment	Reference Manometer Reading $"H_2O$	Percent Difference %
	0.250		0.258	3.1
0-1.0	0.410		0.401	-2.2
	0.800		0.787	-1.7
	1.60		1.640	2.4
1.0-10.0	5.80		5.840	0.7
	9.10		9.190	1.0

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer - Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

Acceptance Criteria:
The manometer being calibrated must be within ± 5.0% of the Standard value at each reading. Otherwise, the manometer must be repaired and/or adjusted as necessary and recalibrated prior to use. Manometers must be capable of measuring velocity pressure to within 0.005 $"H_2O$ on the 0 to 1 inch scale, and 0.05 $"H_2O$ on the 1 to 10 inch scales.
(Environment Canada Reference Method 1/RM/8, Section 2)

ORTECH Environmental
Trendicator Calibration

Calibration Procedure	03 - J005
Trendicator Type	Omega DP 116
MII	COE 20090
Date	August 9, 2019
Calibrated By	JB
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°F)	Tredicator Display Value		Percent Difference
	Before Adjustment (°F)	After Adjustment (°F)	(%)
32	32		0.0
70	70		0.0
100	99		1.0
200	200		0.0
250	250		0.0
300	300		0.0
400	399		0.3
500	498		0.4
600	599		0.2
700	700		0.0
800	800		0.0
900	900		0.0
1000	1000		0.0
1100	1100		0.0
1200	1200		0.0
1250	1250		0.0

$$\% \text{ Difference} = \frac{\text{(micromite - after adjustment reading)}}{\text{micromite}} \times 100$$

Acceptance Criteria:
'Trendicator display must read within ± 1.5%, and ± 3 degrees F of the micromite value at each output. Oth
the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use.
(MOE Source Testing Code, Version #2, Method 5)

ORTECH Environmental

Dry Gas Meter Calibration Data

Calibration Procedure	03-J004
Meter Number	Vost 2
Date	September 27, 2019
Barometric Pressure	29.56
System Leak Check	No Discernible Leak

MII NUMBERS	
DGM	A10117
Gasometer	A01463
Barometer	COE20028

Calibrated By	D Turton
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ {}^\circ F+460}{Tstd\ {}^\circ F+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

Gasometer Reading cm			Gasometer Volume	Gasometer Temperature	DGM Reading L		DGM Volume	DGM Average Temperature	DGM Pressure	DGM Outlet	DGM Calibration	Time	Flow Rate
Initial	Final	cm	ft^3	°C	Initial	Final	ft^3	°C	in. H_2O	°C	Factor	min.	lpm
67.70	35.00	32.70	1.538	21.5	88.320	131.820	1.536	27.0	6.5	27.0	1.004	20	2.2
68.60	35.90	32.70	1.538	21.5	31.820	75.490	1.542	28.0	6.5	28.0	1.003	20	2.2
67.60	34.90	32.70	1.538	21.5	75.490	119.250	1.545	29.0	6.5	29.0	1.004	20	2.2
68.55	52.90	15.65	0.736	22.0	83.920	105.320	0.756	29.0	2.4	29.0	0.991	20	1.1
53.60	37.95	15.65	0.736	22.0	41.250	62.570	0.753	29.0	2.4	29.0	0.995	20	1.1
37.95	22.10	15.85	0.746	22.0	62.570	83.920	0.754	29.0	2.4	29.0	1.006	20	1.1

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05,
otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

DGMCF AVERAGE	
2 Lpm	1.004
1Lpm	0.998

ORTECH Environmental
Trendicator Calibration

Calibration Procedure	03-J005
Trendicator Type	Nutech
MII	A10117
Date	September 27, 2019
Calibrated By	D Turton
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°C)	Tredicator Display Value		Percent Difference
	Before Adjustment (°C)	After Adjustment (°C)	(%)
0	0	NA	0.0
10	10		0.0
20	20		0.0
50	50		0.0
75	75		0.0
100	100		0.0
125	126		-0.8
150	150		0.0
200	200		0.0
300	299		0.3
400	398		0.5
500	498		0.4
600	598		0.3

$$\% \text{ Difference} = \frac{\text{(micromite - after adjustment reading)}}{\text{micromite}} \times 100$$

Acceptance Criteria:
Trendicator display must read within ± 1.5% of the micromite value at each output. Otherwise, the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use. (MOE Source Testing Code, Version #2, Method 5)

TRANSCAT CANADA
Trust in every measure

CERTIFICATE OF CALIBRATION

Customer: ORTECH ENVIRONMENTAL
804 SOUTHDOWN ROAD
MISSISSAUGA, ON L5J 2Y4

PO Number: 20000-J2318

Certificate/SO Number: 9-8389A-60-1 Revision 0

Manufacturer: Mitutoyo
Model Number: 500-196
Description: Digital Caliper
Serial Number: 0140143
ID: B03906

As-Found: In Tolerance
As-Left: In Tolerance

Calibration Date: Jan 12, 2017
Due Date: Jan 12, 2018

Calibrated To: Manufacturer Specification
Calibration Procedure: 1-AC12178-5

The Calibration Services are performed in compliance with the Lab Quality System and adheres to ANSI/ISO/ASQ 9001:2008. The instruments serviced are calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other recognized national metrology institutes (NMIs) and/or natural physical constants or by comparison to consensus standards. All calibrations have been performed using processes having a TAR of 4:1 or better, unless otherwise noted in the Calibration Measurement Data. Calibrations at TAR thresholds of 4:1 or better provide reasonable confidence that the instrument is within the stated tolerances. Out of tolerance data points are marked with an asterisk (*).

As Found/As Left Data

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	OOT	TAR
Function Check							
Parallelism Check			P	P	P		
Length Measure							
Scale Linearity	0.0000in	±(0.001 in)	-0.0010	0.0010	0.0000 in		
	1.5000in	±(0.001 in)	1.4990	1.5010	1.5000 in		
	3.0000in	±(0.001 in)	2.9990	3.0010	3.0000 in		
	4.5000in	±(0.001 in)	4.4990	4.5010	4.5000 in		
	6.0000in	±(0.001 in)	5.9990	6.0010	6.0000 in		
Length Measure I.D.	1.0000in	±(0.001 in)	0.9990	1.0010	1.0010 in		
Length Measure Depth	1.0000in	±(0.001 in)	0.9990	1.0010	1.0000 in		
Length Measure Step	1.0000in	±(0.001 in)	0.9990	1.0010	1.0000 in		
Function Check							
Inch to mm conversion			P	P	P		

Traceable Standards

Asset	Manufacturer	Model Number	Description	Cal Date	Due Date	Traceability Number
M004	Coventry Gauge Ltd	C-84	Gage Block Set, 84 pcs.	26-Aug-16	26-Aug-17	9-&M004-4-1
M457	Starrett Tru-Stone Tech. Div.	80942	Granite Surface Plate	28-Dec-16	31-Dec-17	9-&M457-5-1

Date Received: January 09, 2017
Service Level : R5

Customer Number: 9-321995-000

CERTIFICATE OF CALIBRATION

TRANSCAT CANADA
Trust in every measure

Customer: ORTECH ENVIRONMENTAL
804 SOUTHDOWN ROAD
MISSISSAUGA, ON L5J 2Y4

PO Number: 20000-J2318

Certificate/SO Number: 9-8389A-60-1 Revision 0

Environmental Data

Temperature	Relative Humidity	Temp / RH Asset
68.60°F /20.33°C	35.40%	LEM-O003

Calibrated At:
916 Gateway
Burlington, ON L7L 5K7

Facility Responsible:
916 Gateway
Burlington, ON L7L 5K7
800-828-1470

Calibrated By:
Digitally Signed On January 12, 2017
By Steve Snelling

Steve Snelling
Calibration Technician

Reviewed By:
Digitally Signed On January 12, 2017
By Robert Whittaker

Robert Whittaker
Lab Manager

Unit Barcode: 471A0022134

Date Received: January 09, 2017
Service Level : R5

Customer Number: 9-321995-000

ORTECH
a Kontrol Energy Company

APPENDIX 19

Pre-Test Plan Acceptance Letter
(4 pages)

Ministry of the Environment, Conservation and Parks
Technical Assessment and Standards Development Branch
40 St. Clair Avenue West
7th Floor
Toronto ON M4V 1M2
Phone: 416.327.5519
Fax: 416.327.2936

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Direction des évaluations techniques et de l'élaboration des normes
40, avenue St. Clair Ouest
7e étage
Toronto (Ontario) M4V 1M2
Tél: 416.327.5519
Téléc: 416.327.2936

Ontario

Via email: cbelore@ortech.ca
TSS File No.: SR:SA:109778:19

2019/07/04

Mr. Chris Belore
ORTECH Consulting Inc.
804 Southdown Rd.
Mississauga, ON
L5J 2Y4

Re.: Pre-test Plan for source testing to be conducted at Clean Harbors Canada Inc. Environmental Compliance Approval No. 6547-5G5MSP.

Dear Mr. Belore:

We received your letter, dated 2019/07/04, prepared and submitted on behalf of Clean Harbors Canada Inc. (Corunna facility), and referring to the annual source testing to be conducted at Clean Harbors' liquid waste incinerator (ORTECH Project # 21939).

The testing is required under Condition 2 of the Environmental Compliance Approval No. 6547-5G5MSP, issued on 2003/01/24.

Your letter indicates your intention at using the 2015 pre-test plan (dated 2015/06/17), approved by this section (on 2015/07/07), for the 2019 source testing program.

***Target contaminants*:**

- Total Suspended Particulate Matter (TSP),
- Metals (31 selected metals),
- Semivolatile Organic Compounds (17 dioxins and furans isomers, 12 dioxin-like PCBs, 40 selected PAHs, 11 chlorobenzenes, 16 chlorophenols, di to penta Polychorinated biphenyls congener groups),

- Other Semivolatile Organic Compounds (heptachlor, chlorodane, hexachlorophene, toxaphene, tributyltin),
- Volatile Organic Compounds (29 selected VOCs),
- Halides (HF, HCl, HBr, HI),
- Nitrogen oxides (NOX),
- Sulphur dioxide (SO_2),
- Cyanide,
- Combustion gases (oxygen, CO, and CO_2), and
- Total organic matter (THC).

***Reference methods*:**

- TSP: OSTC Method ON-5,
- Metals: US EPA 40CFR60 Method 29.
- SVOCs: Environment Canada's Report EPS 1/RM/2,
- VOCs: US EPA SW-846 Method 0030,
- Halides: US EPA 40CFR60 Method 26,
- Cyanide: Modified US EPA 40CFR60 Method 26,
- NOx: US EPA 40CFR60 Method 7E,
- SO_2: US EPA 40CFR60 Method 6C,
- O_2/CO_2: US EPA 40CFR60 Method 3A,
- CO: US EPA 40CFR60 Method 10,
- THC: US EPA 40CFR60 Method 25A, and
- Stack Gas Parameters: Ontario Source Testing Code (OSTC) Method ON-1 to ON-4.

Comments: *TSP and metals will be sampled together using a modified Method 5 sampling train.*

TSP an metals sampling will be referenced primarily to the US EPA 40CFR60 Method 29; but if conflicting requirements occur, the OSTC Method ON-5's TSP requirements take precedence.

***Operating Conditions during the source testing program*:**

During the source testing program, Clean Harbors is targeting a waste processing rate of 245 lpm of all combined feed waste streams (i.e., rich, lean and emulsion).

Clean Harbors will ensure there is a consistent composition and injection rates for all the waste streams during testing. An optimal batch mixture will be created for the stack testing, the composition of which will depend on the waste available at the time of testing.

***Process Parameters to be monitored and reported during the source testing program*:**

Clean Harbors' personnel will be responsible for the monitoring, collection, compilation and reporting of pertinent process data during the test program, to:

- Establish waste combustion rate levels; and
- Correlate the emission results with the incinerator's waste combustion rate levels (emissions generator).

Clean Harbors will gather/compile the process data for each day of source testing and ORTECH will append it to the source testing report. The process parameters to be monitored and recorded include:

- Waste feed rates to incinerator (rich, emulsion, lean, alkaline, leachate streams)
- Volumetric flows (TDU, secondary air, and stack exhaust gases)
- Temperatures (primary and secondary combustion chambers, spray dryer – inlet/outlet, stack)
- Pressures (burner, spray dryer outlet, baghouse differential pressure)
- Clean Harbors CEMS data during the source testing program (CO, HCl, CO_2, H_2O, THC, O_2, SO_2, and opacity).

Liquid waste (rich, lean, alkaline and emulsion) samples will be collected by Clean Harbors personnel, based on US EPA Method S004 (Tap) in SW-846, 3rd Edition. A sample will be collected every thirty minutes during each of the three (3) stack test-runs and placed in a large chilled container for compositing. Clean Harbors personnel will also collect a sample of baghouse dust every thirty minutes for each of the stack test-runs.

Four composite sub-samples will be prepared, one sample for Clean Harbors, one sample as a spare and two samples will be retained by ORTECH.

For each of the stack test-runs, a set of liquid waste composite sub-samples will be analysed for metals, dioxins and furans, polychlorinated biphenyls, select volatile organic compounds, and an elemental analysis will be done. A composite sub-sample of the baghouse dust collected during the three tests will be analyzed for metals.

We do not have any objection with your intention at using the 2015 pre-test plan (dated 2015/06/17) approved by this section (on 2015/07/07) for the 2018 source testing program.

The 2015 pre-test plan is acceptable, based on the proposed reference methodologies, sampling strategies, and process data monitoring/collection.

Note that in the last four years a comparison of the emission data generated by Clean Harbors has been done against the data generated by ORTECH analyzers or source testing.

This year we require a relative accuracy certification of Clean Harbors CEMS. To accomplish this certification, there are two approaches available. The first approach is to use Environment Canada's Report EPS 1/PG/7 Relative Accuracy certification procedures. The second approach is to use the source testing results and compare to the data monitored by Clean Harbors CEMS, using identical timeframe.

If the second approach is desired, the source testing data will consist of six data sets representing the elapsed time of the half test-runs of the isokinetic sampling trains, when certifying CO_2, CO, O_2 SO_2, and THC analyzers; and three sets of data representing the elapse time of HCl and isokinetic sampling times full test-runs (as it applies), when certifying the HCl and moisture analyzers.

The Relative Accuracy certification is required to document the quality of the data being generated by Clean Harbors CEMS; when traced back to validated reference methods.

We noted the source testing program schedule for the week of 2019/10/07, with actual testing starting on Tuesday (2019/10/08) and extending for three consecutive days. If changes in the sampling schedule occur, please notify both the MECP's Sarnia District Office, and the Technology Standards Section.

Just a reminder that the source testing report is required to be submitted only in electronic format to the Technology Standards Section; and in electronic and hardcopy formats to the MECP's Sarnia District Office.

If you have any questions with regard to this assessment, I can be reached by phone at 416-994-5449, or by email at guillermo.azocar@ontario.ca.

Sincerely yours,

G Azocar

____

Guillermo Azocar
Source Assessment Specialist
Technology Standards Section

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File AQ-02 (Clean Harbors Canada Inc. - Corunna)

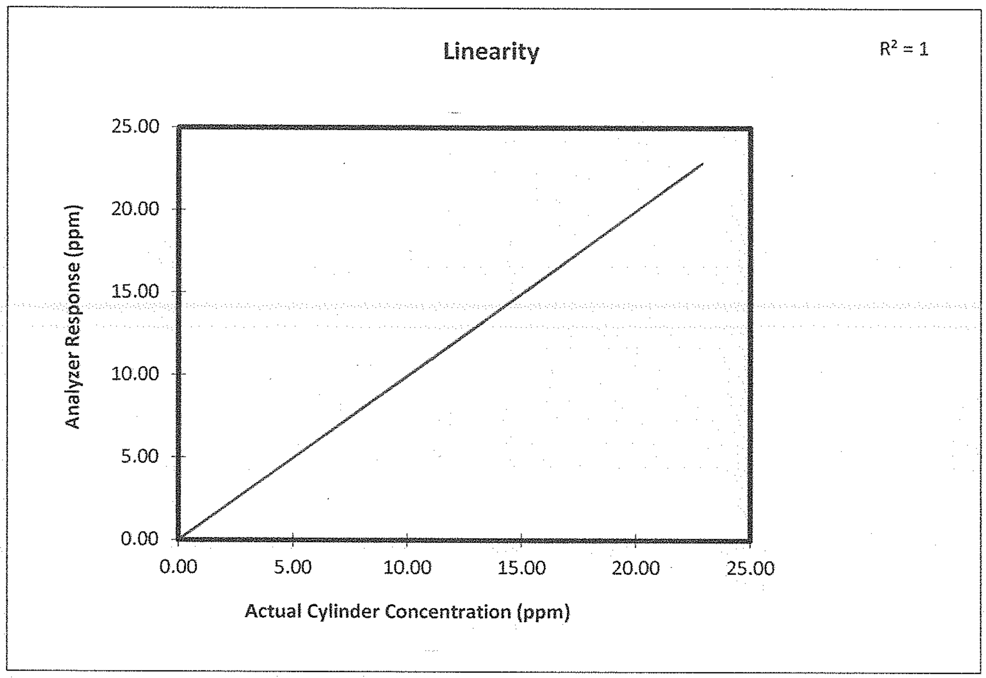
(Doc.Mgmt.5AC070076)

APPENDIX 20

ORTECH CEM Linearity Check Data
(6 pages)

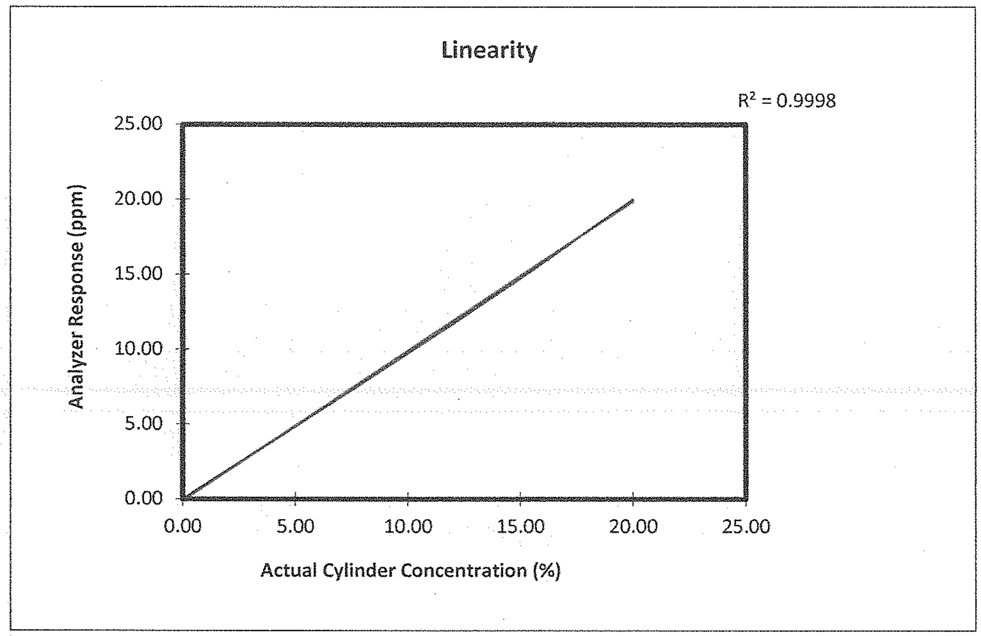
Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Oxygen Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
25	COE 20060	0.00	0.01	0.0
		12.51	12.44	-0.3
		22.90	22.85	-0.2



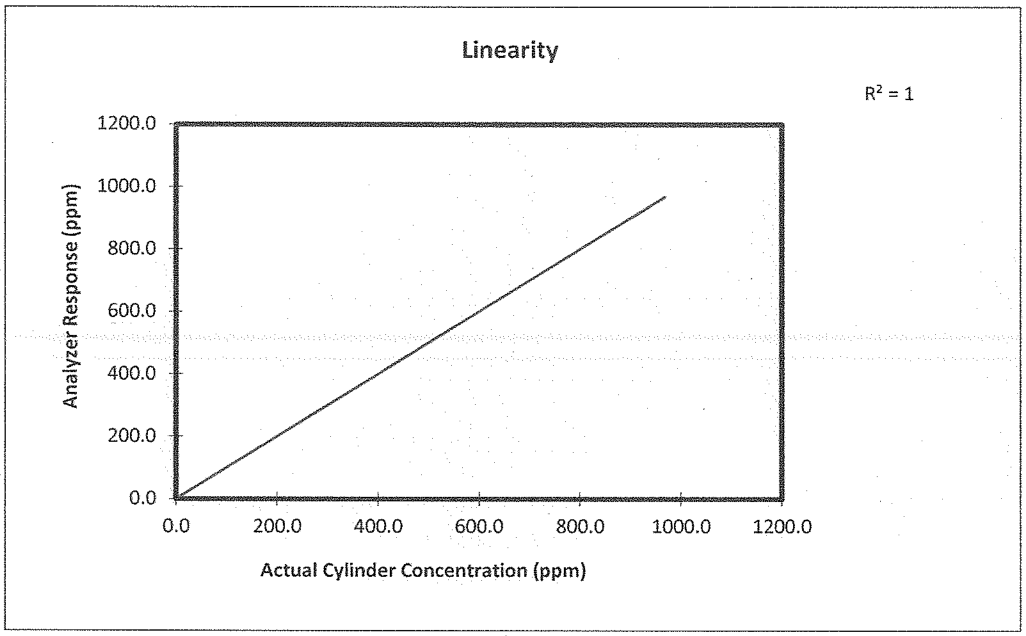
Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Carbon Dioxide Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
20	COE 20060	0.00	0.00	0.0
		12.48	12.21	-1.4
		20.00	19.99	-0.1



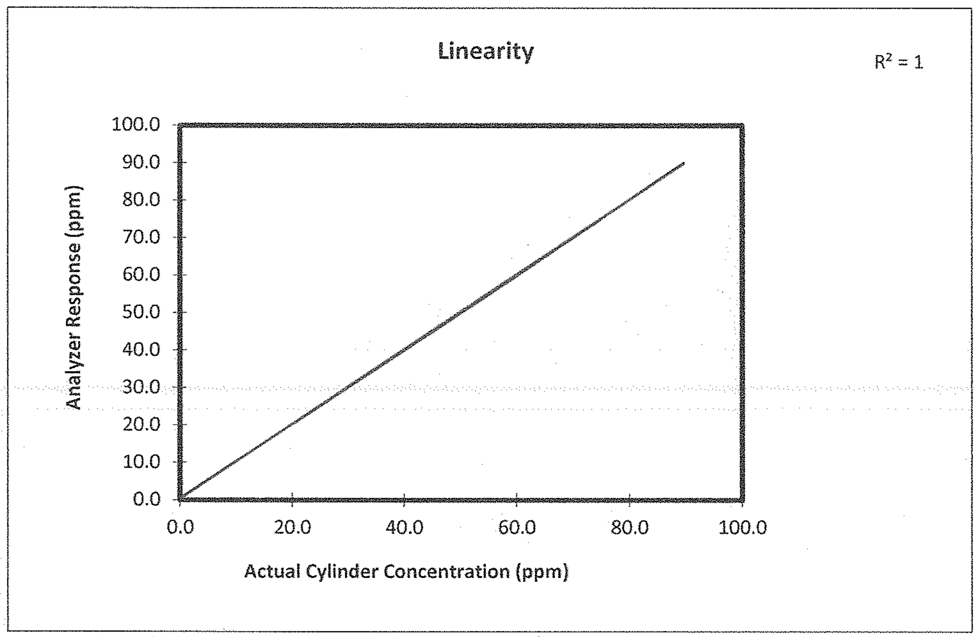
Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Sulphur Dioxide Analyzer
Teledyne API T100H

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
1100	COE 20099	0.0	0.0	0.0
		460.6	462.0	0.1
		968.0	968.0	0.0



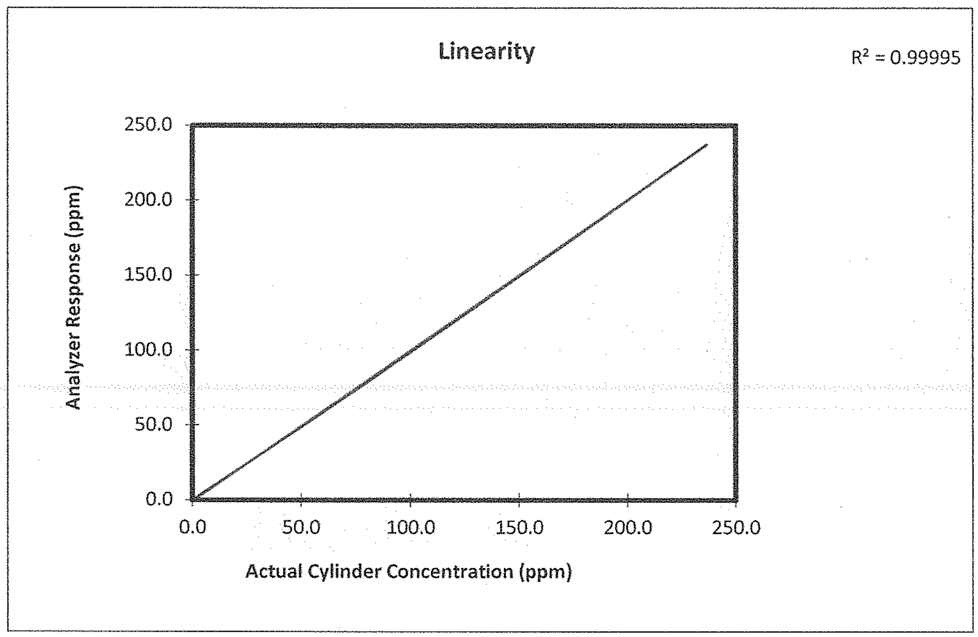
Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Carbon Monoxide Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
100	COE 20101	0.0	0.5	0.5
		52.1	52.0	-0.1
		89.6	90.0	0.4



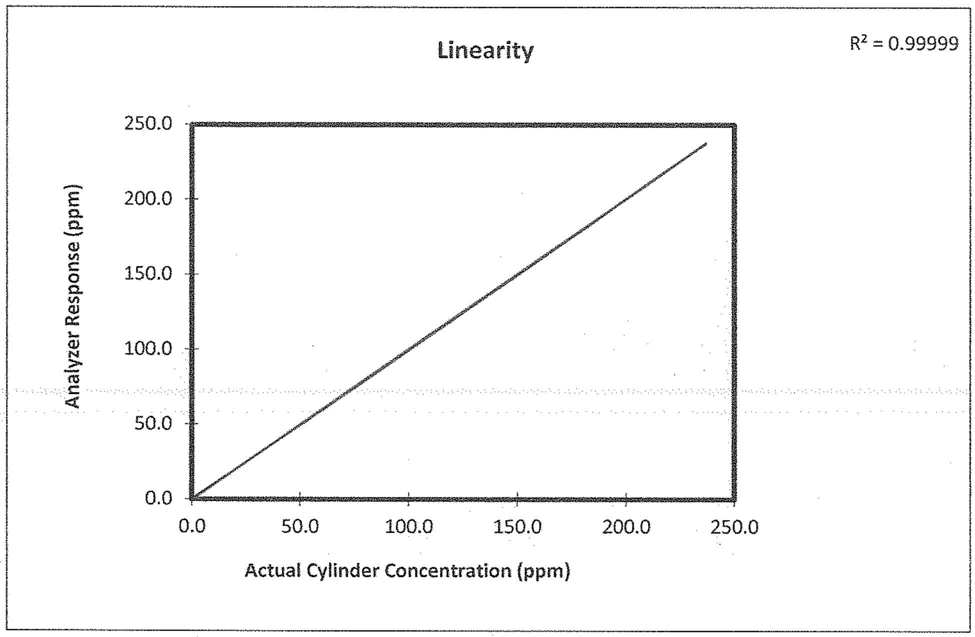
Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Nitric Oxide Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
260	COE 20061	0.0	0.0	0.0
		91.0	89.8	-0.5
		236.7	237.3	0.2



Clean Harbors
October 8, 2019
Analyzer Linearity Determination
Nitrogen Oxides Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
260	COE 20061	0.0	0.0	0.0
		91.0	90.7	-0.1
		236.7	237.7	0.4



APPENDIX 21

ORTECH CEM Calibration Data
(12 pages)

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21939
08-Oct-19
Test 1 Final Calculations (Stack)

Analyzer		O2	CO2	SO2	CO	NO	NOx
MII Number/Serial Number		COE 20060	COE 20060	COE 20099	COE 20101	COE 20061	
Model		Siemens Ultramat 23	Siemens Ultramat 23	Teledyne API T100H	Siemens Ultramat 23	Teledyne 200EH	
Range		25	20	1100	100	260	260
Actual Cylinder Value	High	22.90	20.00	968	89.6	236.7	236.7
	Mid.	12.51	12.48	460.6	52.07	91	91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.01	0.00	0	0.5	0.0	0.0
	Mid	12.44	12.21	462	52.0	89.8	90.7
	High	22.85	19.99	968	90.0	237.3	237.7
System Initial Calibration	Zero	0.24	0.00	0	0.8	0.1	0.0
	Upscale	12.50	12.46	461.1	52.1	91.5	91.7
System Final Calibration	Zero	0.13	0.10	1	0.9	0.7	0.8
	Upscale	12.24	12.55	458.9	52.4	89.1	89.2

Calibration Error Results

Analyzer Calibration Error = (Measured Concentration of Cal Gas in Direct Mode - Manufacturer Certified Cal Gas Concentration)/Analyzer Range)*100

			O2	CO2	SO2	CO	NO	NOx
	Analyzer		O2	CO2	SO2	CO	NO	NOx
	Analyzer Span Range		25.00	20.00	1100	100	260	260
Calibration Error	Zero	%	0.04	0.00	0.00	0.48	0.00	0.00
	Mid	%	0.28	1.35	0.13	0.10	0.46	0.12
	High	%	0.20	0.05	0.00	0.40	0.23	0.38
Acceptable Limits	of Span		+-2%	+-2%	+-2%	+-2%	+-2%	+-2%
Error Results			PASS	PASS	PASS	PASS	PASS	PASS

System Drift

Drift Calculation = | System Bias $_{final}$ - System Bias $_{initial}$ |

		O2	CO2	SO2	CO	NO	NOx
	Analyzer	O2	CO2	SO2	CO	NO	NOx
	Span	25.00	20.00	1100	100	260	260
Initial System Bias	Zero	0.92	0.00	0.00	0.32	0.04	0.00
	Upscale	0.24	1.25	-0.08	0.2	0.7	-1.0
Final System Bias	Zero	0.48	0.50	1.00	0.4	0.3	0.3
	Upscale	-0.80	1.70	-0.28	0.4	-0.3	-2.0
System Zero Drift	%	0.44	0.50	1.00	0.10	0.23	0.31
System Cal Drift	%	1.04	0.45	0.20	0.26	0.92	0.96
Acceptable Limits	of Span	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %
Drift Result		PASS	PASS	PASS	PASS	PASS	PASS

System Calibration Bias

System Bias Calculation = ((Measured Concentration of Cal Gas in System Calibration Mode - Measured Concentration of Cal Gas in Direct Mode)/Analyzer Range))* 100

Analyzer			O2	CO2	SO2	CO	NO	Nox
Analyzer Full Scale Span			25	20	1100	100	260	260
Analyzer Initial	Zero		0.01	0.00	0.00	0.5	0.0	0.0
	Upscale		12.44	12.21	462.00	52.0	89.8	94.3
System Initial	Zero		0.24	0.00	0.00	0.8	0.1	0.0
	Upscale		12.50	12.46	461.10	52.1	91.5	91.7
Analyzer Final	Zero		0.00	0.00	0.00	0.0	0.0	0.0
	Upscale		0.00	0.00	0.00	0.0	0.0	0.0
System Final	Zero		0.13	0.10	1.00	0.9	0.7	0.8
	Upscale		12.24	12.55	458.90	52.4	89.1	89.2
Initial System Bias	Zero	%	0.92	0.00	0.00	0.32	0.04	0.00
	Upscale	%	0.24	1.25	-0.08	0.16	0.65	-1.00
Final System Bias	Zero	%	0.48	0.50	1.00	0.42	0.27	0.31
	Upscale	%	-0.80	1.70	-0.28	0.42	-0.27	-1.96
Acceptable Limits	of Span		+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %
Bias Results			PASS	PASS	PASS	PASS	PASS	PASS

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21939
October 9, 2019
Test 2 Final Calculations (Stack)

Analyzer		O2	CO2	SO2	CO	NO	NOx
MII Number/Serial Number		COE 20060	COE 20060	COE 20099	COE 20101	COE 20061	
Model		Siemens Ultramat 23	Siemens Ultramat 23	Teledyne API T100H	Siemens Ultramat 23	Teledyne 200EH	
Range		25	20	1000	100	250	250
Actual Cylinder Value	High	22.90	20.00	968	89.6	236.7	236.7
	Mid.	12.51	12.48	460.6	52.07	91	91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.01	0.00	0.3	0.3	0.0	0.0
	Mid	12.55	12.50	460.8	52.3	91.1	91.3
	High	22.88	19.99	968	90.0	237.1	237.7
System Initial Calibration	Zero	0.23	0.02	0	0.1	0.1	0.0
	Upscale	12.55	12.49	461.6	52.0	91.3	91.4
System Final Calibration	Zero	0.20	0.10	1	0.8	0.7	0.8
	Upscale	12.42	12.26	460.7	53.8	88.1	88.3

Calibration Error Results

Analyzer Calibration Error = (Measured Concentration of Cal Gas in Direct Mode - Manufacturer Certified Cal Gas Concentration)/Analyzer Range)*100

	Analyzer		O2	CO2	SO2	CO	NO	NOx
Analyzer Span Range			25.00	20.00	1000	100	250	250
Calibration Error	Zero	%	0.04	0.00	0.03	0.25	0.00	0.00
	Mid	%	0.16	0.10	0.02	0.20	0.04	0.12
	High	%	0.08	0.05	0.00	0.40	0.16	0.40
Acceptable Limits	of Span		+-2%	+-2%	+-2%	+-2%	+-2%	+-2%
Error Results			PASS	PASS	PASS	PASS	PASS	PASS

System Drift

Drift Calculation = | System Bias $_{final}$ - System Bias $_{initial}$ |

	Analyzer	O2	CO2	SO2	CO	NO	NOx
	Span	25.00	20.00	1000	100	250	250
Initial System Bias	Zero	0.88	0.10	-0.03	-0.20	0.04	0.00
	Upscale	0.00	-0.05	0.08	-0.3	0.1	0.0
Final System Bias	Zero	0.76	0.50	0.97	0.6	0.3	0.3
	Upscale	-0.52	-1.20	-0.01	1.5	-1.2	-1.2
System Zero Drift	%	0.12	0.40	1.00	0.75	0.24	0.32
System Cal Drift	%	0.52	1.15	0.09	1.79	1.28	1.24
Acceptable Limits	of Span	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %
Drift Result		PASS	PASS	PASS	PASS	PASS	PASS

System Calibration Bias

System Bias Calculation = ((Measured Concentration of Cal Gas in System Calibration Mode - Measured Concentration of Cal Gas in Direct Mode)/Analyzer Range))* 100

Analyzer			O2	CO2	SO2	CO	NO	Nox
Analyzer Full Scale Span			25	20	1000	100	250	250
Analyzer Initial	Zero		0.01	0.00	0.30	0.3	0.0	0.0
	Upscale		12.55	12.50	460.80	52.3	91.1	91.3
System Initial	Zero		0.23	0.02	0.00	0.1	0.1	0.0
	Upscale		12.55	12.49	461.60	52.0	91.3	91.4
Analyzer Final	Zero		0.00	0.00	0.00	0.0	0.0	0.0
	Upscale		0.00	0.00	0.00	0.0	0.0	0.0
System Final	Zero		0.20	0.10	1.00	0.8	0.7	0.8
	Upscale		12.42	12.26	460.70	53.8	88.1	88.3
Initial System Bias	Zero	%	0.88	0.10	-0.03	-0.20	0.04	0.00
	Upscale	%	0.00	-0.05	0.08	-0.27	0.08	0.04
Final System Bias	Zero	%	0.76	0.50	0.97	0.55	0.28	0.32
	Upscale	%	-0.52	-1.20	-0.01	1.52	-1.20	-1.20
Acceptable Limits	of Span		+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %
Bias Results			PASS	PASS	PASS	PASS	PASS	PASS

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21939
October 10, 2019
Test 3 Final Calculations (Stack)

Analyzer		O2	CO2	SO2	CO	NO	NOx
MII Number/Serial Number		COE 20060	COE 20060	COE 20099	COE 20101	COE 20061	
Model		Siemens Ultramat 23	Siemens Ultramat 23	Teledyne API T100H	Siemens Ultramat 23	Teledyne 200EH	
Range		25	20	1000	100	250	250
Actual Cylinder Value	High	22.90	20.00	968	89.6	236.7	236.7
	Mid.	12.51	12.48	460.6	52.07	91	91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.01	0.00	0.3	0.0	0.0	0.0
	Mid	12.55	12.49	459.7	52.1	89.7	89.9
	High	22.90	20.00	968	89.5	237.2	237.4
System Initial Calibration	Zero	0.20	0.00	0	0.4	0.1	0.0
	Upscale	12.47	12.31	457.9	52.3	87.8	88.4
System Final Calibration	Zero	0.34	0.00	0.9	0.8	0.5	0.5
	Upscale	12.50	12.24	459.4	49.9	90.1	90.4

Calibration Error Results

Analyzer Calibration Error = (Measured Concentration of Cal Gas in Direct Mode - Manufacturer Certified Cal Gas Concentration)/Analyzer Range)*100

	Analyzer		O2	CO2	SO2	CO	NO	NOx
	Analyzer Span Range		25.00	20.00	1000	100	250	250
Calibration Error	Zero	%	0.04	0.00	0.03	0.00	0.00	0.00
	Mid	%	0.16	0.05	0.09	0.00	0.52	0.44
	High	%	0.00	0.00	0.00	0.10	0.20	0.28
Acceptable Limits	of Span		+-2%	+-2%	+-2%	+-2%	+-2%	+-2%
Error Results			PASS	PASS	PASS	PASS	PASS	PASS

System Drift

Drift Calculation = | System Bias $_{final}$ - System Bias $_{initial}$ |

	Analyzer	O2	CO2	SO2	CO	NO	NOx
	Span	25.00	20.00	1000	100	250	250
Initial System Bias	Zero	0.76	0.00	-0.03	0.40	0.04	0.00
	Upscale	-0.32	-0.90	-0.18	0.2	-0.8	-0.6
Final System Bias	Zero	1.32	0.00	0.87	0.8	0.2	0.2
	Upscale	-0.20	-1.25	-0.03	-2.2	0.2	0.2

System Zero Drift	%	0.56	0.00	0.90	0.40	0.16	0.20
System Cal Drift	%	0.12	0.35	0.15	2.40	0.92	0.80
Acceptable Limits	of Span	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %
Drift Result		PASS	PASS	PASS	PASS	PASS	PASS

System Calibration Bias

System Bias Calculation = ((Measured Concentration of Cal Gas in System Calibration Mode - Measured Concentration of Cal Gas in Direct Mode)/Analyzer Range))* 100

Analyzer		O2	CO2	SO2	CO	NO	Nox
Analyzer Full Scale Span		25	20	1000	100	250	250
Analyzer Initial	Zero	0.01	0.00	0.30	0.0	0.0	0.0
	Upscale	12.55	12.49	459.70	52.1	89.7	89.9
System Initial	Zero	0.20	0.00	0.00	0.4	0.1	0.0
	Upscale	12.47	12.31	457.90	52.3	87.8	88.4
Analyzer Final	Zero	0.00	0.00	0.00	0.0	0.0	0.0
	Upscale	0.00	0.00	0.00	0.0	0.0	0.0
System Final	Zero	0.34	0.00	0.90	0.8	0.5	0.5
	Upscale	12.50	12.24	459.40	49.9	90.1	90.4

Initial System Bias	Zero	%	0.76	0.00	-0.03	0.40	0.04	0.00
	Upscale	%	-0.32	-0.90	-0.18	0.24	-0.76	-0.60
Final System Bias	Zero	%	1.32	0.00	0.87	0.80	0.20	0.20
	Upscale	%	-0.20	-1.25	-0.03	-2.16	0.16	0.20
Acceptable Limits	of Span		+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %
Bias Results			PASS	PASS	PASS	PASS	PASS	PASS

Total Hydrocarbon Reference Method 25A Calibration Data Sheet
Method 25A:SOP Number 95-T62-SP001

Project Number:	21939	Date:	October 8, 2019
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator	Test 1	

THC Full Scale Setting	**100**
Zero Gas (ppm)	<0.1 ppm
Low Gas Value (ppm)	20-35 % full scale setting
Mid Gas Value (ppm)	45-55 % full scale setting
High Gas Value (ppm)	80-90 % full scale setting

Perform analyzer calibration as per manufacturers instructions.
Calculate the linearity factor "C" based on the zero and high gas values. Based on the calculated linearity, predict the analyzer response for low and mid values (D3 and D4). Calculate calibration error with the low and mid (B3 and B4) gasses.

	Cal.Gas Value (A)	Initial Analyzer Response (B)	Linearity (B2-B1)/(A2-A1)	Predicted Response (A X C)	Calibration Error % ((B)-(D)/AX100
Zero	0 A1	0.35 B1	0.995 C		
High	93.3 A2	93.2 B2			
Mid	50.4 A4	50.3 B4		50.2 D4	0.3 E4
Low	30.51 A3	30.82 B3		30.4 D3	1.5 E3

Criteria +/-5%

Note: If the calibration Error (E3 and E4) are greater than 5%, repeat the procedure until values are acceptable.

Perform test. At the completion of the test or hourly; Calculate the calibration drift as a percent of full scale value.
Introduce the zero and mid level gases at the probe and record data as the system final response.

	System Initial Response (F)	System Final Response (G)	Calibration Drift (G-F)/span*100
Zero	0.35	0.5	-0.15
Mid	50.3	51.9	-1.6

Criteria 3%

Calculate systen response time by introducing zero gas to the probe, record time to reach 95% of calibration gas value.
Repeat with upscale gas. Perform three runs and calculate average of the runs.

	Zero Response Time (seconds)		Upscale Response Time (seconds)
Run 1	43		43
Run 2	44		45
Run 3	43		41
Average	**43**		**43**

Total Hydrocarbon Reference Method 25A Calibration Data Sheet
Method 25A:SOP Number 95-T62-SP001

Project Number:	21939	Date:	October 9, 2019
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator	Test 2	

THC Full Scale Setting	**100**
Zero Gas (ppm)	<0.1 ppm
Low Gas Value (ppm)	20-35 % full scale setting
Mid Gas Value (ppm)	45-55 % full scale setting
High Gas Value (ppm)	80-90 % full scale setting

Perform analyzer calibration as per manufacturers instructions.
Calculate the linearity factor "C" based on the zero and high gas values. Based on the calculated linearity, predict the analyzer response for low and mid values (D3 and D4). Calculate calibration error with the low and mid (B3 and B4) gasses.

	Cal.Gas Value (A)	Initial Analyzer Response (B)	Linearity (B2-B1)/(A2-A1)	Predicted Response (A X C)	Calibration Error % ((B)-(D)/AX100
Zero	0 A1	0.3 B1	1.002 C		
High	93.3 A2	93.8 B2			
Mid	50.4 A4	50.88 B4		50.5 D4	0.7 E4
Low	30.51 A3	30.73 B3		30.6 D3	0.5 E3

Criteria +/-5%

Note: If the calibration Error (E3 and E4) are greater than 5%, repeat the procedure until values are acceptable.

Perform test. At the completion of the test or hourly; Calculate the calibration drift as a percent of full scale value.
Introduce the zero and mid level gases at the probe and record data as the system final response.

	System Initial Response (F)	System Final Response (G)	Calibration Drift (G-F)/span*100
Zero	0.3	0.3	0
Mid	50.88	52.3	-1.4

Criteria 3%

Calculate systen response time by introducing zero gas to the probe, record time to reach 95% of calibration gas value.
Repeat with upscale gas. Perform three runs and calculate average of the runs.

	Zero Response Time (seconds)		Upscale Response Time (seconds)
Run 1	43		43
Run 2	44		45
Run 3	43		41
Average	**43**		**43**

Total Hydrocarbon Reference Method 25A Calibration Data Sheet
Method 25A:SOP Number 95-T62-SP001

Project Number:	21939	Date:	October 10, 2019
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator	Test 3	

THC Full Scale Setting	**100**
Zero Gas (ppm)	<0.1 ppm
Low Gas Value (ppm)	20-35 % full scale setting
Mid Gas Value (ppm)	45-55 % full scale setting
High Gas Value (ppm)	80-90 % full scale setting

Perform analyzer calibration as per manufacturers instructions.
Calculate the linearity factor "C" based on the zero and high gas values. Based on the calculated linearity, predict the analyzer response for low and mid values (D3 and D4). Calculate calibration error with the low and mid (B3 and B4) gasses.

	Cal.Gas Value (A)	Initial Analyzer Response (B)	Linearity (B2-B1)/(A2-A1)	Predicted Response (A X C)	Calibration Error % ((B)-(D)/AX100
Zero	0 A1	0 B1	1.002 C		
High	93.3 A2	93.49 B2			
Mid	50.4 A4	50.63 B4		50.5 D4	0.3 E4
Low	30.51 A3	30.71 B3		30.6 D3	0.5 E3

Criteria +/-5%

Note: If the calibration Error (E3 and E4) are greater than 5%, repeat the procedure until values are acceptable.

Perform test. At the completion of the test or hourly; Calculate the calibration drift as a percent of full scale value.
Introduce the zero and mid level gases at the probe and record data as the system final response.

	System Initial Response (F)	System Final Response (G)	Calibration Drift (G-F)/span*100
Zero	0	0.6	-0.6
Mid	50.63	47.8	2.8

Criteria 3%

Calculate systen response time by introducing zero gas to the probe, record time to reach 95% of calibration gas value.
Repeat with upscale gas. Perform three runs and calculate average of the runs.

	Zero Response Time (seconds)		Upscale Response Time (seconds)
Run 1	43		43
Run 2	44		45
Run 3	43		41
Average	**43**		**43**

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Oxygen
Location	Sarnia, On	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21939	**Analyzer Span Setting**	25

Span Gas Concentration	22.90

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	41	45
2	44	44
3	40	49

System Response Time*	49	Seconds
Average Time	41	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	22.85
2	22.88
3	22.86
4	22.85
5	22.87
Mean	22.86
Standard Deviation (SD)	0.01
% RSD Criteria <3%	**0.06**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Carbon Dioxide
Location	Sarnia, On	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21939	**Analyzer Span Setting**	20

Span Gas Concentration	20.00

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	50	53
2	51	55
3	51	55

System Response Time*	55	Seconds
Average Time	48	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	19.99
2	19.98
3	20
4	19.99
5	20.01
Mean	19.99
Standard Deviation (SD)	0.01
% RSD Criteria <3%	**0.06**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Sulphur Dioxide
Location	Sarnia, On	**Analyzer ID.**	Teledyne API T100H
Project No.	21939	**Analyzer Span Setting**	1100

Span Gas Concentration	968

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	90	93
2	91	93
3	91	94

System Response Time*	94	Seconds
Average Time	81	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	968
2	964
3	966
4	968
5	966
Mean	966
Standard Deviation (SD)	1.67
% RSD Criteria <3%	**0.17**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Carbon Monoxide
Location	Sarnia, On	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21939	**Analyzer Span Setting**	100

Span Gas Concentration	89.6

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	52	55
2	51	55
3	52	55

System Response Time*	55	Seconds
Average Time	49	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	90
2	89.8
3	89.6
4	90
5	89.8
Mean	90
Standard Deviation (SD)	0.17
% RSD Criteria <3%	**0.19**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitric Oxide
Location	Sarnia, On	**Analyzer ID.**	Teledyne 200EH
Project No.	21939	**Analyzer Span Setting**	237

Span Gas Concentration	236.7

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	75	78
2	74	80
3	75	80

System Response Time* 80 Seconds
Average Time 68 Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	237.1
2	237.2
3	237.3
4	237.4
5	237.2
Mean	237
Standard Deviation (SD)	0.11
% RSD Criteria <3%	**0.05**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitrogen Oxides
Location	Sarnia, On	**Analyzer ID.**	Teledyne 200EH
Project No.	21939	**Analyzer Span Setting**	260

Span Gas Concentration	236.7

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	80	89
2	85	85
3	85	89

System Response Time* 89 Seconds
Average Time 76 Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	237.7
2	237.5
3	237.4
4	237.7
5	237.5
Mean	238
Standard Deviation (SD)	0.13
% RSD Criteria <3%	**0.06**

% RSD = SD/Mean X 100

APPENDIX 22

Particulate and Metals Test Emission Calculations
(12 pages)

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	1 - Metals and Particulate
Date:	October 8, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.85
DGM CORRECTION FACTOR	1.018
NOZZLE DIAMETER	6.44 mm
DRY REF GAS VOLUME SAMPLED	5.181 m^3
AVGERGE ISOKINETICITY	102.6 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	179.8 °C
AVERAGE GAS MOISTURE BY VOLUME	48.2 %
AVERAGE GAS VELOCITY	31.81 m/s
BAROMETRIC PRESSURE (Station)	100.339 Kpa
STATIC PRESSURE	0.199 Kpa
ABSOLUTE GAS PRESSURE	100.538 Kpa
OXYGEN CONCENTRATION	9.26 %
CARBON DIOXIDE CONCENTRATION	8.59 %
CARBON MONOXIDE CONCENTRATION	73.2 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	58.03 m^3/s
DRY REF GAS FLOWRATE	19.63 Rm^3/s
DRY ADJ GAS FLOWRATE	23.08 Rm^3/s
WET REF GAS FLOWRATE	37.91 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.181 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 8, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3513.8
Static Pressure	0.800 "H_2O	**WCBDA (g)**	32.9
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.35 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
48.2 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	773.95	1.6	350	50	57	54	1.6	3.0		29.73	
	3	775.93	1.5	352	44	64	60	1.6	3.0		28.82	**99.6**
	6	777.92	1.7	353	45	64	60	1.7	3.0		30.70	**102.2**
	9	779.88	1.6	354	45	65	60	1.7	3.5		29.80	**94.7**
2	12	781.90	1.5	353	45	67	60	1.7	3.5		28.84	**100.5**
	15	783.91	1.5	354	46	68	62	1.7	3.5		28.86	**103.1**
	18	785.91	1.5	354	46	69	62	1.65	3.5		28.86	**102.3**
	21	787.90	1.4	352	46	69	60	1.6	3.5		27.84	**101.7**
3	24	789.99	1.5	355	47	70	63	1.6	3.5		28.87	110.6
	27	791.81	1.5	355	47	70	64	1.7	3.5		28.87	**92.9**
	30	793.82	1.5	354	47	72	64	1.7	3.5		28.86	**102.5**
	33	795.85	1.7	354	47	71	64	1.8	4.0		30.72	**103.3**
4	36	797.93	1.8	355	47	73	95	2.1	4.0		31.63	**99.5**
	39	800.12	2	354	45	73	66	2.1	4.0		33.32	**98.9**
	42	802.44	2	353	45	74	66	2.1	4.0		33.30	**102.0**
	45	804.69	1.9	354	45	74	67	2.1	4.0		32.48	**98.8**
5	48	806.95	2	353	45	74	67	2.15	4.5		33.30	**101.8**
	51	809.28	1.9	351	46	75	68	2.1	4.5		32.42	**102.2**
	54	811.56	2.2	350	47	75	68	2.35	5.0		34.86	**102.3**
	57	813.96	2	351	49	75	69	2.2	5.0		33.26	**100.1**
6	60	816.31	1.8	351	50	76	68	2.1	5.0		31.55	**102.7**
	63	818.58	1.9	349	51	76	69	2.1	4.5		32.38	**104.5**
	66	820.86	2	349	46	76	70	2.2	4.5		33.22	**102.0**
	69	823.18	2.1	350	44	77	70	2.25	5.0		34.06	**101.1**
7	72	825.56	2	350	44	78	71	2.2	5.0		33.24	**101.2**
	75	827.93	2	355	45	79	73	2.2	5.0		33.34	**103.0**
	78	830.29	2	349	45	79	72	2.2	5.0		33.22	**102.6**
	81	832.66	1.9	348	45	79	72	2.1	5.0		32.36	**102.8**
8	84	834.97	2	347	45	79	72	2.2	5.0		33.18	**102.7**
	87	837.33	2	349	47	80	73	2.2	5.0		33.22	**102.2**
	90	839.69	1.9	348	48	79	73	2.1	5.0		32.36	**102.1**
	93	842.02	2	347	48	78	73	2.2	5.0		33.18	**103.5**
9	96	844.34	2	350	48	79	73	2.2	5.0		33.24	**100.5**
	99	846.70	1.9	349	46	79	74	2.1	5.0		32.38	**102.3**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 8, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3513.8
Static Pressure	0.800 "H_2O	**WCBDA (g)**	32.9
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.35 ft³
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
48.2 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	848.98	1.9	350	45	79	74	2.1	5.0		32.40	101.2
	105	851.33	1.9	350	45	80	74	2.1	5.0		32.40	104.4
10	108	853.65	1.9	353	46	80	74	2.1	5.0		32.46	103.0
	111	855.95	2	359	48	81	76	2.2	5.0		33.42	102.3
	114	858.29	2	356	46	79	74	2.2	5.0		33.36	101.5
	117	860.65	1.9	355	47	80	75	2.1	5.0		32.50	102.6
	120	862.95								1.35		102.3
1	0	864.30	1.6	352	55	78	77	1.8	4.0		29.77	
	3	866.50	1.6	350	44	79	77	1.8	4.0		29.73	106.3
	6	868.69	1.6	355	43	80	78	1.8	4.0		29.82	105.6
	9	870.82	1.5	354	42	79	77	1.7	4.0		28.86	102.9
2	12	872.93	1.6	355	42	79	77	1.8	4.0		29.82	105.3
	15	875.05	1.5	355	43	79	77	1.7	4.0		28.87	102.6
	18	877.12	1.5	348	43	79	78	1.7	4.0		28.75	103.4
	21	879.20	1.6	340	44	79	78	1.8	4.0		29.54	103.4
3	24	881.30	1.65	338	45	80	79	1.9	4.0		29.96	100.6
	27	883.54	1.6	337	45	80	78	1.8	4.0		29.49	105.3
	30	885.69	1.6	343	44	82	79	1.8	4.0		29.60	102.7
	33	887.83	1.6	341	42	80	78	1.8	4.0		29.56	102.3
4	36	889.98	1.5	346	41	80	78	1.7	4.0		28.71	102.9
	39	892.09	1.6	353	42	82	79	1.8	4.0		29.78	104.6
	42	894.20	1.55	349	42	82	78	1.75	4.0		29.24	101.5
	45	896.32	1.45	351	41	82	78	1.6	4.0		28.32	103.4
5	48	898.42	1.6	354	41	83	79	1.8	4.0		29.80	106.0
	51	900.55	1.65	355	41	83	78	1.85	4.0		30.28	102.4
	54	902.72	1.8	356	41	83	79	2	4.0		31.65	102.9
	57	904.99	1.7	357	40	83	79	1.9	4.5		30.78	103.1
6	60	907.24	2	355	41	83	78	2.2	5.0		33.34	105.2
	63	909.74	2	360	42	84	79	2.15	5.0		33.44	107.8
	66	911.95	2	363	42	83	79	2.2	5.0		33.50	95.4
	69	914.33	2.15	368	43	84	79	2.35	5.0		34.84	103.0
7	72	916.78	2	371	42	85	80	2.2	5.0		33.67	102.5
	75	919.17	2	372	42	84	79	2.2	5.0		33.69	103.7
	78	921.47	2	374	43	84	79	2.2	5.0		33.73	100.0

