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ORTECH
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Report:

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

Date: December 13, 2018



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Version	Date	Summary Changes/Purpose of Revision
1	December 13, 2018	None

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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$^{3(1)}$	6.37 mg/Rm$^{3(1)}$
Mercury	maximum 50 µg/Rm$^{3(1)}$	1.76 µg/Rm$^{3(1)}$
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm$^{3(1)}$	<3.04 pg TEQ/Rm$^{3(1)}$
Carbon Monoxide	maximum 100 ppm$^{(1)}$	46.4 ppm$^{(1)}$
Oxygen	minimum 8.0 %$^{(2)}$	9.03 %$^{(2)}$
Total Hydrocarbons$^{(3)}$	maximum 100 ppm	7.1 ppm$^{(1)}$
Total Hydrocarbons$^{(4)}$	maximum 100 ppm	4.3 ppm$^{(4)}$
Total Hydrocarbons$^{(5)}$	maximum 100 ppm	11.1 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 September 25 and September 27, 2018 during which three tests were completed for each emission component group using several types of sampling trains and sampling methods. Note, the sample for semi-volatile organics Test No. 2 was lost by the analytical laboratory during the sample extraction process. As a result all SVOC data included in the report is the average of Test No. 1 and Test No. 3 only.

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.

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 222.1, 218.4 and 222.3 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 (99.9914%), Ethyl Acetate (99.9937%), Tetrachloroethene (99.9532%), Toluene (99.9948%), 1,2,4-Trichlorobenzene (99.9990%) and Total Xylenes (99.9952%). 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 2018 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.

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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/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	0.15 g/s	0.071 µg/m^3	120 µg/m^3	0.060	S
Sulphur dioxide	1.61 g/s	0.77 µg/m^3	275 µg/m^3	0.28	S - 24 hour
Sulphur dioxide	1.61 g/s	2.86 µg/m^3	690 µg/m^3	0.41	S - 1 hour
Nitrogen oxides	3.70 g/s	1.76 µg/m^3	200 µg/m^3	0.88	S - 24 hour
Nitrogen oxides	3.70 g/s	6.57 µg/m^3	400 µg/m^3	1.64	S - 1 hour
Carbon monoxide	1.23 g/s	2.62 µg/m^3	6000 µg/m^3	0.044	S - 1/2 hour
Carbon dioxide	2950 g/s	1405 µg/m^3	255800 µg/m^3	0.55	SL
Hydrogen chloride	0.27 g/s	0.13 µg/m^3	20 µg/m^3	0.64	S
Fluorides (as hydrogen fluoride)	0.15 g/s	0.071 µg/m^3	0.86 µg/m^3	8.30	S - 24 hour
Fluorides (as hydrogen fluoride)	0.15 g/s	0.021 µg/m^3	0.34 µg/m^3	6.11	S - 30 day
Hydrogen bromide	<0.16 g/s	0.28 µg/m^3	668 µg/m^3	0.043	G - 1 hour
Hydrogen iodide	0.083 g/s	0.040 µg/m^3	0.5 µg/m^3	7.90	SL
Hydrogen cyanide	<0.0034 g/s	0.0016 µg/m^3	8 µg/m^3	0.020	S
Dioxins & Furans (TEQ) *	<0.071 ng TEQ/s	0.000034 pg TEQ/m^3			
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.070 ng TEQ/s	0.000033 pg TEQ/m^3	0.1 pg TEQ/m^3	0.033	S
Benzo(a)Pyrene	<0.038 µg/s	0.0000000018 µg/m^3	0.00001 µg/m^3	0.018	S - Annual
Biphenyl	2.58 µg/s	0.0000046 µg/m^3	60 µg/m^3	<0.0001	G - 1 hour
2-Chloronaphthalene	<0.038 µg/s	0.000000018 µg/m^3	1 µg/m^3	<0.0001	SL
1-Methylnaphthalene	5.00 µg/s	0.0000024 µg/m^3	35.5 µg/m^3	<0.0001	SL
Naphthalene	20.7 µg/s	0.0000099 µg/m^3	22.5 µg/m^3	<0.0001	G
Quinoline	<0.038 µg/s	0.000000018 µg/m^3	0.005 µg/m^3	0.00036	SL
Terphenyls (m, o, p)	<0.20 µg/s	0.000000095 µg/m^3	15 µg/m^3	<0.0001	SL
1,2-Dichlorobenzene	1.42 µg/s	0.0000025 µg/m^3	30500 µg/m^3	<0.0001	G - 1 hour
1,3-Dichlorobenzene	1.94 µg/s	0.00000092 µg/m^3	50 µg/m^3	<0.0001	SL
1,4-Dichlorobenzene	1.64 µg/s	0.00000078 µg/m^3	95 µg/m^3	<0.0001	S
1,3,5-Trichlorobenzene	0.33 µg/s	0.00000016 µg/m^3	3.6 µg/m^3	<0.0001	SL
1,2,4-Trichlorobenzene	37.00 µg/s	0.000018 µg/m^3	400 µg/m^3	<0.0001	G
1,2,3-Trichlorobenzene	9.82 µg/s	0.0000047 µg/m^3	135 µg/m^3	<0.0001	SL
1,2,4,5-Tetrachlorobenzene	0.29 µg/s	0.00000014 µg/m^3	1 µg/m^3	<0.0001	SL
1,2,3,4-Tetrachlorobenzene	0.10 µg/s	0.000000048 µg/m^3	600 µg/m^3	<0.0001	SL
Pentachlorobenzene	0.087 µg/s	0.000000041 µg/m^3	80 µg/m^3	<0.0001	SL
Hexachlorobenzene	<0.039 µg/s	0.000000019 µg/m^3	0.011 µg/m^3	0.00017	SL
2,4-Dichlorophenol	1.17 µg/s	0.00000056 µg/m^3	33.5 µg/m^3	<0.0001	SL
2,6-Dichlorophenol	<0.19 µg/s	0.000000090 µg/m^3	19 µg/m^3	<0.0001	SL
2,4,5-Trichlorophenol	<0.19 µg/s	0.000000090 µg/m^3	220 µg/m^3	<0.0001	SL
2,4,6-Trichlorophenol	0.25 µg/s	0.00000012 µg/m^3	1.5 µg/m^3	<0.0001	SL
2,3,4,6-Tetrachlorophenol	<0.19 µg/s	0.000000090 µg/m^3	0.75 µg/m^3	<0.0001	SL
Pentachlorophenol	<0.19 µg/s	0.000000090 µg/m^3	20 µg/m^3	<0.0001	G
Polychlorinated biphenyls	0.92 µg/s	0.00000044 µg/m^3	0.15 µg/m^3	0.00029	G
Hexachlorobutadiene	<0.040 µg/s	0.000000019 µg/m^3	0.225 µg/m^3	<0.0001	SL
Hexachloroethane	<0.038 µg/s	0.000000018 µg/m^3	115 µg/m^3	<0.0001	SL
Heptachlor	<0.0093 µg/s	0.0000000044 µg/m^3	0.004 µg/m^3	0.00011	SL
Toxaphene	<0.034 µg/s	0.000000016 µg/m^3	0.015 µg/m^3	<0.0001	SL
Hexachlorophene	<0.19 µg/s	0.000000090 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.

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	2.05 mg/s	0.00098 µg/m^3	12 µg/m^3	0.0081	SL
Antimony	0.047 mg/s	0.000022 µg/m^3	25 µg/m^3	<0.0001	S
Arsenic	0.22 mg/s	0.00010 µg/m^3	0.3 µg/m^3	0.035	G
Barium (as water soluble)	0.11 mg/s	0.000052 µg/m^3	10 µg/m^3	0.00052	G
Beryllium*	<0.00074 mg/s	0.00000035 µg/m^3	0.01 µg/m^3	0.0035	S
Boron	33.5 mg/s	0.016 µg/m^3	120 µg/m^3	0.013	S
Cadmium	0.019 mg/s	0.0000090 µg/m^3	0.025 µg/m^3	0.036	S
Calcium oxide	5.64 mg/s	0.0027 µg/m^3	10 µg/m^3	0.027	S
Chromium	0.16 mg/s	0.000076 µg/m^3	0.5 µg/m^3	0.015	G
Cobalt	0.0056 mg/s	0.0000027 µg/m^3	0.1 µg/m^3	0.0027	G
Copper	0.23 mg/s	0.00011 µg/m^3	50 µg/m^3	0.00022	S
Iron (as metal)	22.6 mg/s	0.011 µg/m^3	4 µg/m^3	0.27	S
Lead	0.029 mg/s	0.000014 µg/m^3	0.5 µg/m^3	0.0028	S - 24 hour
Lead	0.029 mg/s	0.0000040 µg/m^3	0.2 µg/m^3	0.0020	S - 30 day
Lithium	0.029 mg/s	0.000014 µg/m^3	20 µg/m^3	<0.0001	S
Magnesium	0.48 mg/s	0.00023 µg/m^3	72 µg/m^3	0.00032	SL
Manganese (as compounds)	0.39 mg/s	0.00019 µg/m^3	0.4 µg/m^3	0.046	G
Mercury	0.041 mg/s	0.000020 µg/m^3	2 µg/m^3	0.00098	S
Molybdenum	0.12 mg/s	0.000057 µg/m^3	120 µg/m^3	<0.0001	G
Nickel	0.15 mg/s	0.0000072 µg/m^3	0.04 µg/m^3	0.018	S - Annual
Phosphorus	2.05 mg/s	0.00098 µg/m^3	0.5 µg/m^3	0.20	SL
Potassium	14.9 mg/s	0.0071 µg/m^3	1 µg/m^3	0.71	SL
Selenium	0.41 mg/s	0.00020 µg/m^3	10 µg/m^3	0.0020	G
Silicon	21.9 mg/s	0.010 µg/m^3	27 µg/m^3	0.039	SL
Silver	0.00069 mg/s	0.00000033 µg/m^3	1 µg/m^3	<0.0001	S
Sodium hydroxide	33.2 mg/s	0.016 µg/m^3	10 µg/m^3	0.16	G
Strontium	0.018 mg/s	0.0000086 µg/m^3	120 µg/m^3	<0.0001	G
Tin	0.35 mg/s	0.00017 µg/m^3	10 µg/m^3	0.0017	S
Titanium	0.56 mg/s	0.00027 µg/m^3	120 µg/m^3	0.00022	S
Vanadium	0.014 mg/s	0.0000067 µg/m^3	2 µg/m^3	0.00033	S
Zinc	0.39 mg/s	0.00019 µg/m^3	120 µg/m^3	0.00015	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	0.56 mg/s	0.000027 µg/m^3	0.45 µg/m^3	0.0060	S - Annual
Bromodichloromethane	0.043 mg/s	0.000020 µg/m^3	350 µg/m^3	<0.0001	SL
Bromomethane (methyl bromide)	0.22 mg/s	0.00010 µg/m^3	1350 µg/m^3	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.80 mg/s	0.00038 µg/m^3	1000 µg/m^3	<0.0001	S
Chloroethene (vinyl chloride)	0.029 mg/s	0.000014 µg/m^3	1 µg/m^3	0.0014	S
Dibromochloromethane	0.036 mg/s	0.000017 µg/m^3	0.2 µg/m^3	0.0086	SL
1,2-Dibromoethane (Ethylene dibromide)	0.0023 mg/s	0.0000011 µg/m^3	3 µg/m^3	<0.0001	G
Dichlorodifluoromethane	0.057 mg/s	0.000027 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	0.0098 mg/s	0.0000047 µg/m^3	105 µg/m^3	<0.0001	G
Dichloromethane (methylene chloride)	1.38 mg/s	0.00066 µg/m^3	220 µg/m^3	0.00030	G
1,2-Dichloropropane*	0 mg/s	0 µg/m^3	2400 µg/m^3	<0.0001	G
Ethyl Acetate	0.47 mg/s	0.00083 µg/m^3	19000 µg/m^3	<0.0001	G - 1 hour
Ethylbenzene	0.13 mg/s	0.000062 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)	0.99 mg/s	0.00047 µg/m^3	11880 µg/m^3	<0.0001	S
Styrene	0.17 mg/s	0.000081 µg/m^3	400 µg/m^3	<0.0001	S
Tetrachloroethene (perchloroethylene)	0.44 mg/s	0.00021 µg/m^3	360 µg/m^3	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0 mg/s	0 µg/m^3	2.4 µg/m^3	<0.0001	S
Toluene	0.85 mg/s	0.00040 µg/m^3	2000 µg/m^3	<0.0001	S
Tribromomethane (bromoform)	0.037 mg/s	0.000018 µg/m^3	55 µg/m^3	<0.0001	G
1,1,1-Trichloroethane (methyl chloroform)	0.0028 mg/s	0.0000013 µg/m^3	115000 µg/m^3	<0.0001	S
Trichloroethene	0.13 mg/s	0.000062 µg/m^3	12 µg/m^3	0.00052	S
Trichlorofluoromethane	0.0033 mg/s	0.0000016 µg/m^3	6000 µg/m^3	<0.0001	G
Trichloromethane (chloroform)	0.034 mg/s	0.000016 µg/m^3	1 µg/m^3	0.0016	S
Trichlorotrifluoroethane*	0 mg/s	0 µg/m^3	800000 µg/m^3	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene)	0.060 mg/s	0.000029 µg/m^3	220 µg/m^3	<0.0001	S
1,3,5-Trimethylbenzene	0.020 mg/s	0.0000095 µg/m^3	220 µg/m^3	<0.0001	S
Xylenes	0.57 mg/s	0.00027 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

Compund	Destruction and Removal Efficiency				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	%	%	%	%	%
2-Butanone	99.9961	99.9968	99.9813	99.9914	0.0087
Ethyl Acetate	99.9983	99.9982	99.9845	99.9937	0.0079
Tetrachloroethene	99.9972	99.9988	99.8635	99.9532	0.078
Toluene	99.9959	99.9957	99.9930	99.9948	0.0016
Total Xylenes	99.9968	99.9970	99.9919	99.9952	0.0029
1,2,4-Trichlorobenzene	99.9998	-	99.9981	99.9990	0.0012

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 1382°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 184°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	30.7	0.89	37.5
Lean	11.5	1.05	4.76
Emulsion	178.7	0.98	20.1
Total	220.9		

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

The powdered activated carbon (PAC) injection rate during the test program was 11.4 kg/h (25.2 lb/h).

3. EMISSION TESTING PROGRAM

The emission testing program was conducted over three days between September 25 and September 27, 2018 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 ORTECH's 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.
- 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 May 23, 2018, 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 June 11, 2018, 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 11.7% 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 84-120% of the true value (limit of 80-120%), except for silicon in the nitric acid digest sample, and sulphur in 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 82-120% of the true value (limit of 80-120%), except for barium in the nitric acid digest and 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 3.6% well within the acceptable limit of less than ±20%, for fractions that are greater than 5 times the minimum detection limit, except for fraction 2B.
- One blank spike (performed as a pre-digestion spike) was analyzed for this program. All of the results were between 90-107% 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 88-104% within the acceptable limit of 80-120% of the true value, except for fraction 2B.

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.

The extract for Test No. 2 was lost by the analytical laboratory during preparation. As part of the sample preparation procedure the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful. As a result the SVOC average data shown in the report is for Test No. 1 and Test No. 3 only.

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 cyanide, and the results had a relative percent difference of less than 1%, 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 96-99% 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 96-102%.

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 52-130%, 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)	178	177
Moisture by Volume (%)	49.0	49.2
Velocity (m/s)	32.2	31.6
Absolute Pressure (kPa)	99.7	99.7
Carbon Dioxide by Volume (%)*	8.50	8.50
Oxygen by Volume (%)*	9.03	9.03

* 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)	58.7	57.6
Dry Reference Flowrate (Rm^3/s)*	19.5	19.1
Dry Adjusted Flowrate (Rm^3/s)**	23.3	22.9
Wet Reference Flowrate (Rm^3/s)*	38.2	37.6

* 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)	2.53
Dry Reference Concentration (mg/Rm^3)*	7.64
Dry Adjusted Concentration (mg/Rm^3)**	6.37
Wet Reference Concentration (mg/Rm^3)*	3.90
Particulate Emission Rate (g/s)	0.15

* 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 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. Hydrogen bromide was detected in one of the three 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)	4.64	2.63	<2.67	1.44	<0.058
Dry Reference Conc. (mg/Rm^3)*	14.0	7.94	<8.05	4.33	<0.17
Dry Adjusted Conc. (mg/Rm^3)**	11.7	6.61	<6.72	3.61	<0.15
Dry Conc. (ppm)	9.4	9.7	2.4	0.8	0.2
Emission Rate (g/s)	0.27	0.15	<0.16	0.083	<0.0034

* 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)	50749	21.1	63.7	41.7	39197	27.7	1.86
Dry Reference Conc. (mg/Rm^3)**	152865	63.6	192	126	118063	83.4	5.61
Dry Adjusted Conc. (mg/Rm^3)***	127713	53.2	160	105	143619	69.6	4.67
Dry Conc. (ppm)	85000	55.6	102	102	90300	31.9	4.4*
Emission Rate (g/s)	2950	1.23	3.70	2.42	2279	1.61	0.11

* 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 (2.05 mg/s), boron (33.5 mg/s), calcium (4.03 mg/s), iron (22.6 mg/s), phosphorus (2.05 mg/s), potassium (14.9 mg/s), silicon (21.9 mg/s) and sodium (19.1 mg/s). The average sulphur emission rate was 1259 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 also detected in in the impinger sample fraction. 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)	0.70
Dry Reference Concentration (µg/Rm^3)*	2.11
Dry Adjusted Concentration (µg/Rm^3)**	1.76
Wet Reference Concentration (µg/Rm^3)*	1.07
Emission Rate (mg/s)	0.041

* 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.

The extract for SVOC Test No. 2 was lost by the analytical laboratory during preparation. As part of the sample preparation procedure the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful. As a result the SVOC average data shown in the report is for Test No. 1 and Test No. 3 only.

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 4.81 ng/s for dioxins and <1.01 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 (<15.8 pg) and in the lab blank (<40.0 pg) were significant compared to the amounts detected in the test trains (from <90.7 to <1969 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 (<3.69 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)	<1.22	1.22
Dry Reference Conc. (pg TEQ/Rm^3)**	<3.69	5.26
Dry Adjusted Conc. (pg TEQ/Rm^3)***	<3.04	3.04
Wet Reference Conc. (pg TEQ/Rm^3)**	<1.88	1.87
Emission Rate (ng TEQ/s)	<0.071	0.070

* 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 0.92 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	5.01
Trichlorobenzenes	47.2
Tetrachlorobenzenes	0.40
Pentachlorobenzene	0.087
Hexachlorobenzene	<0.039

The total chlorobenzene congener group emission rate averaged <52.7 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	<2.01
Trichlorophenols	<1.35
Tetrachlorophenols	<0.38
Pentachlorophenol	<0.19

The total chlorophenol congener group emission rate averaged <3.92 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 and one of the heptachlor constituents (heptachlor epoxide B) were detected in one of the test samples in levels slightly 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 <52.7 µg/s with six of the PAH compounds (biphenyl, 2-methylnaphthalene, 1-methylnaphthalene, naphthalene, phenanthrene and tetralin) representing approximately 89% 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.

Twenty-two 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 dichloromethane (1.38 mg/s).

The total average volatile organic emission rate was <7.05 mg/s for the three tests performed with dichloromethane representing 19.6% 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 (99.9914%), Ethyl Acetate (99.9937%), Tetrachloroethene (99.9532%), Toluene (99.9948%), Total Xylenes (99.9952%) and 1,2,4-Trichlorobenzene (99.9990%). Note that the contribution of the Thermal Desorber Unit 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 nitrogen oxides (1.64% for the 1-hour standard), fluorides (8.30% for the 24-hour standard and 6.11% for the 30-day standard) and hydrogen iodide (7.90% 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.

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$^{3(1)}$	6.37 mg/Rm$^{3(1)}$
Mercury	maximum 50 µg/Rm$^{3(1)}$	1.76 µg/Rm$^{3(1)}$
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm$^{3(1)}$	<3.04 pg TEQ/Rm$^{3(1)}$
Carbon Monoxide	maximum 100 ppm$^{(1)}$	46.4 ppm$^{(1)}$
Oxygen	minimum 8.0 %$^{(2)}$	9.03 %$^{(2)}$
Total Hydrocarbons$^{(3)}$	maximum 100 ppm	7.1 ppm$^{(1)}$
Total Hydrocarbons$^{(4)}$	maximum 100 ppm	4.3 ppm$^{(4)}$
Total Hydrocarbons$^{(5)}$	maximum 100 ppm	11.1 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 222.1, 218.4 and 222.3 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	0.31	0.73	0.41
2	0.34	0.49	0.69
3	0.13	0.39	0.65
Average	0.26	0.54	0.58

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. Average concentrations are also given for each test period. In Table 136, these concentrations are compared with equivalent concentrations for each test period, recorded by the ORTECH continuous emission monitors. The ORTECH one-minute average concentrations and average test concentrations are provided in Appendix 24.

Overall average CEM concentrations for the tests are compared in the table below:

Combustion Gas	Average Concentration*	
	ORTECH CEM	Clean Harbors CEM
Carbon dioxide, %	8.50	7.50
Carbon monoxide, ppm	55.6	48.4
Oxygen, %	9.03	9.33
Sulphur dioxide, ppm	31.9	8.5
Total hydrocarbons, ppm	8.6	5.7

* dry basis

ORTECH measures total hydrocarbons on a wet basis while Clean Harbors measures total hydrocarbons on a dry basis. The ORTECH THC concentrations were converted to a dry basis for comparison to the Clean Harbors CEM data.

The following table compares the Clean Harbors hydrogen chloride and moisture average CEM results with equivalent results obtained by ORTECH using reference methods:

Combustion Gas	Average Concentration	
	ORTECH	Clean Harbors
Hydrogen chloride, ppm*	9.4	8.6
Moisture, %	49.1	46.9

* dry basis

Please note that the ORTECH reference method test periods for hydrogen chloride were shorter than the Clean Harbors CEM test periods.