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 8, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3513.8
Static Pressure	0.800 "H_2O	**WCBDA (g)**	32.9
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.35 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
48.2 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	923.89	2	372	44	84	80	2.2	5.0		33.69	105.4
8	84	926.28	2.1	372	45	84	80	2.3	5.0		34.52	103.8
	87	928.67	2	374	45	84	80	2.2	5.0		33.73	101.3
	90	931.15	2.1	375	46	83	80	2.3	5.0		34.58	107.9
	93	933.56	2.1	376	46	83	80	2.3	5.0		34.60	102.5
9	96	936.01	2	372	45	83	80	2.2	5.0		33.69	104.2
	99	938.40	2.1	371	43	83	80	2.3	5.0		34.50	103.9
	102	940.81	2.1	368	42	82	79	2.3	5.0		34.43	102.2
	105	943.27	2	368	43	82	80	2.2	5.0		33.60	104.4
10	108	945.69	2.1	369	43	82	80	2.3	5.0		34.46	105.1
	111	948.14	2.1	366	42	82	80	2.3	5.0		34.39	103.9
	114	950.57	2.05	369	42	82	80	2.25	5.0		34.04	102.9
	117	953.02	2	370	44	84	81	2.2	5.0		33.65	105.1
	120	955.42										104.0

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	2 - Metals and Particulate
Date:	October 9, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.85
DGM CORRECTION FACTOR	1.018
NOZZLE DIAMETER	6.44 mm
DRY REF GAS VOLUME SAMPLED	5.351 m^3
AVGERGE ISOKINETICITY	102.4 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	174.6 ^{o}C
AVERAGE GAS MOISTURE BY VOLUME	47.7 %
AVERAGE GAS VELOCITY	32.19 m/s
BAROMETRIC PRESSURE (Station)	100.339 Kpa
STATIC PRESSURE	0.214 Kpa
ABSOLUTE GAS PRESSURE	100.553 Kpa
OXYGEN CONCENTRATION	9.77 %
CARBON DIOXIDE CONCENTRATION	8.26 %
CARBON MONOXIDE CONCENTRATION	82.3 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	58.73 m^3/s
DRY REF GAS FLOWRATE	20.30 Rm^3/s
DRY ADJ GAS FLOWRATE	22.83 Rm^3/s
WET REF GAS FLOWRATE	38.81 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.351 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3550.6
Static Pressure	0.860 "H_2O	**WCBDA (g)**	32.8
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.59 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	56.44	1.7	350	53	54	52	1.7	3.0		30.61	
	3	58.55	1.7	351	47	58	54	1.7	3.0		30.63	**102.5**
	6	60.62	1.7	351	45	60	55	1.7	3.0		30.63	**100.1**
	9	62.69	1.7	347	44	60	56	1.7	3.0		30.55	**99.8**
2	12	64.78	1.8	347	44	60	56	1.9	3.0		31.44	**100.4**
	15	66.92	1.7	347	44	62	57	1.8	3.0		30.55	**99.9**
	18	69.04	1.8	345	45	63	57	1.9	3.0		31.40	**101.6**
	21	71.19	1.8	345	45	63	57	1.95	3.5		31.40	**99.9**
3	24	73.40	1.85	349	45	64	58	2	3.5		31.91	**102.7**
	27	75.62	2	348	45	66	59	2.1	3.5		33.16	**101.8**
	30	77.87	2	348	46	66	59	2.15	3.5		33.16	**98.9**
	33	80.19	2	350	46	67	60	2.15	3.5		33.20	**102.0**
4	36	82.52	2	350	47	68	60	2.15	4.0		33.20	**102.4**
	39	84.82	2.1	349	48	69	61	2.25	4.0		34.00	**101.0**
	42	87.19	2.1	348	49	70	61	2.25	4.0		33.98	**101.3**
	45	89.56	2	350	45	70	62	2.15	4.0		33.20	**101.2**
5	48	91.90	2.05	353	45	71	62	2.2	4.0		33.68	**102.4**
	51	94.24	2.1	353	46	73	64	2.25	4.0		34.09	**101.2**
	54	96.62	2.1	350	44	72	63	2.25	4.0		34.02	**101.3**
	57	99.02	2.15	350	44	73	64	2.3	4.0		34.42	**102.2**
6	60	101.43	2	353	44	73	65	2.15	4.0		33.26	**101.2**
	63	103.82	2.1	355	43	74	66	2.25	4.0		34.13	**104.1**
	66	106.20	2	350	42	73	65	2.15	4.0		33.20	**101.2**
	69	108.56	2.1	354	42	74	66	2.25	4.0		34.11	**102.6**
7	72	110.95	1.95	349	43	74	67	2.1	4.0		32.76	**101.5**
	75	113.27	1.75	350	43	74	67	1.9	4.0		31.06	**101.8**
	78	115.52	1.85	350	44	74	67	2	4.0		31.93	**104.3**
	81	117.78	1.85	353	46	75	68	2	4.0		31.99	**101.9**
8	84	120.04	1.9	350	45	75	68	2.05	4.0		32.36	**101.9**
	87	122.32	1.95	349	46	75	69	2.1	4.0		32.76	**101.2**
	90	124.63	1.95	348	47	76	69	2.1	4.0		32.74	**101.1**
	93	126.94	2.05	349	50	77	70	2.25	4.0		33.59	**100.9**
9	96	129.30	2	349	53	77	70	2.2	4.0		33.18	**100.5**
	99	131.69	2	348	55	77	70	2.2	4.0		33.16	**103.0**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3550.6
Static Pressure	0.860 "H_2O	**WCBDA (g)**	32.8
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.59 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	134.08	1.9	349	58	77	71	2.1	4.0		32.34	**103.0**
	105	136.43	1.9	347	49	78	72	2.1	4.0		32.30	**103.8**
10	108	138.78	2	348	49	80	73	2.25	4.0		33.16	**103.5**
	111	141.14	2.05	347	48	79	72	2.3	4.0		33.55	**101.1**
	114	143.57	2	348	47	79	72	2.25	4.5		33.16	**103.0**
	117	145.99	2	348	46	79	73	2.2	4.5		33.16	**103.9**
	120	148.45								0.59		**105.5**
1	0	149.04	1.5	336	62	77	75	1.7	3.5		28.50	
	3	151.16	1.5	335	44	77	75	1.7	3.5		28.49	**104.1**
	6	153.28	1.6	335	43	76	75	1.8	3.5		29.42	**104.0**
	9	155.43	1.65	335	43	76	75	1.85	4.0		29.88	**102.2**
2	12	157.64	1.55	335	44	76	75	1.75	4.0		28.96	**103.5**
	15	159.81	1.5	334	45	76	75	1.7	4.0		28.47	**104.8**
	18	161.92	1.5	334	43	77	75	1.7	4.0		28.47	**103.5**
	21	164.02	1.6	335	43	77	75	1.8	4.0		29.42	**102.9**
3	24	166.11	1.6	339	44	78	75	1.8	4.0		29.49	**99.3**
	27	168.28	1.7	339	43	78	76	1.9	4.0		30.40	**103.2**
	30	170.48	1.7	341	40	79	76	1.9	4.0		30.44	**101.5**
	33	172.70	1.65	347	44	80	76	1.85	4.0		30.10	**102.4**
4	36	174.91	1.8	343	44	79	76	2	4.0		31.36	**103.8**
	39	177.18	1.7	345	43	80	76	1.9	4.0		30.52	**101.9**
	42	179.42	1.7	350	45	82	77	1.9	4.0		30.61	**103.5**
	45	181.67	1.7	347	44	80	77	1.9	4.0		30.55	**104.0**
5	48	183.91	1.8	347	44	80	77	2	4.0		31.44	**103.6**
	51	186.19	1.9	348	43	80	77	2.15	4.0		32.32	**102.5**
	54	188.54	1.8	347	43	80	77	2	4.0		31.44	**102.9**
	57	190.84	1.9	347	44	80	77	2.1	4.0		32.30	**103.4**
6	60	193.18	2	348	44	80	77	2.2	4.5		33.16	**102.4**
	63	195.58	1.9	348	43	81	77	2.1	4.5		32.32	**102.4**
	66	197.97	1.9	347	44	81	77	2.1	4.5		32.30	**104.5**
	69	200.35	2.05	346	46	81	77	2.3	5.0		33.53	**104.0**
7	72	202.79	2.1	348	46	81	77	2.35	5.0		33.98	**102.7**
	75	205.28	2.05	345	46	81	78	2.3	5.0		33.51	**103.6**
	78	207.74	2.2	342	47	81	78	2.45	5.0		34.65	**103.3**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3550.6
Static Pressure	0.860 "H_2O	**WCBDA (g)**	32.8
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.59 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	210.30	2.1	343	47	81	78	2.35	5.0		33.87	103.7
8	84	212.80	2.1	343	47	82	78	2.35	5.0		33.87	103.6
	87	215.31	2.1	341	46	81	78	2.35	5.0		33.83	104.0
	90	217.81	2.15	340	43	80	78	2.4	5.0		34.21	103.5
	93	220.33	2.05	341	43	80	78	2.3	5.0		33.43	103.2
9	96	222.82	2	341	42	80	78	2.2	5.0		33.02	104.4
	99	225.24	1.9	343	42	80	78	2.1	5.0		32.22	102.7
	102	227.61	1.95	346	43	80	78	2.15	5.0		32.70	103.3
	105	229.98	2	346	42	80	78	2.15	5.0		33.12	102.2
10	108	232.37	2.1	349	44	80	78	2.25	5.0		34.00	101.8
	111	234.77	2	351	44	80	78	2.15	5.0		33.22	99.9
	114	237.18	1.9	352	45	80	78	2.1	5.0		32.40	102.9
	117	239.54	1.9	352	43	80	78	2.1	5.0		32.40	103.5
	120	241.89										103.0

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	3 - Metals and Particulate
Date:	October 10, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.85
DGM CORRECTION FACTOR	1.018
NOZZLE DIAMETER	6.44 mm
DRY REF GAS VOLUME SAMPLED	5.402 m^3
AVGERGE ISOKINETICITY	101.9 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	177.5 °C
AVERAGE GAS MOISTURE BY VOLUME	47.8 %
AVERAGE GAS VELOCITY	33.00 m/s
BAROMETRIC PRESSURE (Station)	100.203 Kpa
STATIC PRESSURE	0.187 Kpa
ABSOLUTE GAS PRESSURE	100.390 Kpa
OXYGEN CONCENTRATION	9.9 %
CARBON DIOXIDE CONCENTRATION	8.10 %
CARBON MONOXIDE CONCENTRATION	86.6 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	60.20 m^3/s
DRY REF GAS FLOWRATE	20.61 Rm^3/s
DRY ADJ GAS FLOWRATE	22.90 Rm^3/s
WET REF GAS FLOWRATE	39.48 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.402 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3595.8
Static Pressure	0.750 "H_2O	**WCBDA (g)**	35.7
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.66 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	145.57	1.8	355	50	58	53	1.8	3.0		31.64	
	3	147.72	1.9	352	40	59	55	1.9	3.0		32.44	**101.5**
	6	149.96	1.9	355	41	60	56	1.95	3.0		32.50	**102.4**
	9	152.08	1.95	350	41	59	55	2	3.0		32.83	**96.9**
2	12	154.32	1.95	351	39	59	55	2	3.0		32.85	**101.0**
	15	156.55	1.95	352	40	59	55	2.05	3.0		32.87	**100.6**
	18	158.78	1.8	352	39	61	56	1.85	3.0		31.58	**100.7**
	21	160.96	1.8	349	40	61	57	1.85	3.0		31.52	**102.1**
3	24	163.10	1.9	351	40	63	56	2	3.0		32.42	**100.0**
	27	165.30	1.9	357	43	63	58	2	3.0		32.54	**100.1**
	30	167.48	1.95	355	43	64	58	2.05	3.0		32.93	**99.3**
	33	169.74	2	345	43	63	57	2.1	3.0		33.14	**101.4**
4	36	172.03	2	345	43	65	57	2.1	3.0		33.14	**101.1**
	39	174.31	2.2	345	45	65	58	2.3	3.0		34.76	**100.4**
	42	176.73	1.9	351	48	64	58	2.05	3.0		32.42	**101.6**
	45	179.02	1.9	353	49	64	58	2	3.5		32.46	**103.9**
5	48	181.29	1.95	351	51	66	59	2.05	3.5		32.85	**103.1**
	51	183.53	2	353	52	67	59	2.1	3.5		33.31	**100.0**
	54	185.83	2	351	54	67	59	2.1	3.5		33.26	**101.4**
	57	188.16	2.35	351	58	67	60	2.45	3.5		36.06	**102.6**
6	60	190.61	2.35	351	61	68	61	2.5	4.0		36.06	**99.6**
	63	193.18	2.5	351	56	69	61	2.6	4.0		37.19	**104.2**
	66	195.72	2.5	353	53	70	62	2.6	4.0		37.24	**99.8**
	69	198.33	2.55	354	51	70	62	2.65	4.0		37.63	**102.5**
7	72	200.95	2.4	353	49	69	62	2.5	4.0		36.48	**102.0**
	75	203.49	2.5	353	44	70	62	2.6	4.0		37.24	**101.9**
	78	206.08	2.4	356	42	72	64	2.5	4.0		36.55	**101.7**
	81	208.64	2.4	353	43	72	64	2.5	4.0		36.48	**102.4**
8	84	211.18	2.55	355	43	72	65	2.65	4.0		37.65	**101.4**
	87	213.78	2.15	357	44	73	65	2.3	4.0		34.62	**100.8**
	90	216.27	2.1	356	45	74	65	2.2	4.0		34.19	**105.0**
	93	218.67	1.85	357	47	74	66	2	4.0		32.11	**102.2**
9	96	220.94	2	356	48	75	66	2.15	4.0		33.37	**103.0**
	99	223.29	2.15	352	44	74	67	2.3	4.0		34.51	**102.4**

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3595.8
Static Pressure	0.750 "H_2O	**WCBDA (g)**	35.7
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.66 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	225.73	2.15	350	44	75	67	2.3	4.0		34.47	102.3
	105	228.15	2	349	44	74	67	2.15	4.0		33.22	101.3
10	108	230.50	1.9	348	44	74	68	2.05	4.0		32.36	101.9
	111	232.81	2	347	43	75	68	2.15	4.0		33.18	102.6
	114	235.16	2.1	349	43	75	68	2.25	4.0		34.04	101.6
	117	237.55	2.05	347	42	75	69	2.2	4.0		33.59	101.0
	120	239.95								0.66		102.4
1	0	240.61	1.5	346	56	74	73	1.65	3.5		28.72	
	3	242.74	1.5	346	46	74	73	1.65	3.5		28.72	105.8
	6	244.81	1.6	349	45	74	73	1.75	3.5		29.72	102.8
	9	246.89	1.5	349	46	75	73	1.65	3.5		28.77	100.2
2	12	248.93	1.5	349	46	76	73	1.65	3.5		28.77	101.4
	15	250.95	1.5	350	47	76	74	1.65	3.5		28.79	100.3
	18	252.97	1.5	351	47	76	74	1.65	3.5		28.81	100.3
	21	255.00	1.6	350	48	78	74	1.75	3.5		29.73	100.8
3	24	257.07	1.6	357	50	79	75	1.75	3.5		29.86	99.3
	27	259.21	1.75	354	46	78	75	1.9	3.5		31.17	102.9
	30	261.39	1.6	353	45	78	74	1.75	3.5		29.79	100.2
	33	263.55	1.6	352	45	78	75	1.75	3.5		29.77	103.8
4	36	265.69	1.7	356	44	78	75	1.85	3.5		30.76	102.7
	39	267.86	1.7	354	45	78	74	1.85	3.5		30.73	101.3
	42	270.05	1.7	353	44	78	74	1.85	3.5		30.71	102.2
	45	272.22	1.8	354	44	78	74	2	3.5		31.62	101.2
5	48	274.45	1.75	353	45	79	74	1.9	3.5		31.15	101.2
	51	276.68	1.9	353	46	80	75	2.1	4.0		32.46	102.4
	54	278.99	1.9	352	46	79	75	2.1	4.0		32.44	101.7
	57	281.32	1.85	354	46	79	75	2.05	4.0		32.05	102.6
6	60	283.64	1.85	350	46	79	75	2.05	4.0		31.97	103.7
	63	285.94	2.05	351	48	78	76	2.25	4.0		33.68	102.5
	66	288.35	2.2	351	46	80	76	2.4	4.0		34.89	102.2
	69	290.87	2.1	350	44	80	76	2.3	4.0		34.07	103.0
7	72	293.33	2.1	349	44	80	76	2.3	4.0		34.04	102.8
	75	295.81	2.3	348	45	80	76	2.5	4.5		35.61	103.6
	78	298.37	2.2	347	44	80	76	2.4	4.5		34.80	102.1

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019	**Operator:**	DH

Pitot Factor	0.85	**Filter (mg)**	0
DGMCF	1.018	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3595.8
Static Pressure	0.750 "H_2O	**WCBDA (g)**	35.7
Nozzle	0.2535 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.66 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	300.90	2.15	353	47	81	77	2.35	4.5		34.53	103.1
8	84	303.37	2.15	354	49	81	77	2.35	4.5		34.55	102.0
	87	305.82	2.2	350	46	80	76	2.4	4.5		34.87	101.3
	90	308.32	1.9	352	42	80	76	2.1	4.5		32.44	102.1
	93	310.69	1.8	350	43	80	77	2	4.5		31.54	104.2
9	96	312.99	2.2	353	43	81	77	2.4	4.5		34.93	103.6
	99	315.45	2.3	352	44	81	77	2.5	4.5		35.69	100.5
	102	318.00	2.35	351	44	81	77	2.55	5.0		36.06	101.8
	105	320.67	2.15	350	45	81	77	2.35	5.0		34.47	105.4
10	108	323.11	1.8	350	45	81	77	2	5.0		31.54	100.6
	111	325.44	1.9	348	44	81	77	2.1	5.0		32.36	104.9
	114	327.78	1.8	349	44	81	77	2	4.5		31.52	102.4
	117	330.06	1.9	349	44	81	78	2.1	4.5		32.38	102.6
	120	332.36										100.6

a Kontrol Energy Company

APPENDIX 23

Semi-Volatile Organics Test Emission Calculations
(12 pages)

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	1 - SVOC
Date:	October 8, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.849
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.46 mm
DRY REF GAS VOLUME SAMPLED	5.159 m^3
AVGERGE ISOKINETICITY	101.2 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	178.4 ^oC
AVERAGE GAS MOISTURE BY VOLUME	47.0 %
AVERAGE GAS VELOCITY	31.10 m/s
BAROMETRIC PRESSURE (Station)	100.339 Kpa
STATIC PRESSURE	0.199 Kpa
ABSOLUTE GAS PRESSURE	100.538 Kpa
OXYGEN CONCENTRATION	9.26 %
CARBON DIOXIDE CONCENTRATION	8.59 %
CARBON MONOXIDE CONCENTRATION	73.2 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	56.72 m^3/s
DRY REF GAS FLOWRATE	19.69 Rm^3/s
DRY ADJ GAS FLOWRATE	23.16 Rm^3/s
WET REF GAS FLOWRATE	37.17 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.159 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant: Clean Harbors
Test No.: 1 - SVOC
Date: October 8, 2019

Plant Location: Corunna, ON
Test Location: Incinerator Exhaust Stack
Operator: DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3478.5
Static Pressure	0.800 "H_2O	**WCBDA (g)**	27.9
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	3.77 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
47.0 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	24.45	2.1	347	60	55	57	2.1	6.0		33.85	
	3	26.74	2	349	52	60	59	2.1	7.5		33.08	**96.6**
	6	29.01	2.1	351	52	61	59	2.1	7.5		33.94	**97.6**
	9	31.29	2	350	51	63	59	2.1	8.0		33.10	**95.7**
2	12	33.64	2.1	350	50	65	60	2.2	8.0		33.92	**100.8**
	15	36.07	2.1	351	50	66	60	2.2	8.0		33.94	**101.4**
	18	38.49	2.1	351	49	68	62	2.2	8.0		33.94	**101.0**
	21	40.89	2.1	350	49	69	62	2.2	8.0		33.92	**99.8**
3	24	43.29	2.1	352	50	70	64	2.2	8.0		33.96	**99.6**
	27	45.73	2.15	352	49	71	63	2.2	8.0		34.36	**101.1**
	30	48.21	2.15	350	49	72	64	2.2	8.0		34.32	**101.6**
	33	50.67	2.15	350	51	72	65	2.2	8.0		34.32	**100.4**
4	36	53.16	2.1	351	50	73	65	2.2	8.0		33.94	**101.6**
	39	55.63	2.1	350	50	73	65	2.2	8.0		33.92	**101.9**
	42	58.13	2.1	350	50	73	65	2.2	8.0		33.92	**103.1**
	45	60.58	2.1	350	51	74	66	2.2	8.0		33.92	**101.0**
5	48	63.08	2	349	51	75	66	2.2	8.0		33.08	**102.9**
	51	65.57	1.95	347	51	75	67	2.1	8.0		32.62	**104.8**
	54	67.93	2	347	52	76	67	2.1	8.0		33.04	**100.4**
	57	70.31	1.95	349	52	76	68	2.1	8.0		32.66	**99.9**
6	60	72.66	1.95	349	52	76	68	2.1	8.0		32.66	**99.9**
	63	75.01	1.8	347	51	77	69	1.9	8.0		31.34	**99.9**
	66	77.31	1.7	348	51	78	69	1.9	8.0		30.48	**101.4**
	69	79.57	1.9	348	51	78	69	1.9	8.0		32.22	**102.5**
7	72	81.84	1.7	347	51	79	70	1.9	8.0		30.46	**97.4**
	75	84.10	1.6	347	52	79	70	1.8	8.0		29.55	**102.2**
	78	86.33	1.65	348	52	79	71	1.8	8.0		30.03	**104.0**
	81	88.54	1.6	347	52	80	71	1.8	8.0		29.55	**101.4**
8	84	90.74	1.6	345	53	80	71	1.8	8.0		29.51	**102.4**
	87	92.97	1.6	349	54	80	71	1.8	8.0		29.59	**103.6**
	90	95.14	1.55	347	54	80	72	1.8	8.0		29.09	**101.1**
	93	97.35	1.55	347	54	80	72	1.8	8.0		29.09	**104.4**
9	96	99.54	1.6	349	55	81	73	1.8	8.0		29.59	**103.4**
	99	101.74	1.65	348	54	81	72	1.8	8.0		30.03	**102.2**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 8, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3478.5
Static Pressure	0.800 "H_2O	**WCBDA (g)**	27.9
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	3.77 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
47.0 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	103.95	1.55	348	55	81	72	1.8	8.0		29.10	101.1
	105	106.12	1.6	350	55	81	73	1.8	8.0		29.61	102.5
10	108	108.31	1.45	351	55	82	72	1.8	8.0		28.20	101.8
	111	110.52	1.55	350	55	82	73	1.7	8.0		29.14	108.0
	114	112.67	1.55	351	55	82	74	1.7	8.0		29.16	101.4
	117	114.80	1.5	352	55	82	74	1.7	8.0		28.70	100.4
	120	116.92								3.77		101.7
1	0	120.69	1.9	355	78	77	77	2.1	7.0		32.36	
	3	123.02	2	351	63	79	77	2.1	8.0		33.12	99.8
	6	125.23	2	352	56	81	78	2.1	8.0		33.14	91.8
	9	127.43	1.9	353	55	82	78	2.1	8.0		32.32	91.2
2	12	129.80	1.85	352	57	83	79	2	8.0		31.87	100.8
	15	132.12	1.6	351	59	84	78	1.8	8.0		29.62	99.7
	18	134.40	1.85	347	60	85	79	2	8.0		31.78	105.3
	21	136.70	1.75	342	60	85	79	2	8.0		30.81	98.4
3	24	139.04	1.8	342	60	85	79	2	8.0		31.25	102.6
	27	141.34	1.8	342	60	85	79	2	8.0		31.25	99.4
	30	143.65	1.7	341	59	87	80	2	8.0		30.35	99.9
	33	145.95	1.7	346	60	87	79	2	8.0		30.44	102.0
4	36	148.30	1.5	350	57	87	80	1.8	8.0		28.67	104.6
	39	150.55	1.6	354	57	87	80	1.8	8.0		29.68	106.7
	42	152.80	1.55	353	57	88	80	1.7	8.0		29.19	103.6
	45	154.99	1.6	355	60	88	80	1.7	8.0		29.70	102.3
5	48	157.18	1.55	357	60	88	80	1.7	8.0		29.26	100.8
	51	159.37	1.7	356	64	89	80	1.7	8.0		30.63	102.5
	54	161.55	1.75	357	64	89	81	2	8.0		31.10	97.3
	57	163.86	1.8	360	65	89	81	2	8.0		31.59	101.7
6	60	166.15	1.85	360	65	89	82	2	8.0		32.03	99.5
	63	168.47	1.8	364	66	89	81	2	8.0		31.67	99.4
	66	170.78	1.55	368	65	89	81	1.8	8.0		29.46	100.7
	69	172.99	1.7	370	65	89	81	1.9	8.0		30.89	104.0
7	72	175.28	1.7	370	65	89	81	1.9	8.0		30.89	103.0
	75	177.54	1.55	375	67	90	81	1.7	8.0		29.59	101.7
	78	179.66	1.6	377	65	90	81	1.7	8.0		30.10	100.1

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 8, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3478.5
Static Pressure	0.800 "H_2O	**WCBDA (g)**	27.9
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	3.77 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.26
CO2%	8.59
COppm	73.2

Measured H2O
47.0 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	181.92	1.8	376	62	90	82	2	8.0		31.90	**105.1**
8	84	184.24	1.8	376	62	90	82	2	8.0		31.90	**101.6**
	87	186.56	1.75	376	61	90	82	2	8.0		31.46	**101.6**
	90	188.88	1.75	378	61	90	82	2	8.0		31.49	**103.1**
	93	191.22	1.8	375	61	89	83	2	8.0		31.88	**104.1**
9	96	193.53	1.4	356	61	89	83	1.5	8.0		27.80	**101.1**
	99	195.65	1.5	349	61	89	83	1.5	8.0		28.65	**103.9**
	102	197.70	1.4	349	61	89	82	1.6	8.0		27.68	**96.7**
	105	199.79	1.4	349	61	89	82	1.6	8.0		27.68	**102.1**
10	108	201.87	1.5	349	60	89	82	1.6	8.0		28.65	**101.6**
	111	203.96	1.45	349	60	89	82	1.6	8.0		28.17	**98.7**
	114	206.04	1.45	349	60	89	82	1.6	8.0		28.17	**99.9**
	117	208.14	1.5	349	60	89	81	1.6	8.0		28.65	**100.8**
	120	210.25										**99.7**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	2 - SVOC
Date:	October 9, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.849
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.46 mm
DRY REF GAS VOLUME SAMPLED	5.270 m^3
AVGERGE ISOKINETICITY	102.3 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	174.3 °C
AVERAGE GAS MOISTURE BY VOLUME	47.4 %
AVERAGE GAS VELOCITY	31.36 m/s
BAROMETRIC PRESSURE (Station)	100.339 Kpa
STATIC PRESSURE	0.214 Kpa
ABSOLUTE GAS PRESSURE	100.553 Kpa
OXYGEN CONCENTRATION	9.77 %
CARBON DIOXIDE CONCENTRATION	8.26 %
CARBON MONOXIDE CONCENTRATION	82.3 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	57.21 m^3/s
DRY REF GAS FLOWRATE	19.88 Rm^3/s
DRY ADJ GAS FLOWRATE	22.35 Rm^3/s
WET REF GAS FLOWRATE	37.84 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.270 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DU

Pitot Factor	0.849	Filter (mg)	0
DGMCF	1.006	Probe (mg)	0
Barometric Pressure	29.63 "Hg	CWTR (g)	3457.8
Static Pressure	0.860 "H_2O	WCBDA (g)	39.3
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	Leak Check Volume	0.48 ft^3
Length	0.000 ft	Reading Interval	3 minutes
Width	0.000 ft	Number of Ports	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.4 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	12.50	2.1	356	56	54	54	2.1	7.0		34.09	
	3	14.88	2	354	54	57	56	2	14.0		33.23	102.0
	6	17.21	2	354	54	57	56	2	12.0		33.23	101.7
	9	19.93	2.05	349	64	59	56	2	8.0		33.54	118.7
2	12	22.30	2.1	349	66	61	56	2	9.0		33.94	101.7
	15	24.55	2	350	66	62	57	2	9.0		33.14	95.2
	18	26.82	1.95	347	63	63	58	2	9.0		32.67	98.3
	21	29.15	2.15	347	60	65	59	2.2	10.0		34.30	101.8
3	24	31.48	2.1	347	56	65	59	2.2	10.0		33.90	96.7
	27	33.92	2.15	347	57	65	59	2.2	10.0		34.30	102.5
	30	36.36	1.9	347	56	66	60	2	10.0		32.25	101.3
	33	38.72	1.8	348	55	66	60	2	10.0		31.40	103.9
4	36	41.00	1.9	348	55	67	61	2	10.0		32.27	103.2
	39	43.30	1.95	349	55	67	61	2	10.0		32.71	101.2
	42	45.60	2.1	348	55	67	61	2.2	10.0		33.92	99.9
	45	47.96	2.1	349	55	69	62	2.2	10.0		33.94	98.8
5	48	50.35	2	348	55	69	63	2.2	10.0		33.10	99.8
	51	52.76	1.95	348	55	70	63	2.2	10.0		32.69	103.0
	54	55.25	2	349	54	70	64	2.1	10.0		33.12	107.6
	57	57.54	2.1	349	52	71	64	2.2	10.0		33.94	97.7
6	60	59.94	1.8	349	47	71	65	1.9	10.0		31.42	99.8
	63	62.24	1.75	351	53	71	64	1.9	10.0		31.02	103.2
	66	64.51	1.75	351	54	72	65	1.9	10.0		31.02	103.5
	69	66.76	1.75	349	53	73	67	1.9	10.0		30.98	102.4
7	72	69.04	1.75	348	55	73	66	1.9	10.0		30.97	103.3
	75	71.30	1.6	349	52	74	67	1.7	10.0		29.63	102.5
	78	73.50	1.6	348	52	74	67	1.7	10.0		29.61	104.1
	81	75.69	1.7	349	52	75	67	1.7	10.0		30.54	103.6
8	84	77.89	1.5	349	52	76	67	1.6	9.0		28.69	100.9
	87	80.02	1.65	348	52	76	67	1.8	9.0		30.07	103.9
	90	82.17	1.65	347	52	76	68	1.8	9.0		30.05	100.0
	93	84.37	1.55	347	52	77	69	1.7	9.0		29.12	102.2
9	96	86.52	1.5	348	52	77	69	1.7	9.0		28.67	102.8
	99	88.67	1.5	347	52	77	69	1.7	9.0		28.65	104.5

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3457.8
Static Pressure	0.860 "H_2O	**WCBDA (g)**	39.3
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.48 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.4 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	90.79	1.55	346	54	78	70	1.7	9.0		29.11	**103.0**
	105	92.93	1.5	346	54	78	70	1.7	9.0		28.63	**102.1**
10	108	95.07	1.4	345	52	78	70	1.5	9.0		27.65	**103.7**
	111	97.13	1.45	345	52	79	71	1.5	9.0		28.13	**103.3**
	114	99.17	1.45	346	52	79	71	1.5	9.0		28.15	**100.3**
	117	101.23	1.45	345	52	79	71	1.5	9.0		28.13	**101.3**
	120	103.28								0.48		**100.8**
1	0	103.76	1.95	339	74	72	73	2.1	10.0		32.50	
	3	106.06	1.9	339	48	74	73	2.1	10.0		32.09	**97.7**
	6	108.42	2	338	48	74	73	2.2	10.0		32.90	**101.4**
	9	110.84	1.8	338	49	75	74	2	10.0		31.21	**101.3**
2	12	113.22	1.85	339	49	76	74	2	10.0		31.66	**104.8**
	15	115.56	1.9	339	50	77	74	2	10.0		32.09	**101.6**
	18	117.92	1.8	338	50	77	74	2	10.0		31.21	**101.0**
	21	120.28	1.9	337	50	79	75	2.1	10.0		32.04	**103.7**
3	24	122.61	1.9	340	50	79	76	2.1	10.0		32.11	**99.3**
	27	124.95	1.7	340	56	80	76	1.9	10.0		30.37	**99.9**
	30	127.28	1.6	342	58	81	76	1.8	10.0		29.50	**105.0**
	33	129.55	1.9	345	58	81	77	2.1	10.0		32.21	**105.4**
4	36	131.89	2	345	58	81	77	2.2	10.0		33.04	**99.9**
	39	134.24	1.95	346	59	82	77	2.2	10.0		32.65	**97.8**
	42	136.63	1.95	345	59	82	77	2.2	10.0		32.63	**100.7**
	45	138.94	1.95	348	59	82	77	2.2	10.0		32.69	**97.3**
5	48	141.36	1.9	347	60	82	77	2.1	10.0		32.25	**102.1**
	51	143.77	2	347	60	82	78	2.2	10.0		33.08	**102.9**
	54	146.23	1.9	348	60	82	78	2.1	10.0		32.27	**102.3**
	57	148.70	1.9	348	60	82	78	2.1	10.0		32.27	**105.4**
6	60	151.11	1.95	347	61	82	78	2.1	10.0		32.67	**102.9**
	63	153.62	1.9	348	61	82	78	2.1	10.0		32.27	**105.7**
	66	156.00	1.9	348	61	82	78	2.1	10.0		32.27	**101.6**
	69	158.44	1.95	347	60	82	78	2.1	10.0		32.67	**104.2**
7	72	160.86	1.8	347	62	82	79	2.1	10.0		31.39	**101.9**
	75	163.31	1.9	346	60	82	78	2.1	10.0		32.23	**107.3**
	78	165.59	1.9	346	60	82	78	2.1	10.0		32.23	**97.2**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 9, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.63 "Hg	**CWTR (g)**	3457.8
Static Pressure	0.860 "H_2O	**WCBDA (g)**	39.3
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.48 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.77
CO2%	8.26
COppm	82.3

Measured H2O
47.4 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	168.15	1.9	346	59	82	78	2.1	10.0		32.23	**109.1**
8	84	170.56	1.75	339	64	82	79	2	10.0		30.79	**102.8**
	87	172.92	1.9	339	63	82	79	2.1	10.0		32.09	**104.3**
	90	175.26	1.8	341	65	83	79	2.1	10.0		31.27	**99.2**
	93	177.63	1.8	342	64	83	79	2.1	10.0		31.29	**103.3**
9	96	179.99	1.5	342	67	83	78	1.7	10.0		28.56	**102.9**
	99	182.18	1.5	342	59	83	78	1.7	10.0		28.56	**104.6**
	102	184.34	1.6	342	59	84	78	1.8	10.0		29.50	**103.2**
	105	186.53	1.6	341	59	84	78	1.8	10.0		29.48	**101.2**
10	108	188.73	1.5	341	55	84	78	1.7	10.0		28.54	**101.6**
	111	190.88	1.45	341	55	84	78	1.7	10.0		28.06	**102.6**
	114	193.03	1.45	342	55	84	78	1.7	10.0		28.08	**104.3**
	117	195.20	1.45	342	55	84	78	1.7	10.0		28.08	**105.3**
	120	197.35										**104.4**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	3 - SVOC
Date:	October 10, 2019

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.849
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.46 mm
DRY REF GAS VOLUME SAMPLED	5.272 m^3
AVGERGE ISOKINETICITY	101.7 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	177.5 °C
AVERAGE GAS MOISTURE BY VOLUME	47.5 %
AVERAGE GAS VELOCITY	31.90 m/s
BAROMETRIC PRESSURE (Station)	100.203 Kpa
STATIC PRESSURE	0.187 Kpa
ABSOLUTE GAS PRESSURE	100.390 Kpa
OXYGEN CONCENTRATION	9.9 %
CARBON DIOXIDE CONCENTRATION	8.10 %
CARBON MONOXIDE CONCENTRATION	86.6 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	58.19 m^3/s
DRY REF GAS FLOWRATE	20.02 Rm^3/s
DRY ADJ GAS FLOWRATE	22.24 Rm^3/s
WET REF GAS FLOWRATE	38.15 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.272 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3489.7
Static Pressure	0.750 "H_2O	**WCBDA (g)**	17.8
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.39 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.5 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	98.85	2	354	55	52	53	2	7.0		33.27	
	3	101.15	1.8	353	49	55	55	1.8	8.0		31.54	**101.2**
	6	103.34	2.1	355	49	57	56	2.1	9.0		34.11	**101.0**
	9	105.62	2.1	355	48	59	55	2.1	9.0		34.11	**97.2**
2	12	107.95	2.15	353	48	60	56	2.2	9.0		34.47	**99.3**
	15	110.35	2.2	355	47	62	55	2.2	9.0		34.91	**100.8**
	18	112.74	2.2	355	47	62	56	2.2	9.0		34.91	**99.2**
	21	115.16	2.2	353	46	64	56	2.2	9.0		34.87	**100.4**
3	24	117.59	2.1	355	46	65	57	2.1	9.0		34.11	**100.5**
	27	120.05	2.15	355	47	65	57	2.2	9.0		34.51	**104.0**
	30	122.40	2.15	354	47	66	58	2.2	9.0		34.49	**98.2**
	33	124.85	2.2	354	48	67	57	2.2	9.0		34.89	**102.1**
4	36	127.33	2.15	355	48	67	58	2.2	9.0		34.51	**102.2**
	39	129.80	2.2	355	49	67	60	2.2	9.0		34.91	**102.9**
	42	132.23	2.3	355	49	68	59	2.2	9.0		35.70	**99.9**
	45	134.74	2.3	352	49	68	60	2.4	9.0		35.63	**101.0**
5	48	137.25	2.15	353	49	68	60	2.2	9.0		34.47	**100.7**
	51	139.70	2.2	352	51	69	60	2.2	9.0		34.85	**101.7**
	54	142.14	2.2	352	51	69	60	2.2	9.0		34.85	**100.0**
	57	144.58	2.2	352	52	70	61	2.2	9.0		34.85	**100.0**
6	60	147.04	1.8	353	50	70	62	1.9	9.0		31.54	**100.6**
	63	149.34	1.9	351	50	71	65	1.9	9.0		32.36	**103.9**
	66	151.61	2	352	50	72	62	1.9	9.0		33.23	**99.3**
	69	153.88	2	354	50	72	62	2.1	9.0		33.27	**97.0**
7	72	156.21	1.8	352	50	72	62	1.9	9.0		31.52	**99.7**
	75	158.50	1.9	354	50	73	64	1.9	9.0		32.42	**103.2**
	78	160.80	1.7	356	50	74	64	1.8	9.0		30.71	**100.7**
	81	163.01	1.7	354	50	74	64	1.8	9.0		30.67	**102.3**
8	84	165.23	1.7	354	50	74	64	1.8	9.0		30.67	**102.6**
	87	167.45	1.7	354	52	75	66	1.8	9.0		30.67	**102.6**
	90	169.66	1.7	357	51	75	65	1.8	9.0		30.73	**101.9**
	93	171.84	1.7	357	52	76	66	1.8	9.0		30.73	**100.8**
9	96	174.02	1.6	354	53	77	67	1.7	9.0		29.75	**100.6**
	99	176.19	1.7	353	52	77	67	1.7	9.0		30.65	**102.8**

ORTECH Environmental

Plant:	Clean Harbors		**Plant Location:**	Corunna, ON
Test No.:	3 - SVOC		**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019		**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3489.7
Static Pressure	0.750 "H_2O	**WCBDA (g)**	17.8
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.39 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.5 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	178.36	1.6	350	52	77	67	1.7	9.0		29.68	99.6
	105	180.53	1.45	347	51	78	68	1.6	9.0		28.20	102.5
10	108	182.60	1.45	347	51	78	68	1.6	9.0		28.20	102.3
	111	184.66	1.5	347	51	78	68	1.6	9.0		28.69	101.8
	114	186.72	1.45	347	51	78	69	1.6	9.0		28.20	100.1
	117	188.76	1.45	347	51	80	69	1.6	9.0		28.20	100.7
	120	190.81								0.39		101.1
1	0	191.20	2	348	68	70	72	2.1	9.0		33.14	
	3	193.47	2	348	47	73	73	2.1	9.0		33.14	96.1
	6	195.88	2	348	47	75	74	2.1	9.0		33.14	101.6
	9	198.15	1.95	350	48	76	74	2.1	9.0		32.77	95.5
2	12	200.49	2	349	48	78	73	2.1	9.0		33.16	99.7
	15	202.86	1.9	349	50	79	74	2.1	9.0		32.32	99.5
	18	205.26	1.9	352	50	80	74	2.1	9.0		32.38	103.2
	21	207.64	1.9	350	50	80	74	2.1	9.0		32.34	102.5
3	24	210.03	1.9	349	50	81	74	2.1	9.0		32.32	102.8
	27	212.41	1.9	352	53	82	75	2.1	9.0		32.38	102.2
	30	214.80	1.85	352	54	82	75	2.1	9.0		31.95	102.6
	33	217.17	1.85	351	53	82	76	2.1	9.0		31.94	103.1
4	36	219.55	1.85	353	52	82	76	2.1	9.0		31.97	103.4
	39	221.93	1.85	353	52	82	76	2.1	9.0		31.97	103.5
	42	224.31	1.8	350	54	83	76	2.1	9.0		31.48	103.5
	45	226.68	1.85	350	54	83	76	2.1	9.0		31.92	104.2
5	48	229.10	1.8	350	54	83	76	2.1	9.0		31.48	105.0
	51	231.43	1.85	349	54	84	77	2.1	9.0		31.90	102.4
	54	233.80	1.85	348	54	84	78	2.1	9.0		31.88	102.5
	57	236.12	1.8	348	55	85	78	2.1	9.0		31.44	100.2
6	60	238.46	1.9	349	55	85	78	2.1	9.0		32.32	102.4
	63	240.80	1.9	348	56	85	77	2.1	9.0		32.30	99.7
	66	243.14	2.1	348	56	85	77	2.3	10.0		33.96	99.7
	69	245.62	2.1	348	56	85	77	2.3	10.0		33.96	100.6
7	72	248.16	1.8	348	55	85	77	2	9.0		31.44	103.0
	75	250.59	1.8	349	57	85	78	2	9.0		31.46	106.4
	78	252.98	1.9	354	55	85	78	2	9.0		32.42	104.6

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	October 10, 2019	**Operator:**	DU

Pitot Factor	0.849	**Filter (mg)**	0
DGMCF	1.006	**Probe (mg)**	0
Barometric Pressure	29.59 "Hg	**CWTR (g)**	3489.7
Static Pressure	0.750 "H_2O	**WCBDA (g)**	17.8
Nozzle	0.2545 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.39 ft^3
Length	0.000 ft	**Reading Interval**	3 minutes
Width	0.000 ft	**Number of Ports**	2
		Number of points / Port	10

Combustion Gases	
O2%	9.9
CO2%	8.10
COppm	86.6

Measured H2O
47.5 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	255.32	1.9	354	58	85	78	2	9.0		32.42	**100.0**
8	84	257.69	1.7	352	59	86	78	2	9.0		30.63	**101.3**
	87	260.05	1.7	356	57	86	78	1.9	9.0		30.71	**106.4**
	90	262.37	1.7	356	57	86	78	1.9	9.0		30.71	**104.8**
	93	264.67	1.7	355	56	86	78	1.9	9.0		30.69	**103.9**
9	96	267.02	1.4	350	56	86	78	1.6	9.0		27.76	**106.1**
	99	269.17	1.4	350	56	86	78	1.6	9.0		27.76	**106.6**
	102	271.28	1.45	349	57	87	79	1.6	9.0		28.24	**104.6**
	105	273.58	1.45	349	57	87	79	1.6	9.0		28.24	111.7
10	108	275.46	1.4	349	56	87	78	1.6	9.0		27.75	**91.3**
	111	277.55	1.5	348	55	87	78	1.6	9.0		28.70	**103.4**
	114	279.63	1.4	348	55	87	78	1.6	9.0		27.73	**99.4**
	117	281.72	1.4	349	54	88	79	1.6	9.0		27.75	**103.4**
	120	283.81										**103.2**

APPENDIX 24

ORTECH One-Minute Average
Combustion Gas Results
(15 pages)

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:52	9.51	8.45	529	74.8	33.9		136	139
09:53	9.12	8.76	560	72.2	35.2		145	148
09:54	9.36	8.57	529	73.2	34.3		142	144
09:55	9.17	8.73	536	68.0	31.5		154	156
09:56	9.71	8.32	508	66.9	32.0		146	149
09:57	9.24	8.66	531	69.0	32.6		149	151
09:58	9.17	8.71	544	74.0	35.3		143	145
09:59	8.83	8.97	575	76.4	35.8		146	149
10:00	9.46	8.52	556	86.2	40.0		134	136
10:01	9.16	8.72	543	70.2	32.1	34.3	145	146
10:02	9.17	8.72	556	78.2	37.8	34.7	141	143
10:03	9.22	8.67	530	71.1	31.5	34.3	149	149
10:04	9.43	8.54	529	68.8	33.3	34.2	150	153
10:05	9.42	8.52	515	65.3	30.1	34.0	147	149
10:06	9.17	8.71	540	71.7	34.4	34.3	146	149
10:07	9.04	8.81	538	71.7	33.2	34.3	147	149
10:08	9.07	8.82	564	79.2	37.4	34.5	145	148
10:09	9.53	8.43	524	74.8	33.0	34.3	139	143
10:10	9.11	8.76	548	72.4	33.5	33.6	148	150
10:11	9.29	8.62	524	71.8	33.4	33.7	143	145
10:12	9.10	8.77	546	69.0	32.0	33.2	155	156
10:13	9.64	8.35	516	69.7	32.6	33.3	143	146
10:14	9.11	8.75	548	70.9	32.6	33.2	149	151
10:15	9.11	8.76	551	78.0	36.1	33.8	141	143
10:16	8.84	8.96	573	75.3	34.4	33.8	151	153
10:17	9.36	8.58	562	87.9	39.6	34.5	134	138
10:18	9.30	8.60	529	71.0	31.3	33.8	145	145
10:19	9.26	8.65	539	71.3	34.3	34.0	146	149
10:20	9.36	8.56	511	67.7	30.0	33.6	151	153
10:21	9.54	8.43	511	65.9	31.5	33.4	155	158
10:22	9.61	8.36	496	63.6	29.1	33.2	152	153
10:23	9.33	8.59	523	67.7	32.1	33.1	151	154
10:24	9.24	8.65	518	67.6	30.6	32.9	152	154
10:25	9.08	8.80	554	75.1	36.1	32.9	147	150
10:26	9.69	8.30	509	70.9	32.6	32.7	140	142
10:27	9.19	8.69	538	69.8	33.7	32.2	149	152
10:28	9.41	8.53	519	74.0	34.1	32.4	144	145
10:29	9.26	8.64	517	67.3	30.2	32.0	155	158
10:30	9.73	8.29	495	66.5	30.9	32.1	149	152
10:31	9.35	8.57	513	65.6	30.2	32.0	150	153
10:32	9.24	8.65	530	69.2	34.1	32.5	145	147
10:33	8.97	8.86	551	73.5	34.7	32.7	148	151
10:34	9.48	8.49	543	79.5	38.4	33.5	139	142
10:35	9.35	8.57	522	70.3	31.9	33.1	143	146
10:36	9.29	8.63	536	71.9	34.5	33.3	145	148
10:37	9.45	8.50	501	67.5	30.4	32.9	150	151
10:38	9.51	8.46	507	66.8	31.9	32.7	153	156
10:39	9.73	8.27	484	64.4	29.2	32.6	148	151
10:40	9.39	8.54	509	67.8	31.7	32.7	151	154
10:41	9.34	8.58	506	69.3	31.4	32.8	150	153
10:42	9.13	8.76	536	71.8	33.8	32.8	151	154
10:43	9.76	8.26	501	68.4	32.3	32.5	141	143
10:44	9.34	8.58	518	67.9	30.9	31.8	151	153
10:45	9.48	8.47	509	69.9	33.2	31.9	144	147
10:46	9.38	8.54	504	65.6	29.1	31.4	157	159
10:47	9.88	8.18	485	65.5	30.6	31.4	150	153
10:48	9.50	8.45	497	65.1	28.8	31.1	153	156
10:49	9.43	8.51	507	69.2	33.0	31.5	148	151

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019

	O2	CO2	SO2	CO	THC (ppm)		NO	NOx
Time	%	%	ppm	ppm	1-min	10-min	ppm	ppm
10:50	9.17	8.71	521	68.7	31.3	31.5	152	155
10:51	9.49	8.48	526	73.9	35.9	31.9	142	146
10:52	9.39	8.53	517	70.1	31.7	31.7	142	144
10:53	9.25	8.65	539	75.0	35.7	32.0	143	146
10:54	9.42	8.51	507	71.1	30.9	32.0	149	150
10:55	9.51	8.46	512	66.4	30.7	31.8	154	157
10:56	9.73	8.27	487	63.0	28.3	31.7	149	151
10:57	9.41	8.52	510	66.3	31.2	31.8	151	154
10:58	9.36	8.56	511	68.6	31.2	32.0	146	148
10:59	9.06	8.81	547	72.8	35.3	32.2	147	151
11:00	9.74	8.27	512	73.8	34.4	32.5	137	139
11:01	9.26	8.64	530	67.5	32.1	32.2	148	151
11:02	9.42	8.52	521	71.2	33.9	32.4	143	145
11:03	9.31	8.60	516	65.8	30.1	31.8	152	154
11:04	9.77	8.26	495	64.4	30.3	31.8	149	152
11:05	9.42	8.51	505	63.3	28.7	31.6	150	153
11:06	9.41	8.53	518	69.6	33.0	32.0	145	148
11:07	9.10	8.75	532	68.4	31.2	32.0	149	151
11:08	9.41	8.56	543	77.4	37.5	32.7	139	142
11:09	9.50	8.45	508	68.2	30.4	32.2	141	143
11:10	9.30	8.62	534	68.9	33.6	32.1	145	148
11:11	9.44	8.50	507	68.4	31.6	32.0	144	146
11:12	9.47	8.49	510	65.3	31.0	31.7	151	154
11:13	9.71	8.28	492	62.7	29.2	31.6	146	149
11:14	9.32	8.59	522	67.2	31.5	31.8	147	150
11:15	9.35	8.57	514	69.6	32.9	32.2	144	147
11:16	9.01	8.84	549	73.9	35.3	32.4	146	149
11:17	9.77	8.26	509	75.4	33.8	32.7	134	137
11:18	9.29	8.61	529	70.1	31.7	32.1	146	149
11:19	9.37	8.56	525	77.0	35.4	32.6	138	140
11:20	9.34	8.57	510	68.5	30.1	32.2	152	154
11:21	9.75	8.28	495	66.2	31.5	32.2	148	151
11:22	9.49	8.46	498	65.0	28.7	32.0	148	150
11:23	9.35	8.57	522	70.4	32.8	32.4	144	147
11:24	9.13	8.73	531	72.4	32.8	32.5	144	146
11:25	9.35	8.59	549	85.8	39.4	33.1	136	139
11:26	9.51	8.43	518	75.4	31.7	32.8	136	139
11:27	9.24	8.65	546	78.6	35.0	32.9	140	143
11:28	9.36	8.56	523	74.5	32.0	32.9	140	142
11:29	9.33	8.60	530	69.5	31.7	32.6	148	151
11:30	9.72	8.27	505	68.6	30.2	32.6	141	143
11:31	9.27	8.63	535	68.8	31.6	32.6	145	148
11:32	9.32	8.58	528	70.9	33.5	33.1	141	143
11:33	8.95	8.87	564	77.6	34.9	33.3	144	147
11:34	9.62	8.37	542	92.5	38.7	33.9	129	131
11:35	9.17	8.69	549	77.4	32.5	33.2	141	143
11:36	9.21	8.67	555	95.5	39.5	34.0	132	135
11:37	9.17	8.69	540	76.4	32.1	33.7	144	146
11:38	9.57	8.41	534	76.9	34.7	33.9	140	144
11:39	9.38	8.53	520	68.3	30.1	33.8	144	145
11:40	9.25	8.63	538	77.0	35.0	34.2	141	144
11:41	9.02	8.80	545	78.2	34.3	34.5	143	145
11:42	9.07	8.78	578	100	43.4	35.5	131	133
11:43	9.35	8.54	532	92.5	36.4	35.7	126	128
11:44	9.03	8.80	562	91.2	38.1	35.6	137	140
11:45	9.13	8.71	538	95.7	37.9	36.1	131	132
11:46	9.05	8.79	545	83.2	35.7	35.8	143	146
11:47	9.52	8.41	512	84.0	34.5	36.0	135	137

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:48	9.10	8.74	531	76.6	33.5	35.9	142	144
11:49	9.09	8.74	532	79.5	35.7	36.4	137	138
11:50	8.69	9.05	585	94.1	39.3	36.9	138	141
11:51	9.31	8.58	559	103	46.9	38.1	118	119
11:52	8.99	8.82	552	90.8	34.5	37.2	136	138
13:38	9.49	8.34	451	71.1	31.7		146	150
13:39	9.11	8.66	474	71.8	32.0		149	153
13:40	9.11	8.65	470	74.0	33.1		147	150
13:41	8.81	8.89	496	76.2	33.0		148	151
13:42	9.46	8.38	472	75.7	35.6		138	140
13:43	9.04	8.70	487	73.7	31.5		147	150
13:44	9.15	8.62	483	78.3	35.6		141	143
13:45	9.09	8.66	471	71.6	30.0		153	155
13:46	9.47	8.37	464	73.9	32.6		146	150
13:47	9.23	8.55	465	70.5	30.0	32.5	147	149
13:48	9.09	8.67	486	76.0	33.8	32.7	144	147
13:49	8.94	8.78	485	74.2	32.2	32.7	148	150
13:50	9.09	8.69	509	81.7	36.9	33.1	143	146
13:51	9.24	8.55	484	75.8	33.8	33.2	141	142
13:52	8.99	8.77	506	76.7	34.2	33.1	143	146
13:53	8.80	8.89	531	84.3	35.8	33.5	139	143
13:54	8.42	9.21	611	106	53.3	35.3	119	122
13:55	9.26	8.51	503	101	48.5	37.1	122	122
13:56	8.87	8.83	512	77.9	32.5	37.1	149	152
13:57	9.03	8.70	488	72.9	32.6	37.3	151	153
13:58	8.83	8.86	501	68.2	29.0	36.9	161	164
13:59	9.75	8.14	439	64.5	28.3	36.5	159	160
14:00	9.81	8.07	403	60.7	19.3	34.7	176	179
14:01	9.68	8.18	416	61.0	20.8	33.4	174	178
14:02	9.13	8.61	465	63.4	26.0	32.6	163	167
14:03	9.30	8.49	481	68.5	33.1	32.3	152	156
14:04	9.12	8.62	486	68.0	31.5	30.2	151	155
14:05	8.86	8.84	524	83.6	39.2	29.2	143	146
14:06	8.80	8.87	518	81.2	36.4	29.6	148	150
14:07	8.91	8.81	536	95.3	43.6	30.7	137	140
14:08	9.62	8.23	441	70.5	29.8	30.8	154	155
14:09	9.63	8.22	418	62.0	23.7	30.3	172	176
14:10	9.69	8.16	408	61.5	23.8	30.8	170	174
14:11	9.24	8.53	448	63.4	27.8	31.5	167	170
14:12	9.77	8.11	424	62.4	28.6	31.8	160	163
14:13	9.32	8.46	441	61.7	25.8	31.0	166	169
14:14	9.35	8.44	445	63.1	28.9	30.8	163	166
14:15	9.04	8.68	463	63.3	24.9	29.3	168	171
14:16	9.57	8.29	447	63.5	27.3	28.4	160	162
14:17	9.71	8.16	411	61.1	20.4	26.1	172	174
14:18	9.73	8.15	407	60.5	20.2	25.1	172	175
14:19	9.33	8.45	428	60.5	20.1	24.8	168	172
14:20	9.43	8.40	447	62.2	24.3	24.8	163	166
14:21	9.49	8.34	430	58.9	21.9	24.2	162	165
14:22	9.23	8.54	453	60.2	22.8	23.6	164	167
14:23	9.25	8.52	443	60.5	23.1	23.4	167	169
14:24	9.14	8.64	474	62.0	29.4	23.4	164	167
14:25	9.69	8.19	425	59.6	33.0	24.2	161	164
14:26	9.90	8.01	389	57.7	25.3	24.0	174	176
14:27	9.32	8.47	430	59.8	22.9	24.3	174	178
14:28	9.05	8.71	470	64.1	30.1	25.3	161	164
14:29	9.67	8.20	433	60.5	33.6	26.6	159	163
14:30	9.27	8.51	449	59.5	28.4	27.0	167	170

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:31	9.22	8.56	457	62.1	30.8	27.9	162	165
14:32	8.96	8.75	471	61.6	30.8	28.7	167	169
14:33	9.39	8.44	466	63.5	34.0	29.8	159	162
14:34	9.61	8.25	418	59.0	31.0	30.0	167	170
14:35	9.59	8.26	418	59.2	25.7	29.3	173	177
14:36	9.21	8.55	445	60.4	27.0	29.4	169	172
14:37	9.23	8.57	473	64.5	32.4	30.4	160	163
14:38	9.74	8.14	416	59.2	33.2	30.7	160	162
14:39	9.74	8.13	399	58.1	24.8	29.8	174	177
14:40	9.73	8.14	393	59.4	24.5	29.4	174	178
14:41	9.49	8.35	418	62.0	24.1	28.7	175	179
14:42	9.76	8.11	415	61.8	29.5	28.6	161	163
14:43	9.22	8.56	454	64.2	29.2	28.1	160	163
14:44	9.37	8.43	443	66.4	34.8	28.5	155	157
14:45	9.16	8.61	453	65.8	32.6	29.2	161	164
14:46	9.70	8.18	432	65.5	34.3	29.9	152	156
14:47	9.20	8.56	451	65.4	32.0	29.9	154	156
14:48	9.15	8.60	458	68.9	35.2	30.1	150	152
14:49	8.69	8.97	501	78.8	35.0	31.1	153	156
14:50	9.21	8.58	493	90.1	45.3	33.2	134	137
14:51	9.05	8.68	476	73.0	41.4	34.9	143	143
14:52	8.96	8.77	493	77.6	37.5	35.7	143	146
14:53	9.04	8.69	466	73.1	40.0	36.8	147	149
14:54	9.19	8.60	468	73.6	36.5	37.0	149	152
14:55	9.33	8.46	444	68.4	36.3	37.3	145	147
14:56	8.93	8.79	481	74.6	35.0	37.4	145	148
14:57	8.78	8.90	490	80.8	40.3	38.2	142	144
14:58	8.62	9.06	528	94.9	42.0	38.9	136	138
14:59	9.25	8.53	478	88.9	48.3	40.2	127	129
15:00	8.81	8.89	502	79.9	39.2	39.6	141	144
15:01	9.00	8.74	487	90.1	44.0	39.9	132	134
15:02	8.79	8.90	491	77.5	39.9	40.2	145	148
15:03	9.39	8.43	464	79.3	41.2	40.3	136	139
15:04	8.91	8.79	478	77.1	37.7	40.4	142	143
15:05	8.91	8.81	489	88.9	41.7	40.9	134	137
15:06	8.67	8.99	498	82.5	41.5	41.6	141	142
15:07	9.06	8.71	500	93.6	44.5	42.0	129	132
15:08	9.00	8.73	477	80.5	36.2	41.4	135	136
15:09	8.87	8.84	499	87.4	35.7	40.2	135	137
15:10	8.93	8.79	476	83.4	36.1	39.8	138	140
15:11	8.99	8.77	500	84.0	34.3	38.9	140	143
15:12	9.17	8.59	477	83.2	36.1	38.5	132	134
15:13	8.81	8.88	509	87.2	34.9	37.9	136	139
15:14	8.84	8.86	499	88.6	37.8	37.9	135	137
15:15	8.60	9.07	530	91.2	36.7	37.4	136	139
15:16	9.26	8.53	489	86.6	39.9	37.2	129	130
15:17	8.79	8.91	518	81.1	33.2	36.1	139	142
15:18	8.98	8.76	502	94.8	38.8	36.3	131	133
15:19	8.86	8.85	491	79.1	33.7	36.1	143	146
15:20	9.38	8.45	465	75.9	34.4	36.0	138	140
15:21	9.08	8.67	466	72.2	30.7	35.6	143	146
15:22	8.98	8.76	483	78.4	34.9	35.5	138	140
15:23	8.77	8.93	492	77.0	32.8	35.3	143	145
15:24	9.10	8.69	502	84.7	37.7	35.3	134	136
15:25	9.14	8.63	471	74.3	34.0	35.0	135	137
15:26	8.93	8.80	494	80.2	33.4	34.4	138	140
15:27	9.04	8.71	472	79.0	35.1	34.5	139	141
15:28	9.08	8.70	486	77.1	32.4	33.9	143	146

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
15:29	9.43	8.39	449	71.9	32.3	33.8	140	142
15:30	9.01	8.74	473	75.1	30.4	33.4	143	145
15:31	8.99	8.75	468	77.5	34.5	33.7	140	142
15:32	8.69	9.00	501	82.9	33.4	33.6	142	144
15:33	9.33	8.49	477	86.6	38.9	34.2	126	130
15:34	8.90	8.82	489	76.0	32.6	33.7	140	143
15:35	9.03	8.72	485	82.6	36.6	34.0	133	136
15:36	8.91	8.81	483	75.9	32.4	33.9	145	146
15:37	9.40	8.44	463	79.4	33.9	33.8	138	141
15:38	9.10	8.65	462	75.5	30.6	33.6	139	141
Min	8.42	8.01	389	57.7	19.3	23.4	118	119
Max	9.90	9.21	611	106	53.3	42.0	176	179
Avg	9.26	8.59	498	73.2	33.1	33.0	147	150

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:04	9.62	8.41	486	97.7	28.5		127	129
09:05	9.69	8.35	462	84.6	30.5		127	128
09:06	9.49	8.50	486	85.5	31.3		131	132
09:07	9.51	8.48	476	86.8	31.6		130	131
09:08	9.50	8.49	488	87.1	32.2		134	136
09:09	9.92	8.16	454	80.7	29.4		130	132
09:10	9.59	8.42	473	77.4	33.4		135	137
09:11	9.57	8.43	471	79.0	33.8		134	136
09:12	9.18	8.74	511	95.2	34.2		134	136
09:13	9.87	8.22	484	97.6	31.6	31.6	123	126
09:14	9.42	8.55	499	84.1	31.8	32.0	132	134
09:15	9.56	8.46	494	96.9	30.6	32.0	128	130
09:16	9.48	8.52	479	77.7	33.1	32.2	138	140
09:17	9.96	8.17	463	77.7	30.0	32.0	136	137
09:18	9.72	8.33	459	72.8	33.0	32.1	136	137
09:19	9.59	8.44	472	78.7	27.7	31.9	134	136
09:20	9.33	8.63	489	81.5	31.9	31.8	137	138
09:21	9.51	8.52	511	101	22.4	30.6	129	131
09:22	9.70	8.35	476	86.2	26.7	29.9	129	130
09:23	9.53	8.49	493	84.1	21.7	28.9	133	135
09:24	9.62	8.42	477	81.5	32.1	28.9	134	135
09:25	9.51	8.52	490	79.8	31.0	29.0	138	139
09:26	9.94	8.17	459	80.7	29.4	28.6	131	131
09:27	9.62	8.42	473	75.1	30.2	28.6	138	139
09:28	9.59	8.44	472	81.7	30.7	28.4	135	136
09:29	9.16	8.78	516	96.6	36.6	29.3	135	137
09:30	9.86	8.26	490	101	27.3	28.8	125	127
09:31	9.49	8.53	492	84.0	29.1	29.5	136	137
09:32	9.59	8.46	488	91.1	28.7	29.7	132	133
09:33	9.52	8.51	476	75.8	37.3	31.2	140	141
09:34	9.86	8.26	471	79.4	25.6	30.6	137	139
09:35	9.74	8.33	461	73.8	29.7	30.4	136	138
09:36	9.59	8.45	477	80.2	24.5	30.0	136	138
09:37	9.31	8.66	495	85.1	32.1	30.1	138	140
09:38	9.37	8.64	532	103	28.7	29.9	129	131
09:39	9.65	8.40	486	94.7	26.1	28.9	125	127
09:40	9.43	8.57	503	87.9	29.7	29.1	134	136
09:41	9.53	8.50	484	85.1	36.5	29.9	134	135
09:42	9.49	8.54	489	76.0	35.1	30.5	141	143
09:43	9.94	8.19	460	76.9	29.1	29.7	137	137
09:44	9.57	8.47	476	74.0	31.8	30.3	139	141
09:45	9.52	8.49	479	82.2	28.1	30.2	136	137
09:46	9.11	8.81	520	95.3	32.4	31.0	136	138
09:47	9.76	8.33	500	102	26.3	30.4	125	126
09:48	9.47	8.53	493	84.3	30.1	30.5	135	136
09:49	9.50	8.52	497	93.3	25.4	30.4	131	133
09:50	9.43	8.56	481	76.2	36.8	31.2	140	141
09:51	9.73	8.35	482	80.3	24.7	30.0	136	138
09:52	9.71	8.34	468	72.6	31.6	29.6	135	136
09:53	9.51	8.50	486	80.7	27.6	29.5	136	138
09:54	9.30	8.65	496	84.2	28.6	29.2	137	138
09:55	9.34	8.65	532	103	30.7	29.4	132	134
09:56	9.64	8.39	489	88.1	29.7	29.1	129	132
09:57	9.37	8.61	506	85.5	30.6	29.6	136	138
09:58	9.53	8.48	483	83.8	36.3	30.2	135	136
09:59	9.39	8.60	492	76.8	29.6	30.6	142	143
10:00	9.91	8.18	468	78.5	28.8	29.8	134	135
10:01	9.49	8.50	483	74.5	31.2	30.5	140	141

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:02	9.43	8.54	489	84.3	28.7	30.2	136	138
10:03	9.00	8.87	534	97.2	31.6	30.6	137	139
10:04	9.58	8.46	522	103	26.4	30.4	123	125
10:05	9.40	8.57	503	90.9	31.0	30.4	132	134
10:06	9.40	8.58	511	97.9	28.6	30.3	132	134
10:07	9.50	8.50	479	80.3	38.0	31.0	140	140
10:08	9.73	8.33	481	79.5	26.3	30.0	140	142
10:09	9.77	8.28	459	72.1	28.4	29.9	139	139
10:10	9.54	8.46	476	77.3	28.6	29.9	140	141
10:11	9.42	8.55	475	72.4	29.9	29.8	143	145
10:12	9.39	8.60	497	76.6	28.4	29.7	142	144
10:13	9.82	8.25	460	70.8	26.8	29.3	135	137
10:14	9.52	8.48	477	69.1	28.7	29.5	143	146
10:15	9.60	8.42	471	76.7	28.4	29.2	140	141
10:16	9.43	8.55	480	73.0	29.9	29.3	144	146
10:17	9.97	8.13	454	71.9	24.9	28.0	138	139
10:18	9.64	8.38	464	67.5	30.1	28.4	142	143
10:19	9.62	8.39	464	72.5	26.9	28.3	140	142
10:20	9.27	8.66	490	73.1	33.2	28.7	143	145
10:21	9.76	8.31	490	88.9	23.3	28.1	135	137
10:22	9.55	8.44	476	72.2	29.5	28.2	139	141
10:23	9.51	8.48	489	76.2	26.8	28.2	139	140
10:24	9.52	8.47	471	69.6	28.0	28.1	143	144
10:25	9.69	8.36	477	72.6	25.8	27.8	142	144
10:26	9.84	8.23	453	66.8	27.6	27.6	139	140
10:27	9.56	8.44	474	71.9	27.7	27.9	141	143
10:28	9.44	8.53	478	72.5	28.5	27.7	142	144
10:29	9.32	8.64	507	83.8	30.3	28.1	139	141
10:30	9.83	8.23	470	79.3	27.8	27.5	133	135
10:31	9.49	8.50	484	71.6	26.3	27.8	140	141
10:32	9.65	8.37	470	73.8	30.3	27.9	137	138
10:33	9.42	8.55	481	69.6	30.3	28.2	145	146
10:34	10.01	8.11	456	68.7	26.4	28.1	138	140
10:35	9.63	8.39	466	66.0	28.9	28.4	142	144
10:36	9.55	8.45	471	73.5	24.9	28.1	139	141
10:37	9.21	8.70	496	78.5	30.0	28.4	141	142
10:38	9.66	8.38	490	90.2	24.8	28.0	133	136
10:39	9.67	8.37	464	71.1	26.5	27.6	137	138
10:40	9.54	8.48	478	73.9	26.3	27.5	140	142
10:41	9.55	8.47	464	71.2	31.6	28.0	142	142
10:42	9.64	8.41	475	72.8	27.0	27.7	141	143
10:43	9.83	8.24	457	69.4	28.0	27.4	137	138
10:44	9.57	8.45	474	70.3	28.6	27.7	141	142
10:45	9.57	8.46	464	69.2	31.0	27.9	142	143
10:46	9.36	8.63	489	73.6	29.6	28.3	140	142
10:47	9.93	8.18	458	74.9	27.1	28.0	133	134
10:48	9.52	8.50	476	70.6	31.6	28.7	139	141
10:49	9.64	8.41	471	75.8	27.3	28.8	135	136
10:50	9.52	8.51	469	68.1	29.2	29.1	142	143
10:51	9.99	8.17	451	69.1	25.8	28.5	138	139
10:52	9.73	8.35	454	66.3	29.3	28.7	140	142
10:53	9.70	8.37	457	70.3	27.8	28.7	139	141
10:54	9.33	8.64	480	71.6	29.3	28.8	141	143
10:55	9.62	8.44	495	89.3	24.3	28.1	133	135
10:56	9.59	8.44	473	76.3	28.8	28.0	135	135
10:57	9.42	8.58	494	78.1	25.7	27.9	137	138
10:58	9.52	8.50	472	76.3	29.0	27.6	137	138
10:59	9.55	8.49	479	71.2	29.3	27.8	141	143

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:00	9.92	8.20	447	65.2	26.8	27.6	139	140
11:01	9.69	8.38	454	64.5	28.3	27.9	144	145
11:02	9.65	8.40	453	67.4	27.3	27.7	142	144
11:03	9.30	8.67	488	74.6	29.2	27.8	141	143
11:04	10.00	8.13	455	77.4	27.2	27.6	131	133
12:03	9.58	8.38	462	85.8	26.8		130	132
12:04	10.17	7.92	432	82.9	28.4		125	127
12:05	9.82	8.19	443	78.0	29.3		132	133
12:06	9.94	8.09	436	77.3	31.8		131	132
12:07	9.78	8.21	438	76.6	30.5		135	136
12:08	10.25	7.86	420	77.6	28.5		130	131
12:09	9.97	8.07	426	75.4	29.6		132	134
12:10	9.93	8.10	430	79.4	27.1		131	133
12:11	9.62	8.32	447	80.7	30.2		133	135
12:12	9.99	8.06	451	83.2	25.8	28.8	129	131
12:13	9.92	8.09	435	77.7	28.5	29.0	129	130
12:14	9.82	8.17	446	80.6	27.4	28.9	130	132
12:15	9.86	8.14	432	78.3	32.0	29.1	132	132
12:16	9.93	8.10	436	77.4	25.3	28.5	134	136
12:17	10.19	7.89	415	75.7	27.4	28.2	130	132
12:18	9.95	8.07	425	77.2	26.3	28.0	133	135
12:19	9.86	8.13	425	78.9	28.8	27.9	133	135
12:20	9.58	8.35	451	82.1	26.1	27.8	131	133
12:21	10.16	7.90	427	80.2	26.6	27.4	124	127
12:22	9.81	8.18	437	79.8	27.9	27.6	132	133
12:23	9.94	8.08	431	79.4	31.3	27.9	129	131
12:24	9.81	8.17	430	77.9	30.4	28.2	135	137
12:25	10.31	7.80	410	77.7	28.6	27.9	131	133
12:26	10.04	7.99	412	77.1	30.1	28.4	131	133
12:27	9.97	8.04	420	79.5	26.8	28.3	131	133
12:28	9.70	8.24	432	81.2	27.6	28.4	132	134
12:29	9.99	8.04	440	88.5	24.0	27.9	127	130
12:30	10.04	7.99	418	79.7	26.9	28.0	127	129
12:31	9.90	8.11	428	79.9	25.4	27.9	130	132
12:32	10.02	8.01	412	80.0	33.1	28.4	132	133
12:33	10.03	8.02	416	80.2	27.8	28.1	133	135
12:34	10.24	7.83	399	76.6	29.0	27.9	128	130
12:35	9.90	8.09	419	79.6	25.9	27.7	131	133
12:36	9.86	8.12	418	78.9	27.0	27.4	131	133
12:37	9.55	8.36	446	83.0	26.2	27.3	132	134
12:38	10.20	7.86	417	78.5	28.1	27.3	129	129
12:39	9.86	8.12	422	76.9	26.9	27.6	132	133
12:40	9.95	8.05	417	78.7	30.0	27.9	130	131
12:41	9.82	8.15	417	78.2	28.4	28.2	134	136
12:42	10.20	7.87	410	78.6	26.5	27.6	131	132
12:43	10.03	7.99	405	77.0	28.5	27.6	130	132
12:44	9.96	8.05	415	82.2	23.9	27.1	130	132
12:45	9.64	8.28	432	84.5	28.6	27.4	131	133
12:46	9.82	8.16	443	94.1	24.8	27.2	126	128
12:47	9.99	8.02	413	83.4	27.5	27.3	124	126
12:48	9.82	8.16	427	84.5	26.0	27.1	129	131
12:49	9.92	8.07	412	81.3	30.1	27.4	130	132
12:50	9.92	8.09	416	81.8	27.4	27.2	133	134
12:51	10.26	7.82	394	78.6	28.3	27.2	129	131
12:52	9.91	8.09	413	81.0	27.0	27.2	131	132
12:53	9.92	8.08	410	81.0	27.0	27.1	130	132
12:54	9.50	8.40	441	86.4	27.0	27.4	131	133
12:55	10.15	7.92	419	87.0	28.4	27.4	123	125

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
12:56	9.85	8.14	421	81.2	27.7	27.6	130	132
12:57	9.92	8.08	421	85.8	29.5	27.8	128	130
12:58	9.80	8.17	416	84.8	31.4	28.4	133	134
12:59	10.13	7.93	410	82.5	27.9	28.2	131	133
13:00	10.05	7.98	400	77.4	30.0	28.4	130	131
13:01	9.98	8.04	406	80.3	24.9	28.1	131	133
13:02	9.73	8.23	416	82.5	27.5	28.1	131	133
13:03	9.87	8.14	431	90.5	23.7	27.8	128	130
13:04	10.08	7.97	404	83.0	27.9	27.9	126	126
13:05	9.84	8.15	419	83.7	24.8	27.6	130	131
13:06	9.95	8.07	407	84.0	30.5	27.8	129	130
13:07	9.82	8.17	420	85.4	27.9	27.7	132	134
13:08	10.30	7.80	391	83.6	27.9	27.3	126	128
13:09	9.99	8.04	399	84.9	29.1	27.4	131	132
13:10	9.99	8.04	398	83.2	26.8	27.1	130	132
13:11	9.64	8.29	421	87.6	28.4	27.5	131	133
13:12	10.22	7.88	404	88.8	28.8	27.6	125	127
13:13	9.91	8.10	410	83.3	27.8	28.0	128	130
13:14	9.95	8.07	414	86.0	30.1	28.2	128	129
13:15	9.89	8.11	405	83.7	31.0	28.8	131	133
13:16	10.25	7.86	398	84.4	25.9	28.4	130	132
13:17	10.24	7.85	384	82.3	29.1	28.5	128	130
13:18	10.19	7.90	394	85.7	26.8	28.4	129	131
13:19	10.12	7.96	392	88.6	27.5	28.2	128	130
13:20	10.21	7.92	401	93.3	22.9	27.8	125	127
13:21	10.54	7.65	376	90.9	26.7	27.7	119	121
13:22	10.40	7.77	384	94.9	25.6	27.3	120	122
13:23	10.55	7.65	373	97.7	30.3	27.6	118	120
13:24	10.46	7.73	379	99.2	27.5	27.3	118	120
13:25	10.94	7.37	357	96.3	28.8	27.1	113	116
13:26	10.64	7.59	367	101.2	27.9	27.3	113	115
13:27	10.41	7.75	379	101.7	27.9	27.2	113	115
13:28	9.99	8.08	408	102.4	28.5	27.4	118	120
13:29	10.56	7.67	397	98.4	27.0	27.3	117	119
13:30	10.33	7.83	396	94.1	29.1	27.9	119	120
13:31	10.32	7.84	398	94.7	33.1	28.6	119	121
13:32	10.20	7.93	397	93.9	35.7	29.6	121	123
13:33	10.41	7.79	398	94.5	29.6	29.5	121	124
13:34	10.43	7.76	388	91.5	30.0	29.8	120	121
13:35	10.24	7.92	400	92.2	27.4	29.6	122	124
13:36	10.04	8.07	409	93.8	31.5	30.0	123	125
13:37	9.97	8.15	430	98.3	28.0	30.0	122	124
13:38	10.35	7.83	401	92.4	29.3	30.1	119	120
13:39	10.04	8.07	420	92.7	30.0	30.4	123	124
13:40	10.22	7.93	403	88.1	33.2	30.8	123	124
13:41	10.05	8.08	410	88.7	31.9	30.7	127	129
13:42	10.44	7.77	394	89.9	31.0	30.2	123	125
13:43	10.00	8.10	414	85.2	31.5	30.4	127	129
13:44	9.85	8.21	427	88.2	27.4	30.1	126	127
13:45	9.46	8.50	458	93.0	31.6	30.5	128	129
13:46	9.87	8.20	458	97.6	30.1	30.4	121	122
13:47	9.64	8.36	453	87.0	30.4	30.6	126	127
13:48	9.58	8.41	465	90.0	33.1	31.0	126	127
13:49	9.56	8.41	450	83.5	37.5	31.8	132	133
13:50	9.75	8.29	455	85.8	30.5	31.5	132	134
13:51	9.86	8.19	433	79.0	36.6	32.0	130	131
13:52	9.62	8.37	450	84.3	29.4	31.8	133	134
13:53	9.52	8.44	449	82.3	31.2	31.8	134	135

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:54	9.39	8.56	482	94.9	30.1	32.1	129	131
13:55	9.81	8.23	452	89.0	31.4	32.0	125	126
13:56	9.38	8.55	476	82.7	30.0	32.0	133	134
13:57	9.50	8.45	470	87.6	35.4	32.5	130	131
13:58	9.36	8.56	471	81.5	33.1	32.5	138	139
13:59	9.95	8.12	445	80.9	30.6	31.8	132	134
14:00	9.56	8.41	458	78.1	32.8	32.1	136	138
14:01	9.55	8.42	462	84.0	28.9	31.3	132	134
14:02	9.21	8.67	483	85.9	31.5	31.5	137	138
14:03	9.67	8.34	478	98.2	26.2	31.0	128	130
Min	9.00	7.37	357	64.5	21.7	27.1	113	115
Max	10.94	8.87	534	103	38.0	32.5	145	146
Avg	9.77	8.26	451	82.3	29.0	29.0	132	134

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:03	10.25	7.87	474	75.5	35.3		136	136
09:04	10.01	8.06	478	76.9	29.6		139	140
09:05	9.90	8.13	446	78.0	29.9		139	139
09:06	9.75	8.27	448	83.9	29.4		138	138
09:07	10.18	7.91	437	87.4	29.7		129	130
09:08	9.80	8.21	430	85.6	33.5		135	136
09:09	9.99	8.06	441	88.0	32.7		133	133
09:10	9.91	8.11	459	77.7	34.7		142	142
09:11	10.42	7.72	351	77.1	37.4		136	137
09:12	10.06	7.97	343	75.2	36.9	32.9	137	137
09:13	9.97	8.03	348	81.1	26.6	32.0	134	135
09:14	9.69	8.22	353	83.1	29.5	32.0	138	138
09:15	10.06	7.95	369	96.9	29.7	32.0	129	130
09:16	9.90	8.04	372	85.6	33.9	32.5	130	130
09:17	9.80	8.13	382	92.6	29.4	32.4	129	130
09:18	9.83	8.11	393	86.1	38.0	32.9	133	133
09:19	9.98	8.00	415	81.1	26.7	32.3	137	137
09:20	10.14	7.86	392	78	34.7	32.3	132	132
09:21	9.85	8.07	455	79.1	31.1	31.6	135	136
09:22	9.75	8.14	463	81.5	32.6	31.2	135	135
09:23	9.60	8.27	450	87.9	31.0	31.7	133	134
09:24	10.09	7.87	431	84.2	29.0	31.6	128	128
09:25	9.67	8.20	429	86.9	33.5	32.0	133	133
09:26	9.82	8.08	441	94.5	36.5	32.2	129	129
09:27	9.73	8.15	451	80.2	36.7	33.0	138	138
09:28	10.29	7.73	457	81.6	36.9	32.9	133	134
09:29	9.95	7.97	453	76	38.0	34.0	135	135
09:30	9.87	8.03	463	82.2	29.3	33.5	133	134
09:31	9.59	8.24	458	85.7	33.9	33.7	135	136
09:32	9.87	8.05	430	102.6	28.7	33.3	128	129
09:33	9.85	8.04	426	91.3	34.4	33.7	127	127
09:34	9.70	8.16	427	98.4	31.6	33.9	128	129
09:35	9.79	8.09	435	90.1	48.7	35.4	131	131
09:36	9.89	8.04	457	89.0	31.7	35.0	134	134
09:37	10.18	7.79	456	81	36.5	34.9	130	131
09:38	9.92	7.99	457	81.8	33.7	34.6	134	134
09:39	9.80	8.08	466	84.7	33.9	34.2	134	134
09:40	9.51	8.31	448	100.4	28.7	34.2	130	130
09:41	10.15	7.82	432	99.3	30.6	33.8	122	122
09:42	9.84	8.06	415	87.8	32.5	34.2	130	130
09:43	10.01	7.93	428	87.3	38.2	34.6	130	130
09:44	9.93	7.99	441	80.2	39.7	35.4	137	136
09:45	10.35	7.69	463	81.1	32.9	33.8	131	131
09:46	10.15	7.82	442	78	34.1	34.1	132	132
09:47	10.06	7.89	440	84.5	28.0	33.2	131	131
09:48	9.79	8.09	431	86.8	29.3	32.8	132	133
09:49	10.01	7.95	425	96.8	28.3	32.2	127	127
09:50	9.95	7.97	408	89.1	33.7	32.7	125	125
09:51	9.80	8.09	404	100.0	29.8	32.6	127	127
09:52	9.93	7.99	410	88.9	36.8	33.1	130	130
09:53	9.88	8.04	433	93.5	30.1	32.3	131	131
09:54	10.25	7.73	442	82	37.7	32.1	129	129
09:55	9.95	7.97	445	82.4	34.7	32.3	133	133
09:56	9.95	7.98	448	86.3	33.4	32.2	133	133
09:57	9.62	8.23	440	93.3	31.2	32.5	133	133
09:58	10.24	7.76	432	91.6	33.5	32.9	126	126
09:59	9.86	8.05	419	85.4	32.7	33.4	133	132
10:00	9.87	8.05	438	97.3	36.2	33.6	128	127

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:01	9.81	8.09	437	86.1	37.7	34.4	134	134
10:02	10.21	7.81	448	87.4	31.3	33.9	132	131
10:03	10.07	7.90	436	78	36.5	34.5	132	132
10:04	9.92	8.03	458	87.2	29.2	33.6	133	133
10:05	9.72	8.18	451	86.8	35.0	33.7	134	134
10:06	9.93	8.04	443	93.2	27.9	33.1	131	131
10:07	10.10	7.90	422	80.8	33.3	33.3	130	129
10:08	9.89	8.07	438	85.8	31.3	33.1	133	133
10:09	9.95	8.03	462	86.1	38.6	33.7	132	132
10:10	10.06	7.95	458	82.2	31.3	33.2	136	136
10:11	10.45	7.64	442	77.2	31.0	32.5	132	132
10:12	10.09	7.92	448	79.0	34.9	32.9	136	136
10:13	10.00	7.99	440	82.0	35.2	32.8	132	133
10:14	9.70	8.23	421	93.8	30.4	32.9	133	134
10:15	10.39	7.71	413	86.6	30.3	32.4	128	129
10:16	9.99	8.01	419	82.3	33.7	33.0	134	133
10:17	10.09	7.93	435	87.2	36.9	33.4	131	131
10:18	10.04	7.97	448	81.1	37.7	34.0	137	137
10:19	10.41	7.71	429	81.1	31.6	33.3	135	135
10:20	10.16	7.88	440	83.5	35.8	33.7	132	133
10:21	10.07	7.97	431	89.0	30.4	33.7	131	131
10:22	9.87	8.12	426	88.3	32.6	33.5	133	133
10:23	10.02	8.02	416	101.0	28.3	32.8	129	129
10:24	10.13	7.91	411	87.8	35.0	33.2	126	126
10:25	9.98	8.04	423	87.8	31.2	33.3	131	132
10:26	10.10	7.95	441	84.5	39.1	33.9	132	132
10:27	9.95	8.08	443	85.5	33.5	33.5	135	135
10:28	10.32	7.77	427	84.4	35.4	33.3	129	129
10:29	9.94	8.08	427	83.6	35.0	33.6	134	134
10:30	9.84	8.14	426	91.3	33.7	33.4	131	132
10:31	9.42	8.48	425	101.9	36.8	34.1	130	130
10:32	10.13	7.94	418	102.5	33.8	34.2	120	120
10:33	9.77	8.21	411	89.9	36.8	35.0	130	129
10:34	9.83	8.17	425	99.4	40.7	35.6	127	127
10:35	9.80	8.18	433	85.4	48.9	37.4	137	137
10:36	10.11	7.95	447	88.3	31.7	36.6	133	134
10:37	10.04	7.99	418	81.5	41.1	37.4	131	132
10:38	9.90	8.11	427	87.3	29.2	36.8	134	135
10:39	9.71	8.25	427	86.7	34.0	36.7	136	136
10:40	9.85	8.16	421	100.4	27.3	36.0	131	132
10:41	10.07	7.98	410	89.1	30.6	35.4	127	128
10:42	9.78	8.20	410	92.9	30.6	35.1	131	132
10:43	10.02	8.02	425	93.4	40.3	35.4	129	130
10:44	9.96	8.07	434	85.4	36.5	35.0	138	139
10:45	10.46	7.68	426	84.3	34.2	33.5	130	131
10:46	10.06	7.99	419	82.4	36.8	34.1	135	136
10:47	10.02	8.02	423	86.6	30.0	32.9	132	132
10:48	9.64	8.31	412	89.8	34.1	33.4	134	135
10:49	10.15	7.93	399	99.6	30.5	33.1	124	124
10:50	9.87	8.14	390	94.7	36.7	34.0	127	128
10:51	9.94	8.09	395	91.9	35.8	34.6	129	129
10:52	9.97	8.07	409	83.7	42.8	35.8	137	138
10:53	10.23	7.90	419	85.9	36.8	35.4	136	138
10:54	10.09	7.99	422	83.7	36.5	35.4	132	133
10:55	9.95	8.10	418	85.6	30.9	35.1	134	135
10:56	9.71	8.27	409	91.0	34.8	34.9	135	136
10:57	9.74	8.28	409	102.9	30.3	34.9	129	130
10:58	10.11	7.97	400	94.5	33.6	34.9	127	127

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:59	9.89	8.15	393	92.5	38.5	35.7	133	133
11:00	9.97	8.09	411	90.6	48.7	36.9	132	133
11:01	9.92	8.13	441	84.4	37.6	37.0	139	140
11:02	10.53	7.67	440	84.9	39.2	36.7	133	134
11:03	10.16	7.94	422	88.0	38.9	36.9	134	135
12:07	9.70	8.29	421	82.3	29.7		150	150
12:08	9.82	8.20	437	90.7	32.4		144	145
12:09	9.77	8.23	460	76.1	38.5		156	156
12:10	10.21	7.90	468	76.6	28.9		151	152
12:11	9.91	8.11	458	72.0	36.5		152	153
12:12	9.83	8.18	468	77.0	27.6		151	152
12:13	9.57	8.37	459	79.6	30.5		153	153
12:14	9.83	8.19	444	100.0	29.5		144	146
12:15	9.79	8.19	440	93.3	31.3		142	142
12:16	9.62	8.34	444	101.7	28.5	31.3	144	145
12:17	9.79	8.20	452	90.9	36.4	32.0	147	148
12:18	9.86	8.17	474	81.3	31.3	31.9	154	154
12:19	10.13	7.93	477	75.8	33.9	31.4	148	149
12:20	9.81	8.18	472	81.6	37.8	32.3	152	152
12:21	9.80	8.20	476	80.3	30.4	31.7	151	151
12:22	9.44	8.48	466	95.2	30.6	32.0	150	151
12:23	10.02	8.02	452	102.0	30.3	32.0	137	137
12:24	9.54	8.38	449	100.5	31.4	32.2	144	144
12:25	9.62	8.32	459	102.9	35.5	32.6	138	138
12:26	9.63	8.32	478	91.8	41.3	33.9	152	153
12:27	10.12	7.95	482	90.0	32.7	33.5	150	151
12:28	9.94	8.08	486	75.6	40.1	34.4	151	152
12:29	9.75	8.23	501	86.7	28.0	33.8	149	150
12:30	9.51	8.40	503	90.1	33.2	33.3	152	152
12:31	9.76	8.23	490	102.9	28.7	33.2	146	148
12:32	9.81	8.17	461	92.3	30.3	33.1	146	146
12:33	9.60	8.33	467	96.4	30.4	33.1	148	149
12:34	9.77	8.20	481	94.3	38.8	33.9	148	148
12:35	9.78	8.21	501	79.8	34.1	33.8	158	159
12:36	10.17	7.89	505	77.2	30.3	32.7	151	152
12:37	9.71	8.25	490	81.8	38.9	33.3	155	155
12:38	9.67	8.28	491	87.6	29.7	32.2	152	153
12:39	9.28	8.58	496	97.9	29.3	32.4	152	153
12:40	9.92	8.09	471	102.9	30.2	32.1	137	138
12:41	9.49	8.42	465	102.9	32.3	32.4	146	147
12:42	9.59	8.34	486	102.9	29.9	32.4	140	140
12:43	9.70	8.26	495	85.5	47.2	34.1	156	157
12:44	10.09	7.98	523	85.3	30.2	33.2	155	156
12:45	9.86	8.12	523	75.9	42.3	34.0	154	155
12:46	9.78	8.20	531	86.6	23.3	33.3	153	154
12:47	9.53	8.39	521	91.3	30.2	32.5	156	156
12:48	9.71	8.28	509	102.9	22.6	31.8	145	146
12:49	9.88	8.12	491	94.3	30.4	31.9	142	143
12:50	9.65	8.31	492	96.9	28.4	31.7	149	150
12:51	9.82	8.18	500	92.1	36.6	32.1	149	150
12:52	9.81	8.21	524	77.3	37.2	32.8	159	160
12:53	10.25	7.86	527	76.4	33.1	31.4	151	152
12:54	9.81	8.20	513	76.2	33.5	31.8	154	156
12:55	9.85	8.17	516	79.3	28.7	30.4	152	153
12:56	9.55	8.41	501	81.7	28.0	30.9	156	158
12:57	10.21	7.92	487	88.1	26.5	30.5	145	147
12:58	9.82	8.20	472	78.3	31.2	31.4	152	154
12:59	9.86	8.18	483	86.4	29.1	31.2	148	150

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:00	9.85	8.18	486	77.3	33.0	31.7	154	155
13:01	10.24	7.90	500	75.6	26.8	30.7	154	157
13:02	10.19	7.92	487	68.1	33.8	30.4	153	154
13:03	9.96	8.10	488	70.7	30.3	30.1	155	157
13:04	9.73	8.27	487	75.4	29.5	29.7	155	156
13:05	9.79	8.26	488	96.0	25.8	29.4	149	151
13:06	10.09	7.99	461	94.2	29.0	29.5	142	143
13:07	9.81	8.22	456	87.0	33.1	30.2	150	152
13:08	9.98	8.09	474	81.3	34.6	30.5	149	151
13:09	9.83	8.21	503	75.6	36.3	31.2	157	160
13:10	10.22	7.90	508	77.6	33.2	31.2	149	151
13:11	9.81	8.21	488	81.2	32.3	31.8	152	153
13:12	9.79	8.22	495	90.9	30.5	31.5	149	150
13:13	9.39	8.51	489	98.6	35.2	32.0	151	153
13:14	10.01	8.06	481	102.9	30.1	32.0	136	137
13:15	9.72	8.28	482	99.4	31.5	32.6	147	148
13:16	9.70	8.30	509	102.9	30.4	32.7	140	142
13:17	9.84	8.19	513	84.8	30.4	32.4	152	153
13:18	10.18	7.95	451	73.3	28.6	31.9	157	159
13:19	10.18	7.92	533	67.9	40.0	32.2	154	156
13:20	9.86	8.17	528	77.8	29.7	31.9	155	156
13:21	9.60	8.36	531	86.3	29.0	31.5	153	154
13:22	9.60	8.39	511	102.9	29.1	31.4	145	147
13:23	9.98	8.07	470	95.2	29.6	30.9	140	142
13:24	9.79	8.23	462	84.0	32.3	31.1	151	152
13:25	9.84	8.19	488	83.8	39.6	31.9	150	152
13:26	9.69	8.30	426	82.6	36.2	32.5	157	159
13:27	10.19	7.92	532	88.8	35.4	33.0	148	149
13:28	9.76	8.24	515	82.2	34.4	33.5	152	154
13:29	9.79	8.23	511	89.3	29.7	32.5	148	150
13:30	9.47	8.46	506	93.2	35.1	33.0	153	155
13:31	9.98	8.09	509	102.1	25.2	32.7	144	145
13:32	9.70	8.28	492	91.9	29.9	32.7	148	149
13:33	9.61	8.37	510	102.9	26.7	32.4	143	144
13:34	9.71	8.28	512	88.8	36.4	32.9	151	152
13:35	9.95	8.12	523	85.0	26.5	31.5	154	156
13:36	10.03	8.03	517	77.2	36.4	31.6	150	151
13:37	9.77	8.24	522	80.5	29.8	31.0	155	156
13:38	9.65	8.33	531	79.9	32.1	30.8	155	156
13:39	9.49	8.48	517	101.9	30.6	30.9	149	151
13:40	9.95	8.09	496	99.6	31.5	30.5	140	141
13:41	9.52	8.42	493	99.8	32.6	31.2	149	150
13:42	9.71	8.28	507	98.3	38.1	32.1	144	145
13:43	9.61	8.36	536	80.0	37.1	33.1	158	159
13:44	10.16	7.95	541	86.6	31.6	32.6	150	151
13:45	9.74	8.26	525	78.6	37.6	33.7	154	155
13:46	9.77	8.24	521	93.2	26.5	32.7	149	150
13:47	9.48	8.45	515	90.1	35.1	33.3	156	157
13:48	10.00	8.07	509	102.4	25.8	32.6	147	148
13:49	9.87	8.15	499	80.2	33.4	32.9	151	152
13:50	9.77	8.24	500	85.7	29.9	32.8	151	152
13:51	9.87	8.15	506	74.2	35.0	33.0	156	157
13:52	10.00	8.08	524	75.4	29.4	32.1	158	160
13:53	10.19	7.91	510	67.7	35.7	32.0	154	155
13:54	9.89	8.14	500	69.9	26.1	31.4	158	160
13:55	9.83	8.19	499	70.5	29.9	30.7	158	159
13:56	9.65	8.35	490	80.9	28.7	30.9	157	159
13:57	10.20	7.90	465	74.1	27.6	30.2	148	150

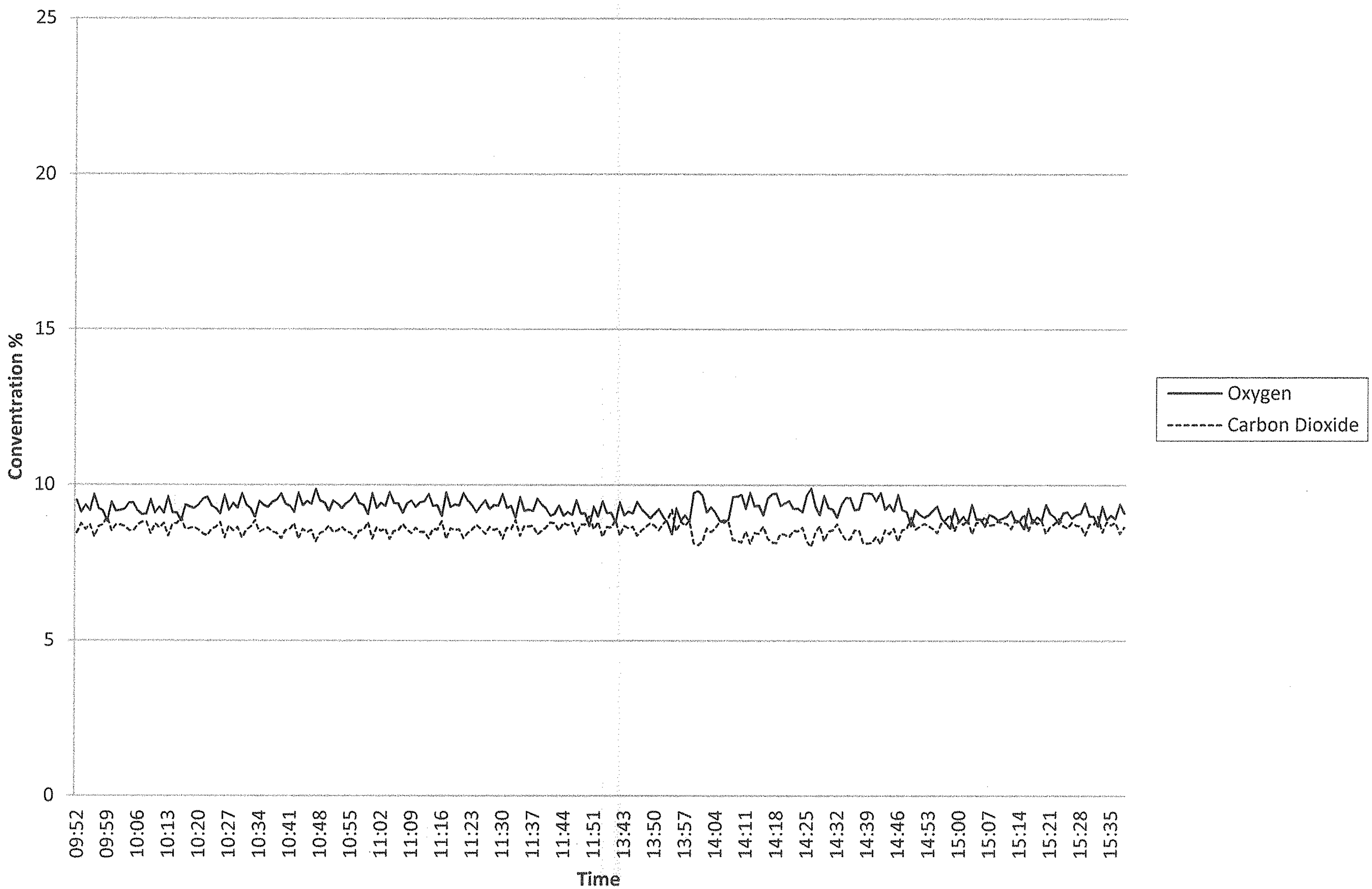
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019

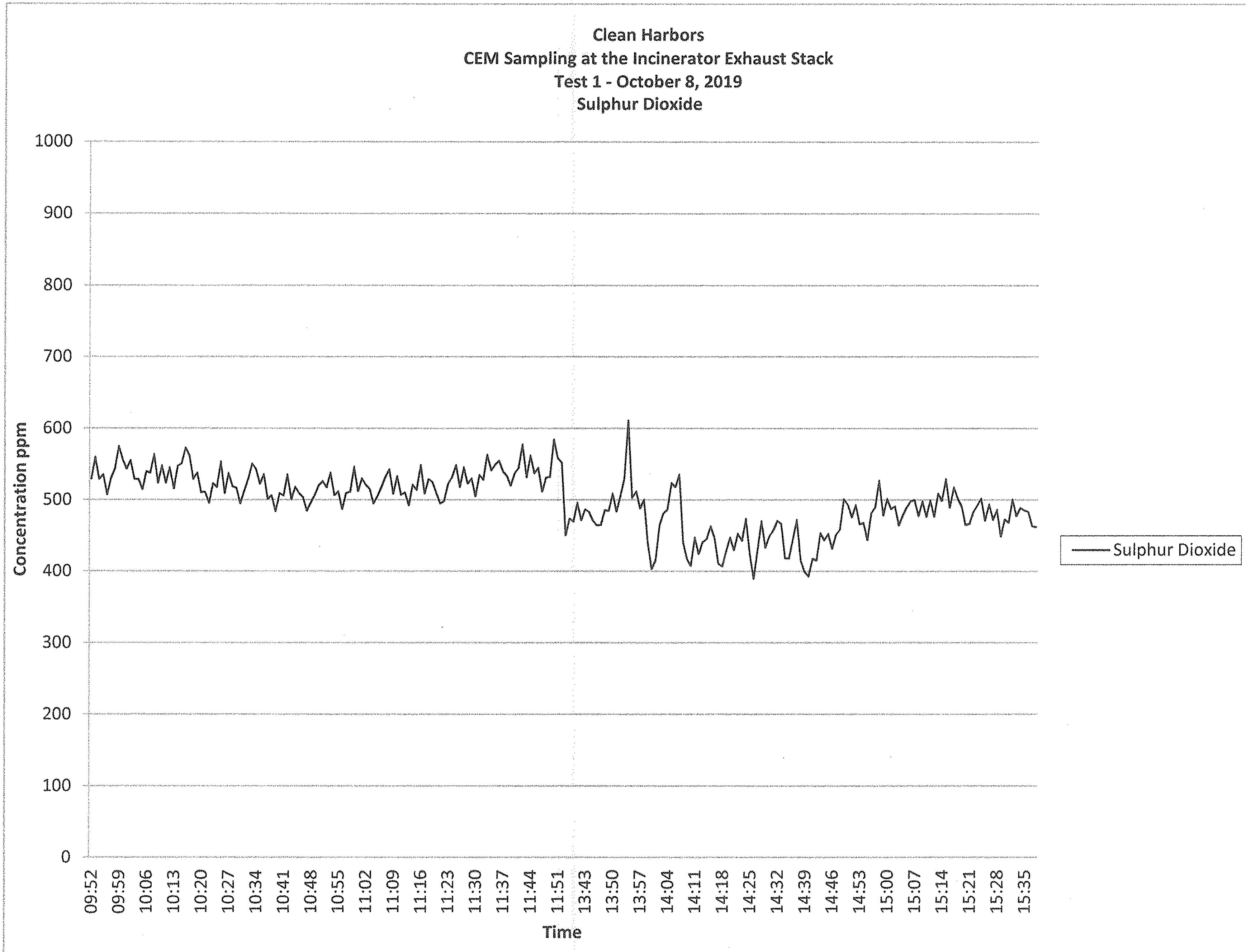
Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:58	9.74	8.26	471	76.9	30.1	30.6	155	156
13:59	9.93	8.12	483	83.0	32.4	30.5	150	151
14:00	9.85	8.18	500	68.4	32.9	30.8	162	163
14:01	10.41	7.76	500	67.3	30.5	30.3	157	159
14:02	10.08	8.01	480	65.1	36.9	31.1	158	159
14:03	9.98	8.08	491	68.7	28.6	30.4	158	159
14:04	9.62	8.35	475	80.9	30.4	30.8	159	161
14:05	9.99	8.09	455	102.4	29.5	30.8	148	150
14:06	9.93	8.11	451	80.8	28.4	30.7	149	150
14:07	9.81	8.21	463	82.7	25.6	30.5	153	154
Min	9.28	7.64	343	65.1	22.6	29.4	120	120
Max	10.53	8.58	541	103	48.9	37.4	162	163
Avg	9.90	8.10	459	86.6	32.9	32.9	141	142

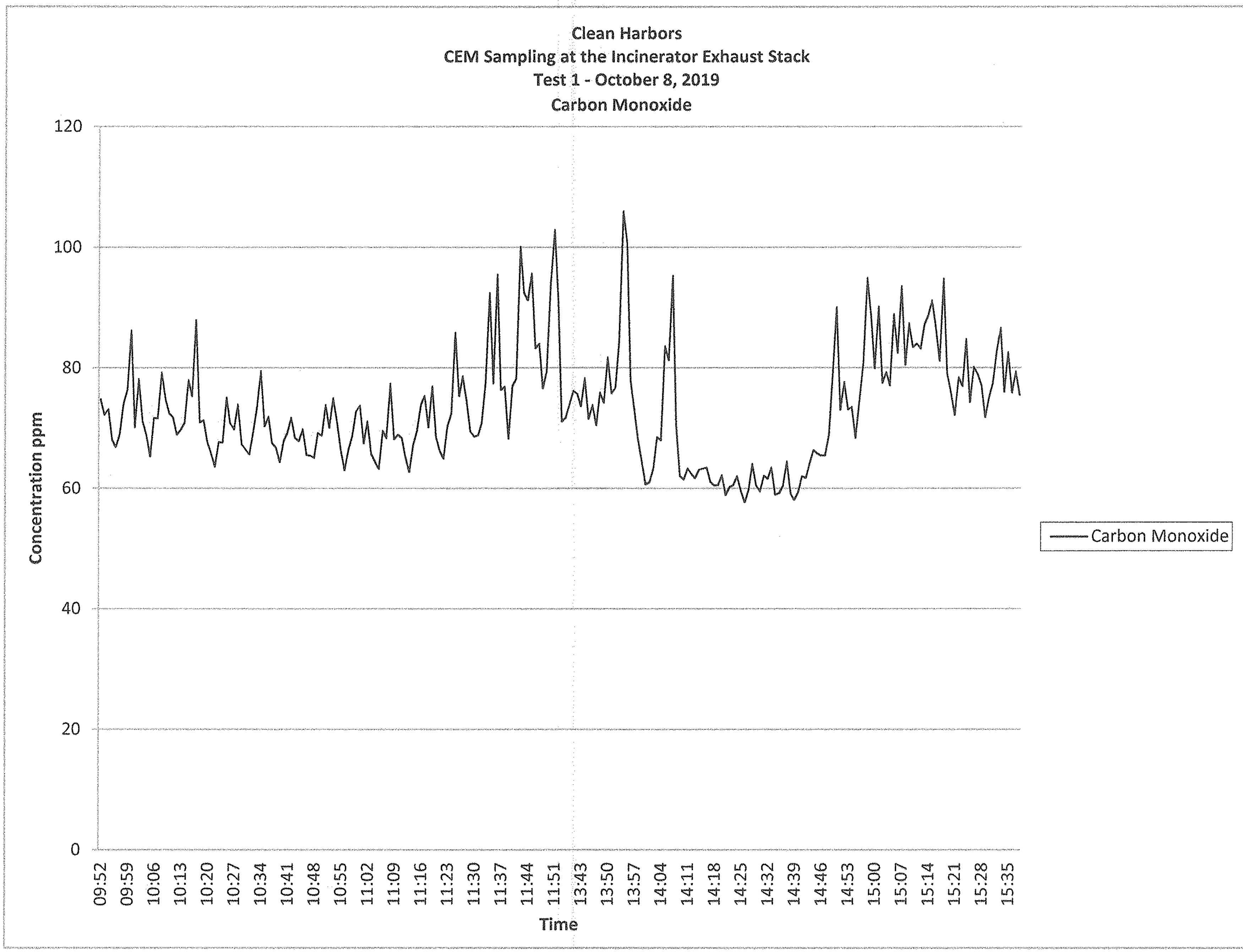
APPENDIX 25

Gas Analysis Graphs
(15 pages)

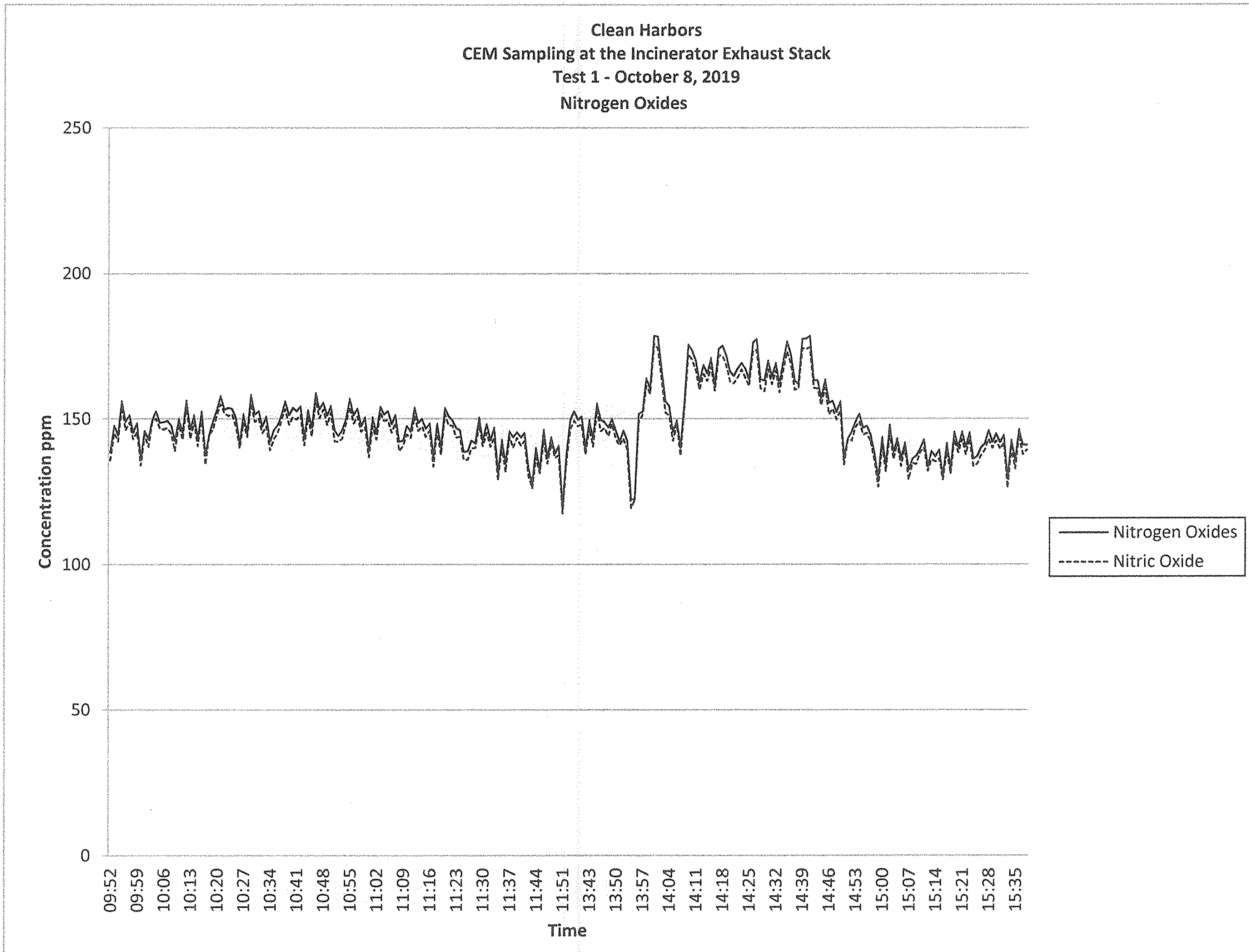
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019
Oxygen & Carbon Dioxide