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	1.3	0	0.4
2	1.3	0	0.4
3	1.2	0	0.4

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 220.9 L/min.
- The average total hydrocarbon concentration at the stack was 4.4 ppm (wet basis) for the three tests performed. The average total dry adjusted hydrocarbon concentration in the stack was 7.1 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 6.37 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 1.76 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 (53.2 mg/Rm^3 or 46.4 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 (<3.04 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 9.03%, which is above the minimum 8.0% oxygen criterion.
- The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9914%), Ethyl Acetate (99.9937%), Tetrachloroethene (99.9532%), Toluene (99.9948%), Total Xylenes (99.9952%) and 1,2,4-Trichlorobenzene (99.9990%). 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 are lower than the criterion provided in the Notice of Amendment to the ECA.

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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. August 2, 2017.
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

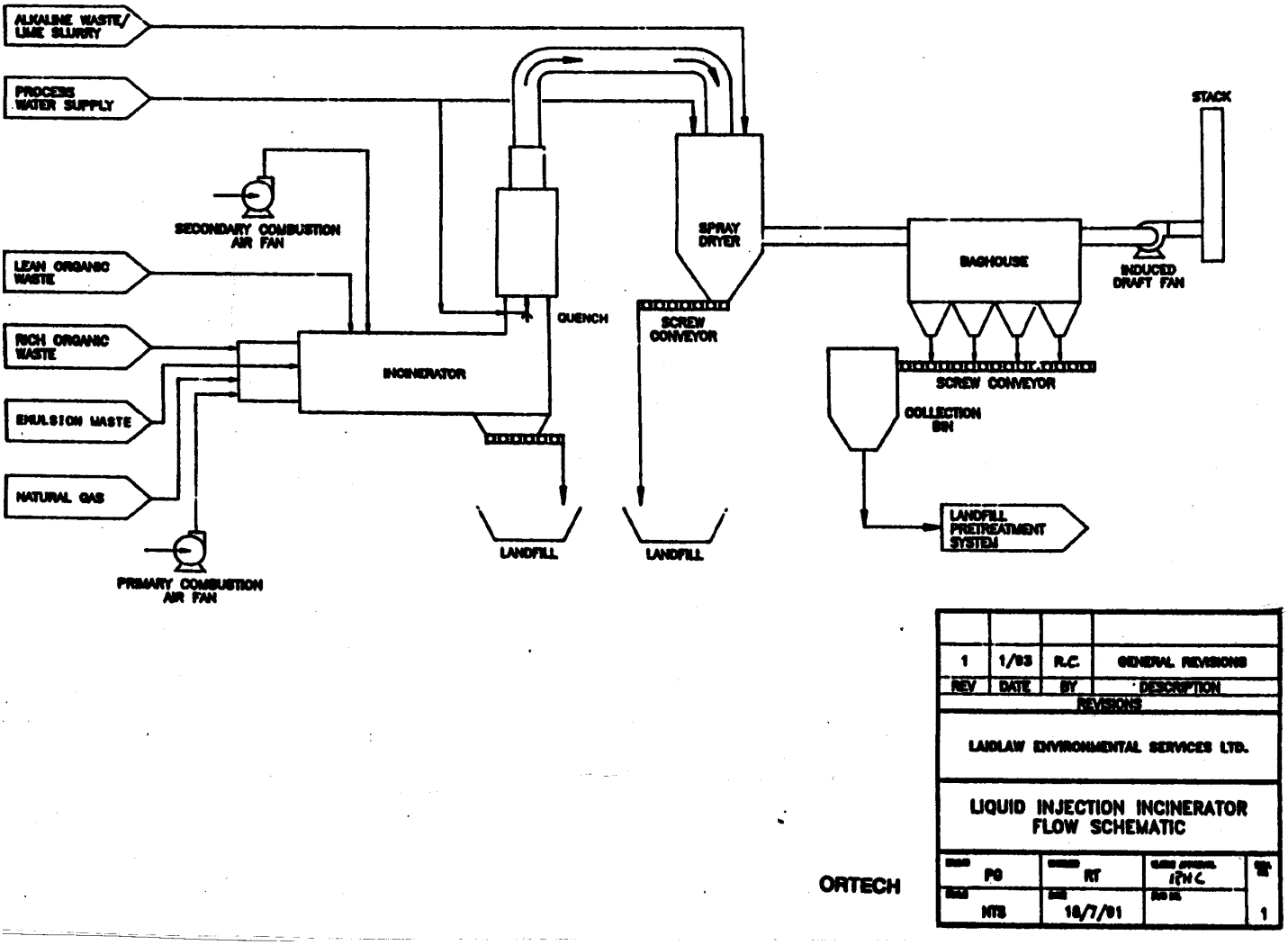


Figure 2
Particulate Matter and Metals Sampling Train

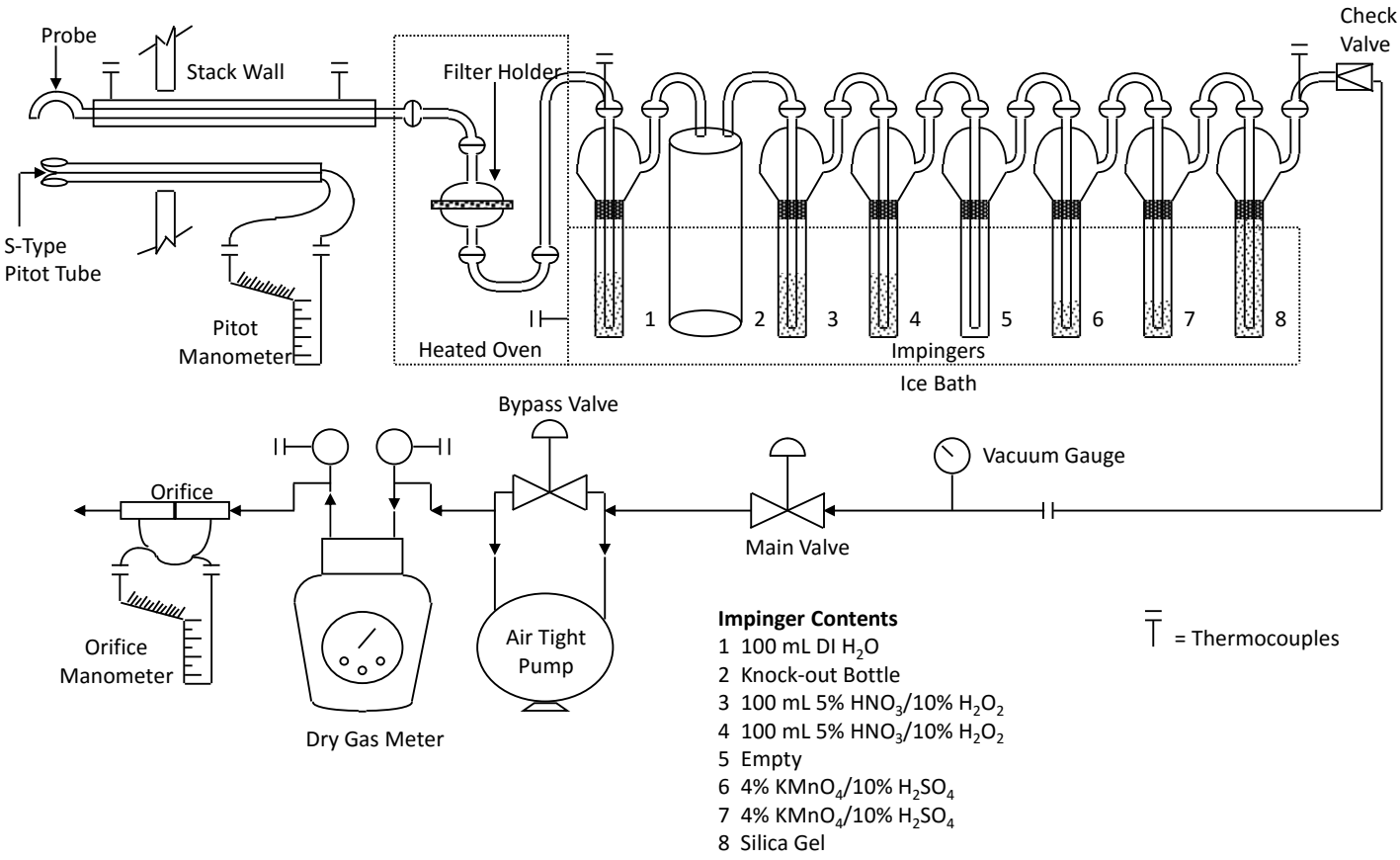
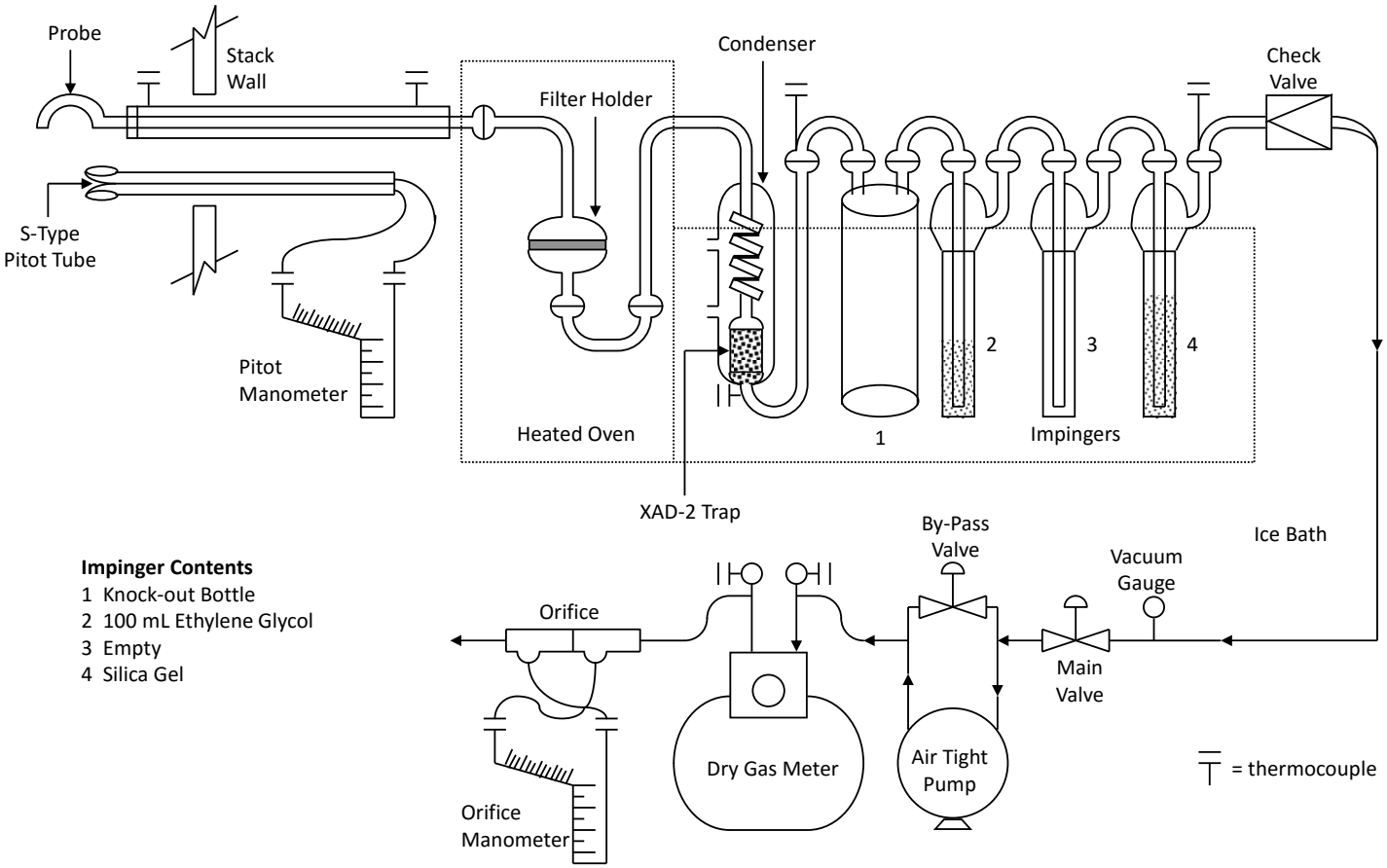


Figure 3
Semi-Volatile Organic Compounds Sampling Train



Impinger Contents
1 Knock-out Bottle
2 100 mL Ethylene Glycol
3 Empty
4 Silica Gel

Figure 4
Acid Gases Sampling Train

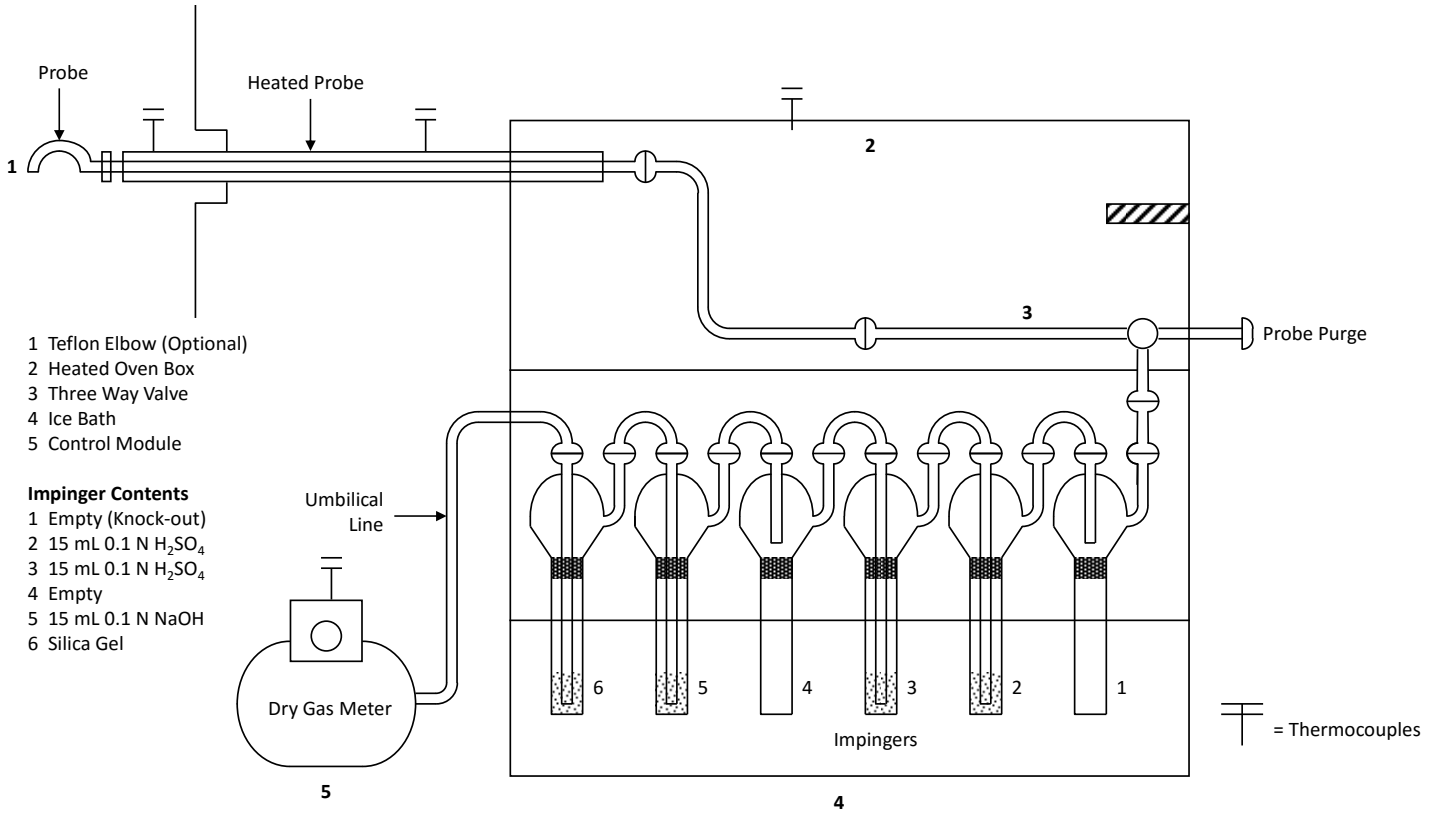


Figure 5
Volatile Organics Sampling Train

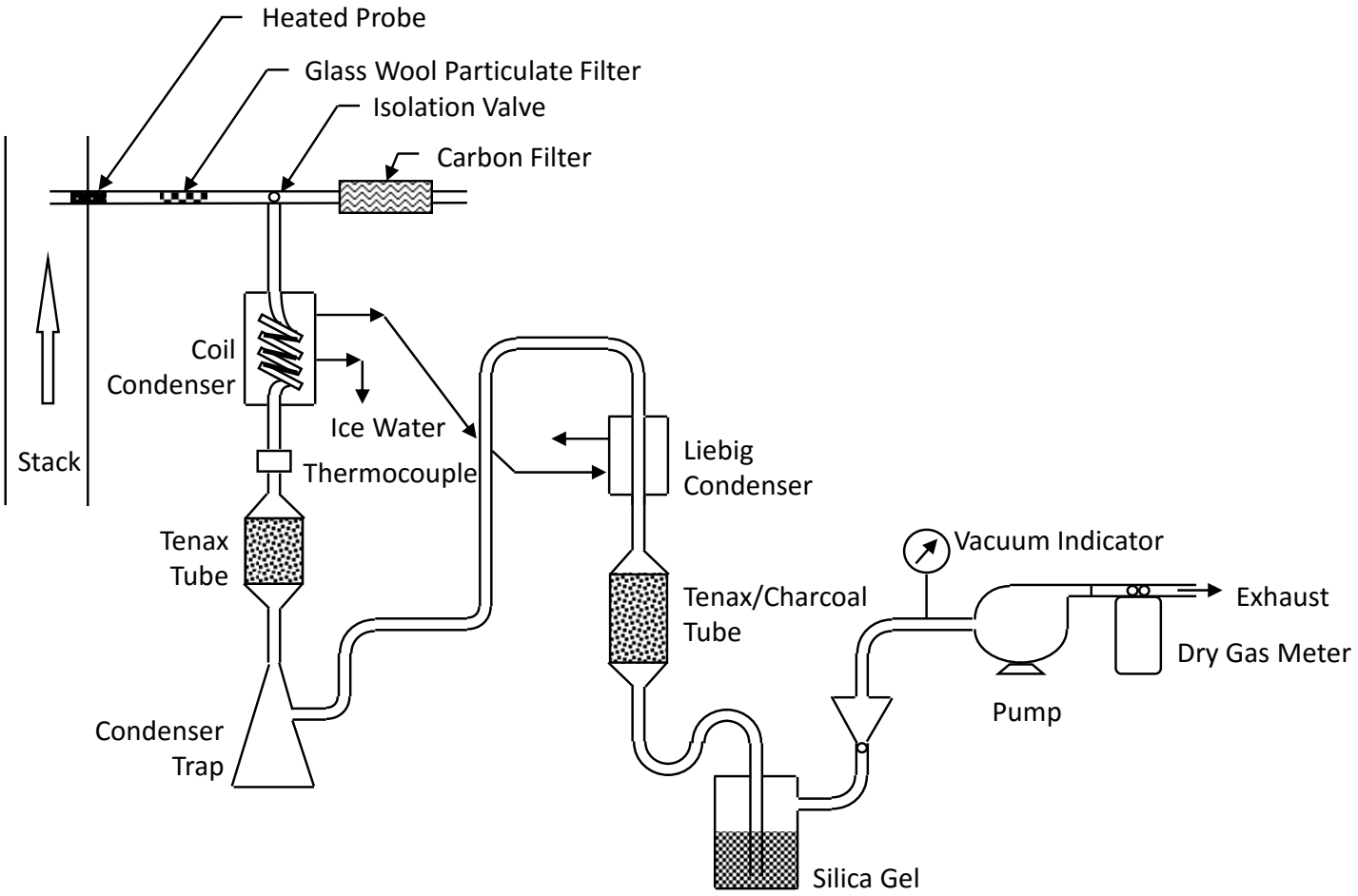
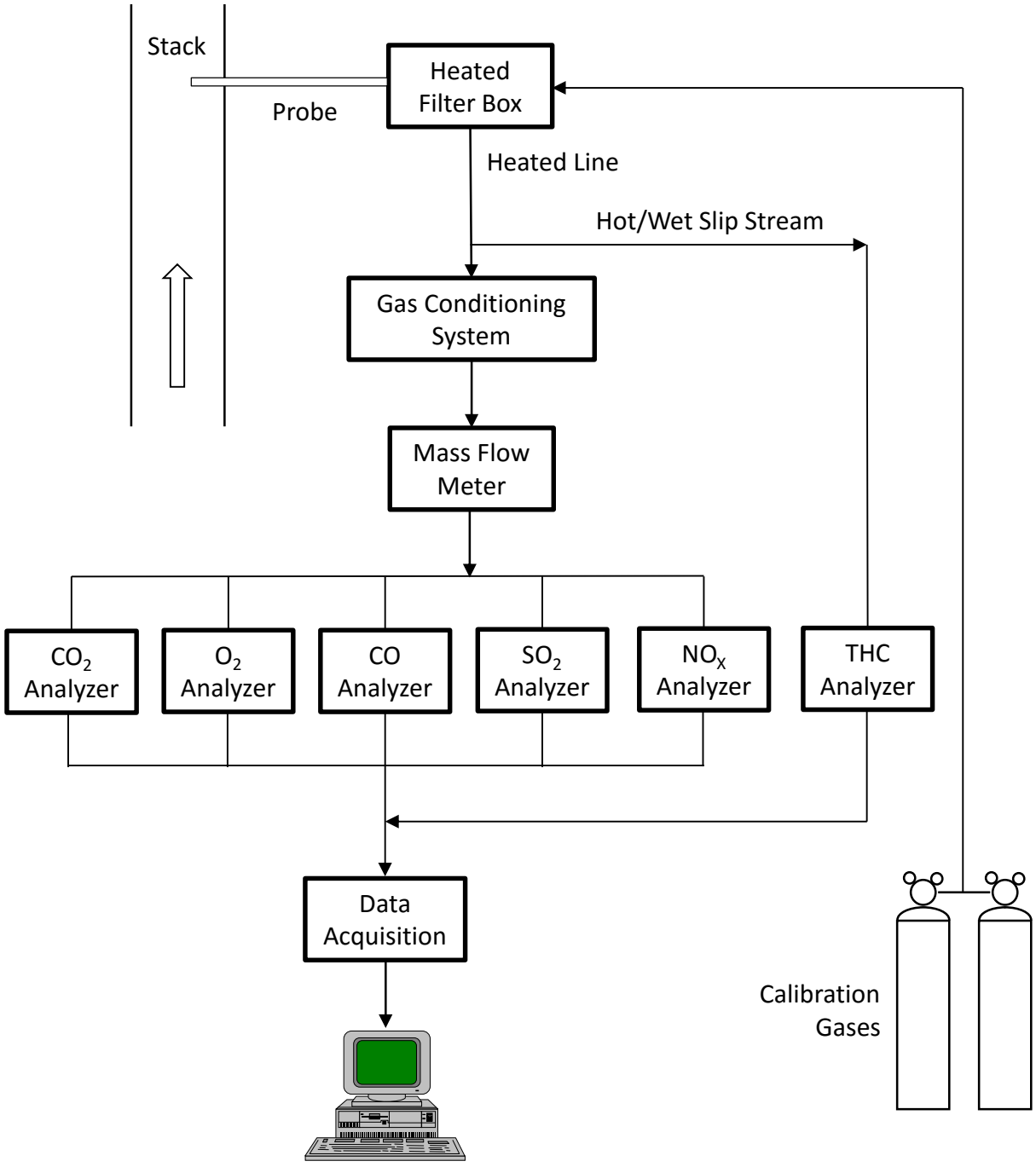


Figure 6
CEM System Schematic



APPENDIX 1

Data Tables
(136 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		Sampling Time*
		Start	Finish	min
1	September 25, 2018	10:45	15:52	240
2	September 26, 2018	9:35	14:56	240
3	September 27, 2018	9:16	14:16	240

Semi-Volatile Organics Trains

Test Number	Test Date	Sampling Period		Sampling Time*
		Start	Finish	min
1	September 25, 2018	10:45	16:00	240
2	September 26, 2018	9:35	14:56	240
3	September 27, 2018	9:16	14:13	240

Acid Gases Trains

Test Number	Test Date	Sampling Period		Sampling Time*
		Start	Finish	min
1	September 25, 2018	10:47	11:47	60
2	September 26, 2018	13:29	14:29	60
3	September 27, 2018	9:22	10:22	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	September 25, 2018	10:45	15:44	242
2	September 26, 2018	9:35	14:56	242
3	September 27, 2018	9:16	14:13	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	September 25, 2018	12:14	12:34	20
1	2	September 25, 2018	12:43	13:03	20
1	3	September 25, 2018	13:46	14:06	20
1	4	September 25, 2018	14:13	14:33	20
2	1	September 26, 2018	9:43	10:03	20
2	2	September 26, 2018	10:09	10:29	20
2	3	September 26, 2018	10:37	10:57	20
2	4	September 26, 2018	11:04	11:24	20
3	1	September 27, 2018	10:40	11:00	20
3	2	September 27, 2018	12:16	12:36	20
3	3	September 27, 2018	12:45	13:05	20
3	4	September 27, 2018	13:11	13:31	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	0.851	1.003	6.53	5.255	105.3
2	0.851	1.003	6.53	5.286	101.1
3	0.851	1.003	6.53	5.238	100.3

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	0.840	1.006	6.40	5.007	102.4
2	0.847	1.006	6.52	5.096	101.0
3	0.847	1.006	6.52	5.035	101.1

* Dry at 25°C and 1 atmosphere

TABLE 14
Clean Harbors Sarnia
Stack Gas Physical Parameters

Particulate and Metals Trains

Test No.	Gas Temp.	Moisture by Volume	Gas Velocity	Absolute Pressure	Carbon Dioxide by Volume	Oxygen by Volume
	°C	%	m/s	kPa	% *	% *
1	177	49.7	31.7	99.4	8.51	8.91
2	180	48.4	32.4	99.6	8.41	9.18
3	177	49.0	32.4	100.1	8.58	8.99
Average	178	49.0	32.2	99.7	8.50	9.03

Semi-Volatile Organics Trains

Test No.	Gas Temp.	Moisture by Volume	Gas Velocity	Absolute Pressure	Carbon Dioxide by Volume	Oxygen by Volume
	°C	%	m/s	kPa	% *	% *
1	176	48.9	31.7	99.4	8.51	8.91
2	178	49.0	31.7	99.6	8.41	9.18
3	176	49.6	31.3	100.1	8.58	8.99
Average	177	49.2	31.6	99.7	8.50	9.03

Averaged Metals and Semi-Volatile Organics Trains

Test No.	Gas Temp.	Moisture by Volume	Gas Velocity	Absolute Pressure	Carbon Dioxide by Volume	Oxygen by Volume
	°C	%	m/s	kPa	% *	% *
1	177	49.3	31.7	99.4	8.51	8.91
2	179	48.7	32.1	99.6	8.41	9.18
3	176	49.3	31.9	100.1	8.58	8.99
Average	177	49.1	31.9	99.7	8.50	9.03
Coefficient of Variation, %	0.9	0.7	0.7	0.3	1.0	1.5

* 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	57.7	18.9	22.8	37.5
2	59.2	19.8	23.4	38.3
3	59.2	19.7	23.7	38.7
Average	58.7	19.5	23.3	38.2

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	57.8	19.2	23.3	37.7
2	57.9	19.2	22.7	37.6
3	57.1	18.9	22.7	37.5
Average	57.6	19.1	22.9	37.6

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	57.8	19.1	23.1	37.6
2	58.5	19.5	23.0	37.9
3	58.1	19.3	23.2	38.1
Average	58.1	19.3	23.1	37.9
Coefficient of Variation, %	0.6	1.1	0.5	0.7

* 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			Dry Gas	Particulate Concentration				Particulate
	Probe Rinse	Main Filter	Total	Volume Sampled	Actual	Dry Reference	Dry Adjusted	Wet Reference	Emission Rate
	mg	mg	mg	Rm^3*	mg/m^3	mg/Rm^3*	mg/Rm^3**	mg/Rm^3*	g/s
1	8.6	31.8	40.4	5.255	2.51	7.69	6.35	3.87	0.14
2	3.7	35.1	38.8	5.286	2.45	7.34	6.20	3.79	0.15
3	8.4	33.0	41.4	5.238	2.64	7.90	6.57	4.03	0.16
Average					2.53	7.64	6.37	3.90	0.15
Coefficient of Variation, %					3.7	3.7	2.9	3.1	4.3

* 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	1.82	0.1189	5.05	15.3	12.6	7.76	0.29
2	1.62	0.1183	4.55	13.7	11.6	7.02	0.27
3	1.57	0.1206	4.32	13.0	10.8	6.60	0.25
Average			4.64	14.0	11.7	7.13	0.27

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	1.07	0.1189	2.97	9.00	7.43	4.56	0.17
2	0.91	0.1183	2.56	7.69	6.50	3.95	0.15
3	0.86	0.1206	2.36	7.11	5.91	3.60	0.14
Average			2.63	7.94	6.61	4.04	0.15

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	<0.950	0.1189	<2.64	<7.99	<6.60	<4.05	<0.15
2	0.99	0.1183	2.79	8.40	7.10	4.31	0.16
3	<0.936	0.1206	<2.58	<7.76	<6.45	<3.93	<0.15
Average			<2.67	<8.05	<6.72	<4.10	<0.16

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	0.53	0.1189	1.48	4.48	3.70	2.27	0.085
2	0.46	0.1183	1.30	3.91	3.31	2.01	0.076
3	0.56	0.1206	1.53	4.60	3.82	2.33	0.089
Average			1.44	4.33	3.61	2.20	0.083

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	<20.8	0.1189	<0.058	<0.17	<0.14	<0.089	<0.0033
2	<20.8	0.1183	<0.058	<0.18	<0.15	<0.090	<0.0034
3	<20.8	0.1206	<0.057	<0.17	<0.14	<0.087	<0.0033
Average			<0.058	<0.17	<0.15	<0.089	<0.0034

* 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
<0.010	<0.12	1.67

Hydrogen Fluoride

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.0070	<0.079	0.95

Hydrogen Bromide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.034	<0.38	<0.96

Hydrogen Iodide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.0025	<0.028	0.52

Hydrogen Cyanide

Method Blank Analysis µg	Reagent Blank Analysis µg	Average Analysis of Test No. 1 to No. 3 µg
<20.8	<20.8	<20.8

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	8.51	54.4	105	104	8.91	53.6	6.4
2	8.41	63.3	94.4	95.2	9.18	28.2	2.9
3	8.58	49.0	107	108	8.99	13.9	3.8
Average	8.50	55.6	102	102	9.03	31.9	4.4

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	7.03	44.9	86.4	86.0	-	44.3	10.4
2	7.10	53.5	79.7	80.4	-	23.8	4.8
3	7.13	40.7	89.0	89.7	-	11.6	6.2
Average	7.09	46.4	85.0	85.4	-	26.5	7.1

* 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	85100	70364	153045	126544	50574	77744	2923
	Carbon Monoxide	54.4	45.0	62.3	51.5	20.6	31.6	1.19
	Nitrogen Oxides ****	105	86.5	197	163	65.0	99.9	3.76
	Nitric Oxide	104	86.1	128	106	42.2	64.8	2.44
	Oxygen	89100	109862	116537	143693	38510	59198	2226
	Sulphur Dioxide	53.6	44.3	140	116	46.3	71.2	2.68
	Total Hydrocarbons	6.4 *	10.4	8.24	6.81	2.72	4.19	0.16
2	Carbon Dioxide	84100	71302	151247	128231	50416	77818	2949
	Carbon Monoxide	63.3	53.7	72.4	61.4	24.1	37.3	1.41
	Nitrogen Oxides ****	94.4	80.0	177	150	59.2	91.3	3.46
	Nitric Oxide	95.2	80.7	117	99.0	38.9	60.1	2.28
	Oxygen	91800	109635	120069	143395	40023	61777	2341
	Sulphur Dioxide	28.2	23.9	73.8	62.5	24.6	38.0	1.44
	Total Hydrocarbons	2.9 *	4.78	3.69	3.13	1.23	1.90	0.072
3	Carbon Dioxide	85800	71377	154304	128365	51258	78164	2978
	Carbon Monoxide	49.0	40.8	56.1	46.7	18.6	28.4	1.08
	Nitrogen Oxides ****	107	89.1	201	168	66.9	102	3.89
	Nitric Oxide	108	89.8	132	110	44.0	67.0	2.55
	Oxygen	89900	109921	117584	143770	39060	59563	2269
	Sulphur Dioxide	13.9	11.6	36.4	30.2	12.1	18.4	0.70
	Total Hydrocarbons	3.8 *	6.24	4.91	4.08	1.63	2.49	0.095

* 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	Actual Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	mg/m^3	mg/m^3	mg/m^3	mg/m^3	%
Carbon Dioxide	50574	50416	51258	50749	0.9
Carbon Monoxide	20.6	24.1	18.6	21.1	13.3
Nitrogen Oxides ***	65.0	59.2	66.9	63.7	6.3
Nitric Oxide	42.2	38.9	44.0	41.7	6.1
Oxygen	38510	40023	39060	39197	2.0
Sulphur Dioxide	46.3	24.6	12.1	27.7	62.6
Total Hydrocarbons	2.72	1.23	1.63	1.86	41.6

Combustion Gas	Dry Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	mg/Rm^3*	mg/Rm^3*	mg/Rm^3*	mg/Rm^3*	%
Carbon Dioxide	153045	151247	154304	152865	1.0
Carbon Monoxide	62.3	72.4	56.1	63.6	13.0
Nitrogen Oxides ***	197	177	201	192	6.6
Nitric Oxide	128	117	132	126	6.4
Oxygen	116537	120069	117584	118063	1.5
Sulphur Dioxide	140	73.8	36.4	83.4	63.0
Total Hydrocarbons	8.24	3.69	4.91	5.61	42.0

Combustion Gas	Dry Adjusted Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	mg/Rm^3**	mg/Rm^3**	mg/Rm^3**	mg/Rm^3**	%
Carbon Dioxide	126544	128231	128365	127713	0.8
Carbon Monoxide	51.5	61.4	46.7	53.2	14.2
Nitrogen Oxides ***	163	150	168	160	5.5
Nitric Oxide	106	99.0	110	105	5.3
Oxygen	143693	143395	143770	143619	-
Sulphur Dioxide	116	62.5	30.2	69.6	62.2
Total Hydrocarbons	6.81	3.13	4.08	4.67	41.0

Combustion Gas	Emission Rate				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	g/s	g/s	g/s	g/s	%
Carbon Dioxide	2923	2949	2978	2950	0.9
Carbon Monoxide	1.19	1.41	1.08	1.23	13.7
Nitrogen Oxides ***	3.76	3.46	3.89	3.70	5.9
Nitric Oxide	2.44	2.28	2.55	2.42	5.7
Oxygen	2226	2341	2269	2279	2.6
Sulphur Dioxide	2.68	1.44	0.70	1.61	62.2
Total Hydrocarbons	0.16	0.072	0.095	0.11	41.0

* 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 *	382	215	291	673
Antimony	8.76	7.21	0.26	16.2
Arsenic	52.6	15.1	9.61	77.3
Barium	18.5	6.22	4.53	29.3
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	9190	9190
Cadmium	3.88	1.17	0.38	5.43
Calcium *	510	<500	949	1459
Chromium	27.4	21.9	2.97	52.3
Cobalt	0.89	0.64	0.11	1.64
Copper	44.7	14.2	8.92	67.8
Iron	2180	1920	468	4568
Lead	4.29	2.07	2.22	8.58
Lithium	6.26	1.76	0.67	8.69
Magnesium *	120	53.0	28.5	149
Manganese	70.0	42.5	6.12	119
Mercury **	0.69	0.20	15.7	16.6
Molybdenum	4.38	39.1	0.32	43.8
Nickel	21.9	28.0	3.58	53.5
Phosphorus	400	106	67.0	573
Potassium	2790	697	131	3618
Selenium	32.5	12.4	98.3	143
Silicon *	353	-	5782	6135
Silver	<0.2	<0.2	0.23	0.23
Sodium *	4920	1330	1070	5990
Strontium	3.09	0.89	1.30	5.28
Sulphur	<10000	<10000	520000	520000
Tin	17.0	4.79	61.7	83.5
Titanium	80.4	49.9	57.6	188
Vanadium	3.33	<1	0.18	3.51
Zinc	84.5	46.3	20.8	152
Total				<553430

* 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 *	265	319	263	528
Antimony	5.38	6.44	0.20	12.0
Arsenic	33.5	16.6	6.28	56.4
Barium	15.2	11.5	4.25	31.0
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	9090	9090
Cadmium	2.65	1.56	0.24	4.45
Calcium *	<500	<500	944	944
Chromium	19.9	18.5	2.12	40.5
Cobalt	0.63	0.78	<0.1	1.41
Copper	34.5	18.5	7.73	60.7
Iron	2530	3290	119	5939
Lead	2.69	2.61	2.44	7.74
Lithium	4.75	2.43	0.63	7.81
Magnesium *	91.2	67.9	18.1	109
Manganese	44.9	49.1	2.67	96.7
Mercury **	0.50	0.23	7.29	8.02
Molybdenum	3.24	22.5	0.13	25.9
Nickel	13.8	18.2	2.46	34.5
Phosphorus	307	181	53.6	542
Potassium	2620	1180	<100	3800
Selenium	24.7	14.6	84.6	124
Silicon *	274	-	6921	7195
Silver	<0.2	<0.2	0.24	0.24
Sodium *	3570	1820	1100	4670
Strontium	2.27	1.33	1.36	4.96
Sulphur	<10000	<10000	279000	279000
Tin	28.3	7.04	70.0	105
Titanium	56.0	48.1	31.4	136
Vanadium	2.51	1.38	<0.1	3.89
Zinc	34.3	44.0	11.3	89.6
Total				<312668

* 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	Probe & Filter Hydrofluoric Acid Digest	Impingers & Rinses	Total Collected
	µg	µg	µg	µg
Aluminum *	296	297	173	469
Antimony	4.81	4.53	0.28	9.62
Arsenic	34.5	11.6	2.02	48.1
Barium	16.4	10.5	3.28	30.2
Beryllium	<0.2	<0.2	<0.2	<0.20
Boron *	<30	42.5	8870	8870
Cadmium	3.80	1.32	0.12	5.24
Calcium *	<500	<500	878	878
Chromium	20.0	15.6	2.11	37.7
Cobalt	0.68	0.85	<0.1	1.53
Copper	40.7	15.9	5.13	61.7
Iron	1960	5550	264	7774
Lead	2.51	2.17	2.84	7.52
Lithium	5.12	1.49	0.45	7.06
Magnesium *	112	60.8	18.2	130
Manganese	51.7	49.0	2.88	104
Mercury **	0.58	0.17	7.99	8.74
Molybdenum	4.11	22.2	0.11	26.4
Nickel	13.7	17.9	1.86	33.5
Phosphorus	360	126	60.6	547
Potassium	3640	974	<100	4614
Selenium	22.4	13.70	31.1	67.2
Silicon *	235	-	4240	4475
Silver	<0.2	<0.2	0.10	0.10
Sodium *	4170	1210	655	4825
Strontium	2.49	1.06	1.15	4.70
Sulphur	<10000	<10000	229000	229000
Tin	25.3	6.99	58.2	90.5
Titanium	64.2	41.4	24.1	130
Vanadium	3.01	1.04	<0.1	4.05
Zinc	31.1	36.8	10.0	77.9
Total				<262337

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m³	µg/Rm³*	µg/Rm³**	µg/Rm³*	mg/s
Aluminum	673	41.9	128	106	64.5	2.42
Antimony	16.2	1.01	3.09	2.56	1.56	0.058
Arsenic	77.3	4.82	14.7	12.2	7.41	0.28
Barium	29.3	1.82	5.57	4.61	2.81	0.11
Beryllium	<0.20	<0.012	<0.038	<0.032	<0.019	<0.00072
Boron	9190	573	1749	1450	881	33.1
Cadmium	5.43	0.34	1.03	0.86	0.52	0.020
Calcium	1459	90.9	278	230	140	5.25
Chromium	52.3	3.26	9.95	8.25	5.01	0.19
Cobalt	1.64	0.10	0.31	0.26	0.16	0.0059
Copper	67.8	4.23	12.9	10.7	6.50	0.24
Iron	4568	285	869	721	438	16.4
Lead	8.58	0.53	1.63	1.35	0.82	0.031
Lithium	8.69	0.54	1.65	1.37	0.83	0.031
Magnesium	149	9.26	28.3	23.4	14.2	0.53
Manganese	119	7.39	22.6	18.7	11.4	0.43
Mercury	16.6	1.03	3.15	2.61	1.59	0.060
Molybdenum	43.8	2.73	8.34	6.91	4.20	0.16
Nickel	53.5	3.33	10.2	8.44	5.13	0.19
Phosphorus	573	35.7	109	90.4	55.0	2.06
Potassium	3618	226	688	571	347	13.0
Selenium	143	8.93	27.3	22.6	13.7	0.52
Silicon	6135	382	1167	968	588	22.1
Silver	0.23	0.014	0.043	0.036	0.022	0.00081
Sodium	5990	373	1140	945	574	21.5
Strontium	5.28	0.33	1.00	0.83	0.51	0.019
Sulphur	520000	32413	98953	82027	49873	1870
Tin	83.5	5.20	15.9	13.2	8.01	0.30
Titanium	188	11.7	35.8	29.6	18.0	0.68
Vanadium	3.51	0.22	0.67	0.55	0.34	0.013
Zinc	152	9.45	28.8	23.9	14.5	0.55
Total	<553430	<34497	<105315	<87300	<53079	<1990

Dry Gas Volume Sampled (Rm^3*) :	5.255
Actual Flowrate (m^3/s) :	57.7
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.8
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 26
Clean Harbors Sarnia
Metal Emission Data, Test No. 2

Metal	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m³	µg/Rm³*	µg/Rm³**	µg/Rm³*	mg/s
Aluminum	528	33.4	99.9	84.5	51.6	1.98
Antimony	12.0	0.76	2.27	1.92	1.18	0.045
Arsenic	56.4	3.57	10.7	9.03	5.51	0.21
Barium	31.0	1.96	5.86	4.95	3.03	0.12
Beryllium	<0.20	<0.013	<0.038	<0.032	<0.020	<0.00075
Boron	9090	575	1720	1455	889	34.0
Cadmium	4.45	0.28	0.84	0.71	0.43	0.017
Calcium	944	59.7	179	151	92.3	3.54
Chromium	40.5	2.56	7.67	6.49	3.96	0.15
Cobalt	1.41	0.089	0.27	0.23	0.14	0.0053
Copper	60.7	3.84	11.5	9.72	5.94	0.23
Iron	5939	376	1124	951	581	22.2
Lead	7.74	0.49	1.46	1.24	0.76	0.029
Lithium	7.81	0.49	1.48	1.25	0.76	0.029
Magnesium	109	6.92	20.7	17.5	10.7	0.41
Manganese	96.7	6.12	18.3	15.5	9.45	0.36
Mercury	8.02	0.51	1.52	1.28	0.78	0.030
Molybdenum	25.9	1.64	4.89	4.14	2.53	0.097
Nickel	34.5	2.18	6.52	5.52	3.37	0.13
Phosphorus	542	34.3	102	86.7	53.0	2.03
Potassium	3800	240	719	608	372	14.2
Selenium	124	7.84	23.4	19.8	12.1	0.46
Silicon	7195	455	1361	1152	704	27.0
Silver	0.24	0.015	0.045	0.038	0.023	0.00088
Sodium	4670	295	883	748	457	17.5
Strontium	4.96	0.31	0.94	0.79	0.49	0.019
Sulphur	279000	17653	52781	44661	27286	1045
Tin	105	6.67	19.9	16.9	10.3	0.39
Titanium	136	8.57	25.6	21.7	13.3	0.51
Vanadium	3.89	0.25	0.74	0.62	0.38	0.015
Zinc	89.6	5.67	17.0	14.3	8.76	0.34
Total	<312668	<19783	<59150	<50050	<30579	<1171