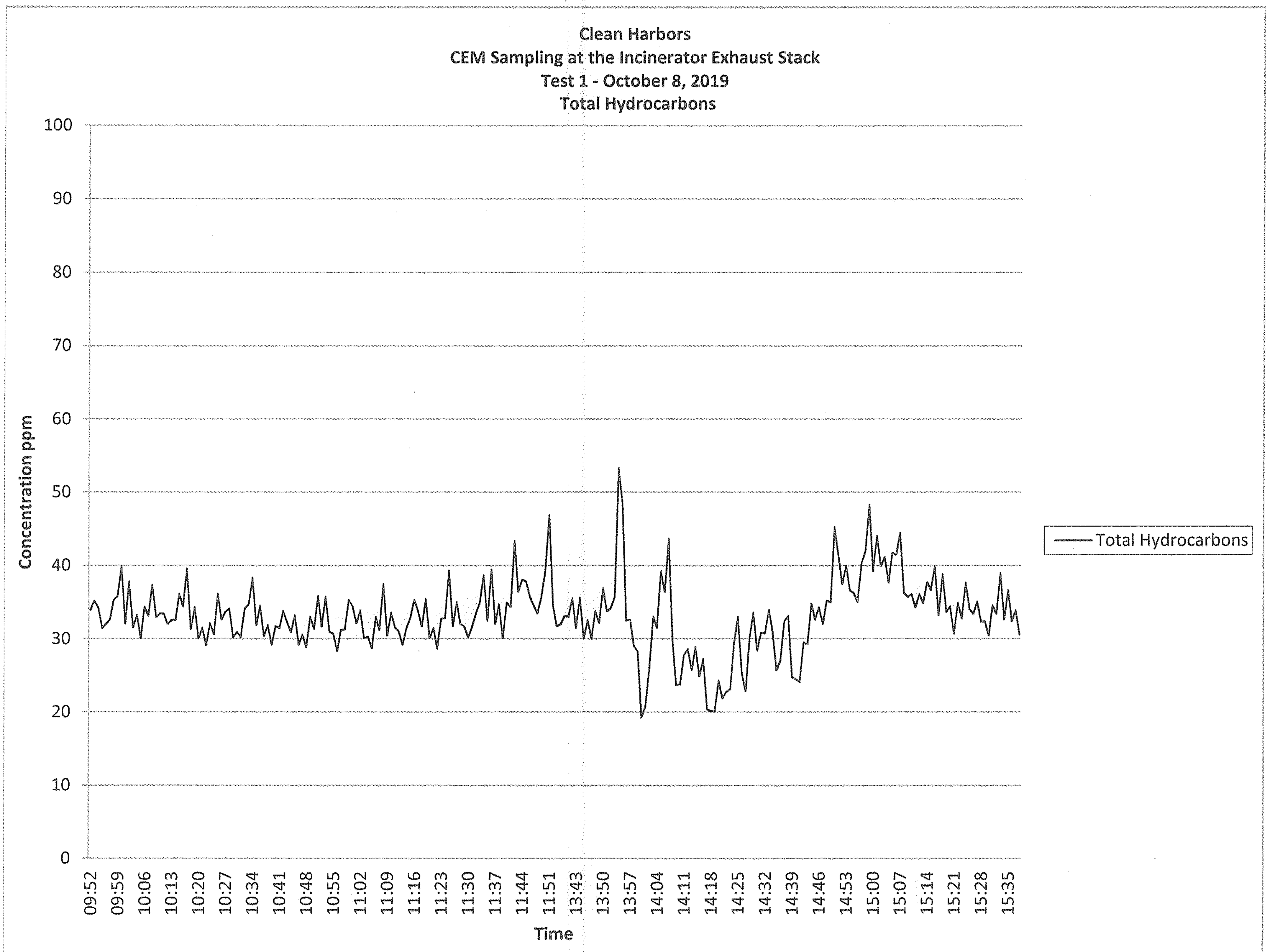



Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019
Sulphur Dioxide
1000
900
800
700
600
500
400
300
200
100
0
Concentration ppm
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
11:09
11:16
11:23
11:30
11:37
11:44
11:51
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Sulphur Dioxide



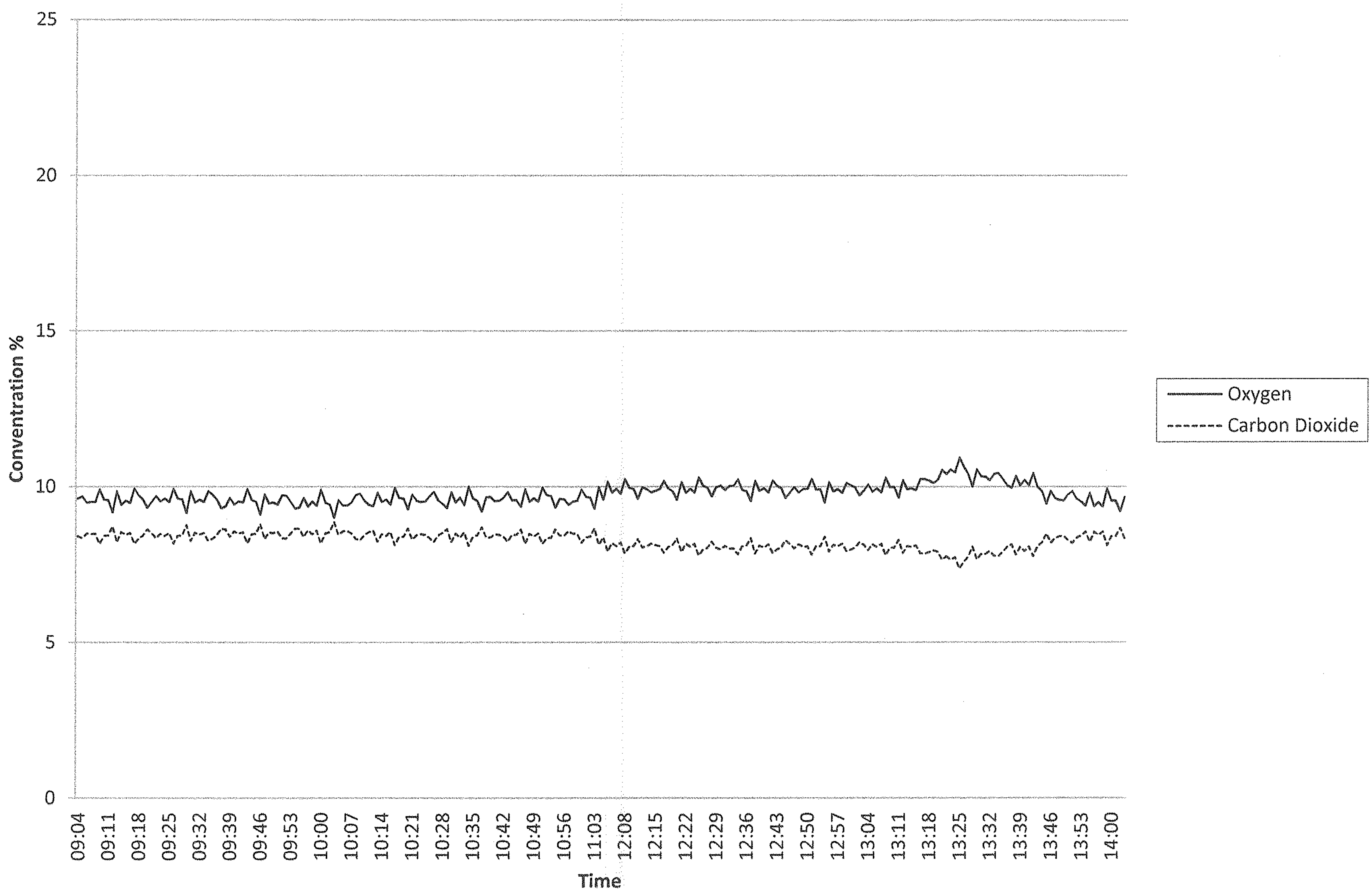
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019
Carbon Monoxide
Concentration ppm
120
100
80
60
40
20
0
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
11:09
11:16
11:23
11:30
11:37
11:44
11:51
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Carbon Monoxide

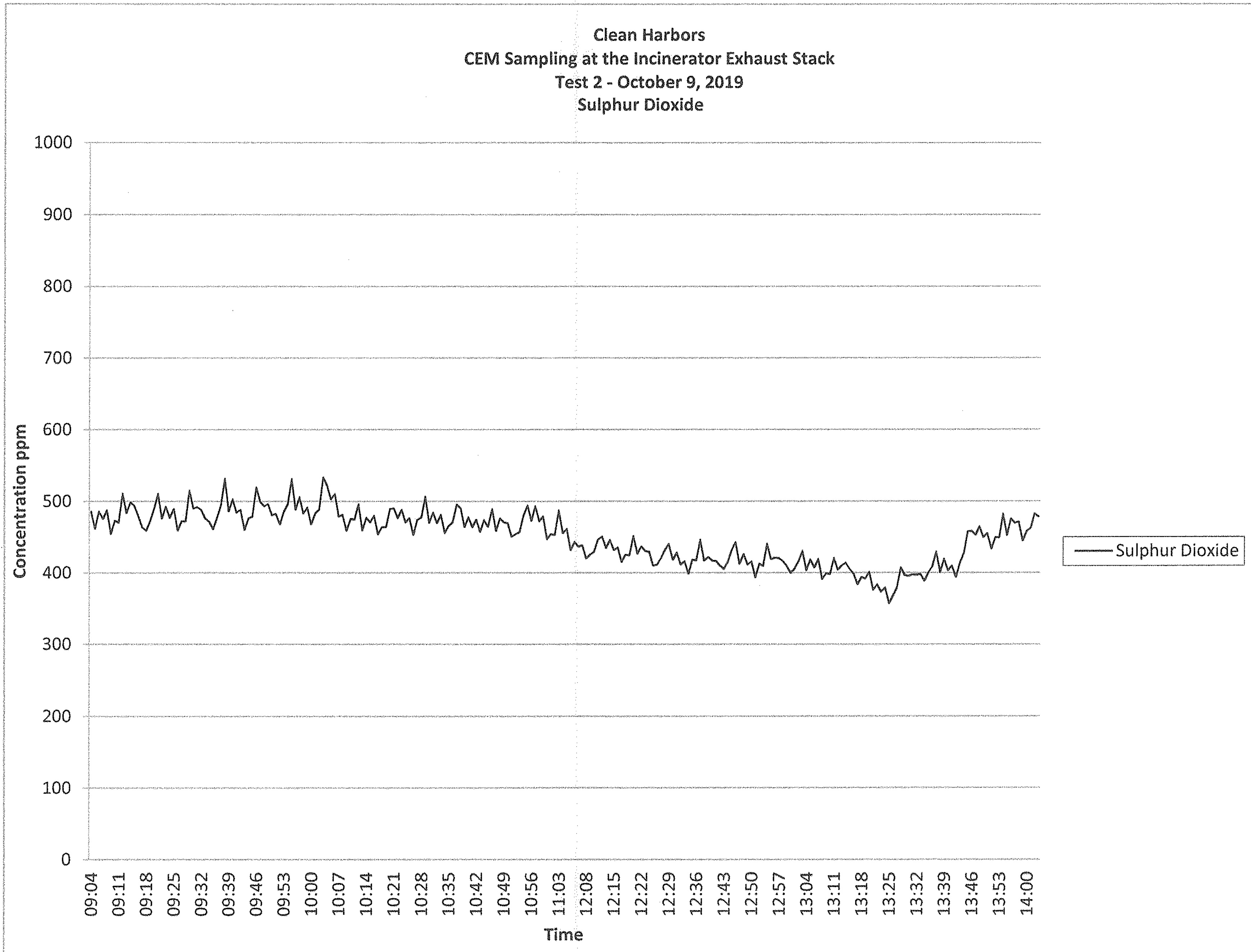

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019
Nitrogen Oxides
Concentration ppm
250
200
150
100
50
0
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
11:09
11:16
11:23
11:30
11:37
11:44
11:51
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Nitrogen Oxides
Nitric Oxide



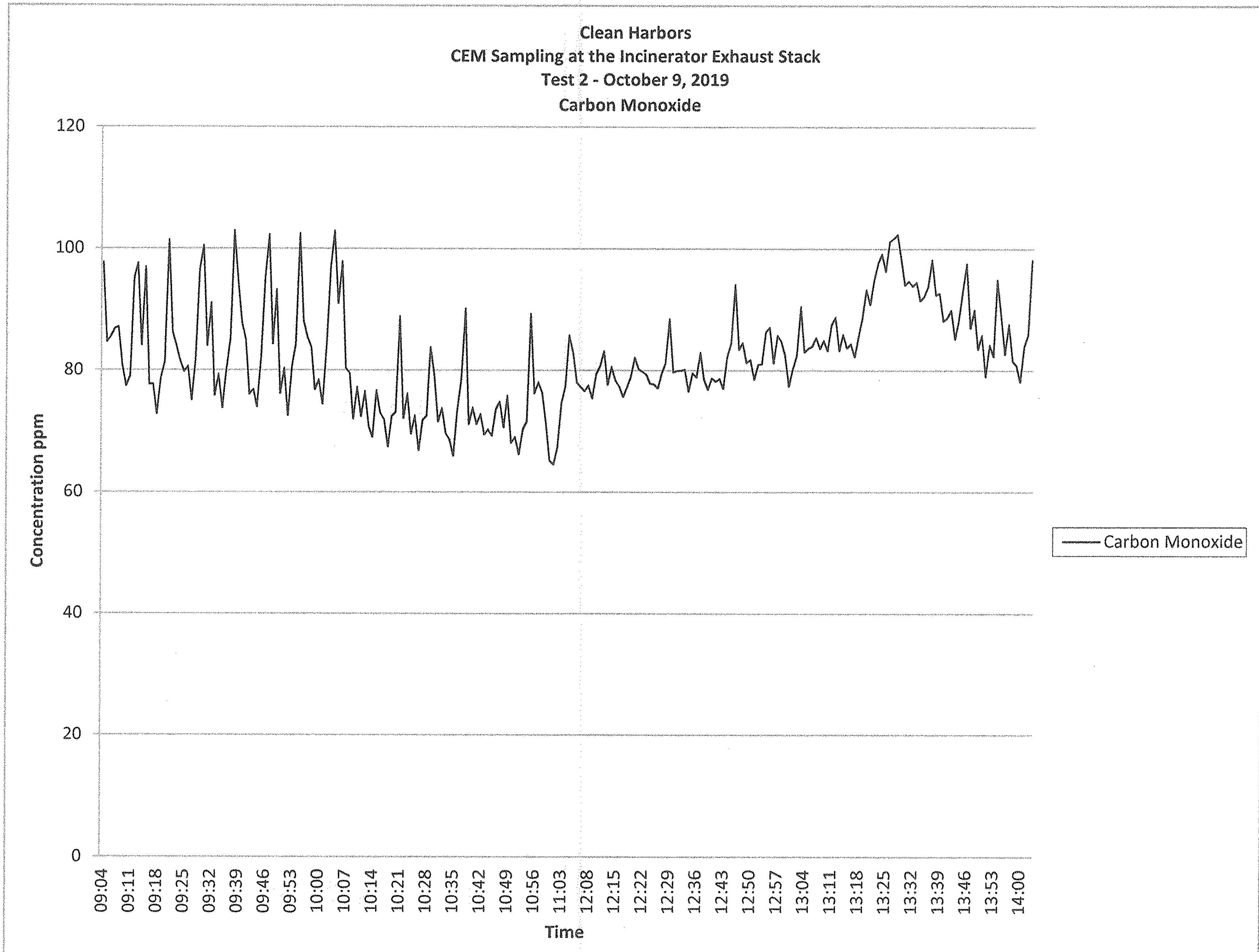
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 8, 2019
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
11:09
11:16
11:23
11:30
11:37
11:44
11:51
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Total Hydrocarbons

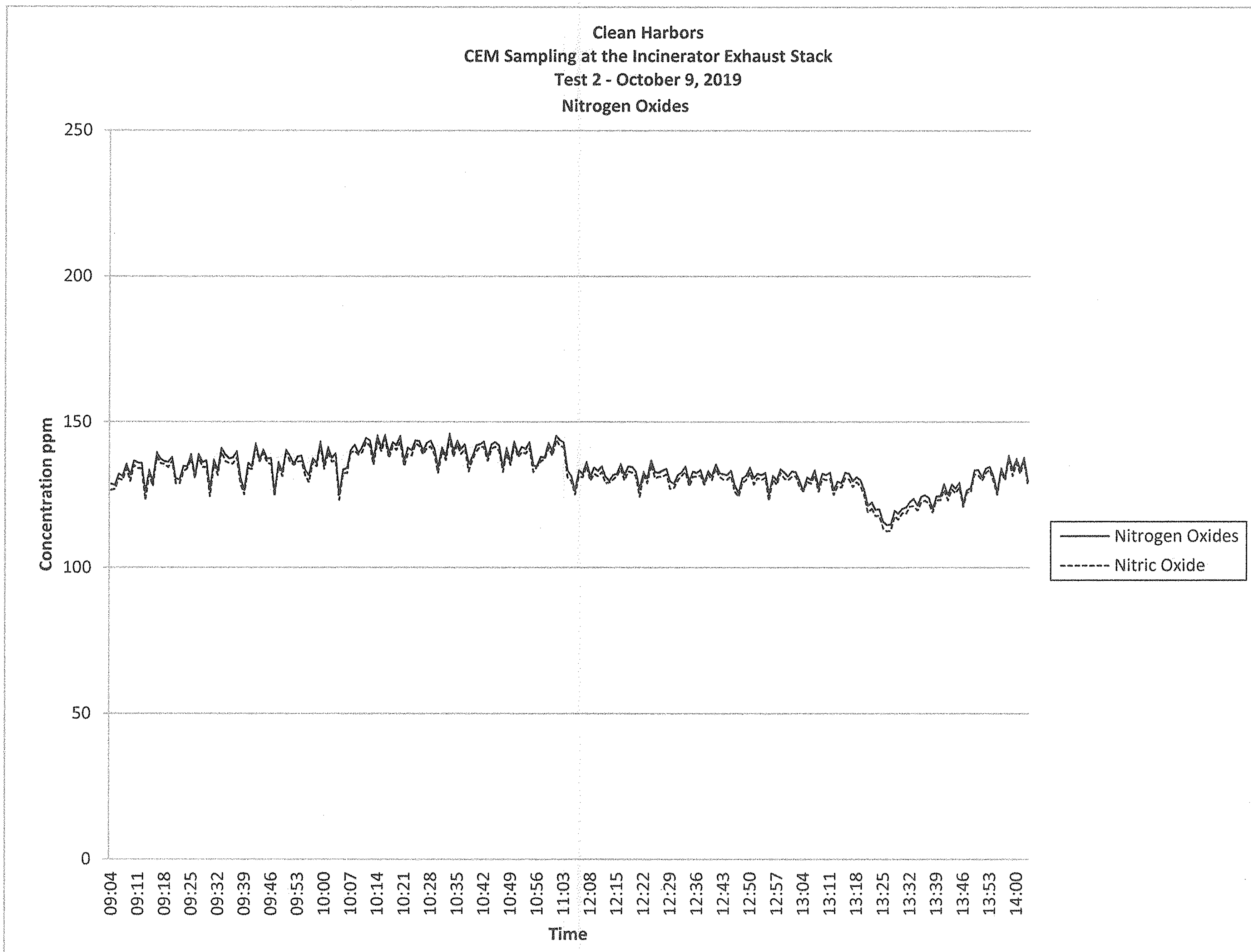
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019
Oxygen & Carbon Dioxide

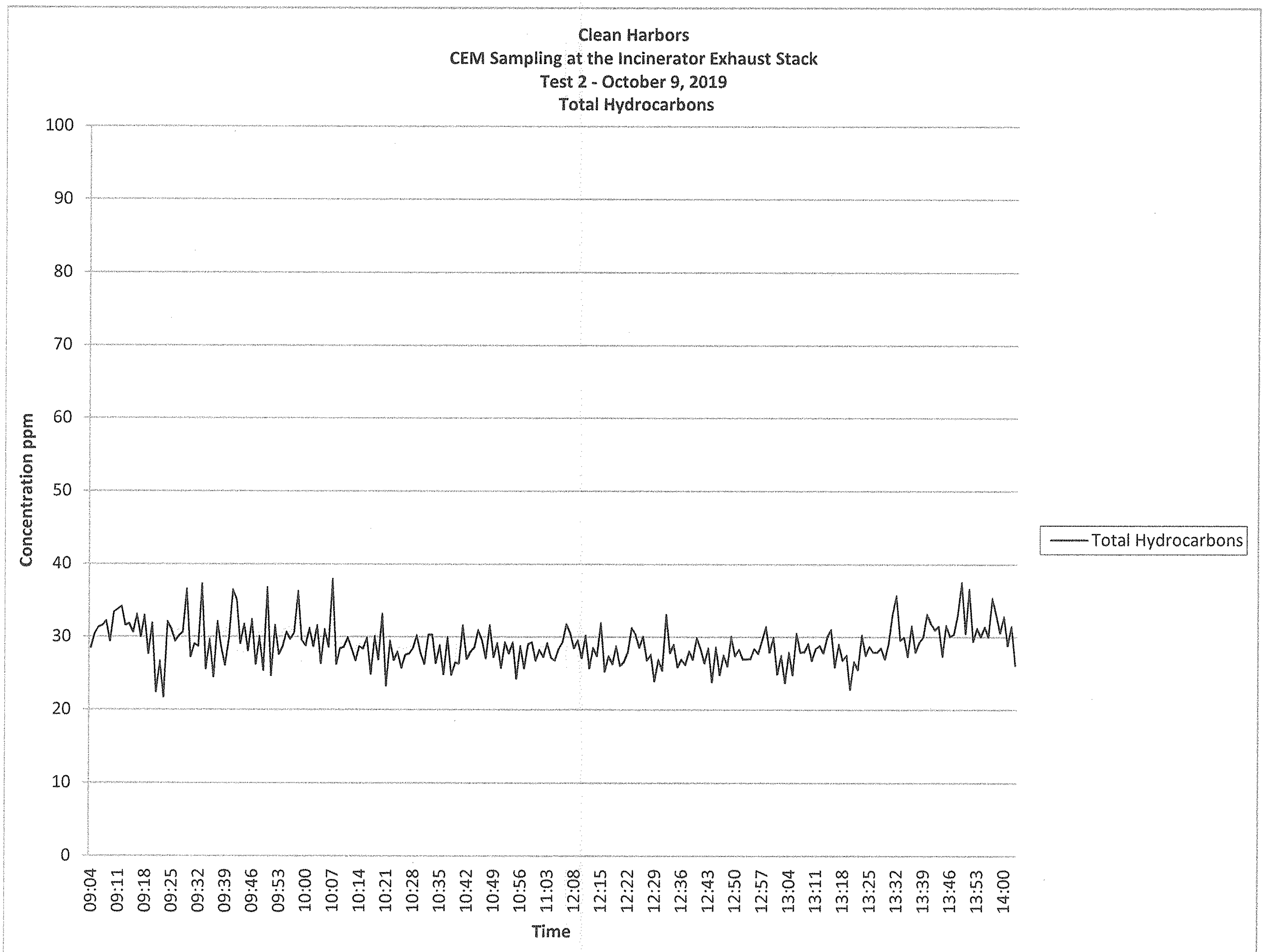




Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
09:04
09:11
09:18
09:25
09:32
09:39
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
12:08
12:15
12:22
12:29
12:36
12:43
12:50
12:57
13:04
13:11
13:18
13:25
13:32
13:39
13:46
13:53
14:00
Time
Sulphur Dioxide

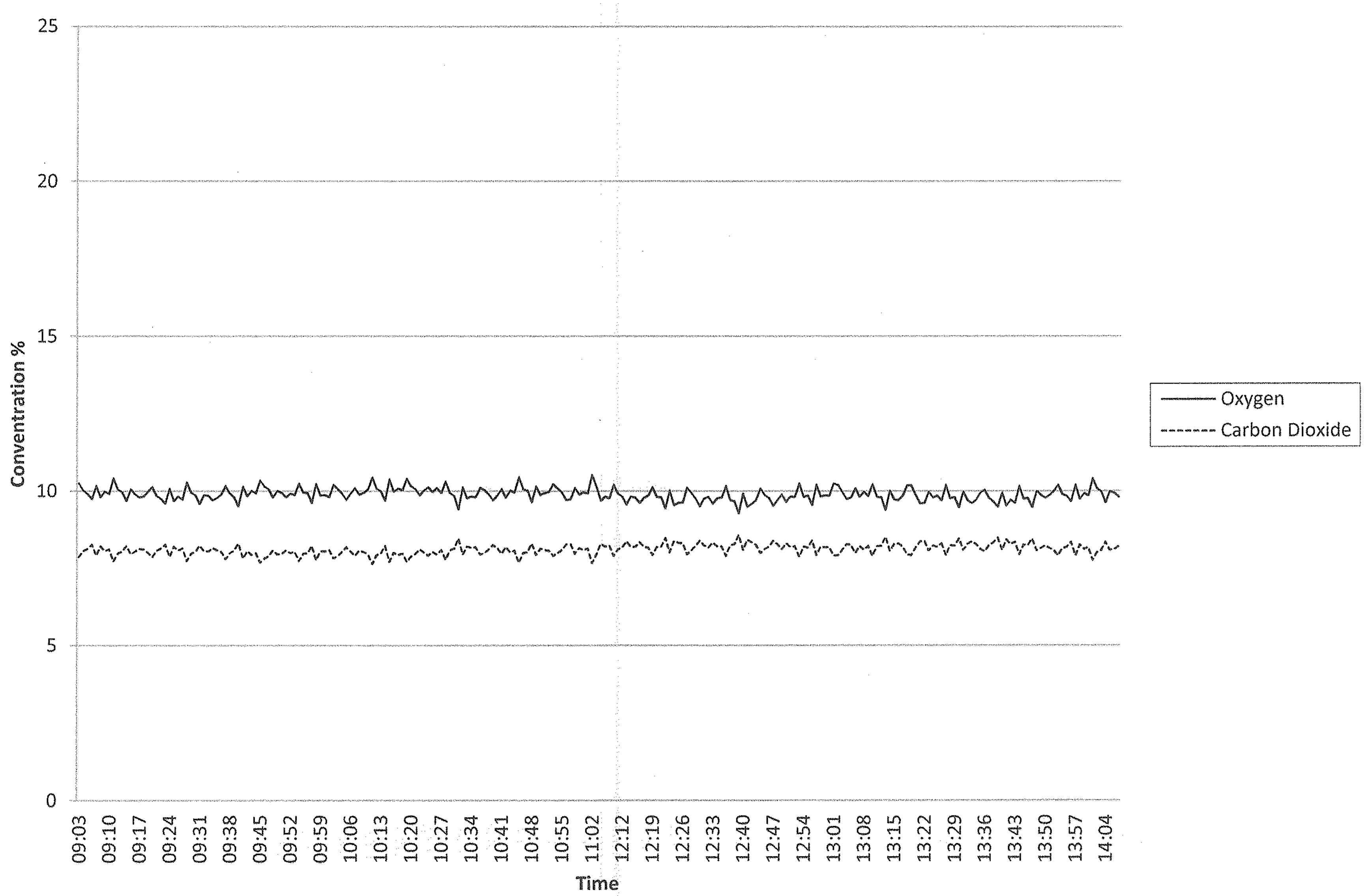

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019
Carbon Monoxide
Concentration ppm
120
100
80
60
40
20
0
09:04
09:11
09:18
09:25
09:32
09:39
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
12:08
12:15
12:22
12:29
12:36
12:43
12:50
12:57
13:04
13:11
13:18
13:25
13:32
13:39
13:46
13:53
14:00
Time
Carbon Monoxide

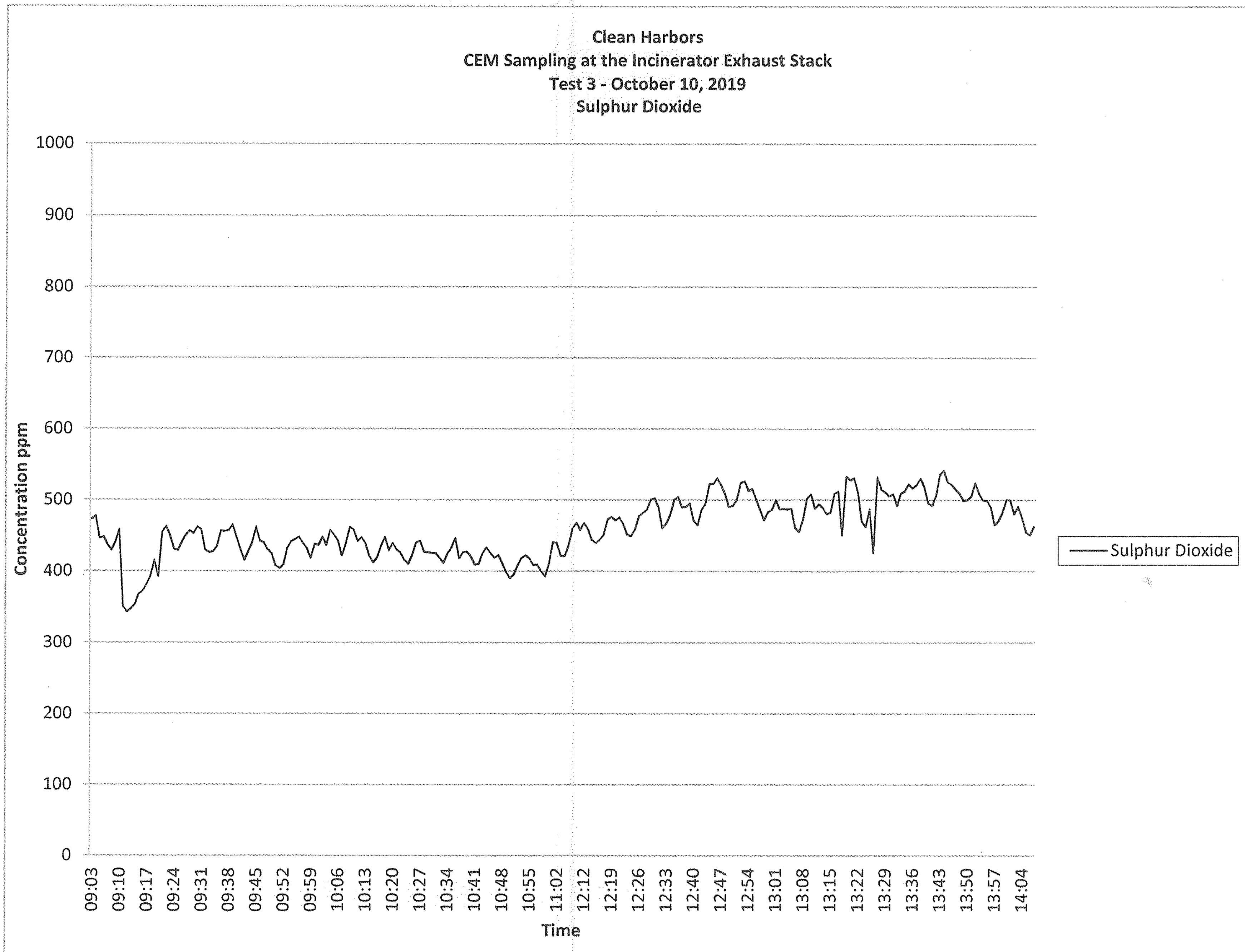

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019
Nitrogen Oxides
Concentration ppm
250
200
150
100
50
0
09:04
09:11
09:18
09:25
09:32
09:39
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
12:08
12:15
12:22
12:29
12:36
12:43
12:50
12:57
13:04
13:11
13:18
13:25
13:32
13:39
13:46
13:53
14:00
Time
Nitrogen Oxides
Nitric Oxide



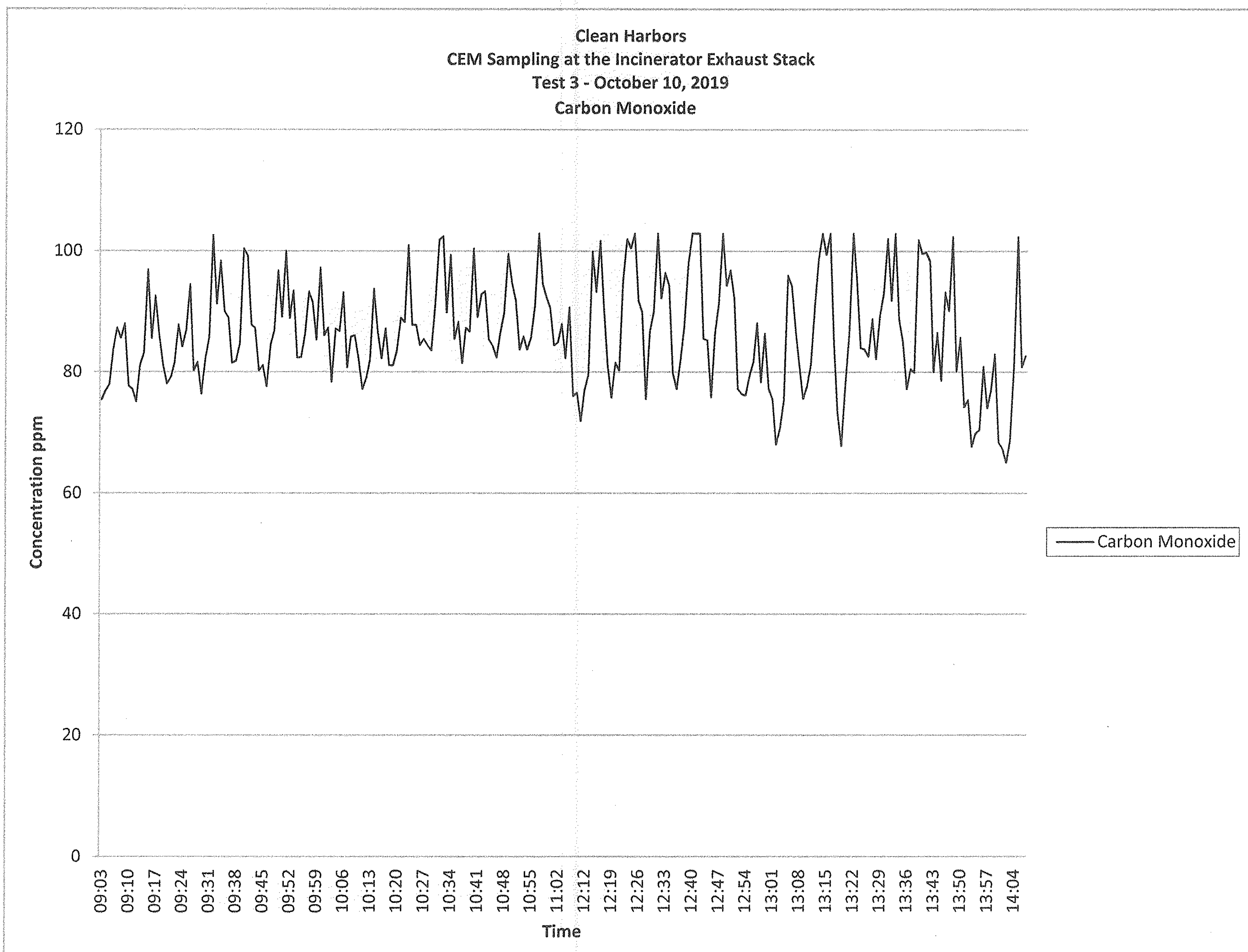
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 9, 2019
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:04
09:11
09:18
09:25
09:32
09:39
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
12:08
12:15
12:22
12:29
12:36
12:43
12:50
12:57
13:04
13:11
13:18
13:25
13:32
13:39
13:46
13:53
14:00
Time
Total Hydrocarbons

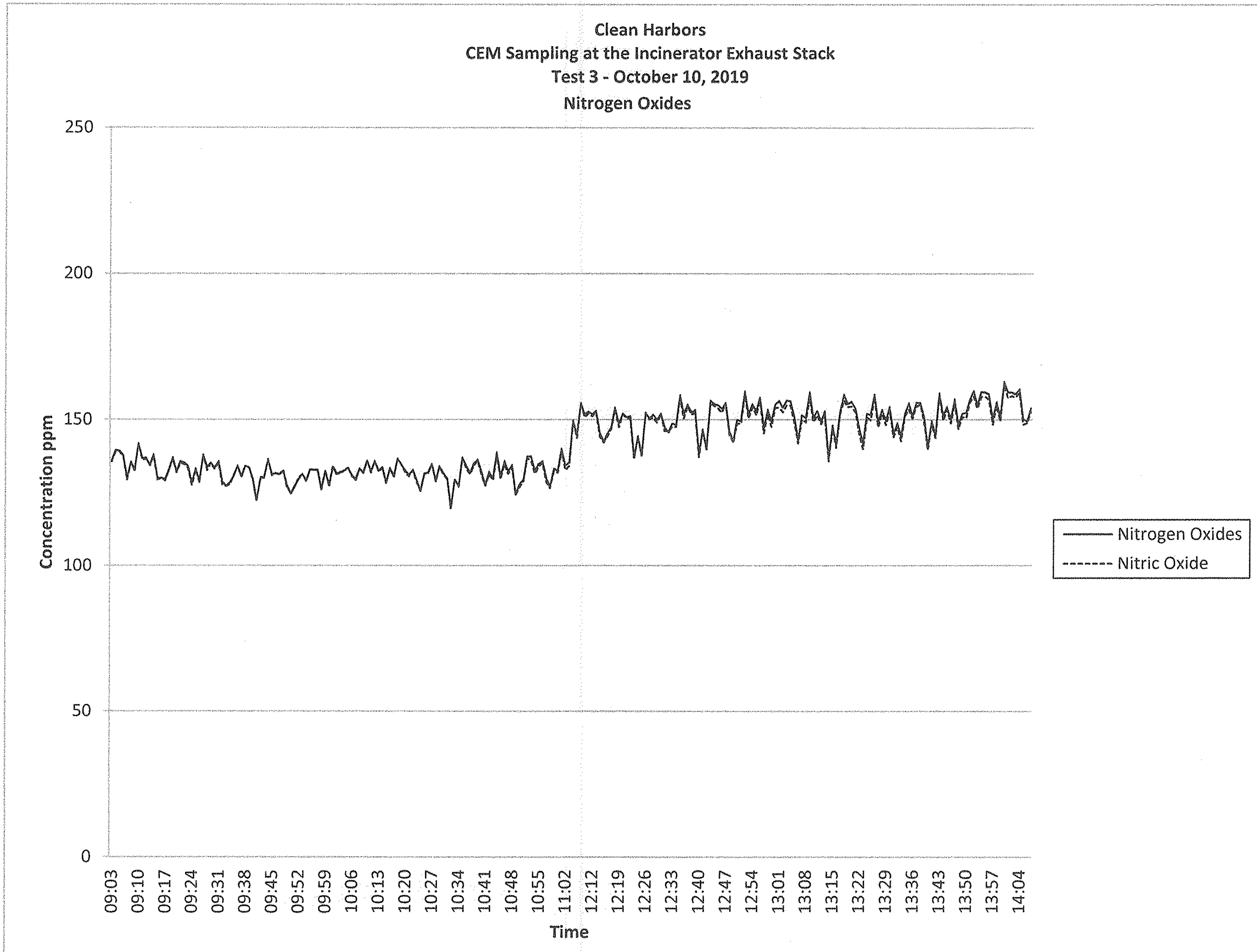
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019
Oxygen & Carbon Dioxide



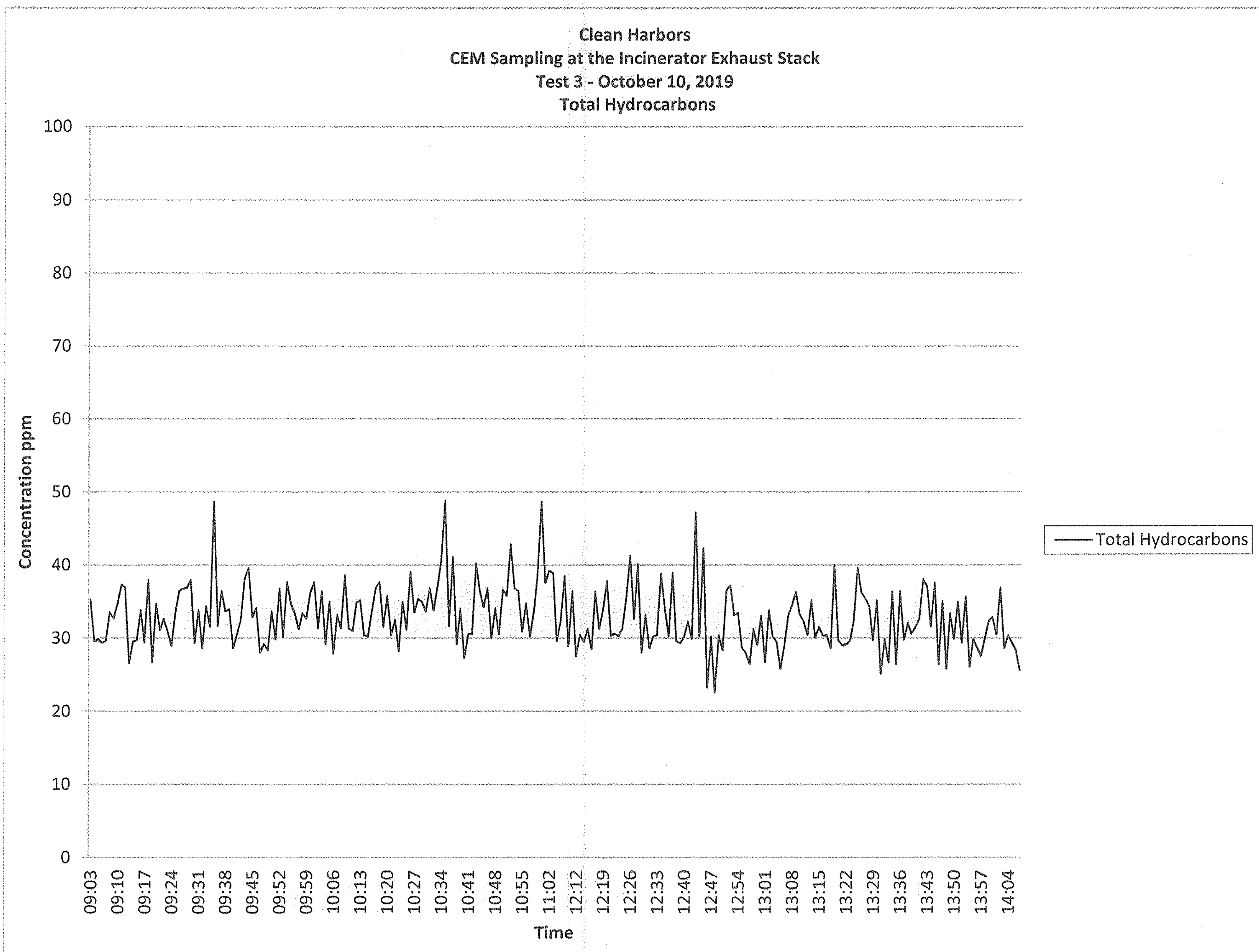


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
09:03
09:10
09:17
09:24
09:31
09:38
09:45
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
Time
Sulphur Dioxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019
Carbon Monoxide
120
100
80
60
40
20
0
Concentration ppm
09:03
09:10
09:17
09:24
09:31
09:38
09:45
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
Time
Carbon Monoxide



Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019
Nitrogen Oxides
Concentration ppm
250
200
150
100
50
0
09:03
09:10
09:17
09:24
09:31
09:38
09:45
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
Time
Nitrogen Oxides
Nitric Oxide



Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 10, 2019
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:03
09:10
09:17
09:24
09:31
09:38
09:45
09:52
09:59
10:06
10:13
10:20
10:27
10:34
10:41
10:48
10:55
11:02
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
Time
Total Hydrocarbons

ORTECH
a Kontrol Energy Company

APPENDIX 26

AERMOD Modelling Files
(1 CD)

APPENDIX 27

Clean Harbors Feed Data Summaries
(3 pages)

DAILY INCINERATION REPORT OF ANALYSIS

CleanHarbors

Incineration Date:

Analysis Date: Thursday, October 10, 2019

Storage Location:

Lab No.: C19-2428

Parameter		Method #	Units	MDL	Lean Storage		Lean Feed		Emulsion	Rich Feed			Alkaline	
					T-801	T-802	T-803	T-804	T-813	T-822	T-824	T-118	T-111	T-113
Date Received at LAB					10-Oct-19	10-Oct-19	10-Oct-19		10-Oct-19		10-Oct-19			10-Oct-19
Time Received at LAB					7:30	7:30	7:30		7:30		7:30			7:30
pH		AM047	pH				9.51		8		7			11.99
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										4.8
Specific Gravity		AM045	g/ml				1.04		0.93		0.91			1.01
Heat Value		AM005	MJ/kg	0.3	2.9	7.1	4.72		18.9		25.1			
Ash @ 750 C		AM129	% mass	0.03			4		1.4		1.17			
Fluoride	Total	AM005	% mass F	0.002										
	Soluble	AM036	% mass F	0.002										
	Organic	AM005	% mass F	0.002										
Chloride	Total	AM005	% mass Cl	0.007		1.33	0.85		1.23		0.74			0.01
	Soluble	AM036	% mass Cl	0.007		0.32								
	Organic	AM005	% mass Cl	0.007		1.01								
Nitrite	Soluble	AM005	% massNO2	0.003										
Sulphur	Total	AM005	% mass S	0.004										
	Soluble	AM036	% mass S	0.004										
	Non Sulphate	AM005	% mass S	0.004										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30			8940							0.064
	Normality	AM046	N	0.01										
Phase Composition	Organic	AM045	% volume	0.5			5		30		40			
	Emulsion	"	% volume	0.5			0		62		52			
	Aqueous	"	% volume	0.5			87		0		0			
	Sludge	"	% volume	0.5			0		0		0			1
	Solid	"	% volume	0.5			8		8		8			
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<100			0.49
Solids @ 110 C		AM003	% mass	0.03										155
Total Organic Carbon		AM142	ppm	1										
Water Content by KF :		AM074	% H2O						36		23			

Additional Analysis:

Comments:

ANALYST: JO

CleanHarbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: ______________ Analysis Date: Wednesday, October 09, 2019

Storage Location: ______________ Lab No.: C19-2412

Parameter		Method #	Units	MDL	Lean Storage		Lean Feed		Emulsion	Rich Feed			Alkaline	
					T-801	T-802	T-803	T-804	T-813	T-822	T-824	T-118	T-111	T-113
Date Received at LAB					9-Oct-19	9-Oct-19	9-Oct-19		9-Oct-19		9-Oct-19			9-Oct-19
Time Received at LAB					7:00	7:00	7:00		7:00		7:00			7:00
pH		AM047	pH				9.58		8		7			12
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										3.66
Specific Gravity		AM045	g/ml				1.06		0.93		0.9			1.01
Heat Value		AM005	MJ/kg	0.3	3.4	7.5	3.37		19.7		29.5			
Ash @ 750 C		AM129	% mass	0.03			3.8		1.78		1.03			
Fluoride	Total	AM005	% mass F	0.002										
	Soluble	AM036	% mass F	0.002										
	Organic	AM005	% mass F	0.002										
Chloride	Total	AM005	% mass Cl	0.007		1.16	0.63		1.63		0.74			
	Soluble	AM036	% mass Cl	0.007		0.3								0.02
	Organic	AM005	% mass Cl	0.007		0.86								
Nitrite	Soluble	AM005	% massNO2	0.003										
Sulphur	Total	AM005	% mass S	0.004										
	Soluble	AM036	% mass S	0.004										
	Non Sulphate	AM005	% mass S	0.004										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30										
	Normality	AM046	N	0.01										0.024
Phase Composition	Organic	AM045	% volume	0.5			4		36		56			
	Emulsion	"	% volume	0.5			0		54		38			
	Aqueous	"	% volume	0.5			92		0		0			
	Sludge	"	% volume	0.5			0		0		0			
	Solid	"	% volume	0.5			4		10		6			0.5
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<100			
Solids @ 110 C		AM003	% mass	0.03										0.08
Total Organic Carbon		AM142	ppm	1										50
Water Content by KF :		AM074	% H2O						30		22			

Additional Analysis: ______________

Comments: ______________

ANALYST: JO

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: ____________ Analysis Date: Tuesday, October 08, 2019

Storage Location: ____________ Lab No.: C19-2400

Parameter		Method #	Units	MDL	Lean Storage		Lean Feed		Emulsion	Rich Feed			Alkaline	
					T-801	T-802	T-803	T-804	T-813	T-822	T-824	T-118	T-111	T-113
Date Received at LAB					8-Oct-19	8-Oct-19	8-Oct-19		8-Oct-19		8-Oct-19			8-Oct-19
Time Received at LAB					7:00	7:00	7:00		7:00		15:00			7:00
pH		AM047	pH				9.6		8		7			12.3
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										7.58
Specific Gravity		AM045	g/ml				1.05		0.96		0.84			1
Heat Value		AM005	MJ/kg	0.3	3.4	6.4	5.2		14.8		28.3			
Ash @ 750 C		AM129	% mass	0.03			4.19		1.84		0.78			
Fluoride	Total	AM005	% mass F	0.002										
	Soluble	AM036	% mass F	0.002										
	Organic	AM005	% mass F	0.002										
Chloride	Total	AM005	% mass Cl	0.007		1.35	1.02		1.27		0.43			
	Soluble	AM036	% mass Cl	0.007		0.27			0.15					0.02
	Organic	AM005	% mass Cl	0.007		1.08			1.12					
Nitrite	Soluble	AM005	% massNO2	0.003										
Sulphur	Total	AM005	% mass S	0.004										
	Soluble	AM036	% mass S	0.004										
	Non Sulphate	AM005	% mass S	0.004										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30										
	Normality	AM046	N	0.01										0.05
Phase Composition	Organic	AM045	% volume	0.5			5		32		52			
	Emulsion	"	% volume	0.5			0		60		42			
	Aqueous	"	% volume	0.5			85		0		0			
	Sludge	"	% volume	0.5			0		0		0			
	Solid	"	% volume	0.5			10		8		6			0.5
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<100			
Solids @ 110 C		AM003	% mass	0.03										0.17
Total Organic Carbon		AM142	ppm	1										46
Water Content by KF :		AM074	% H2O						60		25			

Additional Analysis: ____________

Comments: ____________

ANALYST: JO

APPENDIX 28

Clean Harbors One-Minute Average Combustion Gas Results (12 pages)

Test No. 1 - October 8, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
9:52:00	71.1	274.4	8.1	47.8	34.6	9.1	0.7	515.5
9:53:00	75.5	277.8	8.3	48.2	38.4	9.1	0.7	537.8
9:54:00	78.1	277.8	8.4	48.7	36.5	8.7	1.1	546.8
9:55:00	79.9	269.9	8.2	48.0	34.8	9.5	0.4	542.2
9:56:00	76.9	267.6	8.1	47.9	37.6	9.1	0.9	534.9
9:57:00	77.2	270.4	8.3	48.5	30.0	9.3	0.7	544.0
9:58:00	76.0	271.8	8.3	48.5	34.0	9.1	0.9	535.6
9:59:00	71.7	271.8	8.1	48.1	30.8	9.9	0.8	520.6
10:00:00	71.8	269.9	8.1	47.5	35.8	9.3	0.8	509.7
10:01:00	74.8	274.1	8.2	48.0	32.7	9.1	0.5	524.7
10:02:00	80.6	278.8	8.4	49.0	41.2	8.7	0.7	554.3
10:03:00	85.0	278.8	8.5	49.2	29.4	9.9	0.3	570.3
10:04:00	81.2	268.4	8.2	48.3	37.6	9.0	0.4	553.6
10:05:00	79.4	269.4	8.3	48.1	32.0	9.2	0.7	554.4
10:06:00	80.0	269.4	8.3	48.5	33.1	9.2	0.7	548.7
10:07:00	71.8	269.4	8.2	48.3	31.1	9.0	0.8	530.6
10:08:00	71.8	269.4	8.2	48.3	29.5	9.6	0.8	530.6
10:09:00	70.0	268.2	8.2	48.0	34.2	9.3	0.8	522.3
10:10:00	71.4	269.0	8.2	47.8	34.9	9.1	0.7	521.8
10:11:00	75.6	273.6	8.3	48.5	37.2	8.9	0.6	545.5
10:12:00	77.9	273.6	8.4	48.6	35.4	8.7	1.0	553.5
10:13:00	79.6	266.9	8.2	48.3	32.9	9.5	0.3	547.6
10:14:00	77.8	265.1	8.1	48.1	35.1	9.1	0.8	535.8
10:15:00	76.7	268.0	8.3	48.5	32.1	9.1	0.7	542.2
10:16:00	73.2	268.0	8.3	48.5	35.5	9.1	0.9	533.4
10:17:00	71.7	266.9	8.2	48.0	31.9	9.7	0.8	527.8
10:18:00	72.7	265.7	8.1	47.7	37.6	9.0	0.8	524.3
10:19:00	77.2	268.6	8.2	48.2	32.1	9.0	0.6	542.4
10:20:00	80.8	269.8	8.4	48.8	42.0	8.8	0.7	559.2
10:21:00	83.7	269.8	8.4	48.9	28.7	9.7	0.3	567.8
10:22:00	82.1	260.7	8.1	48.0	34.4	9.3	0.4	546.6
10:23:00	74.0	263.0	8.2	48.2	29.1	9.3	0.7	531.7
10:24:00	73.9	266.0	8.2	48.5	31.7	9.3	0.7	528.4
10:25:00	70.7	270.5	8.2	48.5	29.9	9.1	0.7	514.3
10:26:00	68.9	267.8	8.0	48.0	32.1	9.4	0.8	504.1
10:27:00	67.9	266.9	8.0	47.5	32.4	9.2	0.7	497.8
10:28:00	72.1	272.9	8.2	48.0	37.1	9.2	0.5	518.3
10:29:00	75.0	272.9	8.3	48.7	34.9	8.8	1.1	528.5
10:30:00	76.7	268.5	8.2	48.5	32.9	9.6	0.3	531.9
10:31:00	74.3	264.1	8.1	48.0	37.9	9.2	0.7	519.7
10:32:00	76.3	264.1	8.2	48.2	30.4	9.4	0.7	526.9
10:33:00	76.7	267.5	8.3	48.5	33.4	9.2	0.8	525.0
10:34:00	71.3	268.9	8.1	48.2	29.3	9.9	0.7	508.3
10:35:00	69.8	266.9	8.1	47.8	35.4	9.3	0.8	499.2
10:36:00	71.7	268.3	8.2	48.2	32.7	9.1	0.6	513.0
10:37:00	76.6	270.3	8.3	48.8	39.9	8.9	0.7	538.9
10:38:00	80.1	270.3	8.4	49.1	30.4	9.9	0.3	552.0
10:39:00	77.5	261.6	8.2	48.2	35.5	9.3	0.4	534.3
10:40:00	75.6	259.4	8.1	47.8	32.3	9.0	0.6	528.0
10:41:00	75.0	259.4	8.2	48.4	32.1	9.3	0.7	523.0
10:42:00	71.1	262.3	8.1	48.4	30.6	9.1	0.7	507.1
10:43:00	69.8	262.3	8.0	48.0	32.3	9.5	0.8	498.1
10:44:00	69.5	260.2	8.0	47.5	34.6	9.3	0.8	488.7
10:45:00	72.7	264.9	8.1	48.1	34.8	9.3	0.5	503.4
10:46:00	76.4	266.2	8.2	48.7	36.2	8.9	0.9	518.8
10:47:00	73.9	260.1	8.1	48.0	32.0	9.7	0.3	515.1
10:48:00	72.5	257.5	8.1	47.9	36.1	9.2	0.6	506.3
10:49:00	74.6	259.5	8.2	48.5	29.9	9.4	0.7	515.9
10:50:00	74.0	259.5	8.2	48.5	33.1	9.4	0.7	512.9
10:51:00	70.6	259.5	8.1	48.1	28.5	10.1	0.7	496.6
10:52:00	68.6	257.4	7.9	47.2	34.1	9.4	0.8	481.6
10:53:00	70.9	260.4	8.0	47.5	29.8	9.4	0.6	491.4
10:54:00	74.4	264.4	8.2	48.5	37.2	9.0	0.7	513.3
10:55:00	76.2	264.4	8.2	48.7	31.0	9.9	0.3	523.3
10:56:00	76.6	256.3	8.1	48.1	37.2	9.3	0.4	520.7
10:57:00	77.7	256.9	8.2	48.6	35.1	9.1	0.7	532.9
10:58:00	77.3	256.9	8.2	48.5	32.4	9.3	0.8	529.6
10:59:00	71.0	257.0	8.1	48.2	29.9	9.3	0.7	505.7
11:00:00	68.9	256.0	8.0	47.7	32.4	9.6	0.7	492.9
11:01:00	68.4	256.0	7.9	47.3	35.0	9.4	0.8	484.5
11:02:00	70.8	259.8	8.1	47.6	37.1	9.4	0.6	502.3
11:03:00	73.4	259.8	8.2	48.1	40.9	8.9	1.0	515.6
11:04:00	78.1	257.8	8.2	48.5	32.5	9.8	0.4	528.5
11:05:00	75.8	254.9	8.1	48.0	38.0	9.2	0.6	519.1