Dry Gas Volume Sampled (Rm^3*) :	5.286
Actual Flowrate (m^3/s) :	59.2
Dry Reference Flowrate (Rm^3/s*) :	19.8
Dry Adjusted Flowrate (Rm^3/s**) :	23.4
Wet Reference Flowrate (Rm^3/s*) :	38.3

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m³	µg/Rm³*	µg/Rm³**	µg/Rm³*	mg/s
Aluminum	469	29.8	89.5	74.4	45.6	1.76
Antimony	9.62	0.61	1.84	1.53	0.93	0.036
Arsenic	48.1	3.06	9.19	7.64	4.68	0.18
Barium	30.2	1.92	5.76	4.79	2.93	0.11
Beryllium	<0.20	<0.013	<0.038	<0.032	<0.019	<0.00075
Boron	8870	564	1693	1408	862	33.4
Cadmium	5.24	0.33	1.00	0.83	0.51	0.020
Calcium	878	55.8	168	139	85.3	3.30
Chromium	37.7	2.40	7.20	5.98	3.66	0.14
Cobalt	1.53	0.097	0.29	0.24	0.15	0.0058
Copper	61.7	3.92	11.8	9.80	6.00	0.23
Iron	7774	494	1484	1234	755	29.2
Lead	7.52	0.48	1.44	1.19	0.73	0.028
Lithium	7.06	0.45	1.35	1.12	0.69	0.027
Magnesium	130	8.27	24.9	20.7	12.7	0.49
Manganese	104	6.58	19.8	16.4	10.1	0.39
Mercury	8.74	0.56	1.67	1.39	0.85	0.033
Molybdenum	26.4	1.68	5.04	4.19	2.57	0.099
Nickel	33.5	2.13	6.39	5.31	3.25	0.13
Phosphorus	547	34.7	104	86.7	53.1	2.06
Potassium	4614	293	881	732	448	17.4
Selenium	67.2	4.27	12.8	10.7	6.53	0.25
Silicon	4475	284	854	710	435	16.8
Silver	0.10	0.0065	0.019	0.016	0.0099	0.00038
Sodium	4825	307	921	766	469	18.1
Strontium	4.70	0.30	0.90	0.75	0.46	0.018
Sulphur	229000	14548	43719	36340	22255	861
Tin	90.5	5.75	17.3	14.4	8.79	0.34
Titanium	130	8.24	24.8	20.6	12.6	0.49
Vanadium	4.05	0.26	0.77	0.64	0.39	0.015
Zinc	77.9	4.95	14.9	12.4	7.57	0.29
Total	<262337	<16666	<50083	<41631	<25495	<987

Dry Gas Volume Sampled (Rm^3*) :	5.238
Actual Flowrate (m^3/s) :	59.2
Dry Reference Flowrate (Rm^3/s*) :	19.7
Dry Adjusted Flowrate (Rm^3/s**) :	23.7
Wet Reference Flowrate (Rm^3/s*) :	38.7

* 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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	µg/m³	µg/m³	µg/m³	µg/m³	%
Aluminum	41.9	33.4	29.8	35.1	17.8
Antimony	1.01	0.76	0.61	0.79	25.5
Arsenic	4.82	3.57	3.06	3.81	23.8
Barium	1.82	1.96	1.92	1.90	3.6
Beryllium	<0.012	<0.013	<0.013	<0.013	1.0
Boron	573	575	564	570	1.1
Cadmium	0.34	0.28	0.33	0.32	10.0
Calcium	90.9	59.7	55.8	68.8	28.0
Chromium	3.26	2.56	2.40	2.74	16.7
Cobalt	0.10	0.089	0.097	0.096	6.9
Copper	4.23	3.84	3.92	4.00	5.1
Iron	285	376	494	385	27.3
Lead	0.53	0.49	0.48	0.50	6.0
Lithium	0.54	0.49	0.45	0.49	9.4
Magnesium	9.26	6.92	8.27	8.15	14.4
Manganese	7.39	6.12	6.58	6.70	9.7
Mercury	1.03	0.51	0.56	0.70	41.6
Molybdenum	2.73	1.64	1.68	2.02	30.7
Nickel	3.33	2.18	2.13	2.55	26.8
Phosphorus	35.7	34.3	34.7	34.9	2.1
Potassium	226	240	293	253	14.0
Selenium	8.93	7.84	4.27	7.01	34.7
Silicon	382	455	284	374	22.9
Silver	0.014	0.015	0.0065	0.012	39.3
Sodium	373	295	307	325	13.0
Strontium	0.33	0.31	0.30	0.31	4.8
Sulphur	32413	17653	14548	21538	44.3
Tin	5.20	6.67	5.75	5.87	12.6
Titanium	11.7	8.57	8.24	9.51	20.1
Vanadium	0.22	0.25	0.26	0.24	8.2
Zinc	9.45	5.67	4.95	6.69	36.1
Total	<34497	<19783	<16666	<23649	40.3

TABLE 29
Clean Harbors Sarnia
Summary of Metal Dry Reference Concentrations

Metal	Dry Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	128	99.9	89.5	106	18.8
Antimony	3.09	2.27	1.84	2.40	26.5
Arsenic	14.7	10.7	9.19	11.5	24.8
Barium	5.57	5.86	5.76	5.73	2.6
Beryllium	<0.038	<0.038	<0.038	<0.038	0.5
Boron	1749	1720	1693	1721	1.6
Cadmium	1.03	0.84	1.00	0.96	10.8
Calcium	278	179	168	208	29.1
Chromium	9.95	7.67	7.20	8.27	17.8
Cobalt	0.31	0.27	0.29	0.29	7.9
Copper	12.9	11.5	11.8	12.1	6.2
Iron	869	1124	1484	1159	26.7
Lead	1.63	1.46	1.44	1.51	7.0
Lithium	1.65	1.48	1.35	1.49	10.3
Magnesium	28.3	20.7	24.9	24.6	15.4
Manganese	22.6	18.3	19.8	20.2	10.8
Mercury	3.15	1.52	1.67	2.11	42.8
Molybdenum	8.34	4.89	5.04	6.09	31.9
Nickel	10.2	6.52	6.39	7.69	28.0
Phosphorus	109	102	104	105	3.2
Potassium	688	719	881	763	13.6
Selenium	27.3	23.4	12.8	21.2	35.3
Silicon	1167	1361	854	1128	22.7
Silver	0.043	0.045	0.019	0.036	39.4
Sodium	1140	883	921	981	14.1
Strontium	1.00	0.94	0.90	0.95	5.7
Sulphur	98953	52781	43719	65151	45.5
Tin	15.9	19.9	17.3	17.7	11.6
Titanium	35.8	25.6	24.8	28.7	21.3
Vanadium	0.67	0.74	0.77	0.73	7.3
Zinc	28.8	17.0	14.9	20.2	37.3
Total	<105315	<59150	<50083	<71516	41.4

* At 25°C and 1 atmosphere

TABLE 30
Clean Harbors Sarnia
Summary of Metal Dry Adjusted Concentrations

Metal	Dry Adjusted Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	106	84.5	74.4	88.4	18.3
Antimony	2.56	1.92	1.53	2.00	26.0
Arsenic	12.2	9.03	7.64	9.62	24.3
Barium	4.61	4.95	4.79	4.79	3.6
Beryllium	<0.032	<0.032	<0.032	<0.032	0.7
Boron	1450	1455	1408	1437	1.8
Cadmium	0.86	0.71	0.83	0.80	9.7
Calcium	230	151	139	174	28.5
Chromium	8.25	6.49	5.98	6.91	17.2
Cobalt	0.26	0.23	0.24	0.24	6.9
Copper	10.7	9.72	9.80	10.1	5.4
Iron	721	951	1234	968	26.5
Lead	1.35	1.24	1.19	1.26	6.5
Lithium	1.37	1.25	1.12	1.25	10.1
Magnesium	23.4	17.5	20.7	20.5	14.5
Manganese	18.7	15.5	16.4	16.9	9.9
Mercury	2.61	1.28	1.39	1.76	42.0
Molybdenum	6.91	4.14	4.19	5.08	31.2
Nickel	8.44	5.52	5.31	6.42	27.2
Phosphorus	90.4	86.7	86.7	87.9	2.4
Potassium	571	608	732	637	13.3
Selenium	22.6	19.8	10.7	17.7	35.3
Silicon	968	1152	710	943	23.5
Silver	0.036	0.038	0.016	0.030	39.8
Sodium	945	748	766	819	13.3
Strontium	0.83	0.79	0.75	0.79	5.5
Sulphur	82027	44661	36340	54343	44.8
Tin	13.2	16.9	14.4	14.8	12.7
Titanium	29.6	21.7	20.6	24.0	20.6
Vanadium	0.55	0.62	0.64	0.61	7.7
Zinc	23.9	14.3	12.4	16.9	36.6
Total	<87300	<50050	<41631	<59660	40.7

* 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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	64.5	51.6	45.6	53.9	18.0
Antimony	1.56	1.18	0.93	1.22	25.7
Arsenic	7.41	5.51	4.68	5.87	23.9
Barium	2.81	3.03	2.93	2.92	3.8
Beryllium	<0.019	<0.020	<0.019	<0.019	1.0
Boron	881	889	862	877	1.6
Cadmium	0.52	0.43	0.51	0.49	9.6
Calcium	140	92.3	85.3	106	28.1
Chromium	5.01	3.96	3.66	4.21	16.8
Cobalt	0.16	0.14	0.15	0.15	6.7
Copper	6.50	5.94	6.00	6.15	5.1
Iron	438	581	755	591	26.9
Lead	0.82	0.76	0.73	0.77	6.2
Lithium	0.83	0.76	0.69	0.76	9.7
Magnesium	14.2	10.7	12.7	12.5	14.2
Manganese	11.4	9.45	10.1	10.3	9.5
Mercury	1.59	0.78	0.85	1.07	41.6
Molybdenum	4.20	2.53	2.57	3.10	30.8
Nickel	5.13	3.37	3.25	3.92	26.8
Phosphorus	55.0	53.0	53.1	53.7	2.1
Potassium	347	372	448	389	13.6
Selenium	13.7	12.1	6.53	10.8	35.0
Silicon	588	704	435	576	23.4
Silver	0.022	0.023	0.0099	0.018	39.7
Sodium	574	457	469	500	13.0
Strontium	0.51	0.49	0.46	0.48	5.1
Sulphur	49873	27286	22255	33138	44.4
Tin	8.01	10.3	8.79	9.03	12.9
Titanium	18.0	13.3	12.6	14.6	20.2
Vanadium	0.34	0.38	0.39	0.37	8.0
Zinc	14.5	8.76	7.57	10.3	36.2
Total	<53079	<30579	<25495	<36384	40.3

* 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	2.42	1.98	1.76	2.05	16.3
Antimony	0.058	0.045	0.036	0.047	24.0
Arsenic	0.28	0.21	0.18	0.22	22.2
Barium	0.11	0.12	0.11	0.11	5.0
Beryllium	<0.00072	<0.00075	<0.00075	<0.00074	2.5
Boron	33.1	34.0	33.4	33.5	1.5
Cadmium	0.020	0.017	0.020	0.019	9.2
Calcium	5.25	3.54	3.30	4.03	26.4
Chromium	0.19	0.15	0.14	0.16	15.1
Cobalt	0.0059	0.0053	0.0058	0.0056	5.8
Copper	0.24	0.23	0.23	0.23	3.6
Iron	16.4	22.2	29.2	22.6	28.3
Lead	0.031	0.029	0.028	0.029	4.5
Lithium	0.031	0.029	0.027	0.029	8.2
Magnesium	0.53	0.41	0.49	0.48	13.2
Manganese	0.43	0.36	0.39	0.39	8.2
Mercury	0.060	0.030	0.033	0.041	39.9
Molybdenum	0.16	0.097	0.099	0.12	29.1
Nickel	0.19	0.13	0.13	0.15	25.2
Phosphorus	2.06	2.03	2.06	2.05	0.8
Potassium	13.0	14.2	17.4	14.9	15.1
Selenium	0.52	0.46	0.25	0.41	33.9
Silicon	22.1	27.0	16.8	21.9	23.1
Silver	0.00081	0.00088	0.00038	0.00069	39.0
Sodium	21.5	17.5	18.1	19.1	11.4
Strontium	0.019	0.019	0.018	0.018	3.6
Sulphur	1870	1045	861	1259	42.7
Tin	0.30	0.39	0.34	0.35	13.7
Titanium	0.68	0.51	0.49	0.56	18.5
Vanadium	0.013	0.015	0.015	0.014	9.6
Zinc	0.55	0.34	0.29	0.39	34.5
Total	<1990	<1171	<987	<1383	38.6

TABLE 33
Clean Harbors Sarnia
Summary of Metal Emission Data

Metal	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg/m³	µg/Rm³*	µg/Rm³**	µg/Rm³*	mg/s
Aluminum	35.1	106	88.4	53.9	2.05
Antimony	0.79	2.40	2.00	1.22	0.047
Arsenic	3.81	11.5	9.62	5.87	0.22
Barium	1.90	5.73	4.79	2.92	0.11
Beryllium	<0.013	<0.038	<0.032	<0.019	<0.00074
Boron	570	1721	1437	877	33.5
Cadmium	0.32	0.96	0.80	0.49	0.019
Calcium	68.8	208	174	106	4.03
Chromium	2.74	8.27	6.91	4.21	0.16
Cobalt	0.096	0.29	0.24	0.15	0.0056
Copper	4.00	12.1	10.1	6.15	0.23
Iron	385	1159	968	591	22.6
Lead	0.50	1.51	1.26	0.77	0.029
Lithium	0.49	1.49	1.25	0.76	0.029
Magnesium	8.15	24.6	20.5	12.5	0.48
Manganese	6.70	20.2	16.9	10.3	0.39
Mercury	0.70	2.11	1.76	1.07	0.041
Molybdenum	2.02	6.09	5.08	3.10	0.12
Nickel	2.55	7.69	6.42	3.92	0.15
Phosphorus	34.9	105	87.9	53.7	2.05
Potassium	253	763	637	389	14.9
Selenium	7.01	21.2	17.7	10.8	0.41
Silicon	374	1128	943	576	21.9
Silver	0.012	0.036	0.030	0.018	0.00069
Sodium	325	981	819	500	19.1
Strontium	0.31	0.95	0.79	0.48	0.018
Sulphur	21538	65151	54343	33138	1259
Tin	5.87	17.7	14.8	9.03	0.35
Titanium	9.51	28.7	24.0	14.6	0.56
Vanadium	0.24	0.73	0.61	0.37	0.014
Zinc	6.69	20.2	16.9	10.3	0.39
Total	<23649	<71516	<59660	<36384	<1383

* 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	171	18.4	18.4
Antimony	<0.2	<0.2	<0.1	<0.20
Arsenic	<1	<1	<0.2	<1.00
Barium	5.31	7.41	2.14	14.9
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	43.3	43.3
Cadmium	0.3	<0.1	0.30	0.57
Calcium *	<500	<500	253	253
Chromium	<1	1.99	1.28	3.27
Cobalt	<0.2	<0.2	<0.1	<0.20
Copper	1.34	<1	2.40	3.74
Iron	<200	<200	43.3	43.3
Lead	<0.5	0.57	0.70	1.27
Lithium	<0.5	<0.5	<0.25	<0.50
Magnesium *	<10	21.1	10.7	10.7
Manganese	<0.5	0.78	2.68	3.46
Mercury **	<0.015	<0.015	1.40	1.40
Molybdenum	<0.2	21.3	<0.1	21.3
Nickel	0.77	3.53	1.63	5.93
Phosphorus	<100	<100	50.5	50.5
Potassium	<100	<100	<100	<100
Selenium	<2	<2	2.17	2.17
Silicon *	171	-	662	833
Silver	<0.2	<0.2	<0.1	<0.10
Sodium *	335	130	359	694
Strontium	<0.2	0.29	0.43	0.72
Sulphur	<10000	<10000	<3000	<3000
Tin	4.01	1.41	42.4	47.8
Titanium	<10	<10	<1	<1.00
Vanadium	<1	<1	<0.1	<1.00
Zinc	<6	<6	18.3	18.3
Total				<5175

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	ng/s
Tetrachlorodibenzo-p-dioxins	85.3	0.0057	0.017	0.014	0.0087	0.33
Pentachlorodibenzo-p-dioxins	61.0	0.0040	0.012	0.010	0.0062	0.23
Hexachlorodibenzo-p-dioxins	245	0.016	0.049	0.040	0.025	0.94
Heptachlorodibenzo-p-dioxins	948	0.063	0.19	0.16	0.096	3.64
Octachlorodibenzo-p-dioxin	1040	0.069	0.21	0.17	0.11	3.99
Total	2379	0.16	0.48	0.39	0.24	9.12

Furans

Congener Group	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	ng/s
Tetrachlorodibenzofurans	91.4	0.0061	0.018	0.015	0.0093	0.35
Pentachlorodibenzofurans	55.8	0.0037	0.011	0.0092	0.0057	0.21
Hexachlorodibenzofurans	65.2	0.0043	0.013	0.011	0.0066	0.25
Heptachlorodibenzofurans	149	0.0099	0.030	0.025	0.015	0.57
Octachlorodibenzofuran	136	0.0090	0.027	0.022	0.014	0.52
Total	497	0.033	0.099	0.082	0.051	1.91

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* At 25°C and 1 atmosphere

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

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 Pentachlorodibenzo-p-dioxins Hexachlorodibenzo-p-dioxins Heptachlorodibenzo-p-dioxins Octachlorodibenzo-p-dioxin Total	The sample was lost by the analytical laboratory during extraction and as a result no data is available.					

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 Pentachlorodibenzofurans Hexachlorodibenzofurans Heptachlorodibenzofurans Octachlorodibenzofuran Total	The sample was lost by the analytical laboratory during extraction and as a result no data is available.					

Dry Gas Volume Sampled (Rm^3*) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	37.6

* At 25°C and 1 atmosphere

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

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	38.8	0.0026	0.0077	0.0064	0.0039	0.15
Pentachlorodibenzo-p-dioxins	14.1	0.00093	0.0028	0.0023	0.0014	0.053
Hexachlorodibenzo-p-dioxins	6.70	0.00044	0.0013	0.0011	0.00067	0.025
Heptachlorodibenzo-p-dioxins	32.6	0.0021	0.0065	0.0054	0.0033	0.12
Octachlorodibenzo-p-dioxin	40.6	0.0027	0.0081	0.0067	0.0041	0.15
Total	133	0.0087	0.026	0.022	0.013	0.50

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	16.4	0.0011	0.0033	0.0027	0.0016	0.062
Pentachlorodibenzofurans	<1.8	<0.00012	<0.00036	<0.00030	<0.00018	<0.0068
Hexachlorodibenzofurans	2.14	0.00014	0.00043	0.00035	0.00021	0.0080
Heptachlorodibenzofurans	6.71	0.00044	0.0013	0.0011	0.00067	0.025
Octachlorodibenzofuran	<3.3	<0.00022	<0.00066	<0.00055	<0.00033	<0.012
Total	<30.4	<0.0020	<0.0060	<0.0050	<0.0030	<0.11

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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

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 38
Clean Harbors Sarnia
Dioxin and Furan Congener Group Actual Concentrations

Dioxins

Congener Group	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
Tetrachlorodibenzo-p-dioxins	0.0057		0.0026	0.0041	53.5
Pentachlorodibenzo-p-dioxins	0.0040		0.00093	0.0025	88.7
Hexachlorodibenzo-p-dioxins	0.016		0.00044	0.0083	134
Heptachlorodibenzo-p-dioxins	0.063		0.0021	0.033	132
Octachlorodibenzo-p-dioxin	0.069		0.0027	0.036	131
Total	0.16		0.0087	0.083	127

Furans

Congener Group	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
Tetrachlorodibenzofurans	0.0061		0.0011	0.0036	98.7
Pentachlorodibenzofurans	0.0037		<0.00012	<0.0019	133
Hexachlorodibenzofurans	0.0043		0.00014	0.0022	133
Heptachlorodibenzofurans	0.0099		0.00044	0.0052	129
Octachlorodibenzofuran	0.0090		<0.00022	<0.0046	135
Total	0.033		<0.0020	<0.017	125

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

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	0.017		0.0077	0.012	53.3
Pentachlorodibenzo-p-dioxins	0.012		0.0028	0.0075	88.6
Hexachlorodibenzo-p-dioxins	0.049		0.0013	0.025	134
Heptachlorodibenzo-p-dioxins	0.19		0.0065	0.098	132
Octachlorodibenzo-p-dioxin	0.21		0.0081	0.11	131
Total	0.48		0.026	0.25	127

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	0.018		0.0033	0.011	98.6
Pentachlorodibenzofurans	0.011		<0.00036	<0.0058	133
Hexachlorodibenzofurans	0.013		0.00043	0.0067	132
Heptachlorodibenzofurans	0.030		0.0013	0.016	129
Octachlorodibenzofuran	0.027		<0.00066	<0.014	135
Total	0.099		<0.0060	<0.053	125

* 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 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	0.014		0.0064	0.010	52.7
Pentachlorodibenzo-p-dioxins	0.010		0.0023	0.0062	88.1
Hexachlorodibenzo-p-dioxins	0.040		0.0011	0.021	134
Heptachlorodibenzo-p-dioxins	0.16		0.0054	0.081	132
Octachlorodibenzo-p-dioxin	0.17		0.0067	0.089	131
Total	0.39		0.022	0.21	126