Test No. 1 - October 8, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
11:06:00	75.6	257.7	8.2	48.5	30.7	9.4	0.7	526.5
11:07:00	76.0	260.0	8.2	48.8	34.0	9.2	0.7	526.5
11:08:00	71.2	258.4	8.1	48.3	28.3	10.0	0.7	507.3
11:09:00	67.8	251.5	8.0	47.5	35.9	9.4	0.8	489.1
11:10:00	71.0	251.5	8.1	48.0	29.9	9.4	0.5	501.4
11:11:00	76.4	251.5	8.3	48.9	40.2	9.0	0.6	524.5
11:12:00	79.4	251.5	8.3	49.0	32.1	9.5	0.3	535.4
11:13:00	77.7	239.7	8.1	48.1	34.6	9.4	0.4	523.6
11:14:00	73.6	239.6	8.1	47.8	36.7	9.2	0.7	515.8
11:15:00	74.5	240.7	8.2	48.3	32.9	9.4	0.8	517.2
11:16:00	71.6	242.3	8.2	48.4	31.1	9.2	0.8	508.3
11:17:00	68.5	240.2	8.1	47.9	34.6	9.6	0.7	498.3
11:18:00	69.7	238.8	8.0	47.7	36.5	9.2	0.9	495.0
11:19:00	73.7	242.0	8.1	48.2	36.3	9.4	0.7	511.6
11:20:00	78.0	243.5	8.3	48.7	40.1	9.0	0.8	525.5
11:21:00	80.0	237.9	8.2	48.4	32.1	9.8	0.4	524.7
11:22:00	77.9	235.5	8.1	47.9	39.5	9.2	0.5	511.5
11:23:00	79.5	237.2	8.2	48.2	30.3	9.2	0.6	519.7
11:24:00	79.6	237.2	8.2	48.4	34.1	9.4	0.7	519.7
11:25:00	74.3	239.3	8.2	48.5	28.1	10.0	0.7	504.7
11:26:00	72.2	237.7	8.0	48.1	34.8	9.3	0.8	490.2
11:27:00	73.4	237.7	8.1	48.1	31.5	9.3	0.5	496.8
11:28:00	76.9	237.7	8.2	48.6	40.9	8.9	0.6	520.6
11:29:00	81.8	239.2	8.3	48.8	35.8	8.9	0.4	533.6
11:30:00	84.9	233.7	8.1	48.2	35.0	9.4	0.4	529.2
11:31:00	81.2	231.1	8.1	47.9	37.8	9.0	0.8	519.3
11:32:00	80.6	234.8	8.2	48.5	34.8	9.4	0.7	531.8
11:33:00	74.7	235.9	8.2	48.5	33.3	9.2	0.8	524.0
11:34:00	74.0	233.8	8.1	48.1	34.0	9.5	0.8	514.6
11:35:00	72.8	233.8	8.0	47.9	37.9	9.1	0.9	507.5
11:36:00	74.0	236.6	8.2	48.3	37.1	9.3	0.8	522.6
11:37:00	77.9	236.6	8.3	48.7	44.7	8.9	0.7	535.8
11:38:00	90.9	236.3	8.3	48.9	32.8	9.7	0.4	547.2
11:39:00	90.7	234.4	8.2	48.3	45.4	9.1	0.4	540.3
11:40:00	93.6	234.4	8.3	48.8	31.0	9.2	0.7	550.7
11:41:00	92.4	234.4	8.3	48.9	38.9	9.2	0.8	547.7
11:42:00	81.2	232.3	8.2	48.6	29.8	9.9	0.8	531.8
11:43:00	78.5	231.0	8.1	48.2	37.0	9.2	0.8	522.6
11:44:00	76.9	231.0	8.1	48.0	35.0	9.2	0.5	517.4
11:45:00	83.0	233.6	8.2	48.6	45.5	8.8	0.6	535.8
11:46:00	92.6	236.1	8.6	48.9	43.4	8.6	0.5	550.4
11:47:00	106.2	230.8	8.6	48.7	39.1	9.3	0.4	552.6
11:48:00	99.9	226.7	8.2	48.3	45.0	8.8	0.9	539.2
11:49:00	101.8	228.4	8.3	48.8	37.4	9.1	0.7	549.9
11:50:00	93.5	230.3	8.4	49.1	39.2	8.9	0.8	544.8
11:51:00	90.2	230.3	8.3	48.8	36.3	9.5	0.8	536.6
11:52:00	82.8	226.0	8.1	48.2	40.9	9.1	0.9	516.9
13:38:00	77.1	229.3	8.0	48.0	35.7	9.6	0.4	481.3
13:39:00	74.9	230.1	8.1	48.2	38.0	9.2	0.8	474.8
13:40:00	75.3	230.1	8.1	48.3	33.8	9.4	0.7	478.3
13:41:00	73.4	231.2	8.1	48.3	32.5	9.2	0.9	469.1
13:42:00	72.0	231.2	8.0	48.1	33.2	9.8	0.8	461.2
13:43:00	69.8	231.2	7.9	47.5	35.5	9.3	0.9	449.4
13:44:00	72.3	233.8	8.0	47.8	34.4	9.3	0.5	458.8
13:45:00	75.3	236.9	8.2	48.6	39.6	8.9	0.7	473.7
13:46:00	77.0	236.3	8.1	48.5	32.1	10.0	0.3	482.6
13:47:00	75.6	233.7	8.1	48.3	38.7	9.2	0.4	476.0
13:48:00	76.9	234.3	8.2	48.6	29.4	9.4	0.6	482.1
13:49:00	76.7	234.3	8.2	48.7	34.8	9.4	0.7	478.9
13:50:00	72.8	236.2	8.1	48.3	29.5	10.1	0.7	465.3
13:51:00	71.7	235.6	8.0	47.9	36.1	9.5	0.8	458.4
13:52:00	73.2	235.6	8.0	48.0	32.7	9.3	0.5	464.1
13:53:00	75.9	237.7	8.2	48.4	38.9	9.1	0.6	479.6
13:54:00	77.1	240.0	8.2	48.6	37.2	8.9	0.6	487.0
13:55:00	80.4	240.2	8.2	48.7	36.2	9.4	0.4	495.1
13:56:00	77.8	237.9	8.1	48.6	38.9	9.2	0.8	489.9
13:57:00	80.0	237.9	8.2	48.8	60.5	8.9	0.7	499.2
13:58:00	121.3	238.4	8.3	49.3	59.1	8.5	0.8	553.9
13:59:00	136.3	233.8	8.3	49.3	34.8	9.8	0.7	564.7
14:00:00	95.2	227.1	8.2	48.8	35.1	9.2	0.7	503.3
14:01:00	77.5	228.2	8.2	48.9	30.3	9.4	0.5	496.0
14:02:00	70.1	228.2	8.2	48.9	32.7	8.9	0.5	492.1
14:03:00	67.0	225.3	8.1	48.7	19.4	10.0	0.4	472.3
14:04:00	63.4	220.9	7.8	47.8	23.0	10.0	0.5	435.1

Test No. 1 - October 8, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
14:05:00	59.3	221.2	7.6	46.9	26.8	10.0	0.5	395.0
14:06:00	61.6	225.2	7.8	47.4	33.8	9.4	0.7	410.7
14:07:00	68.8	230.1	8.1	48.4	29.7	9.9	0.6	465.5
14:08:00	71.1	224.9	8.1	48.3	39.9	9.3	0.9	480.5
14:09:00	76.0	223.8	8.1	48.3	37.0	9.1	0.5	490.7
14:10:00	82.9	225.2	8.3	48.9	45.4	9.1	0.8	515.0
14:11:00	87.6	224.1	8.3	49.3	30.4	8.9	0.6	527.4
14:12:00	82.4	215.5	8.1	48.8	23.6	9.8	0.5	497.7
14:13:00	63.1	212.8	7.8	47.3	24.2	9.8	0.8	416.2
14:14:00	63.3	218.5	7.8	46.9	27.0	10.0	0.7	405.4
14:15:00	63.8	225.8	7.9	46.6	31.4	9.4	0.8	415.7
14:16:00	64.2	226.9	7.9	46.6	25.2	10.1	0.6	426.0
14:17:00	63.7	231.6	7.8	46.5	30.6	9.4	0.9	420.7
14:18:00	64.2	235.0	7.9	46.8	26.0	9.7	0.5	428.8
14:19:00	65.3	239.2	8.0	47.3	32.3	9.2	0.6	441.7
14:20:00	65.5	242.4	8.1	47.6	21.9	10.0	0.4	451.2
14:21:00	64.2	239.8	7.9	47.0	23.9	10.0	0.6	432.2
14:22:00	62.2	241.6	7.7	46.4	22.1	9.8	0.5	397.2
14:23:00	62.3	245.6	7.7	46.5	28.7	9.6	0.8	399.1
14:24:00	63.8	252.2	8.0	47.2	25.1	10.0	0.6	428.6
14:25:00	62.0	248.5	7.9	47.0	27.4	9.8	0.8	430.6
14:26:00	61.6	248.5	7.9	46.9	27.7	9.4	0.6	427.8
14:27:00	62.7	251.3	8.0	47.2	29.1	9.6	0.7	439.5
14:28:00	63.8	254.6	8.1	47.6	28.5	9.2	1.0	447.6
14:29:00	62.9	254.2	8.1	47.6	21.9	9.9	0.7	451.8
14:30:00	59.5	250.3	7.9	46.8	21.9	10.3	0.5	426.9
14:31:00	59.6	257.5	7.7	46.4	32.4	9.4	0.8	392.2
14:32:00	65.8	266.3	8.0	47.6	29.5	9.2	0.8	443.6
14:33:00	66.4	263.9	8.1	47.8	24.9	10.0	0.6	459.6
14:34:00	62.8	257.6	7.9	47.1	29.5	9.6	0.8	437.0
14:35:00	63.3	259.7	8.0	47.2	25.7	9.4	0.5	439.8
14:36:00	64.2	261.9	8.1	47.6	32.1	9.2	0.7	456.0
14:37:00	64.6	257.3	8.1	47.4	22.1	10.1	0.5	464.1
14:38:00	62.8	254.5	8.0	47.0	22.8	9.8	0.5	447.5
14:39:00	59.6	256.1	7.8	46.5	22.8	9.8	0.5	412.6
14:40:00	59.7	257.4	7.8	46.5	31.2	9.4	0.7	412.6
14:41:00	64.7	262.0	8.1	47.6	27.3	9.4	0.8	451.5
14:42:00	63.0	256.1	8.0	47.2	20.6	10.0	0.8	442.5
14:43:00	61.6	254.4	7.8	46.5	21.8	10.0	0.7	412.5
14:44:00	61.9	261.2	7.7	46.4	22.6	10.0	0.6	390.6
14:45:00	61.7	263.1	7.7	46.3	27.4	9.4	1.0	389.5
14:46:00	63.2	265.4	7.8	46.4	28.6	10.1	0.5	407.3
14:47:00	65.5	267.2	7.9	46.7	32.5	9.4	0.9	429.2
14:48:00	67.4	270.8	8.0	47.1	28.9	9.6	0.7	444.0
14:49:00	67.4	272.3	8.0	47.1	31.6	9.4	0.8	441.1
14:50:00	67.0	272.3	8.0	47.0	28.5	10.1	0.8	438.5
14:51:00	66.2	272.3	7.9	46.7	32.7	9.4	0.9	430.6
14:52:00	68.4	275.6	8.0	47.0	29.8	9.4	0.6	439.2
14:53:00	75.0	281.5	8.2	47.8	44.3	8.8	0.9	464.0
14:54:00	85.3	280.9	8.3	48.1	30.6	10.0	0.4	495.2
14:55:00	81.7	274.7	8.1	47.6	37.8	9.2	0.5	486.5
14:56:00	75.1	274.5	8.2	47.5	32.8	9.2	0.7	475.2
14:57:00	75.3	276.6	8.2	47.7	35.1	9.2	0.8	475.2
14:58:00	73.8	279.4	8.2	47.8	32.7	9.2	0.8	466.7
14:59:00	71.9	278.3	8.0	47.3	34.8	9.6	0.7	451.7
15:00:00	71.3	278.3	8.0	47.1	38.7	9.2	0.8	447.9
15:01:00	78.5	281.6	8.3	47.9	43.1	9.0	0.7	478.1
15:02:00	85.4	281.6	8.7	48.5	44.6	8.8	1.0	496.1
15:03:00	92.8	280.0	8.6	48.7	36.2	9.6	0.5	509.5
15:04:00	86.5	275.7	8.2	48.1	45.0	9.0	0.7	493.8
15:05:00	85.0	275.1	8.2	48.2	34.1	9.2	0.7	491.8
15:06:00	83.1	277.1	8.3	48.5	40.0	9.0	0.8	485.8
15:07:00	79.3	277.1	8.2	48.2	32.3	9.8	0.6	478.2
15:08:00	77.5	273.5	8.1	47.4	42.3	9.2	0.8	463.3
15:09:00	80.1	275.5	8.2	47.6	33.3	9.2	0.6	471.3
15:10:00	84.3	278.1	8.3	48.3	45.2	8.8	0.8	486.9
15:11:00	88.4	276.4	8.6	48.4	34.6	9.9	0.3	498.2
15:12:00	87.1	271.5	8.5	47.9	40.9	9.2	0.3	489.2
15:13:00	83.7	270.9	8.2	47.9	42.0	9.0	0.6	483.8
15:14:00	86.0	270.9	8.2	48.2	39.2	9.3	0.6	489.1
15:15:00	84.3	273.8	8.3	48.4	41.4	8.8	0.7	486.6
15:16:00	84.6	272.1	8.2	48.4	40.2	9.3	0.6	485.4
15:17:00	85.0	265.7	8.1	48.2	42.0	8.9	0.7	482.5
15:18:00	89.1	265.7	8.3	49.0	43.5	9.1	0.5	502.3

Test No. 1 - October 8, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
15:19:00	90.3	265.7	8.4	49.2	47.3	8.7	0.8	506.8
15:20:00	90.3	259.0	8.3	48.9	37.5	9.5	0.3	510.6
15:21:00	86.1	256.7	8.3	48.7	46.1	9.1	0.4	502.1
15:22:00	89.3	257.1	8.3	48.8	34.1	9.3	0.5	506.9
15:23:00	86.8	255.3	8.3	48.7	39.3	9.1	0.6	493.4
15:24:00	79.0	255.3	8.2	48.5	31.9	9.9	0.5	483.0
15:25:00	74.7	253.7	8.0	47.9	39.9	9.2	0.6	460.9
15:26:00	75.2	254.7	8.1	48.1	33.3	9.2	0.4	462.9
15:27:00	79.3	259.8	8.3	48.8	43.0	8.8	0.6	484.9
15:28:00	81.7	261.3	8.3	49.1	35.3	9.7	0.2	499.3
15:29:00	79.9	255.4	8.1	48.6	38.7	9.3	0.2	489.7
15:30:00	78.5	254.5	8.1	48.3	41.4	9.1	0.5	480.0
15:31:00	81.4	256.7	8.2	48.6	37.9	9.3	0.6	485.8
15:32:00	79.7	257.7	8.2	48.7	34.8	9.1	0.6	481.8
15:33:00	73.4	254.7	8.0	47.8	36.5	9.6	0.5	458.2
15:34:00	73.2	254.7	8.0	47.7	40.0	9.2	0.7	450.0
15:35:00	78.4	260.9	8.2	48.6	39.7	9.2	0.4	473.9
15:36:00	79.8	260.9	8.2	48.7	47.3	9.0	0.7	480.0
15:37:00	85.0	258.3	8.2	48.5	36.5	9.8	0.3	493.0
Max	136.3	281.6	8.7	49.3	60.5	10.3	1.1	570.3
Min	59.3	212.8	7.6	46.3	19.4	8.5	0.2	389.5
Average	75.7	253.7	8.1	48.1	34.2	9.3	0.6	494.4

Test No. 2 - October 9, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
9:04:00	79.2	316.4	7.9	47.2	25.1	10.3	0.6	463.6
9:05:00	78.0	313.6	7.9	47.0	30.0	9.8	0.7	456.6
9:06:00	77.5	311.9	7.9	46.8	29.3	9.6	0.4	449.3
9:07:00	81.3	314.0	8.0	47.1	35.1	9.2	0.6	463.5
9:08:00	87.8	316.6	8.1	47.7	34.5	9.0	0.5	480.9
9:09:00	94.4	305.0	8.0	47.7	30.8	9.7	0.3	489.1
9:10:00	88.8	298.4	7.9	47.2	34.6	9.3	0.8	478.7
9:11:00	88.7	302.5	8.1	47.8	32.0	9.5	0.5	490.0
9:12:00	89.6	302.5	8.2	48.7	32.8	9.3	0.7	498.7
9:13:00	88.2	293.7	8.1	48.3	28.7	10.1	0.6	490.5
9:14:00	81.0	284.2	7.9	47.4	31.4	9.5	0.7	467.3
9:15:00	80.2	285.3	8.0	47.5	31.0	9.5	0.5	472.3
9:16:00	86.2	285.3	8.1	47.8	36.8	9.1	0.5	486.1
9:17:00	93.5	285.3	8.1	48.2	27.4	10.1	0.2	502.1
9:18:00	93.5	275.3	8.0	47.8	33.6	9.5	0.4	497.6
9:19:00	92.6	275.8	8.1	48.0	25.7	9.5	0.4	501.3
9:20:00	90.0	275.8	8.1	48.0	29.7	9.5	0.6	496.4
9:21:00	77.4	272.2	8.0	47.4	24.9	10.2	0.6	473.8
9:22:00	76.1	272.2	7.9	47.1	28.7	9.6	0.7	465.7
9:23:00	77.1	273.1	7.9	47.1	28.2	9.4	0.5	463.3
9:24:00	83.1	279.3	8.1	48.2	34.9	9.2	0.6	485.3
9:25:00	89.8	279.3	8.2	48.3	33.3	9.0	0.6	500.0
9:26:00	95.1	270.3	8.0	47.8	29.5	9.8	0.4	500.1
9:27:00	89.5	267.7	8.0	47.7	31.6	9.4	0.8	489.4
9:28:00	84.2	270.2	8.1	47.9	29.4	9.6	0.6	489.4
9:29:00	80.9	271.5	8.1	47.7	32.5	9.4	0.7	484.3
9:30:00	81.9	271.5	8.0	47.7	26.4	10.0	0.7	482.1
9:31:00	79.5	268.9	7.9	47.3	30.8	9.5	0.8	466.0
9:32:00	79.6	271.3	8.0	47.5	29.9	9.5	0.4	471.7
9:33:00	87.2	273.9	8.1	47.9	39.2	9.1	0.5	489.0
9:34:00	99.6	275.0	8.2	48.3	25.6	10.2	0.3	507.8
9:35:00	100.2	267.4	8.0	47.9	31.4	9.4	0.4	501.8
9:36:00	90.2	268.5	8.1	48.1	25.2	9.6	0.5	497.8
9:37:00	86.3	268.5	8.1	48.0	30.0	9.4	0.6	491.9
9:38:00	77.3	268.5	8.0	47.6	26.6	9.9	0.6	477.3
9:39:00	78.2	268.5	8.0	47.4	28.1	9.8	0.7	473.1
9:40:00	77.9	266.5	7.9	47.2	30.6	9.6	0.5	466.2
9:41:00	84.8	270.1	8.0	47.4	37.5	9.4	0.6	485.8
9:42:00	98.0	272.4	8.2	48.3	35.7	8.9	0.9	506.5
9:43:00	111.0	265.9	8.1	48.0	30.3	9.6	0.3	516.5
9:44:00	100.2	262.6	8.0	47.8	32.5	9.4	0.7	503.0
9:45:00	90.3	266.9	8.2	48.4	28.7	9.4	0.6	504.0
9:46:00	86.2	266.9	8.1	48.2	30.8	9.4	0.7	497.2
9:47:00	79.4	265.3	8.0	47.7	25.2	9.9	0.7	480.8
9:48:00	77.7	265.3	7.9	47.3	30.3	9.5	0.8	465.9
9:49:00	78.7	266.8	8.0	47.6	27.7	9.5	0.4	474.2
9:50:00	90.1	271.9	8.1	48.2	38.0	9.1	0.6	498.0
9:51:00	102.2	274.3	8.2	48.7	26.2	10.1	0.3	518.0
9:52:00	102.0	264.4	8.0	47.8	32.3	9.4	0.4	507.5
9:53:00	93.6	265.1	8.0	47.7	27.3	9.4	0.5	495.0
9:54:00	89.0	266.4	8.1	48.3	29.0	9.4	0.6	497.8
9:55:00	79.5	266.4	8.1	48.2	28.0	9.2	0.6	488.7
9:56:00	78.3	265.3	8.0	47.6	29.7	9.7	0.7	480.2
9:57:00	76.4	265.3	7.9	47.2	30.0	9.3	0.7	472.3
9:58:00	80.5	269.8	8.0	47.7	37.5	9.3	0.6	483.2
9:59:00	93.9	273.3	8.2	48.4	34.0	8.9	1.1	509.2
10:00:00	98.8	266.7	8.1	48.1	31.0	9.8	0.3	513.9
10:01:00	92.1	263.5	8.0	47.9	32.7	9.4	0.6	502.1
10:02:00	86.7	264.8	8.1	48.2	27.6	9.4	0.6	502.1
10:03:00	83.2	264.8	8.1	48.1	31.6	9.4	0.6	495.3
10:04:00	81.1	268.6	8.1	47.9	25.6	9.9	0.7	486.8
10:05:00	80.4	268.6	8.0	47.8	30.8	9.5	0.8	480.2
10:06:00	79.8	270.0	8.0	47.8	28.5	9.3	0.4	483.9
10:07:00	95.7	273.7	8.2	48.3	44.6	8.9	0.7	508.2
10:08:00	114.4	273.7	8.3	48.6	28.1	10.0	0.3	530.3
10:09:00	118.3	265.4	8.2	48.3	32.9	9.3	0.4	528.9
10:10:00	97.7	267.8	8.2	48.6	30.2	9.1	0.5	517.9
10:11:00	93.7	267.8	8.2	48.6	28.9	9.5	0.6	510.9
10:12:00	81.7	269.8	8.1	48.5	28.5	9.3	0.7	488.5
10:13:00	79.7	268.2	8.0	48.1	28.0	9.9	0.7	479.8
10:14:00	76.5	266.9	7.9	47.5	27.6	9.4	0.7	467.7
10:15:00	78.1	270.3	8.0	47.9	29.4	9.4	0.5	475.3
10:16:00	78.6	277.0	8.2	48.6	30.3	9.0	0.9	489.9
10:17:00	76.7	270.3	8.0	48.1	24.9	9.9	0.3	486.1

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Time	CO ppm	HCl ppm	CO_2 %	H_2O %	THC ppm	O_2 %	Opacity %	SO_2 ppm
10:18:00	72.9	267.0	8.0	47.7	31.2	9.5	0.5	472.9
10:19:00	75.8	268.9	8.1	47.9	25.7	9.5	0.5	478.1
10:20:00	78.3	271.7	8.1	48.2	29.0	9.3	0.7	481.4
10:21:00	77.2	273.7	8.1	48.0	24.0	10.1	0.6	477.9
10:22:00	70.9	268.4	7.8	47.2	27.6	9.7	0.7	459.6
10:23:00	71.6	271.2	7.9	47.5	25.2	9.5	0.4	463.7
10:24:00	76.5	277.8	8.1	48.3	32.7	9.3	0.6	480.6
10:25:00	81.5	279.1	8.1	48.6	27.0	10.2	0.2	496.3
10:26:00	82.5	269.6	8.0	47.9	29.8	9.5	0.4	492.5
10:27:00	76.9	270.3	8.0	47.5	27.7	9.3	0.6	489.3
10:28:00	76.2	270.3	8.1	48.0	27.8	9.5	0.6	488.0
10:29:00	73.4	271.6	8.0	47.8	26.8	9.3	0.7	479.0
10:30:00	73.0	269.3	8.0	47.5	27.0	9.8	0.7	473.7
10:31:00	71.3	267.5	7.9	47.2	28.7	9.5	0.8	462.5
10:32:00	73.4	268.9	7.9	47.4	31.4	9.5	0.5	470.5
10:33:00	81.4	275.7	8.1	48.3	31.9	9.1	1.0	493.9
10:34:00	85.0	270.6	8.0	48.1	26.8	9.9	0.3	500.6
10:35:00	80.0	266.7	8.0	47.7	30.6	9.4	0.4	487.6
10:36:00	76.2	266.7	8.1	47.9	25.6	9.4	0.5	483.8
10:37:00	74.6	266.7	8.1	47.8	28.9	9.4	0.6	480.1
10:38:00	72.9	266.2	8.0	47.8	23.8	10.0	0.6	474.2
10:39:00	69.1	261.7	7.9	47.5	28.7	9.6	0.7	457.0
10:40:00	71.0	264.3	7.9	47.3	25.3	9.4	0.3	463.9
10:41:00	77.8	267.5	8.0	47.8	33.7	9.2	0.6	482.1
10:42:00	84.5	269.7	8.2	48.2	27.8	9.7	0.2	497.3
10:43:00	84.4	264.1	8.0	48.0	28.3	9.6	0.4	490.0
10:44:00	76.8	260.2	7.9	47.4	29.7	9.4	0.6	473.1
10:45:00	75.4	261.9	8.0	47.8	28.5	9.4	0.6	476.7
10:46:00	74.9	266.3	8.1	48.1	28.0	9.2	0.7	479.2
10:47:00	73.6	262.5	8.0	47.7	26.8	9.8	0.7	472.7
10:48:00	72.3	259.7	7.9	47.3	28.3	9.6	0.8	460.8
10:49:00	73.3	261.7	8.0	47.6	28.7	9.6	0.4	466.5
10:50:00	75.0	265.8	8.1	48.2	32.4	9.2	0.9	476.6
10:51:00	78.8	261.3	8.1	48.5	25.5	10.0	0.3	485.9
10:52:00	76.4	257.1	7.9	47.5	31.9	9.6	0.4	470.4
10:53:00	77.6	257.1	8.0	47.8	25.5	9.6	0.6	477.3
10:54:00	77.5	259.6	8.1	48.0	28.3	9.6	0.6	478.5
10:55:00	72.2	259.6	8.0	47.6	23.6	10.1	0.6	465.2
10:56:00	71.7	256.7	7.9	47.3	27.4	9.7	0.7	456.2
10:57:00	72.6	258.7	7.9	47.4	24.7	9.7	0.4	451.8
10:58:00	75.0	261.4	8.0	47.7	31.7	9.3	0.5	464.2
10:59:00	81.4	264.4	8.1	48.1	30.6	9.1	0.4	480.3
11:00:00	86.9	257.8	8.1	47.9	28.5	9.6	0.4	488.4
11:01:00	81.7	255.8	8.0	47.8	31.5	9.4	0.7	482.0
11:02:00	79.9	257.1	8.1	47.9	27.0	9.4	0.7	485.8
11:03:00	76.9	262.3	8.2	48.2	27.2	9.4	0.8	481.7
11:04:00	74.2	262.3	8.1	48.1	24.8	9.9	0.7	474.4
12:03:00	80.7	254.0	7.9	47.7	27.7	9.7	0.7	440.1
12:04:00	78.5	252.7	7.8	47.3	29.3	10.1	0.6	432.9
12:05:00	77.9	252.7	7.7	47.1	29.8	9.9	0.6	425.9
12:06:00	81.6	256.2	7.8	47.4	32.4	9.9	0.5	439.6
12:07:00	82.6	256.2	7.9	47.5	31.1	9.4	0.8	449.3
12:08:00	83.0	254.1	7.9	47.6	29.3	10.1	0.3	454.0
12:09:00	82.0	252.9	7.8	47.5	30.4	9.7	0.6	445.5
12:10:00	78.2	252.9	7.9	47.4	27.0	9.9	0.5	443.2
12:11:00	76.7	252.9	7.9	47.5	30.3	9.7	0.5	443.2
12:12:00	78.6	255.1	7.9	47.8	26.8	10.3	0.6	441.1
12:13:00	76.7	252.7	7.8	47.1	29.1	9.9	0.7	428.3
12:14:00	78.1	255.2	7.8	47.3	28.0	9.9	0.5	432.7
12:15:00	80.9	256.4	7.9	47.6	32.3	9.4	0.5	444.5
12:16:00	80.0	254.7	7.9	47.6	26.5	10.4	0.3	452.0
12:17:00	79.2	253.2	7.8	47.4	29.7	9.7	0.4	448.2
12:18:00	78.3	253.2	7.8	47.4	28.9	9.7	0.5	443.9
12:19:00	78.1	253.2	7.8	47.4	29.1	9.7	0.6	443.9
12:20:00	78.8	258.1	7.9	47.7	27.7	9.7	0.7	441.2
12:21:00	78.8	256.8	7.8	47.5	27.6	10.1	0.6	435.5
12:22:00	76.9	254.5	7.7	47.1	28.9	9.9	0.6	424.2
12:23:00	77.7	256.2	7.7	47.3	30.4	9.9	0.5	428.4
12:24:00	80.1	260.2	7.9	47.7	31.9	9.3	0.9	440.7
12:25:00	80.5	257.4	7.9	47.5	28.0	10.0	0.3	445.7
12:26:00	80.5	254.8	7.8	47.3	30.4	9.6	0.5	438.9
12:27:00	81.8	258.4	7.9	47.9	27.3	9.8	0.5	445.3
12:28:00	79.7	258.4	7.9	47.7	29.7	9.8	0.6	442.6
12:29:00	78.5	255.0	7.8	47.4	25.2	10.3	0.6	430.0

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
12:30:00	76.3	253.4	7.6	46.8	28.5	9.9	0.7	414.4
12:31:00	76.0	253.4	7.7	46.7	26.1	9.9	0.4	416.9
12:32:00	79.4	257.9	7.9	47.1	32.4	9.5	0.5	428.6
12:33:00	83.7	261.4	8.0	47.5	26.9	10.4	0.2	441.2
12:34:00	83.6	259.1	7.9	47.3	29.3	10.0	0.3	436.7
12:35:00	80.4	257.8	7.7	46.9	28.7	9.8	0.5	425.9
12:36:00	80.0	262.7	7.9	47.2	28.5	10.0	0.6	426.1
12:37:00	79.5	264.5	7.9	47.1	27.2	9.8	0.7	419.1
12:38:00	78.2	264.5	7.8	46.8	28.0	10.2	0.7	415.3
12:39:00	78.5	269.5	7.7	46.7	28.6	9.8	0.6	412.6
12:40:00	79.2	271.0	7.8	46.9	31.0	9.8	0.6	420.7
12:41:00	81.2	275.9	7.9	47.6	31.7	9.3	0.8	437.7
12:42:00	79.3	274.4	7.9	47.5	27.3	10.1	0.3	442.6
12:43:00	77.5	273.2	7.8	47.1	29.8	9.9	0.4	431.0
12:44:00	78.0	278.5	7.9	47.3	25.7	9.9	0.5	430.8
12:45:00	77.4	280.8	7.8	47.2	29.3	9.7	0.6	428.3
12:46:00	78.1	283.2	7.8	47.1	25.3	10.4	0.7	424.4
12:47:00	76.7	280.1	7.7	46.6	29.7	10.0	0.7	417.7
12:48:00	78.5	282.5	7.7	46.7	26.4	9.8	0.3	414.8
12:49:00	83.3	291.9	7.9	47.4	33.3	9.4	0.5	429.8
12:50:00	85.9	293.0	8.0	47.5	28.0	9.9	0.2	440.0
12:51:00	85.5	283.5	7.8	47.0	30.4	9.9	0.4	436.1
12:52:00	83.3	282.3	7.7	47.0	29.0	9.7	0.6	429.2
12:53:00	81.2	286.2	7.8	47.3	28.3	9.9	0.6	430.7
12:54:00	79.6	292.4	7.9	47.3	26.8	9.7	0.7	425.7
12:55:00	78.1	292.4	7.8	46.9	28.0	10.1	0.6	419.1
12:56:00	79.0	297.1	7.7	46.9	28.3	9.7	0.7	414.0
12:57:00	80.9	300.6	7.8	47.3	30.6	9.9	0.6	423.2
12:58:00	83.2	310.8	7.9	47.8	33.7	9.3	0.7	437.7
12:59:00	85.0	303.0	7.9	47.7	28.0	10.2	0.2	448.3
13:00:00	82.5	295.9	7.8	47.2	29.9	9.8	0.4	438.9
13:01:00	82.5	296.9	7.9	47.2	26.6	9.8	0.5	434.1
13:02:00	83.0	296.9	7.9	47.2	29.8	9.8	0.6	430.3
13:03:00	80.8	299.0	7.8	47.1	24.7	10.4	0.6	425.7
13:04:00	76.8	300.5	7.7	46.7	27.8	9.9	0.7	413.5
13:05:00	76.9	305.4	7.7	46.7	26.2	9.9	0.3	413.5
13:06:00	79.5	312.4	7.9	47.2	32.4	9.5	0.4	424.7
13:07:00	84.1	317.4	8.0	47.9	29.0	9.6	0.3	440.1
13:08:00	85.4	308.5	7.8	47.7	28.9	10.0	0.3	439.4
13:09:00	81.1	302.1	7.8	47.1	30.3	9.8	0.6	426.2
13:10:00	81.8	305.7	7.9	47.3	28.6	9.8	0.5	430.6
13:11:00	82.6	309.5	7.9	47.4	28.0	9.6	0.6	430.6
13:12:00	81.6	306.5	7.8	47.0	28.0	10.3	0.6	425.8
13:13:00	81.9	304.8	7.7	46.7	28.7	9.9	0.6	411.5
13:14:00	82.8	309.3	7.8	47.0	29.4	9.9	0.4	416.5
13:15:00	84.1	314.9	7.9	47.5	32.4	9.5	0.5	425.9
13:16:00	86.0	308.6	7.8	47.5	27.2	10.3	0.2	433.7
13:17:00	83.2	301.2	7.7	46.9	30.7	9.9	0.3	424.3
13:18:00	82.8	302.7	7.8	47.2	25.9	9.9	0.4	430.0
13:19:00	82.5	304.4	7.8	47.3	29.4	9.7	0.6	430.0
13:20:00	81.4	308.7	7.8	47.4	24.5	10.6	0.5	423.4
13:21:00	81.1	308.7	7.7	47.1	27.8	10.2	0.6	415.2
13:22:00	82.6	311.9	7.6	47.0	26.6	10.0	0.2	405.4
13:23:00	84.9	318.8	7.7	47.2	31.4	10.0	0.5	407.0
13:24:00	87.0	324.5	7.7	47.3	28.2	9.8	0.3	410.3
13:25:00	87.2	316.4	7.5	46.9	29.5	10.5	0.2	404.0
13:26:00	87.2	309.1	7.4	46.5	29.5	10.3	0.6	394.6
13:27:00	92.5	315.1	7.5	46.9	29.3	10.5	0.4	394.6
13:28:00	94.3	316.3	7.5	46.9	29.5	10.3	0.6	392.5
13:29:00	92.7	314.8	7.4	46.5	28.3	11.0	0.5	385.3
13:30:00	94.0	316.4	7.3	46.0	30.6	10.5	0.5	373.7
13:31:00	96.7	320.6	7.4	46.2	32.1	10.3	0.3	381.8
13:32:00	97.6	331.1	7.6	46.9	34.5	9.9	0.4	408.8
13:33:00	97.3	333.3	7.7	47.1	28.9	10.7	0.2	423.1
13:34:00	92.7	326.0	7.6	46.6	30.8	10.2	0.3	417.0
13:35:00	90.5	330.5	7.6	46.4	28.5	10.2	0.3	415.0
13:36:00	90.9	338.3	7.6	46.3	32.0	10.0	0.5	415.0
13:37:00	91.4	353.4	7.6	46.3	28.0	10.7	0.5	417.6
13:38:00	90.4	353.4	7.6	46.1	30.0	10.2	0.6	413.6
13:39:00	88.5	357.2	7.5	45.8	30.2	10.0	0.3	407.8
13:40:00	92.0	372.4	7.7	46.4	34.1	9.8	0.4	419.9
13:41:00	93.2	374.3	7.8	46.6	32.1	9.6	0.5	429.6
13:42:00	92.3	368.2	7.7	46.5	31.4	10.3	0.2	435.2
13:43:00	91.6	368.2	7.7	46.5	31.2	9.9	0.6	430.8

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
13:44:00	88.7	373.1	7.7	46.5	29.4	10.1	0.5	432.8
13:45:00	86.8	378.9	7.7	46.4	32.0	9.9	0.7	426.1
13:46:00	88.2	378.9	7.7	46.4	29.1	10.5	0.5	426.1
13:47:00	85.2	376.8	7.6	46.2	33.3	9.9	0.6	424.0
13:48:00	84.9	381.5	7.7	46.3	33.4	9.7	0.4	436.7
13:49:00	90.0	392.7	8.0	47.0	39.7	9.3	0.4	463.1
13:50:00	93.2	385.7	8.0	47.2	29.8	10.2	0.2	486.2
13:51:00	89.8	378.1	7.9	46.8	35.9	9.6	0.3	483.0
13:52:00	86.2	378.4	8.0	47.0	28.7	9.4	0.4	485.4
13:53:00	84.3	378.4	8.0	47.0	33.2	9.4	0.5	481.8
13:54:00	82.0	384.8	8.0	47.1	29.1	9.9	0.6	478.0
13:55:00	80.7	383.3	7.9	47.0	32.3	9.7	0.7	474.0
13:56:00	78.6	386.1	7.9	46.5	31.6	9.5	0.5	462.1
13:57:00	81.5	395.8	8.0	47.1	36.1	9.3	0.6	475.9
13:58:00	84.9	395.8	8.0	47.4	34.5	9.1	0.8	486.2
13:59:00	87.9	380.7	8.0	47.0	32.3	9.6	0.3	490.2
14:00:00	84.1	376.8	8.0	47.0	35.9	9.2	0.6	483.0
14:01:00	82.7	378.9	8.1	47.5	30.7	9.4	0.5	498.0
14:02:00	81.5	375.1	8.1	47.5	33.2	9.2	0.5	495.0
14:03:00	80.3	375.1	8.0	47.5	28.6	10.1	0.6	489.2
Max	118.3	395.8	8.3	48.7	44.6	11.0	1.1	530.3
Min	69.1	252.7	7.3	45.8	23.6	8.9	0.2	373.7
Average	83.1	288.5	7.9	47.5	29.6	9.7	0.5	458.9

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
9:03:00	103.1	133.3	8.1	47.2	34.2	9.5	0.1	467.7
9:04:00	98.5	133.0	8.2	47.2	26.8	9.7	0.4	463.7
9:05:00	93.4	133.0	8.1	47.2	29.7	9.7	0.5	448.5
9:06:00	88.7	133.0	8.1	47.1	28.6	10.1	0.6	440.4
9:07:00	85.7	133.0	8.0	46.6	28.8	9.8	0.6	427.8
9:08:00	85.0	133.0	8.0	46.5	31.0	9.6	0.3	424.4
9:09:00	86.5	134.3	8.1	46.8	33.4	9.6	0.4	434.4
9:10:00	93.4	135.9	8.2	47.2	33.3	9.1	0.7	453.0
9:11:00	96.0	134.4	8.1	47.1	33.6	9.8	0.2	457.6
9:12:00	96.1	131.4	8.1	46.8	34.9	9.4	0.6	451.4
9:13:00	98.1	131.4	8.2	47.0	27.4	9.6	0.4	455.7
9:14:00	92.7	133.0	8.2	47.3	30.9	9.4	0.6	441.2
9:15:00	88.3	133.0	8.1	47.1	28.6	10.2	0.6	431.9
9:16:00	83.9	131.0	7.9	46.3	32.2	9.6	0.6	414.9
9:17:00	88.7	133.1	8.1	46.8	28.4	9.6	0.3	429.7
9:18:00	91.2	133.1	8.2	47.1	38.3	9.2	0.5	435.2
9:19:00	102.2	135.2	8.3	47.6	27.4	10.3	0.1	455.4
9:20:00	102.9	133.1	8.2	47.5	35.4	9.4	0.1	455.4
9:21:00	100.0	130.7	8.2	47.2	30.5	9.7	0.3	453.5
9:22:00	96.9	130.7	8.2	47.1	31.2	9.4	0.5	451.6
9:23:00	93.4	130.7	8.2	47.1	29.5	9.4	0.6	447.2
9:24:00	88.2	130.7	8.0	46.5	29.9	9.7	0.7	428.6
9:25:00	88.7	130.7	8.0	46.4	32.6	9.5	0.5	422.3
9:26:00	91.6	133.1	8.2	47.1	35.2	9.5	0.5	436.8
9:27:00	93.8	133.1	8.2	47.2	33.0	9.1	0.9	446.6
9:28:00	96.8	131.9	8.2	47.1	32.6	9.8	0.1	456.0
9:29:00	95.8	130.6	8.1	46.8	37.1	9.4	0.5	445.3
9:30:00	101.7	131.7	8.2	47.2	28.9	9.6	0.5	458.0
9:31:00	97.1	131.7	8.2	47.4	32.4	9.4	0.6	450.4
9:32:00	90.6	131.7	8.2	47.2	26.9	10.2	0.6	438.9
9:33:00	87.7	130.3	8.0	46.5	32.1	9.6	0.6	420.1
9:34:00	89.4	130.3	8.0	46.7	29.4	9.6	0.3	427.9
9:35:00	92.6	132.6	8.1	47.0	40.1	9.2	0.5	434.8
9:36:00	108.1	132.6	8.2	47.3	30.1	10.1	0.1	457.7
9:37:00	109.2	131.2	8.1	47.0	35.1	9.5	0.2	456.3
9:38:00	106.1	131.2	8.2	47.3	31.9	9.5	0.4	457.3
9:39:00	107.2	132.2	8.3	47.5	33.1	9.5	0.5	459.7
9:40:00	99.5	132.2	8.2	47.3	29.9	9.5	0.6	444.1
9:41:00	94.0	130.1	8.0	46.6	30.8	9.9	0.6	420.8
9:42:00	89.4	130.1	7.9	46.3	31.7	9.7	0.6	410.8
9:43:00	92.6	132.1	8.1	47.0	37.9	9.7	0.4	423.6
9:44:00	100.3	133.6	8.2	47.3	38.4	9.2	0.8	437.8
9:45:00	114.0	132.3	8.2	47.5	32.8	9.8	0.2	458.3
9:46:00	102.3	128.9	8.0	46.8	33.7	9.6	0.3	435.5
9:47:00	99.5	130.4	8.1	47.1	27.5	9.8	0.5	437.5
9:48:00	93.8	130.4	8.1	47.2	32.5	9.6	0.6	420.6
9:49:00	90.9	130.4	8.1	47.0	26.8	10.5	0.6	414.8
9:50:00	89.7	130.4	7.9	46.6	31.5	9.8	0.7	404.0
9:51:00	92.2	130.4	8.0	46.7	28.2	9.8	0.3	405.9
9:52:00	94.3	130.4	8.0	46.8	36.7	9.4	0.5	411.3
9:53:00	101.8	132.3	8.1	47.2	29.9	10.4	0.0	433.1
9:54:00	102.7	130.8	8.0	47.0	36.8	9.7	0.2	436.4
9:55:00	105.4	130.8	8.1	47.1	34.1	9.5	0.5	443.4
9:56:00	102.9	130.8	8.2	47.2	33.4	9.7	0.6	440.8
9:57:00	100.9	130.8	8.2	47.2	30.2	9.5	0.7	436.8
9:58:00	98.1	130.8	8.0	47.0	32.9	9.9	0.8	423.5
9:59:00	93.0	130.8	8.0	46.8	31.7	9.7	0.7	416.8
10:00:00	96.5	133.2	8.1	47.1	35.3	9.7	0.4	426.7
10:01:00	99.7	133.2	8.1	47.3	37.9	9.2	0.8	430.1
10:02:00	104.1	133.8	8.1	47.5	30.6	10.1	0.1	445.2
10:03:00	96.9	131.0	8.0	47.0	37.6	9.7	0.2	433.8
10:04:00	101.6	131.0	8.1	47.4	28.8	9.5	0.5	444.3
10:05:00	103.1	132.5	8.2	47.7	34.0	9.5	0.6	446.1
10:06:00	99.4	132.5	8.2	47.6	26.8	10.3	0.6	443.6
10:07:00	93.1	132.5	7.9	46.7	32.6	9.9	0.8	427.8
10:08:00	94.0	131.2	7.9	46.6	30.7	9.7	0.4	427.6
10:09:00	96.8	133.2	8.1	46.9	37.5	9.4	0.6	435.9
10:10:00	101.4	134.4	8.2	47.6	30.5	9.9	0.1	457.1
10:11:00	99.0	132.5	8.1	47.2	32.9	9.8	0.3	451.2
10:12:00	94.1	132.5	8.0	47.2	34.3	9.6	0.7	440.5
10:13:00	96.5	132.5	8.1	47.4	33.1	9.8	0.6	444.6
10:14:00	94.4	132.5	8.1	47.3	29.5	9.6	0.8	438.4
10:15:00	87.8	132.5	7.9	46.6	29.0	10.2	0.6	417.1
10:16:00	86.7	132.5	7.8	46.3	32.6	9.8	0.7	407.9

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
10:17:00	90.1	136.1	8.0	46.5	35.3	9.8	0.4	418.4
10:18:00	94.4	137.6	8.1	46.7	36.9	9.4	0.8	428.6
10:19:00	100.2	138.8	8.1	46.9	30.3	10.4	0.1	440.9
10:20:00	92.4	137.3	7.9	46.4	34.4	9.7	0.2	421.8
10:21:00	94.6	138.8	8.0	46.8	27.7	9.7	0.5	431.0
10:22:00	93.1	139.8	8.0	46.6	31.8	9.7	0.6	422.2
10:23:00	91.2	141.2	8.0	46.6	27.8	10.6	0.7	417.1
10:24:00	91.3	141.2	7.9	46.4	33.9	9.9	0.7	407.9
10:25:00	93.1	142.7	7.8	46.2	30.0	9.7	0.4	407.9
10:26:00	97.2	145.7	8.0	46.5	39.1	9.5	0.5	420.4
10:27:00	105.4	146.9	8.2	47.1	32.9	9.3	0.2	437.5
10:28:00	105.8	142.5	8.1	46.9	34.4	9.8	0.2	437.5
10:29:00	97.1	137.3	8.0	46.3	33.8	9.6	0.7	425.9
10:30:00	95.9	137.3	8.0	46.6	32.1	9.8	0.6	427.3
10:31:00	94.1	139.8	8.1	46.8	32.7	9.6	0.8	421.9
10:32:00	93.7	134.0	8.0	46.3	31.2	10.3	0.8	418.6
10:33:00	92.4	130.1	7.9	46.1	34.4	9.7	0.7	412.4
10:34:00	96.5	130.1	8.1	46.7	39.1	9.7	0.5	422.6
10:35:00	103.9	128.9	8.2	46.7	47.0	9.0	0.7	428.1
10:36:00	127.7	125.7	8.3	47.0	31.1	10.0	0.2	440.1
10:37:00	110.0	120.5	8.1	46.6	40.2	9.5	0.3	415.2
10:38:00	104.7	120.5	8.2	46.9	28.8	9.5	0.7	421.4
10:39:00	101.1	120.5	8.2	47.2	34.0	9.5	0.7	420.3
10:40:00	96.3	119.3	8.2	47.1	28.3	10.3	0.7	414.8
10:41:00	94.2	117.2	8.0	46.6	32.7	9.6	0.8	402.2
10:42:00	95.9	117.2	8.1	46.8	31.7	9.6	0.4	408.2
10:43:00	96.7	117.2	8.2	47.6	40.2	9.4	0.6	413.6
10:44:00	104.8	117.2	8.3	48.2	35.3	9.2	0.4	430.1
10:45:00	105.4	114.8	8.2	47.8	33.9	9.7	0.2	426.8
10:46:00	100.0	111.0	8.1	47.3	37.3	9.4	0.9	415.6
10:47:00	104.7	111.0	8.2	47.7	29.9	9.6	0.6	421.4
10:48:00	101.0	111.0	8.1	47.5	33.6	9.6	0.7	405.9
10:49:00	96.2	108.6	8.0	47.2	29.9	10.3	0.7	391.4
10:50:00	93.8	108.6	7.9	47.1	35.4	9.7	0.8	385.6
10:51:00	94.5	107.0	8.0	47.2	34.5	9.7	0.4	392.5
10:52:00	97.0	107.0	8.1	47.5	40.7	9.3	0.7	400.1
10:53:00	106.2	108.0	8.2	47.8	33.8	10.2	0.2	414.1
10:54:00	107.9	104.3	8.1	47.4	35.3	9.6	0.3	412.5
10:55:00	105.0	104.3	8.1	47.4	29.5	9.6	0.5	414.8
10:56:00	96.1	104.3	8.1	47.2	33.8	9.6	0.6	403.5
10:57:00	94.5	104.3	8.1	47.2	29.8	10.4	0.7	401.0
10:58:00	93.5	103.3	8.0	46.7	33.3	9.7	0.7	394.3
10:59:00	92.2	103.3	8.0	46.5	35.6	9.5	0.5	391.6
11:00:00	95.7	103.3	8.2	47.2	43.0	9.3	0.6	407.2
11:01:00	113.2	104.3	8.3	47.9	35.6	9.1	0.7	434.8
11:02:00	112.5	101.7	8.2	47.6	35.4	9.9	0.3	432.0
11:03:00	100.4	100.0	8.1	47.0	36.2	9.7	0.8	413.0
12:07:00	78.1	102.5	8.0	47.1	27.8	9.6	0.8	415.0
12:08:00	80.6	102.5	8.2	47.4	31.2	9.6	0.6	429.7
12:09:00	96.1	102.5	8.3	47.8	37.5	9.0	0.8	455.5
12:10:00	104.2	100.2	8.2	47.6	27.8	10.0	0.2	460.8
12:11:00	97.2	98.6	8.1	47.5	33.4	9.3	0.3	452.0
12:12:00	97.2	98.6	8.2	47.9	25.9	9.3	0.6	461.8
12:13:00	93.9	96.2	8.2	47.7	28.3	9.5	0.7	453.4
12:14:00	84.5	96.2	8.1	47.5	24.4	10.1	0.7	439.1
12:15:00	82.7	94.3	8.0	46.9	27.6	9.6	0.8	433.3
12:16:00	84.1	94.3	8.1	47.1	25.4	9.4	0.4	441.2
12:17:00	86.1	95.4	8.2	47.3	33.6	9.2	0.5	446.9
12:18:00	102.8	95.4	8.3	47.8	29.7	9.8	0.1	466.8
12:19:00	108.2	95.4	8.2	47.6	33.4	9.4	0.3	468.9
12:20:00	107.5	94.4	8.2	47.5	35.4	9.2	0.7	467.5
12:21:00	107.0	94.4	8.3	48.0	28.3	9.4	0.6	471.0
12:22:00	98.4	94.4	8.3	48.0	27.3	9.4	0.7	464.1
12:23:00	86.0	95.6	8.1	47.5	28.4	9.9	0.7	447.2
12:24:00	86.2	95.6	8.0	47.3	29.2	9.4	0.8	441.6
12:25:00	91.2	99.5	8.2	47.8	31.2	9.4	0.7	453.6
12:26:00	101.6	100.6	8.3	47.9	39.3	9.0	0.8	472.1
12:27:00	114.1	100.6	8.3	47.9	30.4	9.7	0.2	479.7
12:28:00	119.9	98.3	8.2	47.6	39.3	9.3	0.2	482.5
12:29:00	125.4	98.3	8.3	48.0	25.9	9.1	0.5	496.0
12:30:00	119.0	99.4	8.4	48.5	31.7	9.3	0.7	495.9
12:31:00	104.4	99.4	8.3	48.1	23.5	10.1	0.7	484.1
12:32:00	89.8	98.2	8.1	47.4	29.4	9.7	0.7	455.4
12:33:00	91.1	98.2	8.1	47.6	27.0	9.3	0.3	460.6

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
12:34:00	95.5	99.3	8.2	47.9	35.9	9.1	0.5	470.1
12:35:00	111.7	100.5	8.4	48.5	31.9	9.1	0.3	495.1
12:36:00	115.7	99.0	8.3	48.2	31.0	9.4	0.2	495.1
12:37:00	103.4	97.3	8.2	47.7	36.2	9.2	0.7	482.5
12:38:00	106.8	97.3	8.3	48.1	27.3	9.4	0.6	487.8
12:39:00	101.4	99.0	8.3	48.0	27.4	9.2	0.8	484.2
12:40:00	85.8	99.0	8.1	47.4	28.3	10.1	0.7	464.8
12:41:00	85.3	97.5	8.0	47.1	30.2	9.4	0.7	459.2
12:42:00	92.7	99.4	8.2	47.5	30.9	9.4	0.6	480.2
12:43:00	97.2	101.0	8.3	47.7	45.0	8.8	0.6	489.6
12:44:00	134.3	101.0	8.4	47.9	28.9	9.8	0.1	516.1
12:45:00	136.6	99.6	8.2	47.7	41.0	9.2	0.3	516.1
12:46:00	138.4	99.6	8.3	48.1	24.5	9.2	0.6	525.2
12:47:00	123.3	100.7	8.3	48.4	29.3	9.4	0.7	517.1
12:48:00	100.6	100.7	8.3	48.3	23.1	10.1	0.6	502.7
12:49:00	89.4	100.7	8.1	47.7	29.1	9.4	0.8	479.6
12:50:00	91.1	100.7	8.2	47.7	25.4	9.4	0.4	484.8
12:51:00	94.9	102.7	8.3	48.1	34.9	9.2	0.5	493.9
12:52:00	121.1	102.7	8.4	48.6	32.3	9.0	0.3	524.1
12:53:00	127.2	101.0	8.3	48.0	29.4	9.7	0.2	522.3
12:54:00	108.4	101.0	8.2	47.7	31.6	9.2	0.9	508.3
12:55:00	104.7	101.0	8.2	47.8	26.2	9.5	0.6	507.5
12:56:00	96.3	101.0	8.2	47.8	27.5	9.5	0.7	498.4
12:57:00	85.6	101.0	8.1	47.5	25.9	10.2	0.7	480.8
12:58:00	83.2	99.7	8.0	47.1	29.4	9.6	0.7	471.9
12:59:00	85.2	101.5	8.1	47.6	26.7	9.6	0.5	483.5
13:00:00	90.2	101.5	8.2	47.8	32.0	9.2	0.5	492.0
13:01:00	95.0	101.5	8.2	48.1	25.1	10.3	0.1	496.2
13:02:00	91.9	99.8	8.1	47.9	31.4	9.4	0.1	481.5
13:03:00	89.9	99.8	8.1	47.7	24.9	9.6	0.4	481.5
13:04:00	91.2	99.8	8.2	48.0	27.6	9.6	0.6	483.3
13:05:00	89.5	100.8	8.3	48.4	22.9	10.2	0.6	483.3
13:06:00	80.6	99.0	8.0	47.3	26.4	9.8	0.7	456.0
13:07:00	77.8	99.0	8.0	47.1	27.3	9.6	0.4	452.9
13:08:00	81.3	102.0	8.2	47.8	31.6	9.4	0.5	466.7
13:09:00	99.1	102.0	8.3	48.4	33.8	9.2	0.5	498.7
13:10:00	108.3	100.4	8.2	47.9	29.2	9.8	0.1	501.4
13:11:00	100.1	96.8	8.0	47.0	30.5	9.4	0.8	485.1
13:12:00	91.7	96.8	8.1	47.2	25.5	9.8	0.5	487.6
13:13:00	87.8	98.0	8.2	47.5	30.0	9.4	0.7	484.0
13:14:00	84.4	96.4	8.0	47.0	26.1	10.1	0.7	478.7
13:15:00	85.2	96.4	8.0	46.8	29.9	9.5	0.7	478.7
13:16:00	95.9	96.4	8.1	47.4	27.5	9.5	0.5	500.0
13:17:00	100.9	96.4	8.2	47.4	44.9	9.1	0.5	507.9
13:18:00	154.9	98.3	8.3	47.9	25.3	10.1	0.1	543.0
13:19:00	141.8	95.5	8.1	47.5	36.6	9.5	0.2	526.9
13:20:00	126.0	95.5	8.2	47.4	26.0	9.3	0.4	525.0
13:21:00	115.3	94.3	8.3	47.9	27.4	9.5	0.5	523.7
13:22:00	95.2	94.3	8.2	47.8	23.6	10.1	0.6	504.6
13:23:00	76.6	92.7	7.9	46.7	26.7	9.8	0.6	462.0
13:24:00	83.3	92.7	7.9	46.6	29.0	9.5	0.4	454.5
13:25:00	87.3	92.7	8.1	47.1	35.5	9.3	0.4	479.5
13:26:00	113.2	92.7	8.4	47.6	33.3	8.9	0.7	515.3
13:27:00	122.7	92.7	8.3	47.6	29.3	9.7	0.2	520.0
13:28:00	100.3	89.0	8.1	47.0	30.8	9.5	0.7	496.1
13:29:00	94.0	89.0	8.2	47.3	27.3	9.5	0.6	499.1
13:30:00	91.5	90.2	8.2	47.6	31.5	9.3	0.7	495.3
13:31:00	95.5	90.2	8.1	47.3	26.1	9.9	0.7	494.1
13:32:00	94.2	88.6	8.1	47.0	30.4	9.5	0.7	488.9
13:33:00	95.5	90.3	8.2	47.3	27.9	9.5	0.4	496.9
13:34:00	97.0	90.3	8.3	47.4	35.1	9.1	0.5	501.5
13:35:00	110.2	91.9	8.3	47.9	24.9	10.3	0.1	519.2
13:36:00	108.1	89.9	8.1	47.2	34.8	9.4	0.2	506.8
13:37:00	112.1	89.9	8.2	47.4	28.8	9.2	0.4	515.4
13:38:00	115.9	89.9	8.3	48.1	29.0	9.4	0.5	522.8
13:39:00	101.9	89.9	8.3	47.9	26.5	9.2	0.6	509.2
13:40:00	89.0	89.9	8.0	47.1	27.9	9.7	0.7	489.0
13:41:00	86.2	89.9	8.1	47.0	29.4	9.5	0.6	486.4
13:42:00	88.9	91.6	8.2	47.5	34.3	9.3	0.5	496.8
13:43:00	116.0	94.1	8.4	48.4	34.3	8.9	0.8	529.7
13:44:00	129.2	92.4	8.3	47.9	31.6	9.6	0.0	533.1
13:45:00	116.7	88.8	8.1	47.2	38.4	9.2	0.5	517.6
13:46:00	118.7	88.8	8.3	47.6	25.9	9.4	0.4	527.9
13:47:00	107.5	90.4	8.4	48.1	32.0	9.2	0.6	519.0

Test No. 3 - October 10, 2019
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
13:48:00	93.4	91.7	8.2	47.7	25.5	9.9	0.6	500.9
13:49:00	90.6	90.2	8.1	47.2	32.2	9.5	0.7	489.3
13:50:00	95.2	91.4	8.2	47.4	26.1	9.4	0.3	495.4
13:51:00	98.6	91.4	8.2	47.6	34.8	9.2	0.4	499.9
13:52:00	108.9	93.1	8.3	47.9	23.8	10.3	0.0	514.7
13:53:00	100.9	90.4	8.1	47.6	30.7	9.7	0.1	498.9
13:54:00	91.9	90.4	8.1	47.5	25.7	9.4	0.4	494.4
13:55:00	88.6	90.4	8.2	47.6	26.4	9.6	0.5	493.2
13:56:00	85.2	90.4	8.2	47.5	25.4	9.4	0.6	485.0
13:57:00	81.5	90.4	8.0	47.2	25.4	9.8	0.7	465.4
13:58:00	77.8	90.4	8.0	47.2	26.6	9.6	0.5	462.1
13:59:00	79.1	92.0	8.1	47.4	29.6	9.6	0.6	471.2
14:00:00	88.2	93.3	8.3	48.1	29.7	9.1	0.7	490.1
14:01:00	90.4	93.3	8.2	48.1	26.4	10.0	0.1	491.3
14:02:00	85.0	92.0	8.1	47.6	32.1	9.4	0.4	476.3
14:03:00	89.8	92.0	8.2	47.8	22.9	9.6	0.5	485.9
14:04:00	85.3	92.0	8.2	47.6	25.8	9.6	0.5	476.2
14:05:00	76.0	92.0	8.0	47.2	22.1	10.2	0.5	456.2
14:06:00	75.1	92.0	8.0	47.1	25.3	9.8	0.7	447.3
14:07:00	77.4	95.1	8.0	47.4	23.1	9.8	0.3	451.5
Max	154.9	146.9	8.4	48.6	47.0	10.6	0.9	543.0
Min	75.1	88.6	7.8	46.1	22.1	8.8	0.0	385.6
Average	98.0	112.0	8.1	47.3	31.2	9.6	0.5	457.8

APPENDIX 29

Clean Harbors One-Minute Average Process Data (15 pages)

Test No. 1 - October 8, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
9:52:00	46.6	14.2	154.3	217.3	36.6	314.0	25.7	26728	13034	19.9	1361.4	1180.1	515.1	188.5	172.7	-13.1	-54.5	-147.0	232.9
9:53:00	46.7	14.0	154.1	216.4	36.9	313.4	25.4	26196	12933	19.4	1364.5	1181.6	515.0	188.5	172.7	-6.5	-46.4	-135.0	238.8
9:54:00	46.1	14.4	154.0	216.5	36.4	312.5	25.8	26728	13163	19.9	1367.6	1183.1	515.0	188.0	173.7	-19.1	-61.3	-158.3	228.8
9:55:00	46.1	14.2	154.1	216.2	37.2	315.5	25.7	26375	12865	19.9	1365.9	1183.2	515.5	188.5	173.7	-9.8	-50.9	-139.3	232.1
9:56:00	45.8	13.6	154.1	217.4	37.1	311.9	24.6	26811	12888	20.7	1368.8	1183.8	516.0	188.5	173.7	-31.0	-76.8	-180.5	197.1
9:57:00	46.4	13.6	153.8	217.1	37.4	310.6	25.7	26811	12978	19.8	1364.9	1181.5	515.8	189.0	173.7	-15.0	-55.2	-149.6	224.1
9:58:00	46.2	13.9	154.4	218.3	37.4	309.2	24.8	26728	12949	20.3	1364.8	1182.7	516.1	189.0	173.7	-27.5	-75.0	-173.0	187.5
9:59:00	46.2	13.7	153.2	216.6	37.1	309.2	25.3	26555	13039	20.3	1363.8	1181.3	516.4	189.0	173.7	-14.6	-55.8	-146.9	206.4
10:00:00	46.5	14.5	154.0	216.2	36.6	311.6	24.4	26375	13034	19.8	1366.0	1183.0	516.2	189.5	173.7	-7.9	-49.5	-137.7	214.0
10:01:00	46.7	14.0	153.9	216.5	37.7	313.6	24.6	26458	12927	19.5	1365.8	1183.9	515.8	189.5	173.7	-7.8	-46.2	-138.3	236.7
10:02:00	46.9	14.1	153.2	216.6	37.0	315.0	25.1	26016	12933	19.2	1371.3	1186.3	516.0	189.5	173.7	-3.9	-44.3	-131.1	242.4
10:03:00	46.7	14.1	154.0	215.6	37.1	314.7	24.5	26458	12753	19.6	1371.3	1185.2	516.1	189.0	173.7	-11.4	-51.9	-144.0	232.3
10:04:00	46.0	13.8	153.4	216.8	37.1	312.9	25.1	26106	12972	19.6	1374.1	1186.8	516.3	189.0	173.7	-5.8	-45.2	-135.8	240.6
10:05:00	46.2	14.3	154.0	219.2	37.0	313.1	25.1	26728	13034	20.0	1371.5	1185.4	516.4	189.0	173.7	-16.4	-57.4	-155.9	229.1
10:06:00	46.0	13.5	153.3	217.4	37.6	315.3	24.8	26465	12832	19.7	1371.8	1186.2	516.5	189.5	173.7	-12.5	-54.3	-146.5	233.3
10:07:00	47.0	14.4	153.2	217.7	37.7	314.0	24.9	26555	12927	20.2	1368.6	1185.2	516.6	189.5	174.7	-17.1	-59.1	-154.7	208.9
10:08:00	46.9	14.1	154.3	218.5	37.7	313.9	25.4	26548	12927	20.1	1369.1	1185.1	516.7	189.5	174.7	-16.1	-58.0	-153.4	210.3
10:09:00	46.5	14.1	153.4	218.0	37.5	314.3	24.6	26285	12983	19.9	1370.8	1186.0	516.6	190.0	174.7	-10.3	-50.2	-143.4	214.8
10:10:00	46.8	13.2	154.0	220.7	37.1	312.8	25.2	26285	12955	19.8	1370.6	1185.8	516.5	190.0	174.7	-12.4	-54.7	-146.2	237.0
10:11:00	46.4	14.3	154.6	218.0	37.7	313.1	24.5	26203	12837	19.5	1372.8	1187.8	516.6	189.5	174.7	-6.0	-46.6	-135.4	241.3
10:12:00	45.9	13.5	153.9	216.3	37.5	313.1	24.7	27080	13090	19.9	1374.6	1187.7	516.6	189.5	174.7	-19.0	-63.5	-155.5	232.7
10:13:00	45.8	14.0	153.7	217.8	37.5	316.0	25.7	26023	12893	19.6	1373.4	1186.2	516.1	189.5	174.7	-10.2	-48.6	-140.3	236.5
10:14:00	46.1	14.0	153.0	217.2	37.1	312.5	25.1	27080	13118	20.7	1374.4	1187.1	515.8	189.5	174.7	-30.0	-75.2	-175.7	201.1
10:15:00	46.1	13.7	154.1	217.8	37.4	313.1	25.8	26555	12865	19.9	1369.0	1185.1	516.4	189.5	174.7	-12.7	-54.9	-147.8	227.9
10:16:00	46.4	13.7	154.0	215.5	37.1	313.0	24.8	26458	12972	20.8	1372.0	1187.1	516.1	189.5	174.7	-27.4	-74.6	-171.3	191.1
10:17:00	46.5	13.8	153.9	215.5	38.5	314.1	25.7	26728	12758	19.7	1368.5	1186.3	516.6	190.0	174.7	-13.1	-57.6	-146.3	210.4
10:18:00	46.1	14.1	153.8	217.9	37.3	314.0	24.6	26196	12921	20.3	1373.8	1189.1	517.2	190.0	174.7	-9.1	-50.1	-140.1	206.5
10:19:00	46.5	13.8	154.5	220.6	37.1	312.2	24.7	26285	12843	19.6	1372.1	1188.5	516.8	190.0	174.7	-8.8	-50.1	-138.0	236.8
10:20:00	46.7	13.9	154.0	218.0	36.8	314.2	25.6	26113	12736	19.4	1377.6	1190.4	516.7	190.0	174.7	-3.2	-43.6	-130.9	244.4
10:21:00	45.3	14.2	153.5	219.0	37.7	313.4	25.3	26285	12933	19.4	1373.8	1187.5	516.9	189.5	174.7	-12.0	-51.6	-144.2	232.9
10:22:00	45.1	13.1	153.5	215.5	36.5	310.1	24.6	26203	12798	19.7	1372.9	1186.6	515.5	189.5	174.7	-8.9	-49.4	-137.5	241.8
10:23:00	45.1	14.1	154.0	215.2	37.5	311.3	24.7	26818	12944	20.1	1369.6	1183.7	515.2	189.0	174.7	-17.5	-61.0	-154.2	225.8
10:24:00	45.5	14.1	153.7	215.7	37.7	311.9	24.6	26375	12949	19.7	1365.1	1182.7	514.5	189.5	174.7	-14.2	-56.8	-147.0	231.8
10:25:00	45.1	14.1	153.7	215.8	36.8	309.3	24.5	26728	12949	19.8	1362.6	1182.0	514.1	189.0	174.7	-16.6	-59.1	-154.6	207.7
10:26:00	45.2	13.1	153.6	213.8	37.0	308.9	25.1	26465	12742	19.8	1362.4	1182.0	513.8	189.5	174.7	-11.6	-52.2	-144.0	212.3
10:27:00	45.0	13.8	153.8	214.5	38.6	311.4	25.4	26728	12972	20.0	1362.3	1181.2	513.5	189.0	174.7	-15.5	-58.7	-151.1	239.0
10:28:00	45.1	14.1	154.1	214.8	37.1	312.8	25.7	26375	12747	19.6	1364.5	1182.1	512.4	188.5	174.7	-7.5	-47.9	-134.9	236.2
10:29:00	45.4	13.5	154.7	219.8	37.2	314.3	25.0	27053	13039	20.0	1365.6	1183.5	512.8	188.0	174.7	-24.1	-65.5	-163.2	227.9
10:30:00	45.5	14.0	154.0	217.7	36.8	312.8	24.9	26375	12938	19.7	1365.8	1181.9	512.4	188.5	174.7	-10.3	-50.3	-142.0	230.7
10:31:00	45.2	13.9	153.6	216.0	37.1	313.4	24.9	26645	12899	20.8	1367.6	1184.1	511.6	188.0	174.7	-32.0	-78.6	-178.3	196.6
10:32:00	45.2	14.3	153.8	218.0	37.4	313.4	25.8	26638	12927	20.0	1363.4	1181.1	511.7	188.5	174.7	-15.9	-56.6	-150.9	223.8
10:33:00	45.1	13.4	154.1	218.9	37.7	312.7	25.5	25318	13039	20.7	1362.0	1181.9	511.3	188.5	174.7	-24.9	-72.9	-163.3	191.6
10:34:00	45.3	14.7	154.3	218.5	37.4	312.8	24.9	26375	12927	19.6	1361.6	1180.5	511.0	188.5	174.7	-11.8	-53.6	-144.1	206.4
10:35:00	45.2	13.9	154.7	214.6	37.7	314.3	25.3	26203	12809	19.7	1364.9	1182.3	510.6	188.0	174.7	-9.1	-49.5	-139.2	217.0
10:36:00	45.3	13.7	154.9	218.7	36.8	315.4	24.6	26375	12860	19.8	1364.9	1182.5	511.4	188.0	174.7	-9.1	-48.5	-138.5	238.1
10:37:00	45.4	14.0	155.3	215.7	37.6	313.8	25.3	23458	12944	19.0	1367.4	1184.4	510.8	188.0	174.7	-4.4	-43.7	-131.9	244.9
10:38:00	45.0	14.0	154.5	216.5	36.8	313.1	24.6	26292	12843	19.2	1364.6	1182.7	511.3	188.0	174.7	-13.7	-56.2	-146.4	232.7
10:39:00	45.2	14.0	154.0	216.1	38.1	313.5	24.5	26375	12826	19.4	1365.4	1182.9	510.7	187.5	174.7	-8.5	-50.2	-137.7	238.9
10:40:00	45.1	14.1	154.3	217.9	37.0	313.6	25.7	26728	13056	20.0	1362.8	1180.4	510.3	187.0	174.7	-21.8	-65.5	-158.8	225.8
10:41:00	45.1	13.8	153.8	219.1	37.5	313.9	24.9	26382	12826	19.4	1359.5	1179.6	509.7	187.5	174.7	-15.5	-57.4	-147.7	226.4
10:42:00	45.2	13.6	154.7	218.7	37.2	313.0	25.9	26818	13039	20.1	1357.9	1178.3	509.9	187.0	174.7	-18.0	-59.7	-155.6	204.6
10:43:00	45.2	13.6	154.0	216.5	36.8	315.6	24.6	25228	12955	20.3	1356.0	1178.1	509.2	187.0	173.6	-12.9	-53.6	-144.3	210.3

Test No. 1 - October 8, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
10:44:00	44.7	13.3	153.9	216.3	36.2	314.9	24.5	26908	12955	19.9	1356.6	1177.9	509.2	186.5	173.6	-19.5	-61.5	-154.7	237.9
10:45:00	44.7	14.0	154.1	222.8	37.3	313.4	25.3	25843	12888	19.7	1358.3	1178.7	508.4	186.5	173.6	-10.8	-53.2	-139.9	239.1
10:46:00	44.9	14.5	153.9	215.6	37.3	312.8	25.9	26908	13124	20.4	1363.3	1179.7	507.8	186.0	173.6	-34.1	-79.8	-181.3	197.9
10:47:00	45.6	14.3	154.0	217.5	37.8	311.5	25.7	26285	12978	19.6	1360.1	1178.4	507.8	186.0	173.6	-15.5	-57.2	-146.6	230.1
10:48:00	45.2	13.7	153.4	219.4	37.2	309.1	25.6	26555	12983	20.2	1360.8	1179.8	507.5	185.5	173.6	-30.0	-74.4	-174.9	187.2
10:49:00	45.0	13.9	154.2	219.8	37.1	311.4	25.8	26645	13112	19.6	1358.1	1178.1	508.0	185.5	172.6	-19.5	-63.2	-154.9	217.4
10:50:00	45.0	14.0	154.7	217.1	37.6	311.3	25.6	26375	12899	19.7	1356.9	1178.4	507.8	185.5	172.6	-13.8	-55.3	-149.9	218.4
10:51:00	45.5	14.0	154.6	218.6	37.3	311.8	25.8	26735	12905	20.0	1353.5	1176.6	508.2	185.5	172.6	-16.6	-57.3	-152.6	194.4
10:52:00	45.1	13.3	154.7	217.2	38.1	313.7	25.0	26375	12871	20.2	1356.8	1178.2	508.5	185.5	172.6	-12.7	-57.4	-144.8	200.8
10:53:00	45.8	14.3	154.5	217.7	37.2	315.2	25.4	26458	13017	20.2	1355.3	1177.0	508.2	185.5	172.6	-13.3	-53.6	-145.5	222.9
10:54:00	45.3	13.5	154.1	218.5	37.3	313.1	24.7	26113	12916	19.5	1359.0	1180.1	508.0	185.5	172.6	-7.2	-46.8	-134.7	228.6
10:55:00	45.4	14.2	153.6	220.5	39.3	314.0	25.4	25760	12809	19.9	1361.6	1180.2	508.5	185.5	172.6	-15.0	-56.7	-148.7	221.0
10:56:00	45.2	14.5	153.9	217.5	37.2	315.2	25.5	26016	12927	19.8	1361.9	1182.1	508.5	185.5	172.6	-9.6	-50.7	-140.0	230.3
10:57:00	44.9	13.5	153.8	215.7	37.0	314.0	24.6	26908	13039	20.4	1361.4	1181.1	509.3	185.0	172.6	-22.1	-64.9	-160.8	218.3
10:58:00	45.2	14.0	154.1	217.1	37.3	313.1	25.7	26555	13045	20.0	1360.5	1180.4	509.5	185.5	172.6	-17.8	-60.0	-150.9	221.6
10:59:00	45.3	13.7	154.2	219.9	37.4	312.8	25.6	26818	13197	20.1	1357.9	1178.5	509.5	185.5	172.6	-20.6	-62.6	-157.5	200.1
11:00:00	45.7	14.0	154.4	216.3	37.1	314.0	25.9	26382	13039	20.3	1357.4	1178.3	509.0	185.5	172.6	-13.3	-55.3	-146.9	206.8
11:01:00	45.2	14.0	153.8	223.4	35.9	314.0	24.5	26908	13028	20.2	1357.1	1179.0	508.4	185.5	172.6	-22.4	-63.9	-161.2	233.6
11:02:00	44.8	14.0	154.0	216.6	37.6	313.1	25.5	26113	12832	20.1	1360.3	1180.1	508.4	185.5	172.6	-8.6	-47.2	-136.8	233.6
11:03:00	45.3	14.2	154.6	215.9	37.3	312.9	24.6	26562	13073	20.9	1363.0	1182.3	508.4	185.0	172.6	-33.0	-81.6	-177.3	199.6
11:04:00	45.6	14.0	154.2	220.1	37.9	313.4	25.7	26465	12820	19.7	1361.1	1182.4	509.4	185.0	172.6	-12.6	-54.7	-144.3	230.1
11:05:00	45.2	13.9	154.4	218.7	37.2	314.2	25.0	26555	12972	21.2	1365.5	1183.9	509.2	185.0	172.6	-25.8	-75.3	-163.4	195.4
11:06:00	45.6	14.0	154.2	220.6	37.7	313.6	25.6	26292	12888	19.6	1361.8	1181.5	509.6	185.5	172.6	-18.5	-61.1	-152.2	219.1
11:07:00	45.3	14.2	154.2	220.7	38.0	313.6	24.6	25497	13000	19.8	1360.0	1182.1	509.3	185.5	172.6	-14.9	-57.3	-147.3	224.8
11:08:00	45.3	13.9	154.1	217.2	37.1	312.2	24.8	26645	13011	20.3	1357.9	1180.9	509.9	185.5	172.6	-15.5	-56.2	-149.8	200.6
11:09:00	45.4	13.6	154.1	207.8	38.4	315.1	25.4	26113	12837	20.1	1360.1	1182.1	509.6	185.5	172.6	-11.5	-52.0	-142.4	207.8
11:10:00	45.3	14.2	155.1	218.9	37.3	313.6	24.5	26292	12848	19.4	1360.0	1181.5	509.9	185.5	172.6	-10.4	-49.7	-141.4	229.4
11:11:00	44.8	13.7	155.2	228.3	38.1	313.7	25.8	25850	12860	19.5	1365.6	1183.2	509.0	185.0	172.6	-6.5	-45.9	-133.6	234.8
11:12:00	45.3	13.6	155.1	225.8	36.1	310.5	24.6	26292	12876	19.5	1362.8	1182.3	509.5	185.0	172.6	-14.5	-57.1	-148.1	219.2
11:13:00	45.4	14.1	153.8	216.6	37.5	308.7	24.5	26113	12865	19.7	1364.1	1183.2	509.2	185.0	172.6	-10.1	-48.9	-138.8	222.9
11:14:00	45.2	14.0	155.0	214.2	37.5	309.2	25.1	26645	12955	20.4	1362.9	1183.0	509.7	185.0	172.6	-23.1	-67.9	-160.6	212.8
11:15:00	45.2	13.5	154.7	224.8	38.4	312.3	25.9	26382	12961	20.1	1360.4	1182.0	510.0	185.5	172.6	-16.2	-58.1	-151.5	217.9
11:16:00	44.8	13.9	155.7	231.6	38.3	310.9	24.6	26908	13062	20.1	1360.8	1181.5	510.0	185.5	172.6	-24.4	-68.0	-162.1	197.8
11:17:00	45.0	13.9	155.6	224.8	37.5	314.3	25.5	24440	12848	19.9	1361.4	1182.0	509.9	185.5	172.6	-13.1	-55.4	-144.6	201.3
11:18:00	45.3	13.9	154.8	218.7	38.3	313.7	24.6	26914	12961	21.1	1363.4	1183.0	510.0	185.5	172.6	-34.4	-82.8	-179.4	205.3
11:19:00	45.3	13.8	154.7	219.5	37.8	313.3	25.2	26375	12702	19.7	1362.0	1182.8	509.6	185.5	172.6	-10.3	-52.8	-138.2	227.4
11:20:00	44.9	13.7	154.9	220.5	37.3	313.6	24.6	26645	12955	20.4	1366.3	1183.8	508.9	185.0	172.6	-32.7	-80.7	-175.2	186.9
11:21:00	45.5	14.0	155.8	217.5	37.1	313.0	24.7	26203	12955	19.7	1363.4	1181.3	509.6	185.0	172.6	-11.6	-51.5	-145.0	221.8
11:22:00	44.7	13.9	155.0	214.4	37.2	313.1	24.6	25933	12792	19.7	1366.6	1184.0	508.8	185.0	172.6	-7.8	-48.7	-136.4	222.5
11:23:00	44.9	13.9	155.4	210.2	39.0	311.3	24.5	26645	13039	19.7	1363.9	1182.1	509.1	185.5	172.6	-17.2	-60.0	-152.6	212.4
11:24:00	45.4	13.7	154.7	220.5	37.7	311.6	25.9	26292	12905	19.9	1362.4	1182.3	508.7	185.5	172.6	-13.5	-54.4	-147.7	217.3
11:25:00	45.1	13.6	154.7	229.2	37.5	312.2	25.8	25408	12927	20.0	1358.5	1180.5	508.9	185.5	172.6	-18.7	-60.2	-150.3	192.2
11:26:00	45.1	14.4	155.3	228.0	37.9	313.0	24.5	25760	12916	19.6	1359.3	1182.2	508.8	185.5	172.6	-13.7	-52.0	-143.9	200.5
11:27:00	45.4	14.1	155.1	226.4	37.6	314.2	25.8	26292	13011	20.0	1361.8	1181.5	509.2	185.0	172.6	-12.7	-51.8	-141.2	225.4
11:28:00	45.7	14.0	155.4	219.6	38.1	312.9	25.3	25850	12685	19.7	1365.6	1184.1	509.2	185.0	172.6	-9.2	-49.0	-135.9	232.9
11:29:00	45.2	13.7	154.1	221.3	37.5	314.0	24.5	26562	12933	19.9	1367.0	1183.6	509.8	185.0	172.6	-18.8	-59.9	-151.8	223.0
11:30:00	45.1	13.9	154.0	215.4	37.5	312.4	25.8	26292	12820	19.7	1365.8	1184.0	510.0	185.0	172.6	-12.1	-53.6	-139.6	226.8
11:31:00	45.3	14.0	155.1	221.3	37.3	312.7	25.4	25497	12955	20.3	1367.5	1185.1	510.3	185.0	172.6	-25.4	-69.0	-161.6	214.1
11:32:00	45.3	13.9	154.8	220.2	37.0	313.7	24.9	26472	12961	19.9	1366.1	1185.2	510.6	185.5	172.6	-18.4	-58.6	-152.0	218.8
11:33:00	45.7	14.2	155.6	222.2	37.5	313.8	24.7	26562	12921	20.3	1365.9	1185.0	511.1	186.0	172.6	-29.4	-70.2	-164.3	194.4
11:34:00	45.1	13.8	153.9	223.0	38.1	314.8	25.9	26285	13023	19.8	1365.0	1184.7	511.1	186.5	172.6	-14.7	-56.0	-145.9	200.4
11:35:00	45.5	13.5	154.7	218.6	37.7	313.3	24.5	26023	13023	20.7	1366.6	1185.8	510.8	186.0	172.6	-32.8	-77.4	-175.8	198.0

Test No. 1 - October 8, 2019

	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
Time	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
11:36:00	45.5	13.8	155.6	224.8	38.2	311.4	25.6	25767	12927	19.3	1368.3	1185.0	510.7	186.0	172.6	-9.5	-48.3	-139.4	239.4
11:37:00	45.4	13.3	155.6	220.4	37.6	309.6	25.7	26030	12714	20.6	1373.5	1188.2	510.6	186.0	172.6	-25.1	-72.8	-162.0	199.4
11:38:00	45.1	13.9	155.1	217.8	37.4	311.3	25.3	26382	12848	19.8	1371.8	1188.6	511.7	186.0	172.6	-15.1	-54.8	-144.2	233.1
11:39:00	45.5	14.0	155.6	219.0	40.1	310.3	24.7	25933	12747	19.3	1375.8	1190.0	511.6	186.0	172.6	-9.2	-49.5	-135.3	236.3
11:40:00	45.4	14.0	155.5	223.7	37.5	308.7	25.7	26292	12876	19.8	1372.5	1189.4	512.4	186.5	172.6	-18.5	-58.7	-153.2	219.3
11:41:00	45.1	13.8	154.5	218.5	37.5	310.7	25.7	26292	12826	19.4	1373.1	1191.4	513.2	187.0	172.6	-15.1	-55.2	-147.0	224.4
11:42:00	45.4	13.9	155.9	215.8	38.0	312.4	25.5	26113	12938	20.0	1372.0	1190.7	513.1	187.5	173.7	-18.6	-60.7	-152.6	200.7
11:43:00	44.8	13.6	155.1	222.5	38.2	311.6	24.4	26030	12905	19.7	1373.3	1190.4	512.9	188.0	173.7	-14.0	-55.8	-141.9	206.1
11:44:00	45.1	13.5	155.5	217.0	37.7	311.9	24.9	26030	12843	19.7	1374.4	1190.3	513.0	188.0	173.7	-13.6	-53.9	-144.0	228.4
11:45:00	45.1	14.5	154.9	219.9	35.5	313.4	25.3	25850	12832	19.3	1379.0	1192.6	513.4	188.0	173.7	-7.3	-42.7	-133.1	228.7
11:46:00	44.9	13.6	155.5	218.3	38.5	313.1	24.6	26465	12972	19.6	1379.6	1193.5	513.5	187.5	173.7	-18.1	-58.0	-152.9	220.8
11:47:00	45.1	14.0	154.8	219.0	38.1	313.8	25.7	25940	12815	19.6	1381.3	1194.1	514.0	188.0	173.7	-9.7	-47.6	-138.4	227.8
11:48:00	45.3	13.8	155.4	216.7	37.4	313.5	25.6	26645	13056	19.6	1383.5	1195.8	514.4	188.0	173.7	-25.2	-68.2	-163.8	220.8
11:49:00	45.2	14.1	155.6	219.1	37.3	311.8	24.6	25933	12916	19.6	1384.0	1197.0	516.0	189.0	173.7	-14.7	-54.3	-148.4	223.7
11:50:00	45.3	14.1	155.4	218.6	37.2	312.8	24.8	23465	12994	20.1	1385.6	1197.8	515.8	189.0	174.7	-32.2	-75.9	-176.3	192.8
11:51:00	45.4	13.5	155.8	222.2	34.7	315.0	25.5	25933	12905	19.6	1383.0	1197.3	516.1	189.5	174.7	-13.7	-54.4	-145.5	208.4
11:52:00	44.8	13.6	154.9	220.5	37.8	314.0	25.8	26472	12865	20.5	1387.1	1198.2	515.8	189.5	174.7	-30.4	-75.6	-171.8	202.9
13:38:00	42.7	13.2	155.3	219.9	37.9	312.8	25.4	25677	12747	19.7	1379.0	1188.6	517.6	187.5	175.7	-10.6	-50.8	-137.4	233.2
13:39:00	42.9	13.5	155.6	218.3	38.6	315.4	24.9	26120	13028	19.9	1380.8	1188.1	516.9	187.0	174.6	-23.9	-66.6	-159.3	223.0
13:40:00	42.4	13.1	155.0	222.6	38.0	318.8	24.5	26037	12775	19.5	1377.6	1187.5	517.0	187.5	174.6	-16.5	-57.0	-145.7	224.1
13:41:00	42.5	13.2	154.6	220.2	38.4	316.7	24.5	26292	12899	19.6	1376.8	1187.3	516.9	187.0	174.6	-27.2	-68.1	-165.2	199.6
13:42:00	42.6	13.3	155.2	219.6	39.8	311.5	25.9	26030	12787	19.6	1373.8	1185.7	516.2	187.0	174.6	-17.7	-57.2	-144.9	203.3
13:43:00	42.3	13.5	155.2	220.3	38.4	309.0	24.5	26451	13000	20.6	1375.3	1187.0	516.0	187.0	174.6	-33.8	-77.1	-174.0	197.6
13:44:00	42.3	13.1	154.6	219.4	38.1	310.6	24.8	25684	12854	19.5	1375.5	1186.0	515.7	186.5	174.6	-9.6	-47.9	-135.7	229.6
13:45:00	42.4	13.4	154.5	218.5	37.6	310.1	25.1	25864	12803	20.3	1377.8	1187.7	515.5	186.0	174.6	-25.4	-69.1	-160.2	190.8
13:46:00	42.7	13.4	154.8	220.1	37.6	311.0	24.6	25857	12888	19.5	1376.0	1186.0	515.4	186.0	174.6	-13.6	-52.8	-141.7	226.2
13:47:00	42.2	12.8	154.5	218.2	39.0	313.5	25.4	25677	12753	19.8	1376.9	1188.2	515.3	186.0	174.6	-10.5	-49.6	-135.0	234.5
13:48:00	42.5	13.6	154.9	220.3	38.1	314.6	25.6	26030	12798	19.7	1374.5	1185.9	516.1	186.0	174.6	-20.6	-60.6	-154.2	218.4
13:49:00	42.4	13.4	155.3	221.4	38.0	315.8	24.7	25947	12714	19.4	1375.1	1186.8	515.5	186.0	174.6	-16.6	-57.5	-146.1	223.6
13:50:00	42.3	13.7	154.7	219.4	37.6	312.6	25.3	25684	12933	19.8	1373.5	1185.8	516.4	186.5	174.6	-19.4	-59.2	-150.7	199.9
13:51:00	42.5	12.9	155.3	221.2	38.2	319.2	24.7	25152	12730	19.5	1374.4	1187.8	516.1	186.5	174.6	-13.2	-53.0	-142.1	206.8
13:52:00	42.5	13.5	155.4	220.7	36.8	319.1	24.9	25767	12865	19.7	1373.3	1187.3	516.1	186.5	174.6	-13.0	-50.9	-143.6	227.3
13:53:00	42.3	13.6	154.8	220.5	37.8	318.5	24.9	24889	12725	19.0	1377.4	1189.3	516.1	186.5	174.6	-7.5	-44.5	-133.6	230.1
13:54:00	42.6	13.5	155.0	217.6	37.8	317.8	24.9	25767	12933	19.4	1378.5	1189.8	516.1	186.5	174.6	-19.6	-60.2	-152.1	221.5
13:55:00	42.1	13.9	155.3	220.4	38.4	318.9	25.8	24709	12837	19.2	1380.5	1190.1	515.7	186.5	174.6	-10.2	-48.1	-136.0	225.9
13:56:00	42.6	12.7	154.6	221.2	37.6	318.6	25.7	25857	12832	18.9	1380.1	1191.7	515.9	186.0	174.6	-4.9	-42.7	-126.8	248.6
13:57:00	42.2	13.5	155.3	222.0	38.0	315.6	24.6	25152	12753	18.7	1390.5	1193.9	515.5	186.0	173.6	3.6	-33.0	-112.4	251.9
13:58:00	42.5	13.5	142.0	220.0	38.5	318.5	24.6	26299	12848	20.1	1397.3	1197.5	515.0	185.0	173.6	-25.6	-65.1	-156.2	206.6
13:59:00	42.0	13.0	143.6	217.8	38.1	318.0	24.9	25684	12764	18.6	1398.4	1199.8	513.8	183.5	172.6	-1.7	-37.9	-116.0	234.5
14:00:00	42.6	13.9	143.6	220.7	37.6	319.5	24.7	25947	12848	19.6	1402.1	1203.5	512.4	182.0	172.6	-24.4	-65.9	-154.4	221.9
14:01:00	42.4	13.5	142.9	221.0	38.2	318.3	24.8	25414	12764	18.7	1400.4	1202.6	511.7	181.0	171.6	0.8	-32.9	-114.0	271.1
14:02:00	42.4	13.3	132.1	219.2	38.4	317.6	25.9	25332	12657	18.6	1403.9	1203.5	509.6	179.5	171.6	-4.3	-46.6	-114.3	262.4
14:03:00	42.4	13.6	134.3	221.0	38.9	317.3	24.6	26389	12983	19.8	1394.8	1195.0	508.2	178.0	170.6	-25.7	-65.8	-154.2	240.3
14:04:00	41.1	12.9	140.3	220.1	38.0	320.0	25.7	26037	12972	19.7	1389.4	1194.7	507.7	177.5	169.6	-22.7	-60.0	-148.4	242.9
14:05:00	42.0	13.0	146.7	217.4	38.5	319.4	24.8	25684	12809	19.5	1386.4	1195.3	508.1	177.5	169.6	-5.6	-42.7	-128.1	253.6
14:06:00	42.0	13.2	146.8	220.5	37.9	315.8	25.4	25414	12685	19.3	1391.5	1199.5	508.3	177.0	168.6	-3.0	-40.6	-120.1	260.3
14:07:00	41.9	13.6	149.0	220.0	38.2	316.4	25.4	25864	12848	19.3	1391.9	1199.9	508.8	177.0	168.6	-8.2	-46.1	-128.4	221.4
14:08:00	42.6	13.3	150.5	220.7	39.3	317.0	24.5	25504	12736	18.8	1394.5	1202.1	509.3	177.5	168.6	-2.0	-37.8	-118.6	232.9
14:09:00	42.1	13.0	151.2	221.8	38.0	315.4	25.4	25594	12657	18.8	1397.1	1201.2	510.0	177.5	167.6	-4.7	-41.9	-125.7	258.3
14:10:00	41.5	13.6	148.9	222.1	38.0	315.0	24.7	24889	12551	18.5	1399.8	1203.9	510.6	177.5	167.6	1.3	-33.5	-113.5	272.8
14:11:00	42.0	13.0	143.9	220.8	38.3	314.2	25.8	26389	12910	19.5	1399.4	1201.2	509.8	177.0	167.6	-27.6	-68.1	-159.0	232.9
14:12:00	42.0	12.9	141.6	202.5	38.3	316.0	25.9	26209	12837	19.4	1388.9	1195.2	510.0	177.5	167.6	-22.6	-63.1	-148.2	238.1

Test No. 1 - October 8, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
14:13:00	42.5	13.3	142.1	204.2	37.7	319.1	24.7	26120	13056	19.4	1382.6	1192.7	512.4	179.5	167.6	-19.1	-54.9	-151.8	256.8
14:14:00	42.0	12.8	141.8	202.9	39.9	319.4	24.9	25594	12843	19.7	1383.6	1195.6	514.2	182.0	168.7	-6.4	-42.5	-123.8	260.3
14:15:00	42.1	12.7	140.3	202.3	38.8	319.0	25.8	26126	13006	20.8	1389.5	1199.9	515.2	183.5	169.8	-36.2	-80.4	-172.4	215.3
14:16:00	42.2	13.5	141.2	203.8	38.6	318.2	24.5	25774	12770	19.5	1387.0	1196.8	516.0	185.5	169.8	-8.6	-45.3	-125.2	235.2
14:17:00	42.0	13.2	140.6	204.3	38.4	317.3	25.3	25774	12657	21.2	1392.9	1201.8	516.4	187.0	170.9	-25.2	-67.6	-150.0	222.4
14:18:00	42.2	13.5	140.7	204.8	38.3	318.5	24.7	25594	12680	19.1	1391.0	1199.7	517.0	188.0	170.9	-4.3	-38.8	-118.9	268.5
14:19:00	41.9	13.2	140.1	203.0	39.3	317.1	25.3	24889	12697	18.9	1398.1	1203.1	517.4	189.0	172.9	1.1	-34.9	-111.4	280.6
14:20:00	42.1	13.3	140.8	202.4	38.3	315.8	25.7	26216	12921	19.7	1390.0	1195.0	517.8	190.0	172.9	-22.3	-60.8	-151.8	239.3
14:21:00	41.9	13.0	139.8	203.6	38.3	320.0	25.6	25332	12916	19.2	1384.6	1194.1	518.7	191.5	174.0	-18.0	-55.3	-146.0	244.8
14:22:00	42.0	13.3	140.0	204.0	38.0	318.3	25.2	25242	12657	19.8	1381.3	1193.2	519.0	192.5	175.1	-7.5	-42.5	-122.9	266.4
14:23:00	42.2	13.5	140.2	204.7	38.5	318.7	25.4	25511	12758	19.0	1386.0	1198.9	518.8	192.5	175.1	-0.7	-36.1	-115.0	271.3
14:24:00	42.0	13.5	140.3	204.9	38.0	319.4	24.4	25414	12927	19.4	1387.4	1197.6	519.4	192.5	175.1	-10.0	-46.5	-131.4	242.1
14:25:00	42.0	13.6	140.1	204.8	39.5	322.0	25.8	24889	12584	18.7	1389.8	1200.4	519.1	192.5	175.1	-2.7	-37.8	-115.3	251.8
14:26:00	42.1	13.1	139.9	202.9	38.1	319.4	24.5	25421	12803	18.9	1391.5	1199.4	519.1	192.5	175.1	-7.8	-43.5	-126.5	282.2
14:27:00	41.9	13.1	140.3	203.6	38.6	315.8	25.4	25007	12663	18.7	1393.3	1202.6	519.3	192.5	176.2	0.7	-33.7	-111.5	284.8
14:28:00	41.9	13.3	139.9	203.4	38.2	319.0	25.8	26396	12871	19.5	1396.0	1203.2	519.6	192.0	176.2	-27.7	-68.6	-161.3	249.6
14:29:00	42.0	13.5	140.6	205.0	37.8	313.1	25.4	26030	12972	20.0	1386.4	1195.4	520.6	193.0	176.2	-31.1	-71.6	-164.3	235.3
14:30:00	41.7	13.3	139.7	204.4	38.0	317.2	25.1	25504	12899	19.6	1379.5	1193.0	521.1	194.5	177.3	-15.4	-53.1	-140.4	251.9
14:31:00	42.0	13.2	140.5	203.4	38.4	318.4	25.9	24530	12685	19.5	1388.8	1201.1	521.0	194.5	177.3	-4.6	-38.6	-121.1	274.1
14:32:00	41.9	13.3	139.7	204.5	38.4	316.7	24.4	25332	12775	20.5	1394.1	1204.7	520.5	194.0	177.3	-26.3	-67.0	-156.0	221.5
14:33:00	41.7	13.1	139.7	203.5	37.8	314.6	25.6	25069	12652	18.8	1392.0	1201.1	520.6	194.0	177.3	-7.1	-41.2	-124.5	247.1
14:34:00	41.6	13.4	140.5	204.0	38.1	314.2	25.9	25069	12685	18.9	1395.8	1203.6	520.2	194.0	177.3	-0.3	-37.1	-114.2	247.2
14:35:00	42.4	13.5	140.3	205.0	38.3	318.8	25.1	24620	12618	18.5	1397.3	1202.5	520.4	194.0	177.3	-2.4	-36.7	-115.7	283.3
14:36:00	41.4	13.1	140.4	204.0	36.5	316.0	25.8	24357	12562	18.2	1401.5	1206.3	519.7	193.5	177.3	0.5	-32.2	-109.7	291.3
14:37:00	42.1	13.5	139.8	203.7	38.1	320.5	25.9	25594	12843	20.0	1397.3	1200.0	519.8	193.5	177.3	-22.7	-61.1	-149.8	247.8
14:38:00	41.9	13.4	140.4	204.4	38.1	321.3	25.6	25152	12736	19.9	1391.8	1197.7	520.1	194.5	177.3	-15.8	-51.9	-140.1	249.4
14:39:00	41.8	13.3	140.3	205.2	38.8	321.8	24.8	24799	12685	19.2	1389.6	1197.6	520.0	195.0	178.4	-4.9	-39.9	-121.9	269.7
14:40:00	41.9	13.4	140.1	204.9	38.5	319.3	25.5	24806	12584	18.7	1397.6	1203.9	519.7	195.0	178.4	1.3	-31.9	-111.6	273.2
14:41:00	41.9	13.3	140.1	204.6	38.0	322.5	25.5	25332	12972	18.5	1397.6	1201.9	519.6	194.5	178.4	-14.8	-49.3	-137.5	243.7
14:42:00	41.9	12.8	140.3	205.0	40.7	322.0	25.8	25774	12758	20.1	1388.5	1195.9	520.1	195.5	178.4	-21.9	-60.6	-149.2	220.8
14:43:00	41.6	13.2	140.6	204.5	38.3	320.9	25.8	25684	13067	20.0	1384.0	1190.8	520.0	196.0	178.4	-27.1	-68.2	-158.1	242.3
14:44:00	41.9	13.2	150.5	203.4	39.0	322.3	25.3	25242	12910	19.8	1378.6	1189.3	520.1	196.5	178.4	-10.7	-46.4	-139.1	235.9
14:45:00	42.0	13.1	146.0	205.1	38.6	315.8	24.5	25504	13006	20.4	1381.4	1192.3	520.7	197.5	179.5	-32.5	-68.5	-173.0	231.4
14:46:00	42.3	13.5	151.1	204.9	38.9	323.0	24.5	25332	12843	19.8	1378.1	1192.1	521.8	198.5	179.5	-14.7	-53.8	-143.8	235.7
14:47:00	41.6	13.0	151.6	204.1	38.2	321.3	24.6	25332	12770	20.5	1382.1	1194.0	522.5	199.5	180.5	-36.3	-80.2	-176.8	203.2
14:48:00	42.1	13.4	153.1	205.5	38.9	322.3	25.9	24799	12803	19.6	1377.0	1190.2	523.6	200.5	180.5	-18.7	-57.8	-148.5	227.9
14:49:00	41.6	13.1	152.8	204.4	37.7	321.6	25.4	25159	12719	20.7	1378.3	1190.8	524.3	201.5	181.6	-27.2	-71.6	-159.8	196.8
14:50:00	41.9	13.4	153.1	202.0	38.8	320.5	25.7	25242	12837	19.5	1375.5	1189.1	524.7	202.5	181.6	-15.3	-55.6	-144.5	215.2
14:51:00	41.9	13.5	154.0	204.1	38.4	319.3	24.6	25594	12708	19.4	1377.4	1190.3	524.9	203.0	182.7	-10.7	-47.6	-135.2	224.0
14:52:00	41.9	13.2	160.0	205.7	36.2	321.0	24.6	25504	12753	19.4	1378.9	1189.6	525.6	203.5	182.7	-7.4	-46.3	-132.5	242.1
14:53:00	42.2	13.3	154.9	202.8	38.3	321.2	24.6	25504	12601	18.9	1384.0	1191.7	526.6	204.0	183.8	-4.9	-40.6	-126.5	250.1
14:54:00	42.0	13.4	152.4	204.7	39.3	322.9	24.7	25864	12798	19.0	1382.0	1190.5	527.7	204.5	183.8	-11.6	-49.2	-139.7	242.7
14:55:00	41.9	13.1	154.7	201.9	38.8	319.6	25.1	25421	12691	19.2	1385.3	1192.2	527.9	205.0	183.8	-7.2	-44.9	-130.2	249.2
14:56:00	41.9	12.8	154.3	203.8	38.2	321.0	25.8	26126	12832	19.2	1382.8	1190.5	529.0	205.5	184.9	-15.3	-54.8	-147.4	238.9
14:57:00	42.7	13.3	154.6	206.2	38.6	319.9	25.7	25857	12629	19.1	1381.9	1190.6	529.3	206.5	184.9	-11.8	-50.0	-138.9	242.9
14:58:00	41.6	13.2	155.3	204.9	41.3	318.8	25.9	26216	12725	19.4	1379.9	1189.8	529.9	207.0	185.9	-16.2	-56.0	-148.7	223.8
14:59:00	41.2	13.1	155.1	208.1	38.2	317.5	25.2	25774	12725	19.5	1379.4	1189.8	530.1	207.5	185.9	-8.6	-46.4	-133.3	225.9
15:00:00	41.8	13.3	156.7	210.2	39.0	314.6	24.6	25864	12876	19.3	1382.9	1190.7	531.0	207.0	185.9	-11.0	-49.3	-142.1	249.9
15:01:00	41.9	13.5	156.6	210.1	37.8	318.0	25.3	25504	12758	18.6	1384.3	1191.5	531.4	207.0	186.9	-3.6	-41.9	-129.3	250.3
15:02:00	41.5	13.1	157.2	207.7	38.8	317.9	25.5	26037	12832	20.1	1388.6	1192.8	531.9	206.0	186.9	-28.2	-69.8	-170.8	223.0
15:03:00	41.4	13.2	156.9	208.5	39.6	321.8	24.6	25421	12770	18.4	1386.8	1190.6	532.2	206.0	186.9	-6.0	-44.2	-133.4	244.6
15:04:00	41.2	13.2	157.1	208.1	36.6	321.1	25.8	25947	12787	19.9	1388.9	1191.9	532.5	206.0	186.9	-26.6	-71.4	-162.6	208.0

Test No. 1 - October 8, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
15:05:00	41.6	13.3	157.1	209.7	38.1	321.2	25.5	25767	12657	19.3	1383.5	1190.3	532.9	206.0	186.9	-12.8	-53.7	-139.8	234.7
15:06:00	41.9	13.0	156.3	207.5	38.3	319.1	24.8	25864	12770	18.7	1385.3	1191.4	532.6	206.0	186.9	-8.6	-46.7	-133.2	227.1
15:07:00	42.4	13.3	157.2	210.2	38.5	321.4	24.9	25421	12669	18.9	1381.9	1190.0	533.2	206.0	186.9	-11.8	-50.4	-139.2	213.9
15:08:00	41.8	13.4	157.1	212.3	38.0	319.7	24.5	25249	12775	19.3	1382.6	1190.9	533.6	206.0	186.9	-5.9	-44.7	-132.8	219.1
15:09:00	42.0	13.4	156.5	209.0	39.0	322.1	25.8	25332	12657	19.0	1381.3	1189.4	533.8	206.0	186.9	-6.7	-43.3	-128.3	239.1
15:10:00	41.9	13.1	156.5	206.9	38.2	320.6	24.6	24979	12646	18.8	1385.3	1190.2	533.3	205.5	186.9	-2.4	-39.4	-123.5	241.0
15:11:00	41.4	13.2	157.6	209.0	38.1	321.8	24.9	25332	12758	18.8	1384.0	1188.5	533.8	205.0	186.9	-10.5	-49.7	-139.1	229.9
15:12:00	41.6	13.4	156.7	209.1	38.3	320.3	24.6	24799	12657	18.9	1382.4	1188.9	533.7	205.0	186.9	-6.6	-41.7	-129.5	235.3
15:13:00	41.6	13.3	158.1	208.7	38.6	320.8	24.5	25332	12809	18.9	1382.5	1188.5	533.6	205.0	186.9	-14.4	-52.7	-144.5	222.0
15:14:00	41.7	13.9	157.4	210.8	39.8	321.0	24.8	24620	12792	18.8	1382.3	1188.0	532.6	205.0	186.9	-7.8	-47.6	-134.4	225.6
15:15:00	41.7	13.5	157.3	210.1	36.5	317.9	25.3	25242	12944	19.4	1381.6	1188.4	530.1	204.0	186.9	-13.2	-51.8	-142.7	199.8
15:16:00	41.8	13.1	157.1	211.8	38.3	321.7	24.8	24709	12629	19.1	1381.4	1189.7	528.0	203.0	186.9	-8.1	-45.8	-131.5	205.1
15:17:00	41.7	13.3	156.7	210.1	38.0	317.8	25.7	25504	12848	18.9	1382.3	1189.3	526.5	202.0	186.9	-15.8	-53.3	-147.6	228.5
15:18:00	42.0	13.1	157.4	210.2	38.6	321.0	24.5	25152	12685	18.7	1383.1	1189.2	524.7	201.5	185.8	-4.6	-42.0	-125.9	230.8
15:19:00	41.5	13.2	157.4	210.6	38.1	320.3	24.7	25332	12809	19.9	1387.1	1190.8	523.7	200.0	185.8	-28.6	-71.5	-164.7	193.3
15:20:00	41.6	13.2	157.1	206.1	38.3	319.7	25.6	24716	12719	18.8	1381.3	1190.3	523.2	199.5	185.8	-7.4	-45.2	-132.3	223.9
15:21:00	41.5	13.2	156.7	208.5	38.0	321.2	24.5	24709	12742	19.5	1384.8	1192.1	522.1	199.0	184.8	-19.9	-64.8	-148.0	189.8
15:22:00	41.9	13.5	157.4	209.9	37.8	315.9	25.8	24979	12775	19.3	1378.9	1189.1	521.7	198.5	184.8	-14.2	-54.1	-140.7	217.6
15:23:00	41.6	13.3	156.8	210.3	38.4	315.2	25.3	24889	12775	19.1	1377.6	1188.8	521.1	198.0	184.8	-10.8	-51.3	-137.9	223.9
15:24:00	41.3	13.3	157.0	210.8	38.3	314.8	25.3	25152	12899	18.8	1375.1	1185.8	520.5	198.0	183.8	-13.8	-52.0	-141.4	200.7
15:25:00	41.5	13.2	157.1	208.9	39.1	316.1	24.5	24709	12787	19.0	1376.3	1186.9	520.1	198.0	183.8	-8.3	-44.8	-132.5	206.7
15:26:00	41.7	13.2	158.3	210.3	35.6	317.2	25.6	25332	12680	19.2	1375.4	1186.9	520.0	197.5	183.8	-7.8	-46.7	-133.9	229.1
15:27:00	41.4	13.2	156.6	206.8	38.0	320.9	25.7	24447	12725	18.5	1377.6	1188.9	518.9	197.0	183.8	-4.1	-40.3	-125.0	231.3
15:28:00	41.7	12.9	157.0	209.7	38.7	319.7	25.8	25601	12798	18.8	1375.8	1186.4	519.0	196.5	183.8	-15.7	-54.9	-143.4	219.9
15:29:00	41.6	13.2	157.1	212.1	38.4	318.5	24.4	25152	12775	19.2	1376.5	1185.5	518.7	196.5	182.8	-9.3	-49.2	-132.8	226.9
15:30:00	41.4	13.2	157.1	210.9	37.9	318.1	25.4	25864	12910	19.3	1375.8	1185.5	518.3	196.0	182.8	-18.2	-58.5	-151.3	215.1
15:31:00	41.6	13.5	157.6	209.6	42.0	322.6	25.0	25159	12770	19.1	1372.1	1185.6	518.3	196.0	182.8	-12.4	-52.1	-140.4	216.8
15:32:00	41.8	13.2	156.4	210.7	37.5	321.8	24.6	25421	12882	19.2	1370.9	1185.3	518.1	196.0	182.8	-18.4	-59.6	-151.0	196.1
15:33:00	41.9	13.0	156.2	210.1	37.8	317.1	24.6	25332	12652	19.4	1369.1	1184.7	517.8	196.0	182.8	-12.9	-53.2	-137.2	201.3
15:34:00	41.5	13.3	156.7	210.0	38.6	317.8	24.5	25504	12798	19.8	1371.4	1185.8	517.1	196.0	181.8	-30.0	-75.1	-168.8	202.3
15:35:00	41.4	13.0	156.4	208.7	38.9	319.1	24.5	24979	12567	19.1	1371.8	1184.7	517.0	196.0	181.8	-6.3	-44.4	-130.5	227.0
15:36:00	41.6	12.8	157.4	210.0	38.4	321.0	25.3	25414	12624	20.1	1375.8	1188.1	516.4	195.5	181.8	-28.9	-73.9	-163.1	191.6
15:37:00	41.6	13.3	156.6	211.5	35.1	319.8	25.5	25069	12742	19.3	1374.0	1187.0	516.6	195.0	181.8	-12.5	-52.2	-135.0	225.7