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	0.015		0.0027	0.0089	98.2
Pentachlorodibenzofurans	0.0092		<0.00030	<0.0047	133
Hexachlorodibenzofurans	0.011		0.00035	0.0055	132
Heptachlorodibenzofurans	0.025		0.0011	0.013	129
Octachlorodibenzofuran	0.022		<0.00055	<0.011	135
Total	0.082		<0.0050	<0.043	125

* 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 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	0.0087		0.0039	0.0063	54.0
Pentachlorodibenzo-p-dioxins	0.0062		0.0014	0.0038	89.0
Hexachlorodibenzo-p-dioxins	0.025		0.00067	0.013	134
Heptachlorodibenzo-p-dioxins	0.096		0.0033	0.050	132
Octachlorodibenzo-p-dioxin	0.11		0.0041	0.055	131
Total	0.24		0.013	0.13	127

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	0.0093		0.0016	0.0055	99.0
Pentachlorodibenzofurans	0.0057		<0.00018	<0.0029	133
Hexachlorodibenzofurans	0.0066		0.00021	0.0034	133
Heptachlorodibenzofurans	0.015		0.00067	0.0079	129
Octachlorodibenzofuran	0.014		<0.00033	<0.0071	135
Total	0.051		<0.0030	<0.027	125

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

Dioxins

Congener Group	Emission Rate				Coefficient of Variation
	Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	%
Tetrachlorodibenzo-p-dioxins	0.33		0.15	0.24	54.3
Pentachlorodibenzo-p-dioxins	0.23		0.053	0.14	89.2
Hexachlorodibenzo-p-dioxins	0.94		0.025	0.48	134
Heptachlorodibenzo-p-dioxins	3.64		0.12	1.88	132
Octachlorodibenzo-p-dioxin	3.99		0.15	2.07	131
Total	9.12		0.50	4.81	127

Furans

Congener Group	Emission Rate				Coefficient of Variation
	Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	%
Tetrachlorodibenzofurans	0.35		0.062	0.21	99.2
Pentachlorodibenzofurans	0.21		<0.0068	<0.11	133
Hexachlorodibenzofurans	0.25		0.0080	0.13	133
Heptachlorodibenzofurans	0.57		0.025	0.30	129
Octachlorodibenzofuran	0.52		<0.012	<0.27	135
Total	1.91		<0.11	<1.01	125

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

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

Dioxins

Congener Group	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	ng/s
Tetrachlorodibenzo-p-dioxins	0.0041	0.012	0.010	0.0063	0.24
Pentachlorodibenzo-p-dioxins	0.0025	0.0075	0.0062	0.0038	0.14
Hexachlorodibenzo-p-dioxins	0.0083	0.025	0.021	0.013	0.48
Heptachlorodibenzo-p-dioxins	0.033	0.098	0.081	0.050	1.88
Octachlorodibenzo-p-dioxin	0.036	0.11	0.089	0.055	2.07
Total	0.083	0.25	0.21	0.13	4.81

Furans

Congener Group	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	ng/s
Tetrachlorodibenzofurans	0.0036	0.011	0.0089	0.0055	0.21
Pentachlorodibenzofurans	<0.0019	<0.0058	<0.0047	<0.0029	<0.11
Hexachlorodibenzofurans	0.0022	0.0067	0.0055	0.0034	0.13
Heptachlorodibenzofurans	0.0052	0.016	0.013	0.0079	0.30
Octachlorodibenzofuran	<0.0046	<0.014	<0.011	<0.0071	<0.27
Total	<0.017	<0.053	<0.043	<0.027	<1.01

* 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	Laboratory Blank
	pg	pg
Tetrachlorodibenzo-p-dioxins	<1.3	<2.1
Pentachlorodibenzo-p-dioxins	<0.62	<1.0
Hexachlorodibenzo-p-dioxins	<0.60	2.72
Heptachlorodibenzo-p-dioxins	<0.64	<1.1
Octachlorodibenzo-p-dioxin	<2.8	<8.1
Total	<5.96	<15.0

Furans

Congener Group	Blank Train	Laboratory Blank
	pg	pg
Tetrachlorodibenzofurans	<1.1	<1.4
Pentachlorodibenzofurans	<0.81	2.23
Hexachlorodibenzofurans	<0.79	4.94
Heptachlorodibenzofurans	<0.66	<1.4
Octachlorodibenzofuran	<0.95	<5.5
Total	<4.31	<15.5

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

Specific Isomer	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	pg/m^3	pg/Rm^3*	pg/Rm^3**	pg/Rm^3*	ng/s
2378-tetrachlorodibenzo-p-dioxin	<3.1	<0.21	<0.62	<0.51	<0.32	<0.012
12378-pentachlorodibenzo-p-dioxin	<4.9	<0.33	<0.98	<0.81	<0.50	<0.019
123478-hexachlorodibenzo-p-dioxin	12.4	0.82	2.48	2.04	1.26	0.048
123678-hexachlorodibenzo-p-dioxin	25.2	1.67	5.03	4.15	2.56	0.097
123789-hexachlorodibenzo-p-dioxin	20.3	1.35	4.05	3.34	2.06	0.078
1234678-heptachlorodibenzo-p-dioxin	514	34.1	103	84.6	52.3	1.97
Octachlorodibenzo-p-dioxin	1040	69.0	208	171	106	3.99
2378-tetrachlorodibenzofuran	8.49	0.56	1.70	1.40	0.86	0.033
12378-pentachlorodibenzofuran	7.50	0.50	1.50	1.23	0.76	0.029
23478-pentachlorodibenzofuran	8.57	0.57	1.71	1.41	0.87	0.033
123478-hexachlorodibenzofuran	12.0	0.80	2.40	1.97	1.22	0.046
123678-hexachlorodibenzofuran	15.2	1.01	3.04	2.50	1.55	0.058
234678-hexachlorodibenzofuran	27.0	1.79	5.39	4.44	2.75	0.10
123789-hexachlorodibenzofuran	11.1	0.74	2.22	1.83	1.13	0.043
1234678-heptachlorodibenzofuran	101	6.70	20.2	16.6	10.3	0.39
1234789-heptachlorodibenzofuran	21.7	1.44	4.33	3.57	2.21	0.083
Octachlorodibenzofuran	136	9.02	27.2	22.4	13.8	0.52
PCB 77	735	48.8	147	121	74.8	2.82
PCB 81	21.4	1.42	4.27	3.52	2.18	0.082
PCB 126	<34	<2.26	<6.79	<5.60	<3.46	<0.13
PCB 169	<5.6	<0.37	<1.12	<0.92	<0.57	<0.021
PCB 105	3600	239	719	592	366	13.8
PCB 114	274	18.2	54.7	45.1	27.9	1.05
PCB 118	11100	736	2217	1827	1129	42.6
PCB 123	149	9.89	29.8	24.5	15.2	0.57
PCB 156/157	287	19.0	57.3	47.2	29.2	1.10
PCB 167	89.0	5.90	17.8	14.6	9.05	0.34
PCB 189	9.29	0.62	1.86	1.53	0.94	0.036
Total Dioxins & Furans Only	<1968	<131	<393	<324	<200	<7.55

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	pg/m^3	pg/Rm^{3*}	pg/Rm^{3**}	pg/Rm^{3*}	ng/s
2378-tetrachlorodibenzo-p-dioxin						
12378-pentachlorodibenzo-p-dioxin						
123478-hexachlorodibenzo-p-dioxin						
123678-hexachlorodibenzo-p-dioxin						
123789-hexachlorodibenzo-p-dioxin						
1234678-heptachlorodibenzo-p-dioxin						
Octachlorodibenzo-p-dioxin						
2378-tetrachlorodibenzofuran						
12378-pentachlorodibenzofuran						
23478-pentachlorodibenzofuran						
123478-hexachlorodibenzofuran						
123678-hexachlorodibenzofuran						
234678-hexachlorodibenzofuran						
123789-hexachlorodibenzofuran						
1234678-heptachlorodibenzofuran						
1234789-heptachlorodibenzofuran						
Octachlorodibenzofuran						
PCB 77						
PCB 81						
PCB 126						
PCB 169						
PCB 105						
PCB 114						
PCB 118						
PCB 123						
PCB 156/157						
PCB 167						
PCB 189						
Total Dioxins & Furans Only						

The sample was lost by the analytical laboratory during extraction and as a result no data is available.

Dry Gas Volume Sampled (Rm^{3*}) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s^*) :	19.2
Dry Adjusted Flowrate (Rm^3/s^{**}) :	22.7
Wet Reference Flowrate (Rm^3/s^*) :	37.6

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	pg/m^3	pg/Rm^3*	pg/Rm^3**	pg/Rm^3*	ng/s
2378-tetrachlorodibenzo-p-dioxin	<2.0	<0.13	<0.40	<0.33	<0.20	<0.0075
12378-pentachlorodibenzo-p-dioxin	2.38	0.16	0.47	0.39	0.24	0.0089
123478-hexachlorodibenzo-p-dioxin	<2.0	<0.13	<0.40	<0.33	<0.20	<0.0075
123678-hexachlorodibenzo-p-dioxin	<2.1	<0.14	<0.42	<0.35	<0.21	<0.0079
123789-hexachlorodibenzo-p-dioxin	<2.0	<0.13	<0.40	<0.33	<0.20	<0.0075
1234678-heptachlorodibenzo-p-dioxin	17.7	1.16	3.52	2.93	1.77	0.066
Octachlorodibenzo-p-dioxin	40.6	2.67	8.06	6.71	4.06	0.15
2378-tetrachlorodibenzofuran	<2.5	<0.16	<0.50	<0.41	<0.25	<0.0094
12378-pentachlorodibenzofuran	<2.4	<0.16	<0.48	<0.40	<0.24	<0.0090
23478-pentachlorodibenzofuran	<2.0	<0.13	<0.40	<0.33	<0.20	<0.0075
123478-hexachlorodibenzofuran	<1.3	<0.085	<0.26	<0.21	<0.13	<0.0049
123678-hexachlorodibenzofuran	<1.3	<0.085	<0.26	<0.21	<0.13	<0.0049
234678-hexachlorodibenzofuran	<1.3	<0.085	<0.26	<0.21	<0.13	<0.0049
123789-hexachlorodibenzofuran	<2.1	<0.14	<0.42	<0.35	<0.21	<0.0079
1234678-heptachlorodibenzofuran	4.61	0.30	0.92	0.76	0.46	0.017
1234789-heptachlorodibenzofuran	<1.1	<0.072	<0.22	<0.18	<0.11	<0.0041
Octachlorodibenzofuran	<3.3	<0.22	<0.66	<0.55	<0.33	<0.012
PCB 77	1510	99.3	300	250	151	5.67
PCB 81	23.3	1.53	4.63	3.85	2.33	0.087
PCB 126	<53	<3.48	<10.5	<8.76	<5.31	<0.20
PCB 169	<13	<0.85	<2.58	<2.15	<1.30	<0.049
PCB 105	1290	84.8	256	213	129	4.84
PCB 114	104	6.84	20.7	17.2	10.4	0.39
PCB 118	4430	291	880	733	443	16.6
PCB 123	65.9	4.33	13.1	10.9	6.60	0.25
PCB 156/157	78.6	5.17	15.6	13.0	7.87	0.30
PCB 167	31.7	2.08	6.30	5.24	3.17	0.12
PCB 189	3.42	0.22	0.68	0.57	0.34	0.013
Total Dioxins & Furans Only	<90.7	<5.96	<18.0	<15.0	<9.08	<0.34

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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

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				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	pg/m³	pg/m³	pg/m³	pg/m³	%
2378-tetrachlorodibenzo-p-dioxin	<0.21		<0.13	<0.17	31.1
12378-pentachlorodibenzo-p-dioxin	<0.33		0.16	<0.24	49.5
123478-hexachlorodibenzo-p-dioxin	0.82		<0.13	<0.48	102
123678-hexachlorodibenzo-p-dioxin	1.67		<0.14	<0.90	120
123789-hexachlorodibenzo-p-dioxin	1.35		<0.13	<0.74	116
1234678-heptachlorodibenzo-p-dioxin	34.1		1.16	17.6	132
Octachlorodibenzo-p-dioxin	69.0		2.67	35.8	131
2378-tetrachlorodibenzofuran	0.56		<0.16	<0.36	77.5
12378-pentachlorodibenzofuran	0.50		<0.16	<0.33	73.3
23478-pentachlorodibenzofuran	0.57		<0.13	<0.35	88.3
123478-hexachlorodibenzofuran	0.80		<0.085	<0.44	114
123678-hexachlorodibenzofuran	1.01		<0.085	<0.55	119
234678-hexachlorodibenzofuran	1.79		<0.085	<0.94	129
123789-hexachlorodibenzofuran	0.74		<0.14	<0.44	96.8
1234678-heptachlorodibenzofuran	6.70		0.30	3.50	129
1234789-heptachlorodibenzofuran	1.44		<0.072	<0.76	128
Octachlorodibenzofuran	9.02		<0.22	<4.62	135
PCB 77	48.8		99.3	74.0	48.3
PCB 81	1.42		1.53	1.48	5.4
PCB 126	<2.26		<3.48	<2.87	30.3
PCB 169	<0.37		<0.85	<0.61	55.7
PCB 105	239		84.8	162	67.3
PCB 114	18.2		6.84	12.5	64.1
PCB 118	736		291	514	61.3
PCB 123	9.89		4.33	7.11	55.2
PCB 156/157	19.0		5.17	12.1	81.0
PCB 167	5.90		2.08	3.99	67.6
PCB 189	0.62		0.22	0.42	65.8
Total Dioxins & Furans Only	<131		<5.96	<68.3	129

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

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

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

Specific Isomer	Dry Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	pg/Rm³*	pg/Rm³*	pg/Rm³*	pg/Rm³*	%
2378-tetrachlorodibenzo-p-dioxin	<0.62		<0.40	<0.51	30.9
12378-pentachlorodibenzo-p-dioxin	<0.98		0.47	<0.73	49.3
123478-hexachlorodibenzo-p-dioxin	2.48		<0.40	<1.44	102
123678-hexachlorodibenzo-p-dioxin	5.03		<0.42	<2.73	120
123789-hexachlorodibenzo-p-dioxin	4.05		<0.40	<2.23	116
1234678-heptachlorodibenzo-p-dioxin	103		3.52	53.1	132
Octachlorodibenzo-p-dioxin	208		8.06	108	131
2378-tetrachlorodibenzofuran	1.70		<0.50	<1.10	77.4
12378-pentachlorodibenzofuran	1.50		<0.48	<0.99	73.1
23478-pentachlorodibenzofuran	1.71		<0.40	<1.05	88.1
123478-hexachlorodibenzofuran	2.40		<0.26	<1.33	114
123678-hexachlorodibenzofuran	3.04		<0.26	<1.65	119
234678-hexachlorodibenzofuran	5.39		<0.26	<2.83	128
123789-hexachlorodibenzofuran	2.22		<0.42	<1.32	96.6
1234678-heptachlorodibenzofuran	20.2		0.92	10.5	129
1234789-heptachlorodibenzofuran	4.33		<0.22	<2.28	128
Octachlorodibenzofuran	27.2		<0.66	<13.9	135
PCB 77	147		300	223	48.5
PCB 81	4.27		4.63	4.45	5.6
PCB 126	<6.79		<10.5	<8.66	30.5
PCB 169	<1.12		<2.58	<1.85	55.9
PCB 105	719		256	488	67.1
PCB 114	54.7		20.7	37.7	63.9
PCB 118	2217		880	1548	61.1
PCB 123	29.8		13.1	21.4	55.0
PCB 156/157	57.3		15.6	36.5	80.9
PCB 167	17.8		6.30	12.0	67.4
PCB 189	1.86		0.68	1.27	65.6
Total Dioxins & Furans Only	<393		<18.0	<206	129

* 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.

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

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

Specific Isomer	Dry Adjusted Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	pg/Rm³*	pg/Rm³*	pg/Rm³*	pg/Rm³*	%
2378-tetrachlorodibenzo-p-dioxin	<0.51		<0.33	<0.42	30.2
12378-pentachlorodibenzo-p-dioxin	<0.81		0.39	<0.60	48.7
123478-hexachlorodibenzo-p-dioxin	2.04		<0.33	<1.19	102
123678-hexachlorodibenzo-p-dioxin	4.15		<0.35	<2.25	120
123789-hexachlorodibenzo-p-dioxin	3.34		<0.33	<1.84	116
1234678-heptachlorodibenzo-p-dioxin	84.6		2.93	43.8	132
Octachlorodibenzo-p-dioxin	171		6.71	88.9	131
2378-tetrachlorodibenzofuran	1.40		<0.41	<0.91	76.8
12378-pentachlorodibenzofuran	1.23		<0.40	<0.82	72.6
23478-pentachlorodibenzofuran	1.41		<0.33	<0.87	87.7
123478-hexachlorodibenzofuran	1.97		<0.21	<1.09	114
123678-hexachlorodibenzofuran	2.50		<0.21	<1.36	119
234678-hexachlorodibenzofuran	4.44		<0.21	<2.33	128
123789-hexachlorodibenzofuran	1.83		<0.35	<1.09	96.2
1234678-heptachlorodibenzofuran	16.6		0.76	8.69	129
1234789-heptachlorodibenzofuran	3.57		<0.18	<1.88	128
Octachlorodibenzofuran	22.4		<0.55	<11.5	135
PCB 77	121		250	185	49.1
PCB 81	3.52		3.85	3.69	6.3
PCB 126	<5.60		<8.76	<7.18	31.2
PCB 169	<0.92		<2.15	<1.54	56.5
PCB 105	592		213	403	66.5
PCB 114	45.1		17.2	31.1	63.3
PCB 118	1827		733	1280	60.5
PCB 123	24.5		10.9	17.7	54.4
PCB 156/157	47.2		13.0	30.1	80.4
PCB 167	14.6		5.24	9.94	66.9
PCB 189	1.53		0.57	1.05	65.0
Total Dioxins & Furans Only	<324		<15.0	<169	129

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

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

Specific Isomer	Wet Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	pg/Rm³*	pg/Rm³*	pg/Rm³*	pg/Rm³*	%
2378-tetrachlorodibenzo-p-dioxin	<0.32		<0.20	<0.26	31.6
12378-pentachlorodibenzo-p-dioxin	<0.50		0.24	<0.37	49.9
123478-hexachlorodibenzo-p-dioxin	1.26		<0.20	<0.73	103
123678-hexachlorodibenzo-p-dioxin	2.56		<0.21	<1.39	120
123789-hexachlorodibenzo-p-dioxin	2.06		<0.20	<1.13	116
1234678-heptachlorodibenzo-p-dioxin	52.3		1.77	27.0	132
Octachlorodibenzo-p-dioxin	106		4.06	54.9	131
2378-tetrachlorodibenzofuran	0.86		<0.25	<0.56	77.9
12378-pentachlorodibenzofuran	0.76		<0.24	<0.50	73.7
23478-pentachlorodibenzofuran	0.87		<0.20	<0.54	88.6
123478-hexachlorodibenzofuran	1.22		<0.13	<0.68	114
123678-hexachlorodibenzofuran	1.55		<0.13	<0.84	119
234678-hexachlorodibenzofuran	2.75		<0.13	<1.44	129
123789-hexachlorodibenzofuran	1.13		<0.21	<0.67	97.0
1234678-heptachlorodibenzofuran	10.3		0.46	5.37	129
1234789-heptachlorodibenzofuran	2.21		<0.11	<1.16	128
Octachlorodibenzofuran	13.8		<0.33	<7.08	135
PCB 77	74.8		151	113	47.8
PCB 81	2.18		2.33	2.25	4.9
PCB 126	<3.46		<5.31	<4.38	29.8
PCB 169	<0.57		<1.30	<0.94	55.3
PCB 105	366		129	248	67.7
PCB 114	27.9		10.4	19.1	64.5
PCB 118	1129		443	786	61.7
PCB 123	15.2		6.60	10.9	55.6
PCB 156/157	29.2		7.87	18.5	81.4
PCB 167	9.05		3.17	6.11	68.0
PCB 189	0.94		0.34	0.64	66.2
Total Dioxins & Furans Only	<200		<9.08	<105	129

* 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.