Max	47.0	14.7	160.0	231.6	42.0	323.0	25.9	27080	13197	21.2	1403.9	1206.3	533.8	207.5	186.9	3.6	-31.9	-109.7	291.3
Min	41.1	12.7	132.1	201.9	34.7	308.7	24.4	23458	12551	18.2	1353.5	1176.6	507.5	177.0	167.6	-36.3	-82.8	-181.3	186.9
Average	43.7	13.6	152.3	214.5	37.9	315.6	25.1	25884	12855	19.6	1375.2	1188.5	516.2	190.4	176.0	-14.6	-54.9	-144.5	226.1

Test No. 2 - October 9, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
9:04:00	36.8	12.1	156.2	214.5	35.9	255.9	26.3	23991	13079	19.7	1398.0	1170.8	504.0	194.5	176.4	-16.3	-54.3	-147.9	216.2
9:05:00	36.5	12.0	156.9	215.0	36.3	256.1	26.0	26285	13062	20.3	1398.3	1170.6	504.5	194.5	176.4	-10.5	-47.7	-138.1	220.8
9:06:00	36.9	11.4	156.9	218.7	35.3	254.6	27.1	26458	12921	19.8	1398.1	1171.0	504.9	194.5	176.4	-6.0	-44.2	-131.8	241.6
9:07:00	37.0	11.9	157.7	218.1	35.2	257.3	26.7	24785	12955	19.2	1403.3	1173.6	505.0	194.0	176.4	-3.3	-41.8	-124.0	250.9
9:08:00	36.6	11.0	156.6	210.3	35.4	256.6	25.8	26638	13045	19.9	1404.1	1174.9	505.6	193.0	176.4	-13.1	-50.4	-144.7	237.9
9:09:00	37.0	10.7	157.5	214.6	35.9	256.0	25.9	26285	12871	19.8	1405.9	1175.3	505.9	193.5	176.4	-7.6	-44.1	-132.7	241.8
9:10:00	36.7	12.8	157.1	219.0	36.0	256.6	26.7	26438	13225	20.0	1405.5	1176.8	505.9	193.0	176.4	-16.1	-55.2	-148.4	232.3
9:11:00	36.6	11.4	156.6	217.3	36.8	259.4	27.2	21689	12916	19.9	1406.3	1176.5	506.0	192.0	176.4	-8.0	-46.8	-134.2	233.6
9:12:00	36.5	10.4	156.8	213.5	36.2	262.7	26.0	21073	13034	20.5	1409.4	1177.4	505.9	191.0	176.4	-28.7	-71.5	-167.9	197.2
9:13:00	36.8	11.7	157.0	217.4	35.4	260.8	26.6	23991	13011	19.2	1403.9	1175.7	505.5	190.5	175.3	-12.3	-50.4	-140.4	217.5
9:14:00	36.4	12.4	156.5	215.1	36.9	259.9	26.8	18951	13000	20.6	1406.0	1177.1	505.1	190.0	175.3	-29.2	-73.4	-167.7	209.7
9:15:00	36.9	11.8	157.5	221.6	39.3	259.2	25.8	25663	13006	19.8	1407.4	1176.3	504.7	189.5	175.3	-4.8	-42.4	-126.5	243.5
9:16:00	36.9	13.1	157.6	216.0	35.9	262.3	27.1	25663	12888	19.5	1414.4	1179.4	504.4	188.5	174.3	-1.6	-36.9	-122.5	251.4
9:17:00	36.8	11.1	157.4	223.1	36.8	259.7	26.3	21509	12972	19.7	1409.5	1178.7	503.8	188.0	174.3	-10.3	-49.4	-137.3	235.8
9:18:00	36.9	11.2	157.0	220.2	35.1	259.3	26.3	20977	12978	19.9	1413.5	1180.9	503.6	187.5	174.3	-5.7	-42.9	-131.8	244.8
9:19:00	36.8	12.4	156.4	219.2	35.5	259.7	27.1	25746	13006	19.7	1408.1	1179.2	503.0	187.5	173.3	-13.5	-53.9	-145.8	234.1
9:20:00	35.8	11.5	156.1	211.8	38.6	262.9	26.3	26279	13062	19.9	1407.6	1179.4	503.1	187.0	173.3	-9.6	-48.7	-137.3	240.4
9:21:00	36.5	8.9	156.7	215.6	35.8	262.4	27.1	18861	13062	20.0	1404.1	1178.0	502.8	187.5	173.3	-17.9	-57.7	-148.4	213.0
9:22:00	36.8	10.2	157.8	217.9	35.7	266.3	26.8	26106	13000	20.1	1406.8	1178.8	502.7	187.5	173.3	-11.5	-50.1	-140.2	217.9
9:23:00	36.8	11.1	157.5	217.4	35.7	263.6	26.4	22214	12978	19.6	1405.9	1178.5	502.6	187.5	173.3	-9.2	-48.1	-135.6	240.3
9:24:00	37.0	11.9	156.8	220.5	35.4	263.4	26.8	23458	12972	19.6	1411.4	1181.2	502.0	187.0	173.3	-1.6	-38.0	-125.3	242.6
9:25:00	36.8	12.5	157.4	221.9	36.5	265.8	26.5	26721	12983	19.7	1412.1	1181.2	502.1	186.5	173.3	-17.4	-58.4	-149.9	232.9
9:26:00	36.6	10.8	156.5	212.7	34.2	263.7	25.9	21599	13000	19.7	1410.5	1180.3	501.7	186.5	173.3	-9.1	-48.0	-135.8	236.3
9:27:00	36.6	11.8	157.0	216.0	35.6	264.5	27.0	21426	13090	20.4	1411.8	1181.3	501.8	186.5	172.2	-27.5	-66.9	-163.4	226.6
9:28:00	36.8	11.5	157.4	216.8	36.0	263.3	25.9	25933	12989	19.3	1408.5	1180.7	501.4	187.0	172.2	-11.9	-52.5	-139.5	231.5
9:29:00	36.6	9.6	157.2	217.2	35.4	266.9	26.9	26099	13096	20.9	1412.8	1182.1	501.3	186.5	172.2	-30.1	-73.0	-171.5	193.4
9:30:00	36.4	10.3	156.5	218.2	36.2	266.6	27.2	18772	12944	20.2	1408.4	1179.9	501.4	187.0	172.2	-15.2	-55.4	-144.5	213.5
9:31:00	36.6	11.7	156.3	220.3	35.8	267.8	26.3	25573	12910	21.1	1409.8	1180.9	501.4	187.0	172.2	-22.8	-68.5	-161.2	206.7
9:32:00	36.6	11.5	157.6	213.8	36.4	266.5	27.3	26196	12882	19.6	1407.9	1180.3	501.5	186.5	172.2	-6.6	-44.5	-128.7	244.4
9:33:00	36.6	11.1	156.2	219.7	35.5	263.0	27.2	25843	12927	19.2	1416.9	1183.4	500.9	186.5	172.2	-3.6	-39.3	-124.2	253.4
9:34:00	36.9	11.8	157.6	217.0	35.7	262.1	27.1	26458	12978	19.5	1412.1	1182.3	500.8	186.0	172.2	-10.9	-50.1	-139.5	237.4
9:35:00	36.4	9.9	156.3	215.2	35.7	262.0	26.6	18599	12843	19.7	1414.3	1183.5	501.1	186.0	172.2	-8.4	-47.9	-132.0	242.8
9:36:00	36.6	11.2	157.6	217.8	35.6	266.6	26.8	26458	13090	20.2	1410.9	1181.2	500.5	186.0	172.2	-15.1	-55.5	-146.2	233.4
9:37:00	36.7	11.7	157.1	214.9	33.6	262.7	25.9	26368	12916	19.6	1410.9	1181.4	500.8	186.5	172.2	-10.1	-49.9	-139.5	235.9
9:38:00	36.8	12.0	157.8	220.1	34.9	264.5	26.5	25926	13006	20.1	1407.5	1180.5	500.5	186.5	172.2	-17.9	-58.2	-150.0	209.5
9:39:00	36.6	11.9	158.1	221.4	35.5	266.2	27.1	23901	12910	20.1	1408.9	1181.1	500.4	187.0	172.2	-13.3	-52.4	-142.2	216.6
9:40:00	36.8	12.1	156.4	214.3	35.9	268.1	27.2	24606	13129	19.8	1408.0	1181.2	500.8	187.0	172.2	-9.4	-48.9	-137.0	239.8
9:41:00	36.8	10.9	157.7	215.0	35.8	264.5	25.9	26016	12787	19.3	1415.5	1184.1	500.6	186.5	172.2	-3.3	-42.6	-125.2	242.7
9:42:00	36.5	11.9	156.5	216.7	38.8	261.1	26.1	26818	13225	19.9	1417.8	1185.4	500.8	186.5	172.2	-18.3	-57.7	-151.3	235.7
9:43:00	36.4	11.2	156.7	213.9	35.6	263.9	27.1	25048	13006	19.7	1416.3	1184.8	500.3	186.5	172.2	-7.8	-45.8	-134.2	236.9
9:44:00	36.7	10.1	157.2	219.7	35.4	260.9	27.0	26991	13107	20.4	1417.3	1185.7	500.7	186.5	172.2	-30.3	-73.8	-171.2	203.3
9:45:00	36.7	11.5	157.2	216.9	35.7	261.0	26.9	26458	13141	19.5	1414.9	1184.3	500.7	186.5	172.2	-13.4	-52.6	-141.7	233.3
9:46:00	36.5	10.0	156.8	215.9	36.5	261.4	27.2	18772	13051	20.4	1415.9	1185.1	500.8	186.5	172.2	-27.9	-71.8	-169.8	192.7
9:47:00	36.7	11.8	156.9	219.2	35.3	265.2	26.0	26368	12933	20.3	1411.3	1182.7	500.8	187.0	172.2	-14.5	-55.1	-144.8	210.9
9:48:00	36.6	10.0	156.8	218.3	32.9	267.2	26.5	26106	12815	19.9	1411.8	1184.4	500.8	187.0	172.2	-10.1	-49.2	-141.2	208.3
9:49:00	37.0	11.4	157.2	216.5	36.2	264.8	26.1	18516	12955	19.9	1411.8	1184.4	501.0	187.5	172.2	-6.1	-45.5	-131.9	239.9
9:50:00	36.7	12.0	156.4	221.2	36.2	266.2	27.2	24868	12944	19.3	1421.5	1187.4	501.2	187.0	172.2	-2.6	-40.2	-126.3	248.7
9:51:00	36.8	11.2	157.2	218.2	36.2	266.6	27.2	20804	13062	19.8	1417.6	1185.8	501.2	187.0	172.2	-10.9	-51.5	-140.4	235.2
9:52:00	36.5	10.9	157.2	216.7	34.8	265.4	26.0	26196	12972	19.6	1419.4	1186.8	501.0	187.0	172.2	-9.0	-46.6	-134.3	244.3
9:53:00	36.7	12.0	156.8	221.1	34.1	268.2	26.3	26555	13135	19.8	1415.4	1185.7	500.9	187.0	172.2	-16.1	-54.4	-148.0	234.8
9:54:00	36.6	12.3	157.4	219.6	35.9	267.9	27.2	26279	12905	19.6	1416.9	1186.2	501.4	187.0	172.2	-11.8	-49.7	-139.1	238.3
9:55:00	36.6	12.6	156.5	215.4	35.8	268.2	26.8	26728	13096	20.2	1412.3	1185.3	501.1	187.5	172.2	-19.0	-60.0	-151.8	213.9

Test No. 2 - October 9, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
9:56:00	36.7	12.6	157.1	217.5	36.0	269.3	27.1	26375	12871	20.2	1413.9	1185.6	501.2	187.5	172.2	-10.6	-48.4	-140.5	217.8
9:57:00	36.6	11.2	156.9	219.5	35.4	267.2	27.1	26638	13107	20.0	1414.9	1185.7	501.4	188.0	172.2	-12.3	-50.5	-140.3	241.6
9:58:00	36.6	11.8	156.9	219.9	34.8	269.1	27.0	26106	12871	19.6	1419.3	1187.3	501.5	188.0	172.2	-3.9	-40.8	-127.4	243.1
9:59:00	36.8	11.1	157.4	215.1	35.3	265.5	26.0	26555	13169	19.8	1423.0	1188.8	501.8	187.5	173.2	-25.8	-65.8	-159.5	230.9
10:00:00	36.3	10.9	156.4	214.4	35.9	264.9	27.1	26285	12905	19.7	1421.1	1187.8	501.7	187.5	173.2	-9.0	-47.3	-136.5	235.0
10:01:00	36.4	12.3	157.1	217.2	35.8	266.4	26.7	26555	12972	20.5	1421.8	1188.3	501.8	187.0	173.2	-28.8	-72.7	-168.4	201.4
10:02:00	36.6	12.4	156.8	219.6	35.2	266.4	26.1	26555	12983	19.9	1416.9	1186.3	501.6	187.5	173.2	-13.4	-53.6	-143.6	232.8
10:03:00	36.3	11.9	157.1	214.6	35.7	270.4	26.3	18419	12854	20.1	1418.9	1187.8	501.5	187.5	173.2	-18.7	-65.8	-157.4	197.1
10:04:00	36.4	11.7	156.4	220.1	36.9	269.6	27.1	20631	13006	20.0	1414.6	1186.6	501.8	188.0	173.2	-13.7	-54.6	-145.2	212.3
10:05:00	36.4	11.1	155.9	225.0	35.7	272.1	26.8	26203	12893	19.6	1417.9	1188.9	502.0	188.0	173.2	-11.4	-50.4	-137.6	218.3
10:06:00	36.5	10.3	157.4	216.8	36.1	272.6	27.1	26016	12994	19.7	1417.0	1189.0	502.1	188.5	173.2	-6.0	-42.1	-129.6	238.8
10:07:00	36.4	11.7	156.3	218.6	36.6	270.8	26.0	25760	12848	19.3	1426.5	1191.7	502.1	188.0	173.2	-2.0	-38.7	-124.8	249.1
10:08:00	36.6	11.9	158.0	221.4	36.5	268.4	26.6	26113	12983	19.4	1424.3	1191.5	502.2	188.0	173.2	-11.6	-50.3	-140.7	239.8
10:09:00	36.6	11.5	156.5	216.5	36.4	271.4	27.1	26203	12854	19.6	1427.4	1192.0	502.4	188.0	173.2	-5.8	-43.8	-131.6	246.1
10:10:00	35.9	11.1	156.9	219.4	36.8	269.4	25.9	26458	12983	20.1	1422.4	1190.2	502.1	188.0	173.2	-15.4	-54.1	-146.2	235.4
10:11:00	35.5	10.9	156.9	217.8	36.2	269.9	27.2	26113	12893	19.8	1417.0	1187.5	502.6	188.0	173.2	-11.0	-46.3	-137.1	238.6
10:12:00	35.3	10.5	156.2	214.6	36.0	274.1	27.1	26375	13039	19.9	1414.4	1187.5	502.6	188.0	173.2	-19.1	-59.0	-152.1	214.4
10:13:00	35.5	11.7	155.6	217.6	36.3	274.8	26.3	26292	12938	19.5	1411.4	1187.4	502.4	188.0	173.2	-9.3	-49.6	-137.6	217.3
10:14:00	35.6	11.6	156.6	222.6	35.9	273.5	26.7	27170	13163	20.0	1411.8	1187.3	502.4	188.0	173.2	-11.0	-51.3	-141.1	242.1
10:15:00	35.5	11.5	156.0	217.2	36.4	271.5	27.2	26285	12921	19.4	1411.8	1187.2	502.2	188.0	173.2	-3.7	-40.0	-126.0	244.1
10:16:00	35.6	10.2	157.0	221.9	35.3	271.5	27.1	19221	13000	20.5	1415.0	1187.7	502.3	187.5	173.2	-28.7	-72.4	-172.1	208.6
10:17:00	35.3	11.0	156.5	218.3	35.5	271.8	26.1	18861	13006	20.2	1410.6	1184.9	502.3	187.5	173.2	-7.7	-44.9	-135.5	240.2
10:18:00	35.4	12.5	156.4	218.7	36.1	274.8	26.4	23638	12921	21.0	1410.8	1186.0	502.0	187.0	173.2	-25.8	-70.3	-164.3	204.2
10:19:00	35.6	11.0	158.1	218.7	36.5	271.5	26.2	23375	12933	19.8	1406.6	1184.6	501.8	187.5	173.2	-11.9	-51.4	-141.6	238.1
10:20:00	35.3	10.3	156.3	218.7	36.1	272.6	26.6	26375	12815	19.7	1409.0	1186.2	502.0	187.5	173.2	-8.9	-48.5	-135.5	244.1
10:21:00	35.6	11.7	157.8	221.0	36.0	273.2	26.9	23382	13006	20.1	1404.0	1184.2	501.9	187.5	173.2	-13.1	-52.7	-144.5	217.4
10:22:00	35.5	11.5	156.7	216.0	36.4	274.1	26.1	26645	13017	19.6	1405.3	1184.5	502.2	188.0	173.2	-10.4	-48.3	-138.5	225.8
10:23:00	35.6	12.3	157.2	224.2	36.0	271.4	25.9	26638	13034	20.0	1403.5	1183.6	501.9	188.0	173.2	-4.6	-42.0	-129.5	244.2
10:24:00	35.3	11.8	156.6	219.3	36.0	271.6	26.8	26113	12781	19.3	1408.1	1185.4	502.0	187.5	173.2	-1.2	-37.9	-123.6	252.9
10:25:00	35.4	11.4	156.8	215.0	35.2	271.0	27.2	20990	13045	19.6	1406.6	1183.9	501.9	187.0	173.2	-12.3	-50.1	-142.4	239.9
10:26:00	36.0	11.3	157.3	216.9	35.7	269.9	26.1	26555	12966	19.7	1407.9	1185.8	501.7	187.0	173.2	-6.0	-43.9	-131.7	244.5
10:27:00	35.6	11.3	157.4	220.9	36.0	272.4	26.1	19041	13000	20.2	1407.8	1185.2	501.4	187.0	173.2	-15.9	-56.6	-147.9	236.4
10:28:00	35.6	10.5	157.3	222.4	35.5	268.1	27.1	24702	12865	19.4	1405.4	1185.1	501.3	187.5	173.2	-8.6	-48.1	-136.1	235.3
10:29:00	35.4	11.9	157.4	216.2	35.4	271.0	26.2	26997	13253	20.2	1404.1	1183.9	501.3	187.5	173.2	-19.1	-60.3	-153.8	212.1
10:30:00	35.7	11.6	156.9	221.2	35.6	271.5	26.3	26728	12865	19.8	1404.4	1183.6	501.4	187.5	173.2	-10.6	-49.3	-141.4	216.3
10:31:00	35.7	11.7	156.6	215.9	35.3	270.8	26.0	21253	13124	20.3	1406.3	1184.8	501.4	187.5	173.2	-17.5	-56.2	-149.7	241.3
10:32:00	35.3	10.5	157.0	214.7	36.4	268.9	26.5	26375	12753	19.9	1408.0	1186.0	501.4	187.5	173.2	-4.6	-44.4	-127.9	248.3
10:33:00	35.3	10.4	157.1	220.1	35.3	269.5	26.1	23638	12899	20.6	1412.0	1187.5	501.7	187.0	173.2	-28.5	-73.7	-170.5	210.3
10:34:00	35.6	11.6	157.2	220.3	36.0	266.7	25.9	24965	12893	19.2	1409.1	1184.9	501.4	187.0	173.2	-10.2	-49.6	-137.0	245.6
10:35:00	35.6	12.3	157.1	213.9	35.6	262.9	27.2	23375	12747	21.0	1411.1	1186.1	501.2	186.5	173.2	-19.2	-67.3	-156.4	209.5
10:36:00	35.6	10.6	157.9	214.9	36.0	266.0	25.9	26562	12966	19.9	1405.4	1183.1	501.1	186.5	173.2	-11.3	-50.2	-141.5	238.7
10:37:00	35.5	10.0	157.0	218.0	38.4	269.2	26.0	26562	12972	19.8	1406.0	1185.4	501.5	186.5	173.2	-8.4	-47.7	-135.2	242.5
10:38:00	35.7	11.1	157.2	222.0	35.8	271.6	25.8	26645	12961	20.1	1403.0	1183.2	500.9	187.0	173.2	-15.5	-55.9	-146.2	214.4
10:39:00	35.7	12.5	156.2	214.1	36.1	272.6	27.1	26735	12798	19.8	1404.6	1184.5	501.1	187.0	173.2	-9.0	-46.4	-137.8	216.8
10:40:00	35.9	10.8	157.4	220.4	36.5	269.9	26.7	26562	12933	19.4	1404.0	1184.9	501.2	187.0	173.2	-5.8	-41.5	-132.3	240.6
10:41:00	35.8	11.3	157.4	214.0	36.2	265.1	26.5	21868	12832	18.9	1411.3	1187.6	500.9	187.0	173.2	-2.1	-37.8	-125.2	247.8
10:42:00	35.9	12.3	156.8	211.0	34.7	267.9	27.1	26818	12860	19.4	1407.8	1184.7	500.8	186.5	173.2	-13.9	-52.6	-142.1	235.6
10:43:00	35.7	10.5	157.4	222.9	36.5	268.8	27.2	26375	12893	19.5	1407.8	1183.7	500.9	186.5	173.2	-5.1	-42.2	-131.2	240.9
10:44:00	35.9	11.6	156.7	218.9	35.8	270.6	26.4	26818	13112	20.0	1406.0	1183.4	500.8	186.5	173.2	-17.0	-56.7	-149.6	234.9
10:45:00	35.6	12.3	157.4	218.5	36.0	269.0	26.1	26735	12955	19.7	1405.5	1184.4	500.7	186.5	173.2	-9.8	-49.2	-137.7	238.1
10:46:00	35.5	11.4	156.9	218.3	35.7	268.9	26.8	27350	13067	20.5	1406.5	1185.4	500.5	186.5	173.2	-19.1	-59.4	-153.4	211.7
10:47:00	35.9	10.5	157.1	218.7	36.3	265.2	27.1	22401	12972	19.8	1405.5	1184.4	500.8	186.5	173.2	-10.8	-50.5	-140.0	216.9

Test No. 2 - October 9, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
10:48:00	35.6	12.2	156.6	214.3	38.2	252.5	26.3	27177	13135	21.0	1404.9	1183.6	500.6	186.5	173.2	-29.7	-74.1	-171.4	218.5
10:49:00	35.5	13.0	156.9	210.6	35.8	263.9	27.2	18778	12921	20.0	1404.8	1182.8	500.6	186.5	173.2	-2.6	-40.3	-127.8	247.1
10:50:00	35.6	12.0	156.4	217.5	36.4	269.2	26.5	23375	12899	21.0	1411.3	1184.7	500.4	186.0	173.2	-26.5	-69.3	-166.8	206.1
10:51:00	35.3	12.9	156.8	213.8	36.2	272.9	26.6	25587	12876	19.6	1404.9	1183.1	500.1	186.0	173.2	-8.9	-48.3	-135.9	242.1
10:52:00	35.8	11.4	157.8	213.6	35.7	268.1	26.3	22228	12882	19.5	1410.9	1185.8	500.0	185.5	173.2	-3.8	-42.0	-129.4	247.5
10:53:00	36.0	11.2	157.4	218.5	36.3	269.2	27.0	26645	12994	20.0	1407.9	1184.3	499.9	186.0	172.1	-13.3	-53.4	-143.0	238.4
10:54:00	35.7	11.5	157.0	215.5	31.8	263.7	27.1	26562	12848	19.3	1408.4	1184.0	500.0	186.0	172.1	-9.5	-49.1	-135.7	242.9
10:55:00	35.7	11.4	156.7	216.3	36.3	264.4	25.9	26818	12832	20.4	1403.0	1181.2	499.9	186.0	172.1	-15.7	-56.7	-146.1	217.9
10:56:00	35.5	11.3	156.5	209.2	35.4	264.9	25.9	26465	12978	19.8	1403.0	1181.5	499.7	186.0	172.1	-9.2	-48.6	-138.3	222.4
10:57:00	35.3	11.9	156.7	214.1	36.3	267.2	26.0	22408	12972	20.1	1403.6	1181.7	499.9	185.5	172.1	-7.4	-45.5	-132.8	243.4
10:58:00	36.4	12.6	156.3	217.5	37.0	268.8	26.3	23196	12730	19.7	1408.6	1185.7	499.4	185.5	172.1	-2.5	-39.4	-125.0	245.7
10:59:00	36.1	10.2	157.2	215.6	34.4	268.8	27.2	22843	12933	19.4	1410.9	1186.9	499.7	185.0	172.1	-12.2	-52.2	-144.2	230.1
11:00:00	36.4	10.9	157.8	216.4	35.7	264.4	26.0	23735	12921	19.4	1413.9	1188.0	499.7	185.5	172.1	-5.6	-46.1	-132.5	234.2
11:01:00	36.2	10.5	157.1	210.8	36.7	263.5	27.2	26825	13006	19.8	1414.4	1188.1	499.8	185.5	172.1	-17.1	-57.8	-151.6	228.4
11:02:00	36.5	10.8	156.7	216.8	36.5	266.3	26.0	26728	12899	20.1	1414.0	1187.8	500.0	186.5	172.1	-7.8	-46.8	-138.0	230.0
11:03:00	35.9	10.9	157.2	220.2	36.2	268.1	25.9	27177	13124	19.9	1414.1	1187.5	499.6	186.5	172.1	-26.0	-65.4	-163.1	205.3
11:04:00	35.6	11.8	157.2	217.1	35.4	254.0	26.3	26735	13090	19.9	1408.4	1183.1	499.8	186.5	172.1	-12.0	-52.0	-142.7	210.3
12:03:00	35.3	11.9	156.9	215.9	36.2	272.4	27.2	26921	13169	20.4	1383.0	1168.0	490.3	179.0	168.1	-23.6	-65.6	-158.2	208.9
12:04:00	35.6	10.6	157.7	221.1	36.0	270.8	26.5	26292	12910	20.5	1382.8	1167.0	490.2	179.5	168.1	-15.0	-55.5	-145.4	212.3
12:05:00	35.5	11.5	157.7	214.1	36.3	270.7	27.1	26472	13079	20.2	1383.3	1167.8	490.3	179.0	167.1	-17.8	-59.0	-147.3	239.8
12:06:00	35.3	11.3	157.4	215.5	36.6	272.5	27.3	25850	12961	19.9	1387.8	1169.8	490.0	179.5	167.1	-7.2	-45.2	-131.6	240.2
12:07:00	35.5	11.0	157.0	219.2	35.9	271.4	26.9	27004	13056	20.1	1391.5	1171.9	490.0	179.0	167.1	-29.0	-68.5	-164.4	229.5
12:08:00	35.5	11.1	157.4	218.4	36.7	273.3	27.1	25940	12781	20.1	1388.9	1170.0	489.9	179.0	167.1	-13.7	-54.4	-141.2	233.9
12:09:00	35.4	12.0	157.1	220.5	36.2	272.2	27.2	26292	13062	20.7	1390.3	1171.1	490.0	178.5	167.1	-32.6	-79.0	-175.1	200.2
12:10:00	35.4	9.8	156.7	218.4	36.1	271.6	27.0	26209	12972	20.5	1386.3	1169.5	489.8	179.0	167.1	-16.4	-57.7	-147.4	227.6
12:11:00	35.1	10.8	156.4	222.3	37.6	274.1	25.9	26562	12815	20.9	1386.8	1170.5	489.7	179.0	167.1	-27.8	-74.1	-166.0	193.5
12:12:00	35.7	11.3	157.7	221.9	36.2	269.0	27.2	26389	12843	19.8	1383.9	1168.2	489.7	179.0	167.1	-17.9	-60.1	-149.5	205.4
12:13:00	35.4	10.4	157.2	215.6	37.6	267.7	26.1	26120	12809	20.5	1384.4	1169.7	489.8	179.5	167.1	-14.7	-55.4	-144.0	210.8
12:14:00	35.3	10.8	156.0	214.4	35.7	271.8	26.0	26472	12832	20.1	1384.5	1169.4	489.6	179.5	167.1	-9.8	-49.7	-135.7	230.4
12:15:00	35.1	11.4	157.1	218.1	35.3	272.6	26.0	26030	12837	19.7	1390.6	1172.4	489.6	179.5	167.1	-7.3	-46.9	-130.4	240.9
12:16:00	35.2	11.7	157.5	212.4	36.2	271.0	25.9	26292	12994	19.9	1387.6	1171.1	489.5	179.5	167.1	-15.2	-54.7	-145.4	227.4
12:17:00	35.1	11.2	156.7	222.4	36.0	273.4	26.9	26120	12882	19.8	1388.6	1171.8	489.3	179.5	167.1	-10.0	-49.8	-137.9	238.4
12:18:00	35.5	10.8	157.5	217.3	36.4	274.8	26.5	26209	13006	20.2	1388.6	1170.9	489.2	179.0	167.1	-20.0	-61.3	-151.8	229.8
12:19:00	35.4	11.8	156.7	219.5	36.2	274.2	26.4	26030	12938	20.5	1387.0	1171.4	489.4	179.5	167.1	-14.5	-57.1	-143.0	234.1
12:20:00	35.0	11.7	156.3	217.2	36.2	270.9	27.2	21170	12978	20.3	1387.0	1170.5	489.2	179.5	167.1	-22.5	-64.8	-157.8	213.2
12:21:00	35.2	11.8	156.8	217.1	34.8	274.9	26.3	25767	12865	20.3	1385.6	1169.3	489.4	179.5	167.1	-17.1	-58.4	-148.4	219.9
12:22:00	35.2	10.2	157.5	225.4	39.0	275.4	27.3	26292	13073	20.1	1385.0	1169.1	489.6	179.5	167.1	-21.4	-63.1	-151.7	249.6
12:23:00	35.0	11.7	157.2	222.5	36.2	274.4	26.4	25857	12848	20.4	1386.3	1171.2	489.5	180.0	167.1	-9.0	-47.2	-132.5	247.4
12:24:00	35.0	9.7	157.2	224.6	36.3	277.4	27.3	26652	12848	21.0	1393.1	1174.3	489.6	179.5	168.2	-35.6	-82.0	-179.1	210.1
12:25:00	35.6	11.8	157.2	212.7	36.5	274.9	27.1	26299	12770	19.9	1387.8	1172.1	489.5	179.5	168.2	-13.2	-54.4	-141.0	239.6
12:26:00	35.4	12.5	157.2	215.9	35.5	273.9	27.2	25940	12871	20.9	1391.5	1173.7	489.2	179.5	168.2	-32.0	-76.1	-172.3	204.3
12:27:00	34.8	11.6	157.1	216.9	36.0	275.1	27.1	25504	12989	20.3	1387.1	1170.2	488.7	179.5	168.2	-18.3	-60.6	-148.2	234.2
12:28:00	34.9	12.8	157.2	213.9	38.8	273.9	27.3	26216	12882	19.7	1387.6	1170.4	488.9	179.0	168.2	-14.2	-55.3	-143.6	239.0
12:29:00	34.9	12.6	156.7	219.9	36.9	274.1	26.1	26209	13000	20.4	1382.4	1167.4	488.8	179.5	168.2	-20.4	-63.8	-152.1	211.8
12:30:00	34.7	10.9	156.8	221.6	36.0	277.7	26.9	25940	12730	20.0	1382.6	1168.9	489.0	179.5	167.1	-16.9	-57.5	-144.9	217.3
12:31:00	35.2	11.5	157.2	227.3	36.4	279.4	27.3	26209	12933	19.9	1382.1	1168.8	489.1	180.5	167.1	-12.6	-54.1	-139.6	239.3
12:32:00	35.3	11.2	156.5	217.1	36.3	277.0	25.8	25940	12837	19.7	1388.3	1172.1	488.8	181.0	168.2	-8.7	-48.5	-133.0	247.9
12:33:00	35.1	10.5	157.6	221.8	36.8	271.7	26.1	26472	13039	19.7	1385.0	1170.2	489.6	181.0	168.2	-16.9	-58.6	-147.1	233.4
12:34:00	35.1	10.4	157.0	215.6	37.0	260.2	26.3	25864	12871	19.6	1387.4	1170.5	489.9	181.5	168.2	-12.1	-52.5	-138.8	238.4
12:35:00	34.5	10.9	156.7	229.2	37.1	274.1	26.6	26652	12983	20.7	1384.1	1167.6	490.3	182.0	168.2	-22.1	-63.4	-155.4	229.1
12:36:00	34.9	11.1	156.9	216.4	37.1	270.3	26.5	26299	12899	20.2	1380.9	1166.6	490.9	182.5	168.2	-16.4	-56.5	-145.3	228.5
12:37:00	35.0	12.1	157.2	220.1	36.9	272.2	26.9	27184	13000	20.5	1380.1	1166.1	491.5	183.0	169.2	-24.3	-67.4	-160.0	199.7

Test No. 2 - October 9, 2019

	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
Time	Rich Lpm	Emulsion Lpm	Lean Lpm	Alkaline Lpm	Leachate Lpm	TDU Flow SCFM	Flow lbs/h	Primary Nm^3/h	Secondary Nm^3/h	Stack Nm^3/h	Primary °C	Secondary °C	Quench °C	SprayDryer °C	Stack °C	Incinerator mm H_2O	SD Inlet mm H_2O	BH Inlet mm H_2O	Baghouse mm H_2O
12:38:00	34.8	10.5	157.7	212.5	35.1	271.6	26.8	26389	12899	19.9	1380.3	1167.9	492.0	184.0	169.2	-15.0	-55.7	-146.1	203.4
12:39:00	34.9	10.1	156.7	213.9	36.3	274.1	26.9	26209	12978	19.9	1382.4	1169.2	492.0	184.5	169.2	-22.0	-60.4	-155.1	232.6
12:40:00	35.0	12.0	155.7	217.2	36.2	272.6	27.2	25857	12758	19.6	1384.1	1171.1	492.4	185.5	170.2	-7.8	-47.9	-132.0	231.9
12:41:00	34.5	11.0	156.9	212.3	36.7	271.2	26.6	26652	12978	20.6	1390.0	1174.1	493.3	185.5	170.2	-33.3	-80.2	-176.7	191.9
12:42:00	35.0	11.2	156.7	219.1	36.5	277.1	27.2	26209	12921	19.8	1386.4	1171.0	493.7	185.5	170.2	-12.7	-54.6	-141.3	224.9
12:43:00	34.5	10.1	157.2	217.2	35.1	275.7	27.0	25857	12792	20.7	1388.6	1171.9	494.5	186.0	171.2	-25.9	-73.1	-162.3	195.1
12:44:00	34.7	10.3	156.7	222.9	33.2	275.2	25.9	26382	12927	20.1	1384.0	1168.4	494.6	186.0	171.2	-15.9	-56.9	-147.8	227.9
12:45:00	34.7	10.4	156.8	212.8	35.9	277.7	27.3	25325	12809	19.7	1384.0	1170.2	495.1	186.5	171.2	-12.4	-51.0	-140.8	235.6
12:46:00	34.7	12.1	157.4	217.4	36.3	279.5	26.0	25497	13067	20.3	1381.1	1168.3	495.3	187.0	171.2	-17.1	-58.4	-147.9	212.1
12:47:00	34.6	11.2	156.6	212.3	36.2	274.6	26.8	26120	12933	20.1	1382.3	1168.2	496.2	187.0	171.2	-14.9	-55.5	-143.5	219.1
12:48:00	34.8	11.0	157.2	220.2	36.2	275.0	25.9	25325	12893	20.1	1379.0	1167.4	496.4	187.0	171.2	-9.7	-48.7	-135.5	236.4
12:49:00	34.6	10.4	156.4	215.2	41.7	272.3	26.1	24799	12770	19.3	1386.6	1171.5	496.7	187.0	172.2	-5.9	-43.3	-128.2	239.7
12:50:00	34.6	11.0	156.5	221.1	36.0	275.6	27.2	25857	12865	20.0	1385.4	1170.0	496.8	186.5	172.2	-14.7	-55.1	-144.5	228.0
12:51:00	34.3	10.9	157.3	217.4	36.1	275.0	26.9	25152	12815	19.5	1386.9	1170.2	497.2	187.0	172.2	-10.4	-49.6	-136.0	235.4
12:52:00	34.1	11.7	156.7	225.8	36.7	275.7	25.9	26389	12938	19.8	1383.6	1168.8	497.3	186.5	172.2	-19.4	-58.9	-153.6	227.2
12:53:00	34.6	11.1	157.4	223.4	35.9	275.6	26.5	25857	12826	20.1	1383.0	1168.2	497.9	187.0	172.2	-13.8	-54.3	-142.4	227.0
12:54:00	34.4	10.7	157.1	213.9	36.5	274.4	26.1	25677	12933	20.3	1379.9	1167.6	497.9	187.0	172.2	-23.9	-65.5	-160.4	202.4
12:55:00	35.0	11.1	157.1	210.9	36.6	274.2	26.5	25504	12899	20.0	1379.4	1167.2	498.2	187.5	172.2	-15.7	-58.0	-146.3	209.3
12:56:00	34.6	10.2	156.8	212.3	36.6	273.8	27.1	26382	13011	20.9	1381.5	1167.8	498.2	187.5	172.2	-34.4	-79.3	-174.5	213.7
12:57:00	34.5	11.7	157.1	215.3	36.5	269.3	27.2	25767	12787	19.5	1383.9	1167.9	498.3	187.5	172.2	-7.4	-46.6	-129.6	242.9
12:58:00	34.7	11.2	157.1	224.9	36.9	270.6	27.2	25864	12865	21.2	1389.6	1171.2	498.6	187.0	173.2	-30.3	-77.8	-170.1	203.2
12:59:00	34.8	11.1	157.1	228.0	37.1	265.6	26.3	25504	12865	19.4	1384.9	1168.9	498.9	187.0	173.2	-11.4	-50.7	-139.7	234.9
13:00:00	34.7	11.4	157.4	223.6	34.7	276.2	26.1	24882	12725	19.3	1385.5	1169.6	499.1	187.0	173.2	-7.9	-47.6	-132.7	236.8
13:01:00	34.8	11.4	157.4	215.9	35.7	273.2	26.9	26209	13023	19.8	1383.3	1166.7	499.2	187.0	173.2	-15.1	-55.4	-145.7	227.3
13:02:00	34.3	11.5	157.0	218.2	36.7	271.0	27.2	24889	12832	20.0	1382.8	1168.8	499.6	187.0	173.2	-11.8	-51.0	-140.5	232.9
13:03:00	34.7	12.1	156.9	225.9	35.3	271.0	26.9	25414	13141	20.3	1379.3	1167.4	499.8	187.0	173.2	-17.1	-57.5	-149.3	206.3
13:04:00	34.1	10.9	156.1	211.1	36.5	271.4	25.9	25587	12944	19.5	1378.5	1166.9	499.9	187.5	173.2	-14.3	-55.5	-143.6	214.3
13:05:00	34.5	10.8	157.1	219.7	36.0	268.5	26.3	26030	12843	20.1	1376.6	1165.3	499.8	187.5	173.2	-11.3	-51.7	-138.0	239.9
13:06:00	34.0	12.8	156.7	210.9	36.3	271.6	27.2	25504	12860	19.8	1384.6	1169.1	500.1	187.0	173.2	-7.0	-43.2	-128.8	247.1
13:07:00	34.2	12.5	156.9	212.2	36.3	273.7	26.0	25242	12989	19.6	1383.3	1168.1	500.2	186.5	173.2	-17.0	-58.0	-146.5	235.4
13:08:00	34.4	10.6	157.3	222.3	36.6	275.3	25.9	25767	12787	20.0	1381.5	1167.5	499.7	186.0	173.2	-10.5	-51.8	-136.0	241.0
13:09:00	34.2	11.5	156.7	211.0	36.3	275.6	27.2	25414	12888	19.9	1380.6	1167.6	500.2	186.0	173.2	-22.2	-64.0	-154.5	234.6
13:10:00	34.3	11.2	157.1	216.9	36.9	274.1	26.2	24882	12994	19.5	1378.5	1166.9	500.3	186.0	173.2	-12.7	-52.5	-141.6	236.1
13:11:00	34.2	12.0	156.8	226.6	37.8	276.7	26.6	25767	13084	20.5	1378.8	1167.3	500.1	186.0	173.2	-29.9	-69.8	-166.0	212.0
13:12:00	34.7	11.2	156.4	216.5	36.6	273.8	26.0	25587	12820	20.2	1375.4	1165.1	500.2	187.0	173.2	-16.0	-57.7	-146.8	217.1
13:13:00	34.3	11.8	156.6	218.1	37.0	268.9	26.2	24979	12815	20.9	1377.1	1166.0	500.2	186.5	173.2	-33.6	-77.7	-174.9	206.6
13:14:00	34.4	9.7	156.9	223.6	36.6	268.1	26.2	25152	12725	19.6	1377.4	1164.6	500.2	186.5	173.2	-7.8	-46.0	-131.0	237.2
13:15:00	33.7	11.0	156.2	209.4	35.0	271.4	26.0	24792	12927	20.7	1381.1	1167.0	500.2	186.0	173.2	-25.7	-73.9	-159.0	198.1
13:16:00	34.4	11.3	157.4	220.8	36.2	273.8	26.9	25857	12910	19.5	1377.9	1165.1	500.2	185.5	173.2	-13.6	-53.7	-142.9	232.5
13:17:00	34.5	11.2	156.9	222.3	36.1	274.0	27.3	26030	12798	19.8	1381.0	1167.4	500.1	185.5	173.2	-9.2	-48.5	-132.8	234.1
13:18:00	34.3	10.7	156.4	215.8	36.8	275.2	26.2	25414	12899	20.0	1376.6	1165.0	500.1	185.5	172.1	-17.4	-58.3	-146.9	223.3
13:19:00	34.1	10.6	157.4	215.4	36.8	269.2	26.6	23825	12882	19.5	1377.3	1165.3	500.1	185.5	172.1	-12.1	-52.4	-139.7	227.5
13:20:00	34.7	11.4	156.9	232.4	37.1	259.9	25.9	25062	12764	19.9	1373.6	1161.6	499.9	185.0	172.1	-19.6	-59.6	-151.7	200.1
13:21:00	34.4	11.1	156.0	223.7	35.9	223.7	27.2	25587	12753	20.0	1370.9	1159.5	500.1	185.0	172.1	-16.6	-56.9	-144.6	206.7
13:22:00	34.5	11.3	157.1	218.5	33.5	212.6	26.8	25062	12994	20.0	1366.1	1154.3	499.6	184.5	172.1	-15.7	-56.1	-139.8	225.3
13:23:00	34.4	11.4	156.4	215.4	36.2	205.8	27.3	24523	12747	19.7	1368.5	1153.2	499.5	184.0	172.1	-8.6	-45.8	-130.2	228.0
13:24:00	34.5	11.5	157.0	211.9	36.6	192.5	26.9	25940	12854	20.1	1365.3	1149.4	499.3	182.5	172.1	-23.0	-64.4	-152.8	217.8
13:25:00	34.3	11.4	156.7	218.6	35.9	166.7	26.3	25587	12972	19.7	1362.5	1145.4	499.0	182.0	171.1	-17.1	-55.5	-142.0	222.3
13:26:00	34.1	10.9	157.1	223.6	36.5	153.4	27.1	26299	13000	20.0	1355.6	1141.9	498.6	180.5	170.1	-29.3	-71.5	-162.2	211.7
13:27:00	34.6	10.9	156.9	224.0	37.4	156.8	26.0	25767	13000	20.2	1352.4	1138.3	498.1	180.0	170.1	-21.7	-61.1	-149.7	216.7
13:28:00	34.4	10.5	156.9	216.2	35.7	151.5	26.8	26120	12978	20.8	1349.3	1137.1	497.8	179.0	170.1	-42.2	-88.1	-182.8	179.6
13:29:00	34.8	11.4	157.4	204.3	36.2	149.6	26.2	25332	12899	20.5	1342.4	1132.9	497.1	178.5	169.1	-24.1	-65.7	-154.3	195.6

Test No. 2 - October 9, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Inlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
13:30:00	36.2	12.0	157.0	209.2	36.2	152.6	26.6	26479	13051	21.5	1344.8	1134.0	496.5	178.0	168.1	-39.1	-87.4	-180.4	188.8
13:31:00	36.5	12.4	157.0	223.4	36.6	150.8	26.6	25152	12905	20.3	1350.0	1136.9	495.5	177.5	168.1	-13.6	-52.2	-137.7	219.3
13:32:00	36.3	12.5	156.8	228.4	37.9	152.2	26.3	25414	12781	19.5	1359.4	1142.5	495.2	177.0	168.1	-11.0	-49.2	-133.9	227.5
13:33:00	36.5	11.4	157.8	236.7	37.0	156.2	27.1	25677	12888	19.6	1358.8	1140.7	494.3	177.0	168.1	-17.8	-57.2	-147.7	219.8
13:34:00	36.2	12.7	157.4	217.4	36.6	158.2	26.0	25940	12916	20.0	1361.0	1142.0	493.9	177.0	167.1	-17.1	-58.0	-143.7	232.4
13:35:00	36.4	13.5	157.4	218.0	36.2	155.0	26.7	25152	12994	20.2	1358.1	1141.9	493.8	178.5	167.1	-23.5	-65.5	-157.2	221.7
13:36:00	35.8	13.2	156.4	218.1	36.2	158.6	25.9	25594	12848	19.9	1361.9	1144.0	494.1	179.5	167.1	-21.1	-63.1	-149.6	226.1
13:37:00	36.3	13.1	157.5	218.8	36.3	158.5	27.1	25940	12972	20.2	1359.0	1143.5	494.0	180.0	168.2	-24.7	-67.0	-159.0	201.6
13:38:00	36.3	13.2	157.2	220.5	35.9	159.0	26.6	25504	12961	20.1	1359.8	1144.2	494.2	181.0	168.2	-20.3	-62.8	-148.5	207.8
13:39:00	36.2	13.4	156.5	211.9	36.5	158.3	27.2	25594	12848	20.1	1359.9	1144.3	494.5	181.5	168.2	-16.6	-57.7	-145.7	232.1
13:40:00	36.4	12.5	157.4	221.8	36.7	157.5	26.1	25152	12736	19.8	1368.5	1148.1	494.8	182.0	169.2	-9.7	-49.2	-132.6	236.2
13:41:00	36.2	12.1	156.4	216.8	36.3	157.4	25.9	26299	12905	20.1	1370.9	1149.0	494.7	182.0	169.2	-23.8	-64.5	-156.9	228.2
13:42:00	36.1	13.0	156.6	224.8	36.7	159.2	26.1	24799	12803	19.6	1369.3	1148.4	495.1	182.5	169.2	-13.5	-53.6	-142.5	232.4
13:43:00	35.9	12.4	157.2	211.0	35.6	158.5	27.2	26120	13067	20.4	1370.6	1149.7	495.4	182.5	169.2	-29.3	-69.9	-169.4	228.1
13:44:00	35.9	12.6	157.1	224.4	36.3	160.3	27.4	24979	12961	20.4	1368.0	1148.3	495.7	183.0	169.2	-16.4	-56.6	-146.6	231.8
13:45:00	37.0	13.0	157.1	220.5	35.7	162.4	26.3	26030	12961	21.3	1371.0	1149.2	496.1	183.5	170.2	-35.2	-82.9	-178.2	197.6
13:46:00	37.3	13.1	156.4	217.6	36.5	167.9	27.0	25504	12955	20.4	1370.1	1150.6	496.2	184.5	170.2	-20.6	-60.8	-151.9	217.1
13:47:00	38.2	12.3	157.4	219.6	36.0	187.4	27.3	25684	12865	21.3	1377.4	1155.7	496.9	185.0	170.2	-26.3	-73.7	-165.7	204.6
13:48:00	38.2	13.1	156.8	225.6	36.9	185.9	27.2	24972	12815	19.6	1384.8	1158.6	496.7	186.0	171.2	-7.9	-47.6	-133.5	244.4
13:49:00	38.3	13.0	157.0	217.4	35.0	186.3	27.2	24620	12669	19.5	1395.0	1164.9	497.3	186.0	171.2	-3.8	-42.7	-126.7	253.4
13:50:00	38.1	13.1	157.9	220.6	36.5	189.5	26.4	24094	12843	19.8	1397.4	1165.9	497.7	187.0	171.2	-10.9	-49.2	-138.3	240.6
13:51:00	37.8	13.3	156.7	219.0	36.6	189.8	27.1	25062	12832	19.8	1403.8	1169.1	498.1	187.5	172.2	-6.3	-45.3	-130.4	248.4
13:52:00	37.9	12.7	156.9	219.9	36.0	188.9	27.2	24709	12921	20.1	1402.0	1168.9	498.7	188.0	172.2	-14.1	-54.9	-144.3	238.9
13:53:00	38.0	13.1	157.2	218.4	37.7	187.4	26.9	24799	12770	19.7	1405.1	1171.1	499.5	189.0	173.2	-9.8	-50.5	-136.2	245.1
13:54:00	38.0	12.3	157.2	218.7	36.0	191.3	25.9	24799	12882	20.1	1404.9	1171.0	499.9	190.0	173.2	-16.6	-57.4	-148.5	218.3
13:55:00	37.7	12.8	157.7	217.6	36.6	187.9	27.3	24882	12612	19.7	1406.3	1171.6	500.5	190.5	173.2	-9.2	-50.5	-138.8	225.8
13:56:00	37.5	12.0	157.1	233.0	36.1	189.5	27.2	25325	12882	19.3	1406.1	1171.2	501.2	191.5	174.2	-11.4	-51.1	-140.1	254.6
13:57:00	37.9	13.1	156.7	219.8	36.0	188.3	27.1	24447	12657	19.3	1412.8	1173.1	501.7	191.5	174.2	-1.9	-38.3	-123.4	257.0
13:58:00	37.8	13.3	157.0	227.6	36.3	189.9	26.4	24799	12787	19.6	1415.4	1174.6	502.1	191.5	175.2	-16.4	-57.4	-149.6	245.6
13:59:00	37.6	13.5	156.5	221.4	38.6	191.9	26.6	24295	12787	19.2	1413.5	1175.1	502.6	192.0	175.2	-7.2	-46.7	-131.8	248.9
14:00:00	37.6	13.6	157.7	220.1	36.8	191.9	26.3	24882	12927	20.2	1417.0	1177.7	503.3	192.0	175.2	-25.6	-68.4	-167.2	213.9
14:01:00	37.9	12.9	157.2	223.6	36.1	191.3	27.0	25062	12747	19.6	1414.1	1177.3	503.6	192.0	175.2	-10.4	-50.1	-139.4	245.3
14:02:00	37.9	14.1	157.4	214.4	36.4	190.7	27.1	24357	12888	20.8	1416.9	1178.4	504.1	192.0	176.2	-25.6	-70.2	-165.2	206.8
14:03:00	37.8	13.2	158.8	206.2	36.5	191.3	27.2	24889	12770	19.4	1414.0	1176.4	504.5	192.0	176.2	-12.1	-53.8	-141.2	224.8
Max	38.3	14.1	158.8	236.7	41.7	279.5	27.4	27350	13253	21.5	1427.4	1192.0	506.0	194.5	176.4	-1.2	-36.9	-122.5	257.0
Min	33.7	8.9	155.6	204.3	31.8	149.6	25.8	18419	12612	18.9	1342.4	1132.9	488.7	177.0	167.1	-42.2	-88.1	-182.8	179.6
Average	35.8	11.5	157.0	218.1	36.1	252.1	26.6	25184	12931	20.0	1396.2	1173.8	498.6	185.6	171.8	-14.9	-55.2	-144.8	227.4

Test No. 3 - October 10, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Outlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
9:03:00	35.8	11.6	154.8	220.0	38.4	297.8	27.0	22131	12871	19.6	1401.8	1184.4	490.3	192.0	175.7	-3.2	-39.8	-130.4	230.1
9:04:00	36.1	11.6	155.1	221.6	40.1	298.6	27.2	27516	13124	20.1	1399.1	1181.8	489.9	192.0	175.7	-15.0	-53.0	-149.9	213.5
9:05:00	35.5	11.9	155.3	216.8	39.2	296.1	26.9	22041	12944	20.2	1397.8	1182.0	489.9	192.5	175.7	-9.9	-48.3	-142.3	218.1
9:06:00	35.8	11.6	153.3	216.7	38.5	297.3	27.1	26638	12966	20.1	1395.1	1180.5	490.3	192.5	175.7	-17.3	-57.4	-153.0	195.8
9:07:00	35.8	11.6	156.1	225.9	38.6	301.3	27.2	26811	12978	20.2	1395.3	1181.2	490.4	192.5	175.7	-11.7	-49.1	-142.8	199.5
9:08:00	35.6	12.0	153.7	221.4	38.6	298.9	27.2	27613	12994	20.4	1395.4	1181.3	490.3	193.0	175.7	-11.4	-49.9	-141.6	224.3
9:09:00	35.6	11.8	154.4	223.0	38.3	298.7	26.0	18682	12882	19.5	1399.4	1183.0	490.3	193.0	175.7	-3.0	-38.7	-128.0	228.8
9:10:00	35.9	12.4	154.5	220.1	38.7	300.2	27.1	27606	13107	20.4	1402.3	1184.7	490.6	192.5	176.7	-16.3	-54.1	-150.2	222.6
9:11:00	35.7	11.8	154.5	218.2	38.3	298.5	26.0	26991	12882	19.2	1404.3	1185.2	490.3	192.5	176.7	-5.9	-43.5	-132.8	228.1
9:12:00	35.8	12.5	155.0	225.7	38.9	301.3	25.8	24606	12893	21.1	1407.1	1186.5	490.0	192.0	176.7	-29.7	-73.9	-173.1	191.6
9:13:00	36.0	12.0	156.3	222.7	38.0	299.3	26.6	22221	12888	20.1	1400.5	1182.9	490.4	192.0	176.7	-10.5	-47.1	-144.4	219.9
9:14:00	35.9	11.6	155.7	216.5	38.1	296.8	27.0	27343	12933	21.0	1401.9	1183.2	490.0	192.0	176.7	-26.8	-70.3	-169.7	186.6
9:15:00	35.5	12.4	154.2	218.3	39.0	298.6	27.3	25401	13169	19.4	1396.8	1181.1	490.0	192.5	176.7	-14.0	-52.6	-146.7	205.3
9:16:00	35.6	12.4	154.6	225.4	38.5	298.4	27.0	25311	12938	20.1	1398.1	1182.7	490.3	192.5	176.7	-9.4	-46.4	-140.4	205.0
9:17:00	35.9	12.9	155.1	228.3	38.5	298.9	26.7	21779	12905	19.8	1398.6	1181.1	490.2	192.5	176.7	-4.8	-40.5	-131.9	235.0
9:18:00	35.8	12.3	155.2	228.9	38.2	297.8	27.2	18855	12787	19.8	1405.3	1184.1	490.6	192.0	176.7	-0.1	-36.5	-125.8	239.6
9:19:00	35.9	12.8	158.7	213.6	39.2	300.6	25.9	27073	12843	20.3	1402.4	1182.6	490.7	192.0	176.7	-7.3	-43.8	-135.0	230.3
9:20:00	35.8	11.8	153.9	228.2	38.6	297.8	26.6	24606	12882	19.5	1405.8	1184.5	490.5	191.5	175.6	-4.4	-41.3	-131.2	241.3
9:21:00	36.0	13.0	155.1	227.3	35.6	300.4	27.1	25311	13000	20.4	1404.0	1184.1	489.9	191.5	175.6	-14.9	-53.9	-150.5	223.2
9:22:00	35.8	12.0	154.5	220.3	38.1	299.8	27.0	25311	13101	20.0	1403.0	1184.3	490.2	192.0	175.6	-9.8	-47.7	-140.2	228.3
9:23:00	35.8	12.0	156.5	224.8	38.6	300.1	25.9	27433	12994	20.4	1400.0	1182.9	490.4	192.0	175.6	-15.9	-54.2	-151.5	205.8
9:24:00	35.6	11.4	156.1	221.0	38.2	300.3	26.3	25491	12871	20.4	1400.0	1182.7	490.2	192.5	175.6	-10.3	-48.6	-141.2	210.3
9:25:00	35.7	11.6	154.2	220.2	38.6	300.3	25.9	27433	13000	20.0	1398.3	1182.8	490.4	192.5	175.6	-10.7	-48.1	-142.2	237.4
9:26:00	35.7	11.8	155.4	227.3	38.4	301.1	25.9	27080	12803	20.1	1402.1	1184.0	490.4	192.5	175.6	-1.8	-38.2	-126.6	238.3
9:27:00	35.6	11.3	154.2	220.5	38.1	298.9	27.3	27875	12994	20.1	1406.1	1186.0	491.0	192.0	176.7	-21.9	-58.6	-155.4	230.4
9:28:00	35.8	12.4	154.1	223.1	38.6	294.8	25.9	27073	13017	19.9	1403.5	1185.3	491.1	192.0	176.7	-5.9	-43.4	-134.9	236.2
9:29:00	35.7	11.5	152.3	222.5	38.1	296.8	25.9	27433	13017	21.1	1409.0	1187.3	490.9	191.5	176.7	-31.3	-75.4	-172.1	199.3
9:30:00	36.0	11.5	155.4	218.7	39.1	298.5	26.1	27163	12905	20.2	1403.5	1184.4	490.9	192.0	176.7	-12.1	-50.4	-144.9	225.6
9:31:00	35.5	11.7	154.8	212.1	38.8	296.8	27.2	23541	12933	20.7	1402.6	1185.3	490.7	192.0	176.7	-20.0	-64.9	-160.2	191.3
9:32:00	35.8	11.8	155.7	224.0	37.0	302.3	27.2	26106	13118	19.8	1398.5	1182.2	490.6	192.5	176.7	-12.0	-50.7	-144.3	205.3
9:33:00	35.4	12.1	154.5	218.5	38.5	301.7	25.8	27260	12978	19.8	1400.6	1183.3	490.7	192.5	176.7	-7.0	-44.3	-138.5	212.9
9:34:00	35.6	11.6	154.1	218.4	38.5	300.7	26.4	20984	12989	20.2	1398.1	1182.1	490.3	193.0	176.7	-5.3	-41.2	-131.9	234.7
9:35:00	35.4	12.0	155.8	228.7	38.5	301.8	26.3	22311	12882	19.6	1406.5	1185.5	490.2	192.5	176.7	-0.4	-34.5	-124.7	243.1
9:36:00	35.9	11.9	155.1	223.2	38.9	301.0	27.0	22131	12865	19.8	1404.3	1184.2	490.3	192.5	176.7	-7.6	-45.7	-138.3	232.9
9:37:00	35.3	12.2	155.8	222.0	36.9	300.5	27.0	26991	13045	20.4	1406.3	1184.7	490.2	192.5	176.7	-2.1	-37.6	-129.0	239.8
9:38:00	35.5	11.8	155.0	216.9	38.9	302.4	26.0	25311	12966	20.1	1402.9	1183.3	490.6	192.0	176.7	-14.7	-52.8	-149.7	223.2
9:39:00	35.5	11.3	156.5	231.1	39.0	301.9	26.7	22670	12955	20.4	1403.4	1183.3	490.1	192.5	176.7	-8.5	-46.9	-140.5	227.4
9:40:00	35.5	11.8	156.4	215.8	38.0	300.9	26.0	25491	12978	20.5	1400.4	1181.5	490.2	192.5	176.7	-17.5	-55.8	-152.8	204.6
9:41:00	36.0	11.7	154.6	220.0	39.2	300.2	27.2	26016	12978	20.1	1398.6	1180.4	490.3	192.5	176.7	-13.3	-52.1	-144.4	211.9
9:42:00	35.6	11.6	155.0	211.5	38.7	301.1	26.0	22041	13118	20.2	1398.8	1179.7	490.3	192.5	176.7	-13.0	-50.1	-146.2	238.1
9:43:00	35.5	11.3	154.2	226.2	34.7	300.2	26.8	21689	12871	19.6	1400.0	1181.7	490.7	192.5	176.7	-3.6	-38.7	-129.4	238.4
9:44:00	36.0	11.5	158.6	222.3	38.1	301.9	25.9	27516	13096	21.2	1405.3	1182.6	490.8	192.0	176.7	-27.6	-69.4	-171.2	203.7
9:45:00	35.5	10.9	154.7	226.3	38.7	301.1	26.4	18861	12983	19.8	1401.9	1180.1	490.7	192.0	176.7	-8.6	-44.4	-135.5	236.7
9:46:00	35.1	10.6	153.9	219.6	38.4	301.5	26.8	27523	12989	21.3	1403.9	1179.6	490.6	191.5	176.7	-28.0	-70.9	-170.3	195.5
9:47:00	35.2	11.5	154.1	231.0	39.2	300.7	26.9	27433	13000	20.2	1395.8	1175.3	490.7	191.0	175.6	-13.9	-51.1	-147.6	225.6
9:48:00	35.4	11.1	153.1	217.3	38.7	299.9	26.2	25843	12899	19.8	1394.5	1176.0	490.5	191.0	175.6	-13.0	-50.1	-144.2	232.5
9:49:00	35.9	11.0	154.4	216.0	38.4	301.6	26.0	26728	13067	20.3	1391.5	1173.2	490.6	191.0	175.6	-16.2	-54.5	-149.1	208.1
9:50:00	35.3	9.6	154.1	219.2	38.6	300.2	26.9	27253	13079	20.3	1392.3	1174.2	490.1	191.0	175.6	-13.6	-51.9	-144.2	214.7
9:51:00	35.4	10.4	155.6	223.6	38.1	300.8	25.9	27163	12972	19.9	1389.6	1171.9	490.5	190.5	175.6	-8.0	-43.8	-134.0	232.9
9:52:00	34.9	10.9	155.7	211.6	38.9	298.7	26.4	26811	12944	20.2	1396.4	1175.3	490.4	190.0	175.6	-3.9	-39.9	-129.2	242.9
9:53:00	35.4	12.4	155.3	221.1	38.6	298.0	26.7	24073	12944	19.8	1396.9	1176.3	490.1	189.5	175.6	-10.6	-47.6	-141.5	230.9
9:54:00	35.1	11.4	153.1	220.6	38.3	297.9	27.1	21073	12972	19.8	1398.9	1178.6	490.3	189.5	174.6	-7.6	-45.6	-132.8	238.8

Test No. 3 - October 10, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Outlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
9:55:00	35.1	12.2	155.6	224.4	38.1	297.6	27.0	26196	13051	19.9	1395.5	1177.9	490.1	189.5	174.6	-17.8	-58.2	-151.9	222.9
9:56:00	35.1	12.4	154.9	228.9	38.1	294.8	27.2	27080	12910	20.2	1394.1	1178.1	490.4	190.0	174.6	-10.5	-48.8	-142.2	228.9
9:57:00	35.4	12.6	154.7	213.9	38.1	299.6	26.8	27785	13124	20.2	1392.4	1177.5	489.9	190.0	175.7	-18.2	-59.0	-156.0	205.9
9:58:00	35.5	11.8	155.0	219.9	38.1	303.4	25.9	26818	12905	20.5	1391.5	1177.2	489.7	190.5	175.7	-11.9	-51.0	-144.4	211.8
9:59:00	35.3	11.8	154.7	220.1	38.3	301.6	26.4	27696	13000	20.5	1393.3	1176.2	489.6	190.5	175.7	-17.4	-56.1	-153.9	239.2
10:00:00	35.3	11.1	154.9	222.1	38.9	300.9	26.9	26638	12775	19.6	1392.6	1175.7	490.1	190.5	175.7	-7.3	-45.8	-131.6	241.8
10:01:00	35.4	11.0	155.0	219.4	38.5	300.4	27.1	27516	12893	21.1	1397.9	1177.9	489.7	189.5	175.7	-32.0	-75.9	-174.0	207.6
10:02:00	35.1	11.5	154.3	218.8	38.7	304.7	26.5	24606	12871	19.4	1396.5	1176.1	489.6	189.5	175.7	-7.5	-44.9	-136.4	238.6
10:03:00	35.1	11.2	157.9	214.7	38.6	302.9	27.2	27080	12972	21.0	1398.8	1178.5	489.4	189.0	174.6	-17.8	-63.7	-159.0	199.6
10:04:00	35.5	11.1	156.5	214.2	38.6	302.5	27.1	26279	13000	20.2	1395.4	1177.1	489.4	189.0	174.6	-13.6	-51.6	-147.7	227.3
10:05:00	35.4	11.5	155.4	213.4	39.1	301.2	26.0	27080	12916	20.1	1395.1	1178.5	489.1	189.5	174.6	-10.3	-46.7	-142.5	237.1
10:06:00	35.1	11.6	154.8	215.9	38.4	302.4	26.5	27350	12966	20.1	1392.4	1176.9	488.9	190.0	174.6	-16.2	-54.7	-149.2	214.6
10:07:00	35.5	11.4	155.6	214.2	38.1	301.7	25.9	27350	12949	20.2	1393.9	1177.0	488.5	190.0	174.6	-10.1	-48.2	-141.1	219.4
10:08:00	35.8	10.9	152.9	218.8	38.7	295.1	27.1	27260	13011	20.7	1392.4	1175.8	488.5	190.0	174.6	-7.9	-43.3	-136.5	242.0
10:09:00	35.6	11.2	154.7	216.1	38.4	304.7	26.2	26991	12809	20.0	1399.5	1179.3	488.6	190.0	174.6	-3.0	-37.5	-129.0	247.6
10:10:00	35.5	10.9	154.7	226.4	38.4	300.2	27.0	25843	13011	20.2	1399.3	1177.6	488.9	189.5	174.6	-12.6	-51.1	-143.4	235.7
10:11:00	35.1	10.6	156.3	213.0	40.6	301.1	26.9	20894	13000	20.0	1398.0	1176.9	488.4	189.0	174.6	-5.6	-41.5	-131.9	241.6
10:12:00	35.1	11.3	158.5	221.8	38.3	299.6	26.1	27696	13023	20.3	1395.5	1175.8	488.2	188.5	173.6	-18.8	-57.7	-156.5	227.9
10:13:00	34.9	11.8	154.2	218.2	38.1	299.6	26.9	27170	13023	20.3	1394.1	1175.3	488.6	188.5	173.6	-13.9	-51.8	-146.1	230.1
10:14:00	35.1	10.5	153.8	217.7	38.8	299.9	26.1	27875	13197	20.5	1389.0	1174.1	488.6	188.5	173.6	-24.2	-63.6	-162.4	208.4
10:15:00	35.1	10.6	157.2	228.5	37.9	299.6	27.0	27433	12983	20.1	1387.5	1171.5	488.4	189.5	173.6	-14.3	-52.5	-145.9	208.4
10:16:00	35.5	11.3	155.0	208.8	38.4	300.7	26.9	25491	13258	21.0	1387.8	1172.3	488.0	190.0	173.6	-32.2	-75.5	-176.2	210.1
10:17:00	35.2	11.0	155.3	221.4	35.7	299.0	27.1	26555	12910	20.1	1390.6	1173.8	488.0	191.0	173.6	-6.8	-44.5	-134.3	236.6
10:18:00	35.5	10.9	154.2	221.9	38.4	298.1	27.2	27260	12910	21.7	1397.3	1177.1	488.2	191.0	174.7	-28.7	-73.1	-171.1	201.4
10:19:00	35.0	11.9	154.7	226.7	38.5	297.5	26.2	27060	12916	20.1	1393.4	1174.8	488.4	191.0	174.7	-10.6	-47.2	-140.7	236.1
10:20:00	35.2	11.2	153.9	209.2	38.9	296.3	26.7	26908	12758	20.3	1396.5	1175.7	488.4	191.5	174.7	-5.2	-42.7	-131.4	244.3
10:21:00	35.6	11.0	154.4	220.1	38.9	296.1	27.1	25933	13006	20.7	1388.9	1171.4	488.5	192.0	174.7	-14.7	-53.7	-149.6	227.1
10:22:00	35.3	11.1	154.4	220.1	36.9	297.4	26.3	26997	13011	20.3	1389.3	1172.1	488.3	192.5	174.7	-12.9	-52.3	-142.4	235.9
10:23:00	34.9	10.8	156.4	216.7	38.0	301.4	25.9	27433	13118	20.6	1386.8	1169.6	488.7	192.5	174.7	-16.4	-56.1	-150.2	212.8
10:24:00	35.2	11.4	154.5	222.3	38.9	299.0	27.1	26908	12854	20.0	1388.5	1170.7	488.6	193.0	174.7	-11.7	-50.0	-142.8	222.3
10:25:00	36.0	11.7	154.0	217.4	38.3	297.3	26.0	27246	13062	20.1	1387.6	1170.1	488.9	193.5	175.7	-8.7	-43.3	-138.8	244.0
10:26:00	35.5	10.6	153.2	221.2	39.1	297.5	27.0	25491	12927	19.7	1393.6	1172.5	489.2	193.5	175.7	-5.4	-40.8	-128.4	248.8
10:27:00	35.4	11.6	153.0	224.3	38.4	298.8	26.0	27170	12927	20.1	1395.0	1172.8	489.6	193.0	175.7	-15.6	-55.2	-146.1	242.3
10:28:00	35.1	10.7	156.4	216.6	38.5	299.2	27.1	26818	12933	19.7	1396.0	1173.1	489.5	193.0	175.7	-6.2	-41.1	-133.2	247.9
10:29:00	35.1	12.3	154.7	223.2	38.6	297.2	25.9	23811	13084	20.1	1394.1	1172.0	489.7	192.5	175.7	-22.3	-62.7	-158.5	236.5
10:30:00	36.3	11.1	154.1	217.9	39.0	298.7	25.9	27170	13006	19.8	1390.8	1171.9	489.4	193.0	175.7	-14.3	-52.9	-149.0	240.9
10:31:00	35.8	10.9	153.8	223.5	39.2	300.2	27.2	27523	13107	21.0	1395.1	1174.2	490.0	193.5	175.7	-28.0	-66.7	-168.9	216.9
10:32:00	36.1	11.7	154.2	226.1	39.2	297.8	26.3	24702	12994	20.0	1394.3	1174.5	490.0	194.5	176.7	-11.8	-48.6	-144.4	218.0
10:33:00	36.3	11.6	153.0	232.3	41.7	299.5	26.5	27260	12983	21.6	1398.4	1176.6	490.4	194.5	176.7	-31.7	-74.2	-173.8	215.3
10:34:00	36.1	11.2	158.3	218.1	38.6	300.8	26.1	26735	12865	20.0	1402.4	1178.6	490.2	195.0	176.7	-4.0	-41.3	-129.6	245.8
10:35:00	36.5	12.1	156.3	224.6	38.7	300.6	26.9	26728	12871	19.7	1410.3	1180.6	490.5	195.0	176.7	-17.0	-61.4	-155.0	206.7
10:36:00	36.4	11.2	154.7	226.4	38.1	300.4	27.1	26638	12865	19.5	1407.5	1179.3	490.3	195.0	176.7	-9.5	-47.1	-137.9	242.9
10:37:00	36.0	11.6	153.8	213.0	39.1	301.1	25.9	26818	12882	19.5	1411.5	1181.4	490.5	195.0	176.7	-4.2	-39.7	-128.0	249.0
10:38:00	36.3	11.3	155.8	219.9	38.7	300.9	27.0	27080	13073	20.3	1406.3	1178.7	491.1	195.0	176.7	-11.6	-48.6	-145.6	230.8
10:39:00	36.2	11.5	155.3	215.9	38.9	298.6	26.9	26113	13039	19.9	1406.1	1179.2	491.0	195.5	177.7	-9.0	-46.4	-139.5	236.6
10:40:00	36.5	11.3	154.2	230.1	39.3	299.9	27.3	27080	13079	20.3	1403.3	1177.5	491.5	195.5	177.7	-13.8	-52.5	-147.8	215.5
10:41:00	36.2	11.5	155.7	216.4	38.5	299.3	26.7	26997	12916	20.3	1403.4	1178.1	491.3	194.5	177.7	-10.2	-48.4	-139.7	221.6
10:42:00	36.3	10.9	153.3	225.8	38.4	295.3	27.1	26991	13011	20.2	1402.3	1176.1	491.7	193.5	177.7	-6.6	-43.8	-133.4	239.3
10:43:00	36.7	11.2	154.1	209.9	38.4	296.4	25.9	26818	12927	19.9	1405.3	1177.7	491.5	192.5	177.7	-2.5	-37.6	-126.7	247.4
10:44:00	36.3	11.3	157.0	220.5	35.6	294.8	27.1	27260	12938	19.8	1404.6	1177.5	491.4	191.0	176.6	-11.4	-50.0	-143.4	240.3
10:45:00	36.0	10.4	155.0	223.4	38.8	295.5	26.6	26645	12916	19.5	1404.6	1177.4	491.7	190.0	176.6	-6.0	-44.0	-131.8	247.2
10:46:00	35.8	11.5	155.4	223.2	38.6	297.9	26.2	27170	13152	20.0	1405.5	1177.1	491.4	189.0	175.6	-23.9	-63.8	-161.3	238.3

Test No. 3 - October 10, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Outlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
10:47:00	35.8	11.4	155.4	221.4	38.1	300.8	26.0	27087	13112	20.2	1398.6	1173.9	491.1	189.0	175.6	-12.3	-50.0	-145.7	240.4
10:48:00	36.2	11.5	154.5	231.3	38.8	301.1	27.0	27620	13034	20.6	1396.4	1173.5	491.2	188.5	175.6	-31.1	-74.2	-177.1	209.9
10:49:00	36.1	11.6	154.1	230.0	37.2	300.2	27.0	26735	12888	20.3	1391.5	1171.0	490.7	188.0	174.6	-14.5	-52.3	-147.2	222.8
10:50:00	36.0	11.5	155.1	223.2	39.0	301.0	27.1	27350	13017	21.1	1394.6	1171.6	490.7	187.5	174.6	-27.9	-70.6	-169.7	214.9
10:51:00	36.4	11.3	153.9	220.4	39.2	302.3	26.1	26735	12832	19.8	1394.4	1171.3	490.6	187.5	174.6	-6.4	-43.7	-134.4	248.3
10:52:00	36.5	11.7	156.5	215.3	39.2	303.2	26.4	26638	12832	19.3	1400.4	1175.3	490.1	186.5	174.6	-2.7	-40.6	-128.5	253.4
10:53:00	36.0	12.5	155.5	206.2	38.2	301.4	27.1	27087	12854	19.8	1399.3	1175.0	490.1	186.0	173.6	-10.1	-47.7	-140.0	244.0
10:54:00	36.1	11.5	155.8	219.8	39.2	301.4	27.1	26908	13062	19.8	1402.6	1177.3	489.4	186.0	173.6	-5.3	-41.8	-133.7	252.7
10:55:00	36.3	12.1	153.3	221.7	39.2	301.4	26.1	27267	13129	20.0	1396.5	1174.9	489.7	186.0	173.6	-19.6	-58.8	-154.4	237.3
10:56:00	36.3	12.4	154.9	218.5	39.0	303.1	25.9	26914	12966	20.1	1395.5	1175.4	489.0	186.0	173.6	-15.1	-53.4	-147.2	243.2
10:57:00	36.5	12.2	158.8	226.4	38.8	305.0	27.3	27260	12899	20.6	1393.9	1175.2	488.6	186.5	173.6	-16.5	-54.9	-155.7	219.0
10:58:00	36.1	12.3	156.8	232.7	38.5	304.7	27.1	27177	12944	20.2	1394.1	1175.8	488.4	187.0	173.6	-13.7	-53.7	-145.7	221.4
10:59:00	36.7	12.4	154.8	230.4	39.0	304.1	26.3	27267	12955	20.4	1396.1	1177.0	488.6	187.0	172.6	-9.8	-48.2	-140.3	242.1
11:00:00	36.7	12.4	154.7	222.0	37.1	302.1	25.9	26914	12832	19.4	1402.0	1180.4	488.2	187.0	172.6	-4.9	-40.3	-132.8	245.0
11:01:00	36.1	11.6	156.0	221.4	38.7	299.8	27.2	27440	13073	19.7	1401.6	1180.1	488.6	186.5	172.6	-15.0	-53.3	-151.2	235.1
11:02:00	36.4	12.3	153.8	224.6	38.4	303.5	25.9	26818	12938	19.5	1401.4	1178.4	488.2	187.0	172.6	-8.5	-45.7	-136.3	238.0
11:03:00	36.5	12.0	156.8	215.3	38.4	303.8	26.0	27350	13079	20.6	1401.5	1178.9	488.0	186.5	172.6	-28.3	-67.0	-166.9	219.9
12:07:00	34.9	12.3	153.8	222.8	37.3	310.6	26.3	27716	13084	20.1	1396.3	1188.1	486.2	188.0	172.7	-16.6	-52.5	-153.0	240.1
12:08:00	35.4	12.7	153.6	231.1	38.0	309.2	27.2	26921	12848	19.8	1397.4	1189.1	486.1	188.5	172.7	-3.2	-39.8	-130.9	243.9
12:09:00	35.1	12.2	153.2	222.9	38.4	307.4	26.3	27537	12955	21.6	1404.6	1192.2	486.3	187.5	172.7	-27.7	-71.7	-170.3	203.8
12:10:00	35.0	12.7	153.0	226.6	38.4	309.4	25.9	26825	12921	19.7	1402.9	1191.4	486.5	187.5	172.7	-7.7	-45.2	-135.5	239.1
12:11:00	34.7	12.1	153.3	229.2	38.5	308.6	26.7	26825	12820	20.9	1405.0	1193.7	486.7	187.0	172.7	-21.9	-66.3	-159.8	201.0
12:12:00	35.1	12.8	152.9	220.5	37.6	310.1	26.6	27447	12921	19.9	1401.0	1190.2	486.6	187.5	172.7	-13.6	-52.9	-149.3	228.6
12:13:00	35.0	12.1	152.9	224.3	37.7	309.0	26.4	27094	12697	19.7	1399.1	1191.3	486.8	188.0	172.7	-8.8	-47.4	-141.3	235.9
12:14:00	35.3	12.4	153.5	225.0	37.8	309.2	27.0	27267	12860	19.8	1397.3	1189.9	486.9	188.0	172.7	-13.8	-53.2	-146.8	212.8
12:15:00	35.4	12.6	153.7	230.1	37.8	309.2	27.0	27004	12876	20.2	1398.8	1191.8	486.9	188.5	172.7	-10.0	-50.6	-140.7	224.1
12:16:00	35.3	12.1	153.9	230.7	38.6	310.1	26.3	27177	12871	19.9	1397.1	1191.0	486.6	188.5	172.7	-7.0	-44.9	-136.2	244.8
12:17:00	35.2	12.5	154.6	232.1	38.2	309.1	26.0	26742	12775	19.8	1405.3	1193.7	487.1	188.0	172.7	-1.5	-39.1	-126.6	252.3
12:18:00	35.5	13.0	154.1	225.7	37.8	307.8	26.7	27274	12899	20.0	1402.6	1193.4	486.9	187.5	173.7	-10.1	-50.8	-142.9	243.4
12:19:00	35.4	12.2	154.7	230.1	38.4	309.8	26.2	27004	12792	19.8	1405.5	1195.2	487.0	188.0	173.7	-4.9	-41.4	-132.7	248.9
12:20:00	35.2	12.1	153.9	224.0	37.9	310.0	26.7	27357	12966	20.3	1406.3	1194.5	487.4	187.5	173.7	-18.5	-57.7	-156.9	233.4
12:21:00	35.4	11.9	154.5	226.8	38.1	306.8	25.9	26832	12972	19.9	1403.3	1192.7	487.0	188.0	173.7	-13.2	-51.8	-144.2	237.1
12:22:00	34.9	12.7	154.0	227.8	36.4	308.5	26.2	27094	12972	20.1	1402.8	1193.0	487.1	188.0	173.7	-21.0	-60.3	-158.9	215.8
12:23:00	35.0	12.7	154.1	223.2	37.8	309.8	26.0	27094	12832	20.1	1400.8	1192.0	487.4	188.5	173.7	-12.1	-51.1	-145.4	217.9
12:24:00	34.6	12.3	154.5	222.1	37.9	307.4	27.1	27537	12961	20.6	1398.6	1191.8	487.4	189.0	173.7	-29.9	-73.0	-173.0	218.0
12:25:00	34.8	12.0	154.3	222.7	37.9	305.5	26.0	26742	12669	19.4	1399.5	1192.0	487.3	189.0	173.7	-4.4	-41.1	-133.0	243.8
12:26:00	34.8	12.3	154.1	227.9	37.8	305.9	26.0	26652	12815	20.6	1407.0	1194.9	487.6	189.0	173.7	-24.2	-66.4	-167.7	201.6
12:27:00	35.3	12.9	154.8	225.5	38.1	306.5	26.0	26652	12646	19.4	1405.3	1195.1	487.8	189.0	173.7	-7.9	-46.5	-136.7	236.6
12:28:00	35.4	12.2	154.2	226.1	38.4	310.2	26.3	26292	12848	19.4	1410.1	1197.5	488.1	189.0	173.7	-2.6	-40.1	-129.6	240.5
12:29:00	35.4	12.4	154.8	224.1	37.8	309.8	26.7	26825	12758	20.2	1406.0	1194.9	488.0	189.5	173.7	-13.1	-51.2	-149.0	225.2
12:30:00	35.3	13.4	153.6	226.2	38.3	310.1	27.2	26832	12888	19.9	1405.9	1194.9	488.1	190.0	173.7	-10.0	-48.4	-139.7	230.1
12:31:00	34.6	12.9	154.5	224.4	38.0	310.7	27.2	27184	12798	19.7	1400.4	1191.3	488.3	190.0	174.7	-14.9	-55.4	-147.8	205.6
12:32:00	35.3	12.2	154.3	222.0	37.9	311.8	27.2	26914	12798	20.1	1400.4	1191.5	488.2	190.0	174.7	-8.5	-48.7	-138.0	211.8
12:33:00	35.3	12.4	152.9	226.9	38.7	309.7	25.9	27004	12787	19.8	1399.9	1191.8	488.2	190.0	174.7	-8.7	-47.5	-137.2	238.0
12:34:00	35.4	12.6	151.9	227.4	38.3	308.3	26.6	26472	12657	19.3	1407.0	1194.6	488.4	189.5	174.7	-1.3	-37.8	-126.8	241.4
12:35:00	35.3	12.5	153.1	230.7	38.3	310.0	26.9	27274	12899	19.7	1409.3	1194.4	488.5	189.0	174.7	-12.7	-51.7	-147.0	232.4
12:36:00	35.2	12.0	152.3	222.9	37.8	309.8	26.0	26120	12714	19.4	1410.9	1196.0	488.4	189.0	174.7	-6.1	-41.6	-134.0	239.4
12:37:00	35.1	12.1	151.6	220.7	38.3	308.6	27.1	26389	12871	20.3	1410.5	1196.7	488.5	188.5	174.7	-21.6	-61.3	-159.5	224.6
12:38:00	35.6	12.8	152.5	227.9	38.4	308.6	26.0	26652	12753	20.0	1407.5	1196.1	488.6	189.0	174.7	-12.6	-51.4	-146.0	228.0
12:39:00	35.1	12.2	152.3	226.9	40.4	309.2	27.1	27530	12978	19.8	1408.0	1195.5	488.4	189.0	174.7	-28.3	-67.7	-167.8	210.1
12:40:00	36.3	12.4	151.5	227.4	37.9	310.9	26.0	26921	12753	20.2	1405.6	1194.9	488.9	189.5	174.7	-13.2	-49.8	-147.2	214.2
12:41:00	35.7	12.4	152.4	226.8	37.9	308.6	26.0	26921	12860	21.2	1411.9	1198.3	488.9	190.0	174.7	-28.3	-71.1	-172.4	209.0

Test No. 3 - October 10, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Outlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
12:42:00	36.0	12.2	152.1	226.8	37.4	309.1	25.9	26120	12860	19.8	1411.6	1198.8	489.1	190.0	174.7	-2.7	-38.2	-129.8	238.7
12:43:00	36.1	12.1	152.6	227.2	37.2	308.7	26.1	26120	12730	20.2	1421.1	1202.3	488.9	190.0	174.7	-16.8	-62.5	-156.6	201.3
12:44:00	36.1	12.2	152.8	226.1	38.6	309.6	27.1	26299	12775	19.6	1418.5	1201.9	489.2	190.0	174.7	-8.4	-44.8	-139.3	238.4
12:45:00	35.8	13.0	152.3	217.1	40.2	309.2	26.5	26389	12641	19.3	1423.6	1204.0	489.1	190.0	174.7	-3.8	-39.7	-129.7	248.1
12:46:00	35.2	12.5	152.8	230.0	37.7	309.8	27.0	27094	12882	19.4	1418.5	1201.1	489.4	190.5	174.7	-13.5	-49.7	-147.4	229.0
12:47:00	34.9	12.4	152.0	230.4	38.4	307.4	27.3	26569	12854	19.7	1415.6	1200.8	489.4	190.5	174.7	-10.5	-49.7	-140.3	232.6
12:48:00	36.2	12.5	152.4	227.5	37.9	307.9	27.2	26389	12848	19.8	1410.9	1198.2	489.4	190.5	174.7	-13.4	-52.5	-145.5	208.9
12:49:00	35.2	12.4	150.5	229.2	37.8	304.3	27.1	26742	12725	19.0	1415.3	1200.8	489.4	190.5	174.7	-10.8	-48.9	-141.7	220.3
12:50:00	35.3	12.1	153.0	229.6	38.9	307.4	26.2	25684	12691	20.0	1411.0	1200.0	489.6	190.5	174.7	-10.3	-48.0	-138.3	243.3
12:51:00	35.0	12.2	152.3	225.2	37.6	306.1	26.0	26030	12770	19.3	1417.4	1202.7	489.4	190.0	175.7	-3.1	-38.3	-128.2	248.1
12:52:00	34.9	11.9	151.8	228.1	37.5	308.3	27.2	26389	12742	19.7	1419.1	1202.3	489.5	189.5	175.7	-12.8	-50.2	-145.5	238.6
12:53:00	34.9	12.2	151.8	228.8	37.8	310.1	26.4	26832	12691	19.5	1418.6	1202.2	489.9	189.5	175.7	-6.8	-41.2	-134.0	243.9
12:54:00	35.2	11.8	152.2	227.8	37.8	310.6	26.0	27094	12803	20.1	1418.0	1201.4	489.7	189.0	174.6	-22.2	-62.6	-160.5	225.8
12:55:00	35.1	12.3	152.0	227.1	36.9	310.1	27.3	26389	12669	19.7	1414.8	1199.8	490.1	189.5	174.6	-15.7	-53.4	-147.2	229.9
12:56:00	35.4	12.4	152.5	228.1	37.3	310.3	26.9	27184	12949	20.9	1412.0	1199.5	490.2	189.0	174.6	-31.9	-72.6	-175.4	193.8
12:57:00	35.5	11.9	152.7	229.9	37.8	309.4	27.2	26742	12916	20.6	1410.8	1197.7	490.1	189.0	174.6	-13.1	-49.7	-145.9	210.1
12:58:00	35.1	12.5	152.3	223.8	37.6	309.7	26.5	26742	12697	20.8	1413.0	1198.6	490.3	189.0	174.6	-28.3	-70.7	-169.4	202.3
12:59:00	35.3	11.5	152.6	230.1	37.9	312.8	26.7	26742	12624	19.7	1411.8	1196.8	490.1	189.0	174.6	-6.7	-42.0	-133.4	234.4
13:00:00	35.4	11.5	153.0	230.3	37.7	310.0	26.4	25947	12820	19.2	1415.9	1198.6	490.2	188.0	174.6	-6.2	-40.8	-130.1	248.6
13:01:00	35.2	12.0	153.0	222.9	37.4	310.1	26.7	25767	12708	19.6	1411.4	1195.3	490.2	188.0	174.6	-9.6	-47.3	-139.5	237.2
13:02:00	35.1	12.2	152.1	229.3	37.2	308.6	27.1	26299	12714	19.5	1414.3	1197.1	490.1	187.5	174.6	-7.3	-43.7	-133.7	247.1
13:03:00	34.7	11.8	152.0	230.8	36.9	311.1	26.6	26389	12815	20.3	1411.3	1195.0	490.3	187.0	173.6	-19.3	-59.0	-155.0	231.4
13:04:00	35.1	11.3	152.6	220.4	37.0	312.3	26.3	26299	12820	19.7	1411.4	1194.8	490.0	187.0	173.6	-15.3	-54.5	-148.8	236.7
13:05:00	34.8	12.2	151.4	226.2	38.3	310.4	26.6	26749	12882	19.6	1405.3	1191.9	489.9	187.5	173.6	-21.3	-59.6	-156.3	212.2
13:06:00	35.4	11.9	152.6	230.6	37.9	309.0	26.3	26479	12910	19.8	1406.3	1191.4	490.0	187.5	173.6	-14.6	-53.6	-146.0	214.5
13:07:00	35.3	12.3	152.5	229.5	37.5	313.4	27.3	26479	12899	19.9	1407.5	1191.8	490.6	187.5	173.6	-14.7	-51.1	-143.6	235.4
13:08:00	35.6	13.1	152.6	227.8	37.9	309.4	27.0	26037	12584	19.5	1412.1	1194.7	490.0	187.0	173.6	-7.1	-41.3	-132.3	238.4
13:09:00	35.0	12.4	151.7	223.0	37.5	311.6	26.0	27094	12949	19.6	1413.6	1195.6	490.2	186.5	173.6	-19.1	-56.8	-153.8	230.3
13:10:00	35.1	12.8	151.5	230.7	37.7	308.3	26.0	26216	12663	19.8	1413.9	1195.0	490.0	186.5	173.6	-11.9	-50.0	-139.4	233.2
13:11:00	34.8	12.0	151.8	224.2	37.8	306.5	26.9	26832	12933	20.5	1413.4	1195.8	490.0	186.5	173.6	-31.9	-70.4	-172.8	217.9
13:12:00	35.1	12.4	152.9	230.1	37.5	304.0	26.3	26216	12826	20.0	1410.6	1193.5	489.9	187.0	173.6	-17.1	-57.0	-150.8	221.0
13:13:00	35.0	12.4	152.7	228.1	37.5	304.5	27.0	26299	12792	20.8	1412.4	1196.1	489.7	187.0	173.6	-32.7	-75.3	-176.3	186.6
13:14:00	34.9	12.2	151.6	231.3	37.8	303.9	26.0	25947	12905	19.7	1409.8	1196.2	489.8	187.5	173.6	-16.6	-55.8	-149.5	204.2
13:15:00	34.8	12.9	151.8	223.5	37.3	304.2	27.2	25767	12820	20.5	1413.4	1199.8	489.9	188.0	173.6	-26.8	-72.3	-166.5	196.1
13:16:00	35.0	11.8	153.0	224.2	37.0	302.1	26.1	25594	12691	20.0	1413.0	1200.0	489.8	188.0	173.6	-9.4	-46.8	-136.9	233.7
13:17:00	35.0	12.2	153.1	225.9	37.1	310.4	26.1	25062	12685	19.5	1421.9	1204.4	489.8	188.0	173.6	-5.2	-42.2	-128.9	239.0
13:18:00	35.1	11.6	152.9	225.9	36.4	309.8	27.2	25242	12725	19.7	1418.9	1201.6	489.6	188.0	173.6	-10.6	-48.3	-139.7	228.1
13:19:00	35.2	12.0	153.1	222.3	37.5	309.2	26.6	24882	12635	18.9	1421.0	1204.7	489.8	188.0	173.6	-6.6	-43.2	-133.5	235.8
13:20:00	34.8	12.6	152.9	224.6	37.7	310.3	26.4	25504	12865	20.1	1420.0	1200.8	489.7	188.5	173.6	-20.7	-61.4	-155.6	219.8
13:21:00	34.9	12.7	150.7	226.8	38.1	309.5	26.8	25332	12933	19.5	1417.8	1199.0	489.9	188.5	173.6	-14.9	-52.3	-146.2	223.1
13:22:00	34.9	12.8	151.0	227.1	37.7	308.8	27.2	25152	12781	20.1	1413.0	1195.3	489.9	188.5	173.6	-19.8	-57.8	-154.5	198.7
13:23:00	35.7	12.3	150.2	226.2	36.3	310.2	27.1	25325	12770	19.6	1414.6	1196.2	490.0	188.5	173.6	-12.7	-53.1	-143.3	204.9
13:24:00	36.0	11.6	152.2	226.7	37.7	310.2	26.7	25152	12899	20.2	1416.1	1198.3	490.0	188.0	173.6	-12.6	-48.9	-144.0	232.1
13:25:00	36.0	12.3	151.9	224.5	37.6	309.8	27.0	24799	12685	20.0	1424.0	1202.5	490.1	188.0	173.6	-4.1	-41.5	-130.2	236.8
13:26:00	36.0	12.9	151.4	225.9	37.6	310.4	26.8	25152	12832	19.8	1426.1	1203.9	490.1	188.0	173.6	-17.5	-55.0	-154.5	230.2
13:27:00	35.0	12.3	152.0	225.5	37.8	310.7	26.0	24979	12815	19.5	1426.1	1202.2	490.1	188.0	173.6	-10.6	-47.4	-137.6	235.5
13:28:00	36.0	11.3	152.1	227.2	37.4	309.8	26.0	25864	12949	20.3	1424.3	1201.7	490.2	187.5	173.6	-32.8	-74.8	-176.7	195.5
13:29:00	35.9	12.6	151.8	225.9	38.4	309.5	26.4	25332	12832	20.0	1420.4	1199.5	490.2	188.0	173.6	-16.4	-56.1	-149.6	223.2
13:30:00	35.7	12.4	151.5	227.6	38.4	309.9	26.4	25332	12899	20.7	1423.1	1201.7	490.1	188.5	173.6	-29.1	-72.6	-173.0	188.4
13:31:00	35.8	12.4	153.4	226.5	36.6	311.3	26.5	24177	12691	19.9	1421.9	1201.2	490.3	189.0	173.6	-14.3	-53.1	-147.3	204.9
13:32:00	35.8	12.4	152.4	228.2	37.9	308.1	27.1	24274	12809	19.9	1424.8	1203.0	490.1	189.0	173.6	-10.1	-48.1	-138.3	208.3
13:33:00	35.7	11.3	151.6	226.7	37.7	313.1	25.9	24447	12708	19.6	1425.6	1202.2	490.3	189.5	173.6	-7.6	-42.2	-135.5	236.2

Test No. 3 - October 10, 2019

Time	Waste Flows						PAC	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU Flow	Flow	Primary	Secondary	Stack	Primary	Secondary	Quench	SprayDryer	Stack	Incinerator	SD Inlet	BH Outlet	Baghouse
	Lpm	Lpm	Lpm	Lpm	Lpm	SCFM	lbs/h	Nm^3/h	Nm^3/h	Nm^3/h	°C	°C	°C	°C	°C	mm H_2O	mm H_2O	mm H_2O	mm H_2O
13:34:00	35.5	11.9	151.5	220.2	37.5	309.6	26.2	23652	12725	19.1	1428.5	1204.2	490.3	189.0	173.6	-4.6	-38.4	-128.2	242.5
13:35:00	35.7	11.7	151.4	221.4	37.8	308.8	26.3	24357	12736	19.7	1425.1	1202.3	490.3	189.0	174.7	-11.8	-49.6	-140.5	231.3
13:36:00	36.0	11.9	152.0	224.8	38.1	309.0	26.9	24357	12528	19.6	1428.9	1204.9	490.4	189.5	174.7	-6.1	-42.3	-132.0	236.2
13:37:00	36.0	12.1	151.7	229.0	37.2	306.7	26.9	24357	12848	19.7	1428.6	1203.8	490.6	189.0	174.7	-17.4	-54.3	-151.3	219.9
13:38:00	35.8	13.1	152.5	230.2	37.2	304.7	26.4	23825	12725	19.5	1425.8	1203.5	490.3	189.5	174.7	-13.2	-51.4	-144.8	225.4
13:39:00	35.6	13.3	152.4	225.9	36.6	308.9	27.1	24447	12725	19.8	1424.3	1202.3	490.7	189.5	174.7	-18.3	-57.7	-154.6	204.1
13:40:00	35.7	13.4	152.4	222.6	37.5	308.4	27.3	24620	12826	19.6	1422.5	1202.4	490.3	190.0	174.7	-14.1	-53.4	-145.6	210.6
13:41:00	35.4	12.2	152.6	225.6	37.9	306.2	26.0	24889	12809	20.0	1422.6	1202.2	490.7	190.5	174.7	-13.8	-51.3	-146.7	234.6
13:42:00	35.9	13.0	152.6	227.2	37.5	306.5	26.0	24004	12708	19.2	1424.1	1204.3	490.5	190.5	174.7	-3.3	-38.5	-129.0	234.8
13:43:00	35.7	13.1	151.3	223.2	37.5	309.1	27.0	24447	12820	19.9	1427.8	1206.3	490.5	190.0	174.7	-22.0	-59.4	-161.2	230.1
13:44:00	35.8	13.5	152.0	226.3	37.9	311.6	27.1	23472	12584	19.3	1428.1	1205.2	490.5	190.0	174.7	-7.8	-43.1	-135.2	236.1
13:45:00	36.0	13.4	151.6	228.4	37.7	308.9	26.5	25124	12820	21.0	1430.5	1206.7	491.0	190.0	174.7	-30.4	-73.7	-173.9	199.6
13:46:00	35.6	13.3	152.4	228.6	38.0	311.6	26.5	24620	12820	19.8	1426.4	1203.9	490.8	190.5	174.7	-14.3	-53.6	-146.4	226.6
13:47:00	35.8	13.0	152.1	230.2	37.5	310.4	26.5	24004	12708	19.6	1427.1	1204.0	490.9	190.5	175.7	-20.5	-64.9	-158.5	195.5
13:48:00	36.0	13.5	151.7	226.3	38.1	310.5	26.7	24004	12815	19.9	1423.0	1202.3	491.0	191.0	175.7	-13.7	-50.9	-146.4	211.4
13:49:00	34.7	13.5	149.4	228.3	37.5	309.8	27.1	24094	12803	19.8	1425.5	1204.2	491.1	191.0	175.7	-11.8	-48.0	-140.5	219.1
13:50:00	35.0	13.9	151.7	225.9	38.1	309.4	27.3	23832	12753	19.7	1423.6	1202.8	491.1	191.0	175.7	-7.8	-43.5	-133.2	240.7
13:51:00	34.8	13.7	150.0	226.1	37.7	310.1	27.0	23292	12753	19.2	1425.3	1205.7	491.5	190.5	175.7	-4.5	-39.3	-129.4	248.3
13:52:00	34.9	13.5	150.5	226.1	37.2	312.8	26.4	23825	12708	19.5	1422.3	1202.7	491.6	190.0	175.7	-12.9	-49.5	-142.8	239.2
13:53:00	34.6	13.7	150.0	228.0	38.3	308.6	26.3	23825	12719	19.2	1424.3	1203.4	491.4	189.5	175.7	-7.4	-44.7	-134.3	247.8
13:54:00	34.8	13.6	150.9	227.2	37.5	299.0	25.9	23832	12921	19.9	1421.1	1202.0	491.5	189.0	175.7	-20.6	-61.1	-156.1	231.0
13:55:00	35.2	13.3	150.8	228.2	37.6	308.6	25.9	23382	12758	19.4	1417.4	1202.3	491.4	189.5	175.7	-13.8	-52.5	-144.0	234.4
13:56:00	35.3	13.9	149.5	227.2	37.8	310.3	26.3	23389	12882	20.0	1414.1	1200.2	491.7	189.0	175.7	-21.3	-58.8	-156.0	214.8
13:57:00	35.0	13.8	149.3	229.5	37.3	309.2	26.1	23389	12781	19.4	1414.1	1200.8	491.3	189.5	175.7	-12.9	-49.9	-142.5	216.1
13:58:00	34.6	13.6	150.2	225.3	37.1	311.3	26.0	23914	12905	19.4	1412.5	1201.0	491.6	189.0	174.6	-15.0	-54.2	-148.5	240.6
13:59:00	34.5	13.5	149.4	225.4	37.6	310.7	26.1	23299	12719	19.4	1414.6	1201.5	491.5	189.0	174.6	-5.2	-39.1	-130.1	238.6
14:00:00	34.7	13.4	149.9	225.7	37.8	309.0	26.4	24447	12832	20.6	1418.4	1202.1	491.4	188.0	174.6	-34.2	-78.9	-176.4	208.1
14:01:00	34.9	13.3	149.9	227.9	40.1	310.8	26.6	23742	12832	19.5	1415.1	1200.3	491.3	188.0	174.6	-9.0	-45.9	-137.3	237.9
14:02:00	34.8	13.1	150.0	229.1	38.0	308.0	27.1	23645	12730	20.3	1419.3	1202.6	491.6	187.5	174.6	-30.2	-73.3	-171.8	196.9
14:03:00	34.8	13.7	150.0	227.9	37.8	307.7	27.2	24094	12888	19.9	1411.5	1198.9	491.6	187.5	174.6	-17.9	-56.6	-149.3	225.3
14:04:00	34.5	13.1	149.2	222.8	37.1	308.1	27.2	23472	12685	19.3	1411.3	1198.9	491.5	187.5	174.6	-14.2	-52.3	-144.9	233.4
14:05:00	34.5	12.6	150.4	225.5	37.7	308.5	27.3	24357	12843	19.8	1407.4	1196.0	491.7	187.5	174.6	-18.6	-55.6	-150.4	215.0
14:06:00	34.4	13.2	150.2	223.7	36.1	307.4	26.9	23742	12843	19.6	1406.9	1196.3	491.5	187.5	174.6	-12.5	-50.0	-143.3	219.8
14:07:00	34.8	12.8	150.2	230.5	38.0	310.1	27.0	23742	12747	19.9	1406.8	1196.1	491.4	187.5	173.6	-9.2	-45.5	-135.9	238.9

Max	36.7	13.9	158.8	232.7	41.7	313.4	27.3	27875	13258	21.7	1430.5	1206.7	491.7	195.5	177.7	-0.1	-34.5	-124.7	253.4
Min	34.4	9.6	149.2	206.2	34.7	294.8	25.8	18682	12528	18.9	1386.8	1169.6	486.1	186.0	172.6	-34.2	-78.9	-177.1	186.6
Average	35.5	12.1	153.6	223.7	38.1	304.4	26.6	25873	12886	20.0	1406.1	1188.3	489.7	189.9	174.9	-13.5	-51.8	-145.7	226.2

APPENDIX 30

Feed Ultimate
Analysis Report
(9 pages)

Petro Laboratories Inc.

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E-mail: petrolab@gmail.com

LABORATORY REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4
Attn: Christine Belore, Tina Sanderson

Lab no.: 12967 - 1 to 3
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Re: Process Samples from Clean Harbors, Sarnia, Oct 2019, Project no.: 21939 for Ultimate analysis - Ash, Sulphur, Carbon, Hydrogen, Nitrogen, Oxygen & Water in % by weight, ASTM D482(modified), D1552, D3176 (modified).

Petro Lab no.	Ortech Sample ID.	Tests / Results						
		1.	2.	3.	4.	5.	6.	7.
12967	Test #1 19-21939	Ash ASTM D3174 (A)	Sulphur ASTM D1559 (S)	Carbon ASTM D3178 (C)	Hydrogen ASTM D3178 (H)	Nitrogen ASTM D3179 (N)	Oxygen (O)	Water ASTM D3173
1	FR-4 Rich Feed	0.68	0.39	46.48	11.51	3.04	37.90	30.12
2	FL-4 Lean Feed	4.40	0.49	9.27	10.69	0.97	74.18	71.84
3	FE-4 Emulsion Feed	1.90	0.45	37.20	11.04	5.69	43.72	43.95

* Oxygen is obtained by difference = 100-(C+H+N+A+S)

Tested by : A.C. / P.S.(chemist)

Member of ASTM
JS:LN

Approved *James Szeto*

James Szeto, B.Sc.
Chief Chemist

Petro Laboratories Inc.

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E-mail: petrolab@gmail.com

LABORATORY REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 4 to 6
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Sarnia, Oct 2019, Project no.: 21939
for Ultimate analysis - Ash, Sulphur, Carbon, Hydrogen, Nitrogen, Oxygen & Water in %wt.

Petro Lab no.	Ortech Sample ID.	Tests / Results						
		1.	2.	3.	4.	5.	6.	7.
12967	Test #1 19-21939	Ash ASTM D3174 (A)	Sulphur ASTM D1559 (S)	Carbon ASTM D3178 (C)	Hydrogen ASTM D3178 (H)	Nitrogen ASTM D3179 (N)	Oxygen (O)	Water ASTM D3173
4	FR-9 Rich Feed	1.02	0.29	52.07	11.96	2.29	32.37	14.08
5	FL-9 Lean Feed	4.62	0.50	9.62	10.65	0.75	73.86	75.82
6	FE-9 Emulsion Feed	2.11	0.50	42.28	11.02	4.80	39.29	36.80

* Oxygen is obtained by difference = 100-(C+H+N+A+S)

Tested by : A.C. / P.S.(chemist)
Member of ASTM
JS:LN

Approved by James Szeto
James Szeto, B.Sc.
Chief Chemist

Petro Laboratories Inc.

1295 Matheson Blvd. East, Mississauga, Ontario, L4W 1R1 Tel: (905) 361-2388 Fax: (905) 361-2411
E-mail: petrolab@gmail.com

LABORATORY REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 7 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Sarnia, Oct 2019, Project no.: 21939
for Ultimate analysis - Ash, Sulphur, Carbon, Hydrogen, Nitrogen, Oxygen & Water in %wt.

Petro Lab no.	Ortech Sample ID.	Tests / Results						
		1.	2.	3.	4.	5.	6.	7.
12967	Test #1 19-21939	Ash ASTM D3174 (A)	Sulphur ASTM D1559 (S)	Carbon ASTM D3178 (C)	Hydrogen ASTM D3178 (H)	Nitrogen ASTM D3179 (N)	Oxygen (O)	Water ASTM D3173
7	FR-14 Rich Feed	1.22	0.38	52.17	10.88	1.87	33.48	17.56
8	FL-14 Lean Feed	4.46	0.40	9.05	10.94	0.90	74.25	72.02
9	FE-14 Emulsion Feed	1.95	0.38	36.81	11.15	4.18	45.53	36.98

* Oxygen is obtained by difference = 100-(C+H+N+A+S)

Tested by : A.C. / P.S.(chemist)

Member of ASTM
JS:LN

Approved *James Szeto*
James Szeto, B.Sc.
Chief Chemist

Petro Laboratories Inc.

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E-mail: petrolab@gmail.com

QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Ash content - % by weight -test method- ASTM D482

Lab no. 12967	Sample ID# 19-21939	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-4 Rich feed	0.65	0.71	0.68	0.06
2	FL-4 Lean feed	4.20	4.61	4.40	0.40
3	FE-4 Emulsion feed	1.89	1.92	1.90	0.03
4	FR-9 Rich feed	1.06	0.99	1.02	0.07
5	FL-9 Lean feed	4.88	4.37	4.62	0.51
6	FE-9 Emulsion feed	1.92	2.23	2.10	0.31
7	FR-14 Rich feed	1.24	1.20	1.22	0.04
8	FL-14 Lean feed	4.68	4.24	4.46	0.44
9	FE-14 Emulsion feed	1.79	2.11	1.95	0.32

Tested by : P.S.(chemist)

Member of ASTM
JS:LN

Approved by James Szeto

James Szeto, B.Sc.
Chief Chemist

Petro Laboratories Inc.

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Sulfur content - % by weight -test method- ASTM D1552

Lab no. 12967	Sample ID# 19-21939	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-4 Rich feed	0.40	0.37	0.39	0.03
2	FL-4 Lean feed	0.45	0.52	0.49	0.07
3	FE-4 Emulsion feed	0.42	0.48	0.45	0.06
4	FR-9 Rich feed	0.31	0.27	0.29	0.04
5	FL-9 Lean feed	0.49	0.51	0.50	0.02
6	FE-9 Emulsion feed	0.52	0.47	0.50	0.05
7	FR-14 Rich feed	0.39	0.37	0.38	0.02
8	FL-14 Lean feed	0.36	0.44	0.40	0.08
9	FE-14 Emulsion feed	0.37	0.39	0.38	0.02

Tested by : P.S. (chemist)

Approved by James Szeto

James Szeto, B.Sc.
Chief Chemist

Member of ASTM
JS:TL

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Carbon content - % by weight -test method- ASTM D3176

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
12967	19-21939				Difference between Run 1 and 2
1	FR-4 Rich feed	46.60	46.36	46.48	0.24
2	FL-4 Lean feed	9.18	9.36	9.27	0.18
3	FE-4 Emulsion feed	37.00	37.30	37.20	0.20
4	FR-9 Rich feed	52.20	51.94	52.07	0.26
5	FL-9 Lean feed	9.50	9.74	9.62	0.24
6	FE-9 Emulsion feed	42.40	42.28	42.28	0.24
7	FR-14 Rich feed	52.06	52.28	52.17	0.22
8	FL-14 Lean feed	8.92	9.18	9.05	0.26
9	FE-14 Emulsion feed	36.69	36.93	36.81	0.24

Tested by : A.C.(chemist)

Member of ASTM
JS:LN

Approved by James Szeto

James Szeto, B.Sc.
Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Hydrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no. 12967	Sample ID# 19-21939	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-4 Rich feed	11.40	11.62	11.51	0.22
2	FL-4 Lean feed	10.81	10.57	10.69	0.24
3	FE-4 Emulsion feed	10.94	11.14	11.04	0.20
4	FR-9 Rich feed	12.08	11.84	11.96	0.24
5	FL-9 Lean feed	10.54	10.76	10.65	0.22
6	FE-9 Emulsion feed	10.92	11.02	11.02	0.20
7	FR-14 Rich feed	10.74	11.02	10.88	0.28
8	FL-14 Lean feed	10.83	11.05	10.94	0.22
9	FE-14 Emulsion feed	11.25	11.05	11.15	0.20

Tested by : A.C.(chemist)

Member of ASTM

JS:LN

Approved by James Szeto

James Szeto, B.Sc.
Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Nitrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no. 12967	Sample ID# 19-21939	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-4 Rich feed	3.11	2.97	3.04	0.14
2	FL-4 Lean feed	0.92	1.02	0.97	0.10
3	FE-4 Emulsion feed	5.62	5.76	5.69	0.14
4	FR-9 Rich feed	2.24	2.34	2.29	0.10
5	FL-9 Lean feed	0.70	0.80	0.75	0.10
6	FE-9 Emulsion feed	4.74	4.86	4.80	0.12
7	FR-14 Rich feed	1.82	1.92	1.87	0.10
8	FL-14 Lean feed	0.95	0.85	0.90	0.10
9	FE-14 Emulsion feed	4.26	4.10	4.18	0.16

Tested by : A.C.(chemist)

Member of ASTM
JS:LN

Approved by James Szeto

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Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 12967 - 1 to 9
Report date: Nov 1, 2019
Sample in: Oct17, 2019
P.O. no.: 21939-J2651

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21939
Water content - % by weight -test method- ASTM D3113, D1744

Lab no. 12967	Sample ID# 19-21939	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-4 Rich feed	30.33	29.91	30.12	0.42
2	FL-4 Lean feed	72.10	71.58	71.84	0.52
3	FE-4 Emulsion feed	43.72	44.18	43.95	0.46
4	FR-9 Rich feed	13.88	14.28	14.08	0.40
5	FL-9 Lean feed	75.58	76.06	75.82	0.48
6	FE-9 Emulsion feed	36.62	36.98	36.80	0.36
7	FR-14 Rich feed	17.47	17.65	17.56	0.18
8	FL-14 Lean feed	72.24	71.80	72.02	0.44
9	FE-14 Emulsion feed	36.82	37.14	36.98	0.32

Tested by : A.C.(chemist)
Member of ASTM
JS: LN

Approved by *James Szeto*
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