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

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

Specific Isomer	Emission Rate				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/s	ng/s	ng/s	ng/s	%
2378-tetrachlorodibenzo-p-dioxin	<0.012		<0.0075	<0.0097	31.9
12378-pentachlorodibenzo-p-dioxin	<0.019		0.0089	<0.014	50.3
123478-hexachlorodibenzo-p-dioxin	0.048		<0.0075	<0.028	103
123678-hexachlorodibenzo-p-dioxin	0.097		<0.0079	<0.052	120
123789-hexachlorodibenzo-p-dioxin	0.078		<0.0075	<0.043	117
1234678-heptachlorodibenzo-p-dioxin	1.97		0.066	1.02	132
Octachlorodibenzo-p-dioxin	3.99		0.15	2.07	131
2378-tetrachlorodibenzofuran	0.033		<0.0094	<0.021	78.1
12378-pentachlorodibenzofuran	0.029		<0.0090	<0.019	74.0
23478-pentachlorodibenzofuran	0.033		<0.0075	<0.020	88.8
123478-hexachlorodibenzofuran	0.046		<0.0049	<0.025	114
123678-hexachlorodibenzofuran	0.058		<0.0049	<0.032	120
234678-hexachlorodibenzofuran	0.10		<0.0049	<0.054	129
123789-hexachlorodibenzofuran	0.043		<0.0079	<0.025	97.2
1234678-heptachlorodibenzofuran	0.39		0.017	0.20	129
1234789-heptachlorodibenzofuran	0.083		<0.0041	<0.044	128
Octachlorodibenzofuran	0.52		<0.012	<0.27	135
PCB 77	2.82		5.67	4.24	47.5
PCB 81	0.082		0.087	0.085	4.5
PCB 126	<0.13		<0.20	<0.16	29.4
PCB 169	<0.021		<0.049	<0.035	55.0
PCB 105	13.8		4.84	9.32	68.0
PCB 114	1.05		0.39	0.72	64.8
PCB 118	42.6		16.6	29.6	62.0
PCB 123	0.57		0.25	0.41	56.0
PCB 156/157	1.10		0.30	0.70	81.6
PCB 167	0.34		0.12	0.23	68.3
PCB 189	0.036		0.013	0.024	66.5
Total Dioxins & Furans Only	<7.55		<0.34	<3.94	129

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.
Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

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

Specific Isomer	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg/m³	pg/Rm³*	pg/Rm³**	pg/Rm³*	ng/s
2378-tetrachlorodibenzo-p-dioxin	<0.17	<0.51	<0.42	<0.26	<0.0097
12378-pentachlorodibenzo-p-dioxin	<0.24	<0.73	<0.60	<0.37	<0.014
123478-hexachlorodibenzo-p-dioxin	<0.48	<1.44	<1.19	<0.73	<0.028
123678-hexachlorodibenzo-p-dioxin	<0.90	<2.73	<2.25	<1.39	<0.052
123789-hexachlorodibenzo-p-dioxin	<0.74	<2.23	<1.84	<1.13	<0.043
1234678-heptachlorodibenzo-p-dioxin	17.6	53.1	43.8	27.0	1.02
Octachlorodibenzo-p-dioxin	35.8	108	88.9	54.9	2.07
2378-tetrachlorodibenzofuran	<0.36	<1.10	<0.91	<0.56	<0.021
12378-pentachlorodibenzofuran	<0.33	<0.99	<0.82	<0.50	<0.019
23478-pentachlorodibenzofuran	<0.35	<1.05	<0.87	<0.54	<0.020
123478-hexachlorodibenzofuran	<0.44	<1.33	<1.09	<0.68	<0.025
123678-hexachlorodibenzofuran	<0.55	<1.65	<1.36	<0.84	<0.032
234678-hexachlorodibenzofuran	<0.94	<2.83	<2.33	<1.44	<0.054
123789-hexachlorodibenzofuran	<0.44	<1.32	<1.09	<0.67	<0.025
1234678-heptachlorodibenzofuran	3.50	10.5	8.69	5.37	0.20
1234789-heptachlorodibenzofuran	<0.76	<2.28	<1.88	<1.16	<0.044
Octachlorodibenzofuran	<4.62	<13.9	<11.5	<7.08	<0.27
PCB 77	74.0	223	185	113	4.24
PCB 81	1.48	4.45	3.69	2.25	0.085
PCB 126	<2.87	<8.66	<7.18	<4.38	<0.16
PCB 169	<0.61	<1.85	<1.54	<0.94	<0.035
PCB 105	162	488	403	248	9.32
PCB 114	12.5	37.7	31.1	19.1	0.72
PCB 118	514	1548	1280	786	29.6
PCB 123	7.11	21.4	17.7	10.9	0.41
PCB 156/157	12.1	36.5	30.1	18.5	0.70
PCB 167	3.99	12.0	9.94	6.11	0.23
PCB 189	0.42	1.27	1.05	0.64	0.024
Total Dioxins & Furans Only	<68.3	<206	<169	<105	<3.94

* 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	<1.3	<2.1
12378-pentachlorodibenzo-p-dioxin	<0.62	<1.0
123478-hexachlorodibenzo-p-dioxin	<0.60	<2.1
123678-hexachlorodibenzo-p-dioxin	<0.58	2.72
123789-hexachlorodibenzo-p-dioxin	<0.59	<2.1
1234678-heptachlorodibenzo-p-dioxin	<0.87	<2.1
Octachlorodibenzo-p-dioxin	<2.8	<8.1
2378-tetrachlorodibenzofuran	<1.1	<1.4
12378-pentachlorodibenzofuran	<1.4	2.23
23478-pentachlorodibenzofuran	<0.78	<1.2
123478-hexachlorodibenzofuran	<0.69	1.37
123678-hexachlorodibenzofuran	<0.65	<1.0
234678-hexachlorodibenzofuran	<0.68	<1.0
123789-hexachlorodibenzofuran	<1.0	3.57
1234678-heptachlorodibenzofuran	<0.52	<1.1
1234789-heptachlorodibenzofuran	<0.66	<1.4
Octachlorodibenzofuran	<0.95	<5.5
PCB 77	31.0	<5.8
PCB 81	<2.8	<5.6
PCB 126	<3.1	<5.1
PCB 169	<2.0	<3.6
PCB 105	401	<12
PCB 114	41.9	<5.1
PCB 118	1680	<13
PCB 123	<20	<5.1
PCB 156/157	22.2	<5.2
PCB 167	<8.2	<3.4
PCB 189	<2.4	3.68
Total Dioxins & Furans Only	<15.8	<40.0

"<" 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 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	<0.21		<0.13	<0.17
12378-pentachlorodibenzo-p-dioxin	0.500	<0.16		0.078	<0.12
123478-hexachlorodibenzo-p-dioxin	0.100	0.082		<0.013	<0.048
123678-hexachlorodibenzo-p-dioxin	0.100	0.17		<0.014	<0.090
123789-hexachlorodibenzo-p-dioxin	0.100	0.13		<0.013	<0.074
1234678-heptachlorodibenzo-p-dioxin	0.010	0.34		0.012	0.18
Octachlorodibenzo-p-dioxin	0.001	0.069		0.0027	0.036
2378-tetrachlorodibenzofuran	0.100	0.056		<0.016	<0.036
12378-pentachlorodibenzofuran	0.050	0.025		<0.0079	<0.016
23478-pentachlorodibenzofuran	0.500	0.28		<0.066	<0.18
123478-hexachlorodibenzofuran	0.100	0.080		<0.0085	<0.044
123678-hexachlorodibenzofuran	0.100	0.10		<0.0085	<0.055
234678-hexachlorodibenzofuran	0.100	0.18		<0.0085	<0.094
123789-hexachlorodibenzofuran	0.100	0.074		<0.014	<0.044
1234678-heptachlorodibenzofuran	0.010	0.067		0.0030	0.035
1234789-heptachlorodibenzofuran	0.010	0.014		<0.00072	<0.0076
Octachlorodibenzofuran	0.001	0.0090		<0.00022	<0.0046
PCB 77	0.0001	0.0049		0.0099	0.0074
PCB 81	0.0003	0.00043		0.00046	0.00044
PCB 126	0.1000	<0.23		<0.35	<0.29
PCB 169	0.0300	<0.011		<0.026	<0.018
PCB 105	0.00003	0.0072		0.0025	0.0049
PCB 114	0.00003	0.00055		0.00021	0.00038
PCB 118	0.00003	0.022		0.0087	0.015
PCB 123	0.00003	0.00030		0.00013	0.00021
PCB 156/157	0.00003	0.00057		0.00016	0.00036
PCB 167	0.00003	0.00018		0.000063	0.00012
PCB 189	0.00003	0.000018		0.0000067	0.000013
Total Dioxins & Furans Only		<2.05		<0.40	<1.22

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

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

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	<0.62		<0.40	<0.51
12378-pentachlorodibenzo-p-dioxin	0.500	<0.49		0.24	<0.36
123478-hexachlorodibenzo-p-dioxin	0.100	0.25		<0.040	<0.14
123678-hexachlorodibenzo-p-dioxin	0.100	0.50		<0.042	<0.27
123789-hexachlorodibenzo-p-dioxin	0.100	0.41		<0.040	<0.22
1234678-heptachlorodibenzo-p-dioxin	0.010	1.03		0.035	0.53
Octachlorodibenzo-p-dioxin	0.001	0.21		0.0081	0.11
2378-tetrachlorodibenzofuran	0.100	0.17		<0.050	<0.11
12378-pentachlorodibenzofuran	0.050	0.075		<0.024	<0.049
23478-pentachlorodibenzofuran	0.500	0.86		<0.20	<0.53
123478-hexachlorodibenzofuran	0.100	0.24		<0.026	<0.13
123678-hexachlorodibenzofuran	0.100	0.30		<0.026	<0.16
234678-hexachlorodibenzofuran	0.100	0.54		<0.026	<0.28
123789-hexachlorodibenzofuran	0.100	0.22		<0.042	<0.13
1234678-heptachlorodibenzofuran	0.010	0.20		0.0092	0.11
1234789-heptachlorodibenzofuran	0.010	0.043		<0.0022	<0.023
Octachlorodibenzofuran	0.001	0.027		<0.00066	<0.014
PCB 77	0.0001	0.015		0.030	0.022
PCB 81	0.0003	0.0013		0.0014	0.0013
PCB 126	0.1000	<0.68		<1.05	<0.87
PCB 169	0.0300	<0.034		<0.077	<0.056
PCB 105	0.00003	0.022		0.0077	0.015
PCB 114	0.00003	0.0016		0.00062	0.0011
PCB 118	0.00003	0.067		0.026	0.046
PCB 123	0.00003	0.00089		0.00039	0.00064
PCB 156/157	0.00003	0.0017		0.00047	0.0011
PCB 167	0.00003	0.00053		0.00019	0.00036
PCB 189	0.00003	0.000056		0.000020	0.000038
Total Dioxins & Furans Only		<6.18		<1.20	<3.69

* 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.

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

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

Specific Isomer	Toxicity Equivalency Factor	Dry Adjusted 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	<0.51		<0.33	<0.42
12378-pentachlorodibenzo-p-dioxin	0.500	<0.40		0.20	<0.30
123478-hexachlorodibenzo-p-dioxin	0.100	0.20		<0.033	<0.12
123678-hexachlorodibenzo-p-dioxin	0.100	0.41		<0.035	<0.22
123789-hexachlorodibenzo-p-dioxin	0.100	0.33		<0.033	<0.18
1234678-heptachlorodibenzo-p-dioxin	0.010	0.85		0.029	0.44
Octachlorodibenzo-p-dioxin	0.001	0.17		0.0067	0.089
2378-tetrachlorodibenzofuran	0.100	0.14		<0.041	<0.091
12378-pentachlorodibenzofuran	0.050	0.062		<0.020	<0.041
23478-pentachlorodibenzofuran	0.500	0.71		<0.17	<0.44
123478-hexachlorodibenzofuran	0.100	0.20		<0.021	<0.11
123678-hexachlorodibenzofuran	0.100	0.25		<0.021	<0.14
234678-hexachlorodibenzofuran	0.100	0.44		<0.021	<0.23
123789-hexachlorodibenzofuran	0.100	0.18		<0.035	<0.11
1234678-heptachlorodibenzofuran	0.010	0.17		0.0076	0.087
1234789-heptachlorodibenzofuran	0.010	0.036		<0.0018	<0.019
Octachlorodibenzofuran	0.001	0.022		<0.00055	<0.011
PCB 77	0.0001	0.012		0.025	0.019
PCB 81	0.0003	0.0011		0.0012	0.0011
PCB 126	0.1000	<0.56		<0.88	<0.72
PCB 169	0.0300	<0.028		<0.064	<0.046
PCB 105	0.00003	0.018		0.0064	0.012
PCB 114	0.00003	0.0014		0.00052	0.00093
PCB 118	0.00003	0.055		0.022	0.038
PCB 123	0.00003	0.00074		0.00033	0.00053
PCB 156/157	0.00003	0.0014		0.00039	0.00090
PCB 167	0.00003	0.00044		0.00016	0.00030
PCB 189	0.00003	0.000046		0.000017	0.000031
Total Dioxins & Furans Only		<5.09		<1.00	<3.04

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

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/Rm³*	Test No. 2 pg TEQ/Rm³*	Test No. 3 pg TEQ/Rm³*	Average pg TEQ/Rm³*
2378-tetrachlorodibenzo-p-dioxin	1.000	<0.32		<0.20	<0.26
12378-pentachlorodibenzo-p-dioxin	0.500	<0.25		0.12	<0.18
123478-hexachlorodibenzo-p-dioxin	0.100	0.13		<0.020	<0.073
123678-hexachlorodibenzo-p-dioxin	0.100	0.26		<0.021	<0.14
123789-hexachlorodibenzo-p-dioxin	0.100	0.21		<0.020	<0.11
1234678-heptachlorodibenzo-p-dioxin	0.010	0.52		0.018	0.27
Octachlorodibenzo-p-dioxin	0.001	0.11		0.0041	0.055
2378-tetrachlorodibenzofuran	0.100	0.086		<0.025	<0.056
12378-pentachlorodibenzofuran	0.050	0.038		<0.012	<0.025
23478-pentachlorodibenzofuran	0.500	0.44		<0.10	<0.27
123478-hexachlorodibenzofuran	0.100	0.12		<0.013	<0.068
123678-hexachlorodibenzofuran	0.100	0.15		<0.013	<0.084
234678-hexachlorodibenzofuran	0.100	0.27		<0.013	<0.14
123789-hexachlorodibenzofuran	0.100	0.11		<0.021	<0.067
1234678-heptachlorodibenzofuran	0.010	0.10		0.0046	0.054
1234789-heptachlorodibenzofuran	0.010	0.022		<0.0011	<0.012
Octachlorodibenzofuran	0.001	0.014		<0.00033	<0.0071
PCB 77	0.0001	0.0075		0.015	0.011
PCB 81	0.0003	0.00065		0.00070	0.00068
PCB 126	0.1000	<0.35		<0.53	<0.44
PCB 169	0.0300	<0.017		<0.039	<0.028
PCB 105	0.00003	0.011		0.0039	0.0074
PCB 114	0.00003	0.00084		0.00031	0.00057
PCB 118	0.00003	0.034		0.013	0.024
PCB 123	0.00003	0.00045		0.00020	0.00033
PCB 156/157	0.00003	0.00088		0.00024	0.00056
PCB 167	0.00003	0.00027		0.000095	0.00018
PCB 189	0.00003	0.000028		0.000010	0.000019
Total Dioxins & Furans Only		<3.15		<0.61	<1.88

* 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.

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

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	<0.012		<0.0075	<0.0097
12378-pentachlorodibenzo-p-dioxin	0.500	<0.0094		0.0045	<0.0069
123478-hexachlorodibenzo-p-dioxin	0.100	0.0048		<0.00075	<0.0028
123678-hexachlorodibenzo-p-dioxin	0.100	0.0097		<0.00079	<0.0052
123789-hexachlorodibenzo-p-dioxin	0.100	0.0078		<0.00075	<0.0043
1234678-heptachlorodibenzo-p-dioxin	0.010	0.020		0.00066	0.010
Octachlorodibenzo-p-dioxin	0.001	0.0040		0.00015	0.0021
2378-tetrachlorodibenzofuran	0.100	0.0033		<0.00094	<0.0021
12378-pentachlorodibenzofuran	0.050	0.0014		<0.00045	<0.00094
23478-pentachlorodibenzofuran	0.500	0.016		<0.0038	<0.010
123478-hexachlorodibenzofuran	0.100	0.0046		<0.00049	<0.0025
123678-hexachlorodibenzofuran	0.100	0.0058		<0.00049	<0.0032
234678-hexachlorodibenzofuran	0.100	0.010		<0.00049	<0.0054
123789-hexachlorodibenzofuran	0.100	0.0043		<0.00079	<0.0025
1234678-heptachlorodibenzofuran	0.010	0.0039		0.00017	0.0020
1234789-heptachlorodibenzofuran	0.010	0.00083		<0.000041	<0.00044
Octachlorodibenzofuran	0.001	0.00052		<0.000012	<0.00027
PCB 77	0.0001	0.00028		0.00057	0.00042
PCB 81	0.0003	0.000025		0.000026	0.000025
PCB 126	0.1000	<0.013		<0.020	<0.016
PCB 169	0.0300	<0.00064		<0.0015	<0.0011
PCB 105	0.00003	0.00041		0.00015	0.00028
PCB 114	0.00003	0.000032		0.000012	0.000022
PCB 118	0.00003	0.0013		0.00050	0.00089
PCB 123	0.00003	0.000017		0.0000074	0.000012
PCB 156/157	0.00003	0.000033		0.0000089	0.000021
PCB 167	0.00003	0.000010		0.0000036	0.0000069
PCB 189	0.00003	0.0000011		0.00000039	0.00000073
Total Dioxins & Furans Only		<0.12		<0.023	<0.071

Note: "<" indicates that the analyte was not detected and the value of the detection limit was used to calculate the emission data.
Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available.

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

Specific Isomer	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg TEQ/m³	pg TEQ/Rm³*	pg TEQ/Rm³**	pg TEQ/Rm³*	ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	<0.17	<0.51	<0.42	<0.26	<0.0097
12378-pentachlorodibenzo-p-dioxin	<0.12	<0.36	<0.30	<0.18	<0.0069
123478-hexachlorodibenzo-p-dioxin	<0.048	<0.14	<0.12	<0.073	<0.0028
123678-hexachlorodibenzo-p-dioxin	<0.090	<0.27	<0.22	<0.14	<0.0052
123789-hexachlorodibenzo-p-dioxin	<0.074	<0.22	<0.18	<0.11	<0.0043
1234678-heptachlorodibenzo-p-dioxin	0.18	0.53	0.44	0.27	0.010
Octachlorodibenzo-p-dioxin	0.036	0.11	0.089	0.055	0.0021
2378-tetrachlorodibenzofuran	<0.036	<0.11	<0.091	<0.056	<0.0021
12378-pentachlorodibenzofuran	<0.016	<0.049	<0.041	<0.025	<0.00094
23478-pentachlorodibenzofuran	<0.18	<0.53	<0.44	<0.27	<0.010
123478-hexachlorodibenzofuran	<0.044	<0.13	<0.11	<0.068	<0.0025
123678-hexachlorodibenzofuran	<0.055	<0.16	<0.14	<0.084	<0.0032
234678-hexachlorodibenzofuran	<0.094	<0.28	<0.23	<0.14	<0.0054
123789-hexachlorodibenzofuran	<0.044	<0.13	<0.11	<0.067	<0.0025
1234678-heptachlorodibenzofuran	0.035	0.11	0.087	0.054	0.0020
1234789-heptachlorodibenzofuran	<0.0076	<0.023	<0.019	<0.012	<0.00044
Octachlorodibenzofuran	<0.0046	<0.014	<0.011	<0.0071	<0.00027
PCB 77	0.0074	0.022	0.019	0.011	0.00042
PCB 81	0.00044	0.0013	0.0011	0.00068	0.000025
PCB 126	<0.29	<0.87	<0.72	<0.44	<0.016
PCB 169	<0.018	<0.056	<0.046	<0.028	<0.0011
PCB 105	0.0049	0.015	0.012	0.0074	0.00028
PCB 114	0.00038	0.0011	0.00093	0.00057	0.000022
PCB 118	0.015	0.046	0.038	0.024	0.00089
PCB 123	0.00021	0.00064	0.00053	0.00033	0.000012
PCB 156/157	0.00036	0.0011	0.00090	0.00056	0.000021
PCB 167	0.00012	0.00036	0.00030	0.00018	0.0000069
PCB 189	0.000013	0.000038	0.000031	0.000019	0.00000073
Total Dioxins & Furans Only	<1.22	<3.69	<3.04	<1.88	<0.071

* 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	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg TEQ/m³	pg TEQ/Rm³*	pg TEQ/Rm³**	pg TEQ/Rm³*	ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	0.084	1.84	0.21	0.13	0.0048
12378-pentachlorodibenzo-p-dioxin	0.16	0.48	0.40	0.24	0.0092
123478-hexachlorodibenzo-p-dioxin	0.044	0.13	0.11	0.068	0.0026
123678-hexachlorodibenzo-p-dioxin	0.087	0.26	0.22	0.13	0.0050
123789-hexachlorodibenzo-p-dioxin	0.071	0.21	0.18	0.11	0.0041
1234678-heptachlorodibenzo-p-dioxin	0.18	0.53	0.44	0.27	0.010
Octachlorodibenzo-p-dioxin	0.011	0.032	0.027	0.016	0.00062
2378-tetrachlorodibenzofuran	0.032	0.097	0.080	0.049	0.0019
12378-pentachlorodibenzofuran	0.0086	0.026	0.021	0.013	0.00050
23478-pentachlorodibenzofuran	0.095	0.29	0.24	0.15	0.0055
123478-hexachlorodibenzofuran	0.042	0.13	0.10	0.064	0.0024
123678-hexachlorodibenzofuran	0.053	0.16	0.13	0.081	0.0030
234678-hexachlorodibenzofuran	0.092	0.28	0.23	0.14	0.0053
123789-hexachlorodibenzofuran	0.040	0.12	0.10	0.062	0.0023
1234678-heptachlorodibenzofuran	0.035	0.11	0.087	0.054	0.0020
1234789-heptachlorodibenzofuran	0.0074	0.022	0.018	0.011	0.00043
Octachlorodibenzofuran	0.0014	0.0041	0.0034	0.0021	0.000079
PCB 77	0.0074	0.022	0.019	0.011	0.00042
PCB 81	0.00044	0.0013	0.0011	0.00068	0.000025
PCB 126	0.14	0.43	0.36	0.22	0.0082
PCB 169	0.0092	0.028	0.023	0.014	0.00053
PCB 105	0.0049	0.015	0.012	0.0074	0.00028
PCB 114	0.00038	0.0011	0.00093	0.00057	0.000022
PCB 118	0.015	0.046	0.038	0.024	0.00089
PCB 123	0.00021	0.00064	0.00053	0.00033	0.000012
PCB 156/157	0.00036	0.0011	0.00090	0.00056	0.000021
PCB 167	0.00012	0.00036	0.00030	0.00018	0.0000069
PCB 189	0.000013	0.000038	0.000031	0.000019	0.00000073
Total Dioxins & Furans Only	1.04	4.72	2.58	1.59	0.060
Total Dioxins, Furans and PCBs	1.22	5.26	3.04	1.87	0.070

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Dichlorinated biphenyls	32600	2.16	6.51	5.37	3.32	0.13
Trichlorinated biphenyls	18000	1.19	3.59	2.96	1.83	0.069
Tetrachlorinated biphenyls	97300	6.46	19.4	16.0	9.90	0.37
Pentachlorinated biphenyls	149000	9.89	29.8	24.5	15.2	0.57
Hexachlorinated biphenyls	33100	2.20	6.61	5.45	3.37	0.13
Heptachlorinated biphenyls	2820	0.19	0.56	0.46	0.29	0.011
Octachlorinated biphenyls	582	0.039	0.12	0.096	0.059	0.0022
Nonachlorinated biphenyls	94.4	0.0063	0.019	0.016	0.0096	0.00036
Decachlorinated biphenyl	17.6	0.0012	0.0035	0.0029	0.0018	0.000067
Total	333514	22.1	66.6	54.9	33.9	1.28

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* At 25°C and 1 atmosphere

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

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

Congener Group	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Dichlorinated biphenyls Trichlorinated biphenyls Tetrachlorinated biphenyls Pentachlorinated biphenyls Hexachlorinated biphenyls Heptachlorinated biphenyls Octachlorinated biphenyls Nonachlorinated biphenyls Decachlorinated biphenyl Total	The sample was lost by the analytical laboratory during extraction and as a result no data is available.					

Dry Gas Volume Sampled (Rm^3*) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	37.6

* At 25°C and 1 atmosphere

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

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

Congener Group	Total Collected	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	pg	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Dichlorinated biphenyls	7380	0.49	1.47	1.22	0.74	0.028
Trichlorinated biphenyls	12800	0.84	2.54	2.12	1.28	0.048
Tetrachlorinated biphenyls	47700	3.14	9.47	7.89	4.77	0.18
Pentachlorinated biphenyls	69900	4.60	13.9	11.6	7.00	0.26
Hexachlorinated biphenyls	12100	0.80	2.40	2.00	1.21	0.045
Heptachlorinated biphenyls	1000	0.066	0.20	0.17	0.10	0.0038
Octachlorinated biphenyls	150	0.0099	0.030	0.025	0.015	0.00056
Nonachlorinated biphenyls	10.1	0.00066	0.0020	0.0017	0.0010	0.000038
Decachlorinated biphenyl	4.90	0.00032	0.00097	0.00081	0.00049	0.000018
Total	151045	9.93	30.0	25.0	15.1	0.57

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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 65
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Actual Concentrations

Congener Group	Actual Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/m³	ng/m³	ng/m³	ng/m³	%
Dichlorinated biphenyls	2.16		0.49	1.32	89.6
Trichlorinated biphenyls	1.19		0.84	1.02	24.5
Tetrachlorinated biphenyls	6.46		3.14	4.80	48.9
Pentachlorinated biphenyls	9.89		4.60	7.24	51.7
Hexachlorinated biphenyls	2.20		0.80	1.50	66.2
Heptachlorinated biphenyls	0.19		0.066	0.13	67.9
Octachlorinated biphenyls	0.039		0.0099	0.024	83.9
Nonachlorinated biphenyls	0.0063		0.00066	0.0035	114
Decachlorinated biphenyl	0.0012		0.00032	0.00074	80.3
Total	22.1		9.93	16.0	53.8

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

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

Congener Group	Dry Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Dichlorinated biphenyls	6.51		1.47	3.99	89.4
Trichlorinated biphenyls	3.59		2.54	3.07	24.3
Tetrachlorinated biphenyls	19.4		9.47	14.5	48.7
Pentachlorinated biphenyls	29.8		13.9	21.8	51.4
Hexachlorinated biphenyls	6.61		2.40	4.51	66.0
Heptachlorinated biphenyls	0.56		0.20	0.38	67.7
Octachlorinated biphenyls	0.12		0.030	0.073	83.7
Nonachlorinated biphenyls	0.019		0.0020	0.010	114
Decachlorinated biphenyl	0.0035		0.00097	0.0022	80.1
Total	66.6		30.0	48.3	53.6

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

Congener Group	Dry Adjusted Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Dichlorinated biphenyls	5.37		1.22	3.29	89.0
Trichlorinated biphenyls	2.96		2.12	2.54	23.5
Tetrachlorinated biphenyls	16.0		7.89	12.0	48.1
Pentachlorinated biphenyls	24.5		11.6	18.0	50.8
Hexachlorinated biphenyls	5.45		2.00	3.72	65.4
Heptachlorinated biphenyls	0.46		0.17	0.31	67.1
Octachlorinated biphenyls	0.096		0.025	0.060	83.2
Nonachlorinated biphenyls	0.016		0.0017	0.0086	114
Decachlorinated biphenyl	0.0029		0.00081	0.0019	79.6
Total	54.9		25.0	39.9	53.0

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

Congener Group	Wet Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Dichlorinated biphenyls	3.32		0.74	2.03	89.9
Trichlorinated biphenyls	1.83		1.28	1.56	25.0
Tetrachlorinated biphenyls	9.90		4.77	7.34	49.4
Pentachlorinated biphenyls	15.2		7.00	11.1	52.1
Hexachlorinated biphenyls	3.37		1.21	2.29	66.6
Heptachlorinated biphenyls	0.29		0.10	0.19	68.3
Octachlorinated biphenyls	0.059		0.015	0.037	84.2
Nonachlorinated biphenyls	0.0096		0.0010	0.0053	114
Decachlorinated biphenyl	0.0018		0.00049	0.0011	80.6
Total	33.9		15.1	24.5	54.2

* 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 69
Clean Harbors Sarnia
Polychlorinated Biphenyl Emission Rates

Congener Group	Emission Rate				Coefficient of Variation
	Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	%
Dichlorinated biphenyls	0.13		0.028	0.076	90.1
Trichlorinated biphenyls	0.069		0.048	0.059	25.3
Tetrachlorinated biphenyls	0.37		0.18	0.28	49.7
Pentachlorinated biphenyls	0.57		0.26	0.42	52.4
Hexachlorinated biphenyls	0.13		0.045	0.086	66.9
Heptachlorinated biphenyls	0.011		0.0038	0.0073	68.5
Octachlorinated biphenyls	0.0022		0.00056	0.0014	84.4
Nonachlorinated biphenyls	0.00036		0.000038	0.00020	115
Decachlorinated biphenyl	0.000067		0.000018	0.000043	80.8
Total	1.28		0.57	0.92	54.5

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

TABLE 70
Clean Harbors Sarnia
Summary of Polychlorinated Biphenyl Emission Data

Congener Group	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Dichlorinated biphenyls	1.32	3.99	3.29	2.03	0.076
Trichlorinated biphenyls	1.02	3.07	2.54	1.56	0.059
Tetrachlorinated biphenyls	4.80	14.5	12.0	7.34	0.28
Pentachlorinated biphenyls	7.24	21.8	18.0	11.1	0.42
Hexachlorinated biphenyls	1.50	4.51	3.72	2.29	0.086
Heptachlorinated biphenyls	0.13	0.38	0.31	0.19	0.0073
Octachlorinated biphenyls	0.024	0.073	0.060	0.037	0.0014
Nonachlorinated biphenyls	0.0035	0.010	0.0086	0.0053	0.00020
Decachlorinated biphenyl	0.00074	0.0022	0.0019	0.0011	0.000043
Total	16.0	48.3	39.9	24.5	0.92

* 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	7450	63.0
Trichlorinated biphenyls	863	106
Tetrachlorinated biphenyls	8410	93.1
Pentachlorinated biphenyls	23000	107
Hexachlorinated biphenyls	4200	43.2
Heptachlorinated biphenyls	254	20.6
Octachlorinated biphenyls	26.3	8.90
Nonachlorinated biphenyls	<2.8	<5.3
Decachlorinated biphenyl	<1.4	<1.9
Total	<44208	<449

"<" 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
1,3-Dichlorobenzene	601	39.9	120	98.9	61.1	2.30
1,4-Dichlorobenzene	201	13.3	40.1	33.1	20.4	0.77
1,2-Dichlorobenzene	246	16.3	49.1	40.5	25.0	0.94
Total Dichlorobenzene	1048	69.5	209	172	107	4.02
1,3,5-trichlorobenzene	85.9	5.70	17.2	14.1	8.74	0.33
1,2,4-trichlorobenzene	1600	106	320	263	163	6.14
1,2,3-trichlorobenzene	521	34.6	104	85.7	53.0	2.00
Total Trichlorobenzene	2207	146	441	363	224	8.46
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	87.1	5.78	17.4	14.3	8.86	0.33
1,2,3,4-tetrachlorobenzene	24.5	1.63	4.89	4.03	2.49	0.094
Total Tetrachlorobenzene	112	7.40	22.3	18.4	11.4	0.43
Pentachlorobenzene	29.6	1.96	5.91	4.87	3.01	0.11
Hexachlorobenzene	10.4	0.69	2.08	1.71	1.06	0.040
Total Chlorobenzenes	3407	226	680	561	346	13.1
Hexachloroethane	<10	<0.66	<2.00	<1.65	<1.02	<0.038
a,2,6-Trichlorotoluene	<10	<0.66	<2.00	<1.65	<1.02	<0.038

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
1,3-Dichlorobenzene						
1,4-Dichlorobenzene						
1,2-Dichlorobenzene						
Total Dichlorobenzene						
1,3,5-trichlorobenzene						
1,2,4-trichlorobenzene						
1,2,3-trichlorobenzene						
Total Trichlorobenzene						
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	The sample was lost by the analytical laboratory during extraction and as a result no data is available.					
1,2,3,4-tetrachlorobenzene						
Total Tetrachlorobenzene						
Pentachlorobenzene						
Hexachlorobenzene						
Total Chlorobenzenes						
Hexachloroethane						
a,2,6-Trichlorotoluene						

Dry Gas Volume Sampled (Rm^3*) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	37.6

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
1,3-Dichlorobenzene	421	27.7	83.6	69.6	42.1	1.58
1,4-Dichlorobenzene	670	44.0	133	111	67.1	2.51
1,2-Dichlorobenzene	506	33.3	100	83.7	50.7	1.90
Total Dichlorobenzene	1597	105	317	264	160	5.99
1,3,5-trichlorobenzene	89.3	5.87	17.7	14.8	8.94	0.34
1,2,4-trichlorobenzene	18100	1190	3595	2993	1812	67.9
1,2,3-trichlorobenzene	4700	309	933	777	470	17.6
Total Trichlorobenzene	22889	1505	4546	3785	2291	85.9
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	67.6	4.44	13.4	11.2	6.77	0.25
1,2,3,4-tetrachlorobenzene	29.8	1.96	5.92	4.93	2.98	0.11
Total Tetrachlorobenzene	97.4	6.40	19.3	16.1	9.75	0.37
Pentachlorobenzene	16.1	1.06	3.20	2.66	1.61	0.060
Hexachlorobenzene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Total Chlorobenzenes	<24610	<1618	<4888	<4070	<2463	<92.4
Hexachloroethane	<10	<0.66	<1.99	<1.65	<1.00	<0.038
a,2,6-Trichlorotoluene	<10	<0.66	<1.99	<1.65	<1.00	<0.038

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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

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	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
1,3-Dichlorobenzene	39.9		27.7	33.8	25.5
1,4-Dichlorobenzene	13.3		44.0	28.7	75.7
1,2-Dichlorobenzene	16.3		33.3	24.8	48.3
Total Dichlorobenzene	69.5		105	87.3	28.7
1,3,5-trichlorobenzene	5.70		5.87	5.78	2.1
1,2,4-trichlorobenzene	106		1190	648	118
1,2,3-trichlorobenzene	34.6		309	172	113
Total Trichlorobenzene	146		1505	826	116
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	5.78		4.44	5.11	18.5
1,2,3,4-tetrachlorobenzene	1.63		1.96	1.79	13.2
Total Tetrachlorobenzene	7.40		6.40	6.90	10.3
Pentachlorobenzene	1.96		1.06	1.51	42.4
Hexachlorobenzene	0.69		<0.66	<0.67	3.4
Total Chlorobenzenes	226		<1618	<922	107
Hexachloroethane	<0.66		<0.66	<0.66	0.6
a,2,6-Trichlorotoluene	<0.66		<0.66	<0.66	0.6

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

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	120		83.6	102	25.3
1,4-Dichlorobenzene	40.1		133	86.6	75.9
1,2-Dichlorobenzene	49.1		100	74.8	48.5
Total Dichlorobenzene	209		317	263	29.0
1,3,5-trichlorobenzene	17.2		17.7	17.4	2.4
1,2,4-trichlorobenzene	320		3595	1957	118
1,2,3-trichlorobenzene	104		933	519	113
Total Trichlorobenzene	441		4546	2493	116
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	17.4		13.4	15.4	18.2
1,2,3,4-tetrachlorobenzene	4.89		5.92	5.41	13.4
Total Tetrachlorobenzene	22.3		19.3	20.8	10.0
Pentachlorobenzene	5.91		3.20	4.55	42.1
Hexachlorobenzene	2.08		<1.99	<2.03	3.2
Total Chlorobenzenes	680		<4888	<2784	107
Hexachloroethane	<2.00		<1.99	<1.99	0.4
a,2,6-Trichlorotoluene	<2.00		<1.99	<1.99	0.4

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

Specific Isomer	Dry Adjusted 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	98.9		69.6	84.3	24.6
1,4-Dichlorobenzene	33.1		111	71.9	76.4
1,2-Dichlorobenzene	40.5		83.7	62.1	49.2
Total Dichlorobenzene	172		264	218	29.7
1,3,5-trichlorobenzene	14.1		14.8	14.5	3.1
1,2,4-trichlorobenzene	263		2993	1628	119
1,2,3-trichlorobenzene	85.7		777	431	113
Total Trichlorobenzene	363		3785	2074	117
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	14.3		11.2	12.8	17.5
1,2,3,4-tetrachlorobenzene	4.03		4.93	4.48	14.1
Total Tetrachlorobenzene	18.4		16.1	17.2	9.3
Pentachlorobenzene	4.87		2.66	3.77	41.5
Hexachlorobenzene	1.71		<1.65	<1.68	2.4
Total Chlorobenzenes	561		<4070	<2315	107
Hexachloroethane	<1.65		<1.65	<1.65	0.3
a,2,6-Trichlorotoluene	<1.65		<1.65	<1.65	0.3

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

Specific Isomer	Wet 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	61.1		42.1	51.6	26.0
1,4-Dichlorobenzene	20.4		67.1	43.8	75.3
1,2-Dichlorobenzene	25.0		50.7	37.8	47.9
Total Dichlorobenzene	107		160	133	28.3
1,3,5-trichlorobenzene	8.74		8.94	8.84	1.6
1,2,4-trichlorobenzene	163		1812	987	118
1,2,3-trichlorobenzene	53.0		470	262	113
Total Trichlorobenzene	224		2291	1258	116
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	8.86		6.77	7.81	18.9
1,2,3,4-tetrachlorobenzene	2.49		2.98	2.74	12.7
Total Tetrachlorobenzene	11.4		9.75	10.6	10.7
Pentachlorobenzene	3.01		1.61	2.31	42.8
Hexachlorobenzene	1.06		<1.00	<1.03	3.9
Total Chlorobenzenes	346		<2463	<1405	107
Hexachloroethane	<1.02		<1.00	<1.01	1.1
a,2,6-Trichlorotoluene	<1.02		<1.00	<1.01	1.1

* 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 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	2.30		1.58	1.94	26.4
1,4-Dichlorobenzene	0.77		2.51	1.64	75.1
1,2-Dichlorobenzene	0.94		1.90	1.42	47.6
Total Dichlorobenzene	4.02		5.99	5.01	27.9
1,3,5-trichlorobenzene	0.33		0.34	0.33	1.2
1,2,4-trichlorobenzene	6.14		67.9	37.0	118
1,2,3-trichlorobenzene	2.00		17.6	9.82	113
Total Trichlorobenzene	8.46		85.9	47.2	116
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	0.33		0.25	0.29	19.3
1,2,3,4-tetrachlorobenzene	0.094		0.11	0.10	12.3
Total Tetrachlorobenzene	0.43		0.37	0.40	11.1
Pentachlorobenzene	0.11		0.060	0.087	43.1
Hexachlorobenzene	0.040		<0.038	<0.039	4.3
Total Chlorobenzenes	13.1		<92.4	<52.7	106
Hexachloroethane	<0.038		<0.038	<0.038	1.5
a,2,6-Trichlorotoluene	<0.038		<0.038	<0.038	1.5

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

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

Specific Isomer	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
1,3-Dichlorobenzene	33.8	102	84.3	51.6	1.94
1,4-Dichlorobenzene	28.7	86.6	71.9	43.8	1.64
1,2-Dichlorobenzene	24.8	74.8	62.1	37.8	1.42
Total Dichlorobenzene	87.3	263	218	133	5.01
1,3,5-trichlorobenzene	5.78	17.4	14.5	8.84	0.33
1,2,4-trichlorobenzene	648	1957	1628	987	37.0
1,2,3-trichlorobenzene	172	519	431	262	9.82
Total Trichlorobenzene	826	2493	2074	1258	47.2
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	5.11	15.4	12.8	7.81	0.29
1,2,3,4-tetrachlorobenzene	1.79	5.41	4.48	2.74	0.10
Total Tetrachlorobenzene	6.90	20.8	17.2	10.6	0.40
Pentachlorobenzene	1.51	4.55	3.77	2.31	0.087
Hexachlorobenzene	<0.67	<2.03	<1.68	<1.03	<0.039
Total Chlorobenzenes	<922	<2784	<2315	<1405	<52.7
Hexachloroethane	<0.66	<1.99	<1.65	<1.01	<0.038
a,2,6-Trichlorotoluene	<0.66	<1.99	<1.65	<1.01	<0.038

* 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	<10	<10
1,4-Dichlorobenzene	34.9	13.3
1,2-Dichlorobenzene	10.7	<10
Total Dichlorobenzene	<55.6	<33.3
1,3,5-trichlorobenzene	<10	<10
1,2,4-trichlorobenzene	718	<10
1,2,3-trichlorobenzene	220	<10
Total Trichlorobenzene	<948	<30
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	<10	<10
1,2,3,4-tetrachlorobenzene	<10	<10
Total Tetrachlorobenzene	<20	<20
Pentachlorobenzene	<10	<10
Hexachlorobenzene	<10	<10
Total Chlorobenzenes	<1044	<103
Hexachloroethane	<10	<10
a,2,6-Trichlorotoluene	<10	<10

"<" 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
2,6-dichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
2,4 & 2,5-dichlorophenol	499	33.1	99.7	82.1	50.8	1.91
3,5-dichlorophenol	90.0	5.97	18.0	14.8	9.15	0.35
2,3-dichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
3,4-dichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Total Dichlorophenols	<739	<49.0	<148	<122	<75.2	<2.83
2,4,6-trichlorophenol	70.1	4.65	14.0	11.5	7.13	0.27
2,3,6-trichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
2,3,5-trichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
2,4,5-trichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
2,3,4-trichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
3,4,5-trichlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Total Trichlorophenols	<320	<21.2	<63.9	<52.7	<32.6	<1.23
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
2,3,4,5-tetrachlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Total Tetrachlorophenols	<100	<6.63	<20.0	<16.5	<10.2	<0.38
Pentachlorophenol	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Total Chlorophenols	<1209	<80.2	<241	<199	<123	<4.64
Heptachlor	<0.25	<0.017	<0.050	<0.041	<0.025	<0.00096
Heptachlor Epoxide A	<2.5	<0.17	<0.50	<0.41	<0.25	<0.0096
Heptachlor Epoxide B	<0.40	<0.027	<0.080	<0.066	<0.041	<0.0015
Total Heptachlor	<3.15	<0.21	<0.63	<0.52	<0.32	<0.012
Oxychlorodane	<0.62	<0.041	<0.12	<0.10	<0.063	<0.0024
trans-Chlorodane	<1.4	<0.093	<0.28	<0.23	<0.14	<0.0054
cis-Chlorodane	<1.4	<0.093	<0.28	<0.23	<0.14	<0.0054
Total Chlorodane	<3.42	<0.23	<0.68	<0.56	<0.35	<0.013
Parlar-26	<4.8	<0.32	<0.96	<0.79	<0.49	<0.018
Parlar-50	<2.6	<0.17	<0.52	<0.43	<0.26	<0.010
Parlar-62	<4.0	<0.27	<0.80	<0.66	<0.41	<0.015
Total Toxaphene	<11.4	<0.76	<2.28	<1.88	<1.16	<0.044
Hexachlorophene	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Hexachlorobutadiene	10.9	0.72	2.18	1.79	1.11	0.042
Octachlorostyrene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Tributyltin	<500	<33.2	<99.9	<82.3	<50.9	<1.92

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
2,6-dichlorophenol						
2,4 & 2,5-dichlorophenol						
3,5-dichlorophenol						
2,3-dichlorophenol						
3,4-dichlorophenol						
Total Dichlorophenols						
2,4,6-trichlorophenol						
2,3,6-trichlorophenol						
2,3,5-trichlorophenol						
2,4,5-trichlorophenol						
2,3,4-trichlorophenol						
3,4,5-trichlorophenol						
Total Trichlorophenols						
2,3,5,6 & 2,3,4,6-tetrachlorophenol						
2,3,4,5-tetrachlorophenol						
Total Tetrachlorophenols						
Pentachlorophenol						
Total Chlorophenols						
Heptachlor						
Heptachlor Epoxide A						
Heptachlor Epoxide B						
Total Heptachlor						
Oxychlorodane						
trans-Chlorodane						
cis-Chlorodane						
Total Chlorodane						
Parlar-26						
Parlar-50						
Parlar-62						
Total Toxaphene						
Hexachlorophene						
Hexachlorobutadiene						
Octachlorostyrene						
Tributyltin						

The sample was lost by the analytical laboratory during extraction and as a result no data is available.

Dry Gas Volume Sampled (Rm^3*) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	37.6

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
2,6-dichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
2,4 & 2,5-dichlorophenol	114	7.49	22.6	18.9	11.4	0.43
3,5-dichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
2,3-dichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
3,4-dichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Total Dichlorophenols	<314	<20.6	<62.4	<51.9	<31.4	<1.18
2,4,6-trichlorophenol	62.8	4.13	12.5	10.4	6.29	0.24
2,3,6-trichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
2,3,5-trichlorophenol	127	8.35	25.2	21.0	12.7	0.48
2,4,5-trichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
2,3,4-trichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
3,4,5-trichlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Total Trichlorophenols	<390	<25.6	<77.4	<64.5	<39.0	<1.46
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
2,3,4,5-tetrachlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Total Tetrachlorophenols	<100	<6.57	<19.9	<16.5	<10.0	<0.38
Pentachlorophenol	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Total Chlorophenols	<854	<56.1	<170	<141	<85.5	<3.20
Heptachlor	<0.11	<0.0072	<0.022	<0.018	<0.011	<0.00041
Heptachlor Epoxide A	<1.4	<0.092	<0.28	<0.23	<0.14	<0.0053
Heptachlor Epoxide B	0.22	0.014	0.044	0.036	0.022	0.00083
Total Heptachlor	<1.73	<0.11	<0.34	<0.29	<0.17	<0.0065
Oxychlorodane	<0.42	<0.028	<0.083	<0.069	<0.042	<0.0016
trans-Chlorodane	<0.74	<0.049	<0.15	<0.12	<0.074	<0.0028
cis-Chlorodane	<0.72	<0.047	<0.14	<0.12	<0.072	<0.0027
Total Chlorodane	<1.88	<0.12	<0.37	<0.31	<0.19	<0.0071
Parlar-26	<3.3	<0.22	<0.66	<0.55	<0.33	<0.012
Parlar-50	<1.3	<0.085	<0.26	<0.21	<0.13	<0.0049
Parlar-62	<1.9	<0.12	<0.38	<0.31	<0.19	<0.0071
Total Toxaphene	<6.50	<0.43	<1.29	<1.07	<0.65	<0.024
Hexachlorophene	<50	<3.3	<9.93	<8.27	<5.00	<0.19
Hexachlorobutadiene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Octachlorostyrene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Tributyltin	<500	<32.9	<99.3	<82.7	<50.0	<1.88

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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

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				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/m³	ng/m³	ng/m³	ng/m³	%
2,6-dichlorophenol	<3.32		<3.29	<3.30	0.6
2,4 & 2,5-dichlorophenol	33.1		7.49	20.3	89.2
3,5-dichlorophenol	5.97		<3.29	<4.63	41.0
2,3-dichlorophenol	<3.32		<3.29	<3.30	0.6
3,4-dichlorophenol	<3.32		<3.29	<3.30	0.6
Total Dichlorophenols	<49.0		<20.6	<34.8	57.6
2,4,6-trichlorophenol	4.65		4.13	4.39	8.4
2,3,6-trichlorophenol	<3.32		<3.29	<3.30	0.6
2,3,5-trichlorophenol	<3.32		8.35	<5.83	61.0
2,4,5-trichlorophenol	<3.32		<3.29	<3.30	0.6
2,3,4-trichlorophenol	<3.32		<3.29	<3.30	0.6
3,4,5-trichlorophenol	<3.32		<3.29	<3.30	0.6
Total Trichlorophenols	<21.2		<25.6	<23.4	13.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<3.32		<3.29	<3.30	0.6
2,3,4,5-tetrachlorophenol	<3.32		<3.29	<3.30	0.6
Total Tetrachlorophenols	<6.63		<6.57	<6.60	0.6
Pentachlorophenol	<3.32		<3.29	<3.30	0.6
Total Chlorophenols	<80.2		<56.1	<68.2	25.0
Heptachlor	<0.017		<0.0072	<0.012	55.5
Heptachlor Epoxide A	<0.17		<0.092	<0.13	40.5
Heptachlor Epoxide B	<0.027		0.014	<0.020	41.6
Total Heptachlor	<0.21		<0.11	<0.16	41.7
Oxychlorodane	<0.041		<0.028	<0.034	27.8
trans-Chlorodane	<0.093		<0.049	<0.071	44.2
cis-Chlorodane	<0.093		<0.047	<0.070	45.9
Total Chlorodane	<0.23		<0.12	<0.18	41.7
Parlar-26	<0.32		<0.22	<0.27	26.8
Parlar-50	<0.17		<0.085	<0.13	47.7
Parlar-62	<0.27		<0.12	<0.20	50.9
Total Toxaphene	<0.76		<0.43	<0.59	39.3
Hexachlorophene	<3.32		<3.3	<3.30	0.6
Hexachlorobutadiene	0.72		<0.66	<0.69	6.7
Octachlorostyrene	<0.66		<0.66	<0.66	0.6
Tributyltin	<33.2		<32.9	<33.0	0.6

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

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

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*	%
2,6-dichlorophenol	<9.99		<9.93	<9.96	0.4
2,4 & 2,5-dichlorophenol	99.7		22.6	61.2	89.1
3,5-dichlorophenol	18.0		<9.93	<14.0	40.8
2,3-dichlorophenol	<9.99		<9.93	<9.96	0.4
3,4-dichlorophenol	<9.99		<9.93	<9.96	0.4
Total Dichlorophenols	<148		<62.4	<105	57.4
2,4,6-trichlorophenol	14.0		12.5	13.2	8.2
2,3,6-trichlorophenol	<9.99		<9.93	<9.96	0.4
2,3,5-trichlorophenol	<9.99		25.2	<17.6	61.2
2,4,5-trichlorophenol	<9.99		<9.93	<9.96	0.4
2,3,4-trichlorophenol	<9.99		<9.93	<9.96	0.4
3,4,5-trichlorophenol	<9.99		<9.93	<9.96	0.4
Total Trichlorophenols	<63.9		<77.4	<70.7	13.5
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<9.99		<9.93	<9.96	0.4
2,3,4,5-tetrachlorophenol	<9.99		<9.93	<9.96	0.4
Total Tetrachlorophenols	<20.0		<19.9	<19.9	0.4
Pentachlorophenol	<9.99		<9.93	<9.96	0.4
Total Chlorophenols	<241		<170	<206	24.7
Heptachlor	<0.050		<0.022	<0.036	55.3
Heptachlor Epoxide A	<0.50		<0.28	<0.39	40.3
Heptachlor Epoxide B	<0.080		0.044	<0.062	41.4
Total Heptachlor	<0.63		<0.34	<0.49	41.5
Oxychlorodane	<0.12		<0.083	<0.10	27.6
trans-Chlorodane	<0.28		<0.15	<0.21	44.0
cis-Chlorodane	<0.28		<0.14	<0.21	45.7
Total Chlorodane	<0.68		<0.37	<0.53	41.5
Parlar-26	<0.96		<0.66	<0.81	26.6
Parlar-50	<0.52		<0.26	<0.39	47.5
Parlar-62	<0.80		<0.38	<0.59	50.7
Total Toxaphene	<2.28		<1.29	<1.78	39.1
Hexachlorophene	<9.99		<9.93	<9.96	0.4
Hexachlorobutadiene	2.18		<1.99	<2.08	6.5
Octachlorostyrene	<2.00		<1.99	<1.99	0.4
Tributyltin	<99.9		<99.3	<99.6	0.4

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

Specific Isomer	Dry Adjusted Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
2,6-dichlorophenol	<8.23		<8.27	<8.25	0.3
2,4 & 2,5-dichlorophenol	82.1		18.9	50.5	88.6
3,5-dichlorophenol	14.8		<8.27	<11.5	40.1
2,3-dichlorophenol	<8.23		<8.27	<8.25	0.3
3,4-dichlorophenol	<8.23		<8.27	<8.25	0.3
Total Dichlorophenols	<122		<51.9	<86.8	56.8
2,4,6-trichlorophenol	11.5		10.4	11.0	7.4
2,3,6-trichlorophenol	<8.23		<8.27	<8.25	0.3
2,3,5-trichlorophenol	<8.23		21.0	<14.6	61.8
2,4,5-trichlorophenol	<8.23		<8.27	<8.25	0.3
2,3,4-trichlorophenol	<8.23		<8.27	<8.25	0.3
3,4,5-trichlorophenol	<8.23		<8.27	<8.25	0.3
Total Trichlorophenols	<52.7		<64.5	<58.6	14.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<8.23		<8.27	<8.25	0.3
2,3,4,5-tetrachlorophenol	<8.23		<8.27	<8.25	0.3
Total Tetrachlorophenols	<16.5		<16.5	<16.5	0.3
Pentachlorophenol	<8.23		<8.27	<8.25	0.3
Total Chlorophenols	<199		<141	<170	24.0
Heptachlor	<0.041		<0.018	<0.030	54.7
Heptachlor Epoxide A	<0.41		<0.23	<0.32	39.6
Heptachlor Epoxide B	<0.066		0.036	<0.051	40.7
Total Heptachlor	<0.52		<0.29	<0.40	40.8
Oxychlorodane	<0.10		<0.069	<0.086	26.9
trans-Chlorodane	<0.23		<0.12	<0.18	43.3
cis-Chlorodane	<0.23		<0.12	<0.17	45.1
Total Chlorodane	<0.56		<0.31	<0.44	40.8
Parlar-26	<0.79		<0.55	<0.67	25.9
Parlar-50	<0.43		<0.21	<0.32	46.8
Parlar-62	<0.66		<0.31	<0.49	50.0
Total Toxaphene	<1.88		<1.07	<1.48	38.4
Hexachlorophene	<8.23		<8.27	<8.25	0.3
Hexachlorobutadiene	1.79		<1.65	<1.72	5.8
Octachlorostyrene	<1.65		<1.65	<1.65	0.3
Tributyltin	<82.3		<82.7	<82.5	0.3

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

Specific Isomer	Wet Reference Concentration				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
2,6-dichlorophenol	<5.09		<5.00	<5.05	1.1
2,4 & 2,5-dichlorophenol	50.8		11.4	31.1	89.5
3,5-dichlorophenol	9.15		<5.00	<7.1	41.4
2,3-dichlorophenol	<5.09		<5.00	<5.05	1.1
3,4-dichlorophenol	<5.09		<5.00	<5.05	1.1
Total Dichlorophenols	<75.2		<31.4	<53.3	58.0
2,4,6-trichlorophenol	7.13		6.29	6.71	8.9
2,3,6-trichlorophenol	<5.09		<5.00	<5.05	1.1
2,3,5-trichlorophenol	<5.09		12.7	<8.90	60.6
2,4,5-trichlorophenol	<5.09		<5.00	<5.05	1.1
2,3,4-trichlorophenol	<5.09		<5.00	<5.05	1.1
3,4,5-trichlorophenol	<5.09		<5.00	<5.05	1.1
Total Trichlorophenols	<32.6		<39.0	<35.8	12.8
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<5.09		<5.00	<5.05	1.1
2,3,4,5-tetrachlorophenol	<5.09		<5.00	<5.05	1.1
Total Tetrachlorophenols	<10.2		<10.0	<10.1	1.1
Pentachlorophenol	<5.09		<5.00	<5.05	1.1
Total Chlorophenols	<123		<85.5	<104	25.5
Heptachlor	<0.025		<0.011	<0.018	56.0
Heptachlor Epoxide A	<0.25		<0.14	<0.20	40.9
Heptachlor Epoxide B	<0.041		0.022	<0.031	42.1
Total Heptachlor	<0.32		<0.17	<0.25	42.2
Oxychlorodane	<0.063		<0.042	<0.053	28.3
trans-Chlorodane	<0.14		<0.074	<0.11	44.6
cis-Chlorodane	<0.14		<0.072	<0.11	46.4
Total Chlorodane	<0.35		<0.19	<0.27	42.1
Parlar-26	<0.49		<0.33	<0.41	27.3
Parlar-50	<0.26		<0.13	<0.20	48.1
Parlar-62	<0.41		<0.19	<0.30	51.3
Total Toxaphene	<1.16		<0.65	<0.91	39.8
Hexachlorophene	<5.09		<5.00	<5.05	1.1
Hexachlorobutadiene	1.11		<1.00	<1.05	7.2
Octachlorostyrene	<1.02		<1.00	<1.01	1.1
Tributyltin	<50.9		<50.0	<50.5	1.1

* 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 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	<0.19		<0.19	<0.19	1.5
2,4 & 2,5-dichlorophenol	1.91		0.43	1.17	89.7
3,5-dichlorophenol	0.35		<0.19	<0.27	41.8
2,3-dichlorophenol	<0.19		<0.19	<0.19	1.5
3,4-dichlorophenol	<0.19		<0.19	<0.19	1.5
Total Dichlorophenols	<2.83		<1.18	<2.01	58.3
2,4,6-trichlorophenol	0.27		0.24	0.25	9.3
2,3,6-trichlorophenol	<0.19		<0.19	<0.19	1.5
2,3,5-trichlorophenol	<0.19		0.48	<0.33	60.3
2,4,5-trichlorophenol	<0.19		<0.19	<0.19	1.5
2,3,4-trichlorophenol	<0.19		<0.19	<0.19	1.5
3,4,5-trichlorophenol	<0.19		<0.19	<0.19	1.5
Total Trichlorophenols	<1.23		<1.46	<1.35	12.4
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<0.19		<0.19	<0.19	1.5
2,3,4,5-tetrachlorophenol	<0.19		<0.19	<0.19	1.5
Total Tetrachlorophenols	<0.38		<0.38	<0.38	1.5
Pentachlorophenol	<0.19		<0.19	<0.19	1.5
Total Chlorophenols	<4.64		<3.20	<3.92	25.8
Heptachlor	<0.00096		<0.00041	<0.00069	56.3
Heptachlor Epoxide A	<0.0096		<0.0053	<0.0074	41.3
Heptachlor Epoxide B	<0.0015		0.00083	<0.0012	42.4
Total Heptachlor	<0.012		<0.0065	<0.0093	42.5
Oxychlorodane	<0.0024		<0.0016	<0.0020	28.6
trans-Chlorodane	<0.0054		<0.0028	<0.0041	45.0
cis-Chlorodane	<0.0054		<0.0027	<0.0040	46.7
Total Chlorodane	<0.013		<0.0071	<0.010	42.5
Parlar-26	<0.018		<0.012	<0.015	27.6
Parlar-50	<0.010		<0.0049	<0.0074	48.5
Parlar-62	<0.015		<0.0071	<0.0112	51.6
Total Toxaphene	<0.044		<0.024	<0.034	40.1
Hexachlorophene	<0.19		<0.19	<0.19	1.5
Hexachlorobutadiene	0.042		<0.038	<0.040	7.6
Octachlorostyrene	<0.038		<0.038	<0.038	1.5
Tributyltin	<1.92		<1.88	<1.90	1.5

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

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

Specific Isomer	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
2,6-dichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
2,4 & 2,5-dichlorophenol	20.3	61.2	50.5	31.1	1.17
3,5-dichlorophenol	<4.63	<14.0	<11.5	<7.08	<0.27
2,3-dichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
3,4-dichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
Total Dichlorophenols	<34.8	<105	<86.8	<53.3	<2.01
2,4,6-trichlorophenol	4.39	13.2	11.0	6.71	0.25
2,3,6-trichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
2,3,5-trichlorophenol	<5.83	<17.6	<14.6	<8.90	<0.33
2,4,5-trichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
2,3,4-trichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
3,4,5-trichlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
Total Trichlorophenols	<23.4	<70.7	<58.6	<35.8	<1.35
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
2,3,4,5-tetrachlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
Total Tetrachlorophenols	<6.60	<19.9	<16.5	<10.1	<0.38
Pentachlorophenol	<3.30	<9.96	<8.25	<5.05	<0.19
Total Chlorophenols	<68.2	<206	<170	<104	<3.92
Heptachlor	<0.012	<0.036	<0.030	<0.018	<0.00069
Heptachlor Epoxide A	<0.13	<0.39	<0.32	<0.20	<0.0074
Heptachlor Epoxide B	<0.020	<0.062	<0.051	<0.031	<0.0012
Total Heptachlor	<0.16	<0.49	<0.40	<0.25	<0.0093
Oxychlorodane	<0.034	<0.10	<0.086	<0.053	<0.0020
trans-Chlorodane	<0.071	<0.21	<0.18	<0.11	<0.0041
cis-Chlorodane	<0.070	<0.21	<0.17	<0.11	<0.0040
Total Chlorodane	<0.18	<0.53	<0.44	<0.27	<0.010
Parlar-26	<0.27	<0.81	<0.67	<0.41	<0.015
Parlar-50	<0.13	<0.39	<0.32	<0.20	<0.0074
Parlar-62	<0.20	<0.59	<0.49	<0.30	<0.0112
Total Toxaphene	<0.59	<1.78	<1.48	<0.91	<0.034
Hexachlorophene	<3.30	<9.96	<8.25	<5.05	<0.19
Hexachlorobutadiene	<0.69	<2.08	<1.72	<1.05	<0.040
Octachlorostyrene	<0.66	<1.99	<1.65	<1.01	<0.038
Tributyltin	<33.0	<99.6	<82.5	<50.5	<1.90

* 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	<50	<50
2,4 & 2,5-dichlorophenol	<50	<50
3,5-dichlorophenol	<50	52
2,3-dichlorophenol	<50	<50
3,4-dichlorophenol	<50	<50
Total Dichlorophenols	<250	<252
2,4,6-trichlorophenol	<50	<50
2,3,6-trichlorophenol	<50	<50
2,3,5-trichlorophenol	<50	<50
2,4,5-trichlorophenol	<50	<50
2,3,4-trichlorophenol	<50	<50
3,4,5-trichlorophenol	<50	<50
Total Trichlorophenols	<300	<300
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<50	<50
2,3,4,5-tetrachlorophenol	<50	139
Total Tetrachlorophenols	<100	<189
Pentachlorophenol	<50	<50
Total Chlorophenols	<700	<791
Heptachlor	<0.10	<0.11
Heptachlor Epoxide A	<0.90	<1.3
Heptachlor Epoxide B	<0.14	<0.21
Total Heptachlor	<1.14	<1.62
Oxychlorodane	<0.30	<0.44
trans-Chlorodane	<0.67	<0.75
cis-Chlorodane	<0.66	<0.73
Total Chlorodane	<1.63	<1.92
Parlar-26	<2.5	<2.3
Parlar-50	<0.90	<1.2
Parlar-62	<1.4	<1.8
Total Toxaphene	<4.80	<5.30
Hexachlorophene	<50	<50
Hexachlorobutadiene	<10	<10
Octachlorostyrene	<10	<10
Tributyltin	-	<500

"<" 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	54.5	3.62	10.9	8.97	5.54	0.21
Acenaphthylene	178	11.8	35.6	29.3	18.1	0.68
Anthracene	50.2	3.33	10.0	8.26	5.11	0.19
Benzo(a)Anthracene	11.4	0.76	2.28	1.88	1.16	0.044
Benzo(b)Fluoranthene	30.1	2.00	6.01	4.95	3.06	0.12
Benzo(k)Fluoranthene	10.9	0.72	2.18	1.79	1.11	0.042
Benzo(a)fluorene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Benzo(b)fluorene	16.2	1.07	3.24	2.67	1.65	0.062
Benzo(g,h,i)Perylene	17.4	1.15	3.48	2.86	1.77	0.067
Benzo(a)Pyrene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Benzo(e)Pyrene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Biphenyl	889	59.0	178	146	90.4	3.41
2-Chloronaphthalene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Chrysene/Triphenylene/Benzo(b)anthracene	51.1	3.39	10.2	8.41	5.20	0.20
Coronene	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Dibenzo(a,c/a,h)Anthracene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Dibenzo(a,e)pyrene	<50	<3.32	<9.99	<8.23	<5.09	<0.19
9,10-dimethylanthracene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
7,12-Dimethylbenzo(a)anthracene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Fluoranthene	198	13.1	39.5	32.6	20.1	0.76
Fluorene	103	6.83	20.6	17.0	10.5	0.39
Indeno(1,2,3-cd)Pyrene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
2-methylanthracene	80.8	5.36	16.1	13.3	8.22	0.31
3-Methylcholanthrene	<50	<3.32	<9.99	<8.23	<5.09	<0.19
1-Methylnaphthalene	1490	98.9	298	245	152	5.71
2-Methylnaphthalene	1020	67.7	204	168	104	3.91
1-Methylphenanthrene	388	25.7	77.5	63.9	39.5	1.49
9-Methylphenanthrene	55.0	3.65	11.0	9.05	5.59	0.21
Naphthalene	5320	353	1063	876	541	20.4
Perylene	<10	<0.66	<2.00	<1.65	<1.02	<0.038
Phenanthrene	508	33.7	101	83.6	51.7	1.95
Picene	<50	<3.32	<9.99	<8.23	<5.09	<0.19
Pyrene	123	8.16	24.6	20.2	12.5	0.47
Quinoline	<10	<0.66	<2.00	<1.65	<1.02	<0.038
m-terphenyl	34.4	2.28	6.87	5.66	3.50	0.13
o-Terphenyl	<10	<0.66	<2.00	<1.65	<1.02	<0.038
p-terphenyl	16.8	1.11	3.36	2.76	1.71	0.064
Tetralin	3400	226	679	560	346	13.0
Total	<14356	<952	<2867	<2363	<1460	<55.0

Dry Gas Volume Sampled (Rm^3*) :	5.007
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	23.3
Wet Reference Flowrate (Rm^3/s*) :	37.7

* 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						
Coronene						
Dibenzo(a,c/a,h)Anthracene						
Dibenzo(a,e)pyrene						
9,10-dimethylanthracene						
7,12-Dimethylbenzo(a)anthracene	The sample was lost by the analytical laboratory during extraction and as a result no data is available.					
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						
Total						

Dry Gas Volume Sampled (Rm^3*) :	5.096
Actual Flowrate (m^3/s) :	57.9
Dry Reference Flowrate (Rm^3/s*) :	19.2
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	37.6

* 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	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	66.7	4.38	13.2	11.0	6.68	0.25
Acenaphthylene	116	7.63	23.0	19.2	11.6	0.44
Anthracene	34.1	2.24	6.77	5.64	3.41	0.13
Benzo(a)Anthracene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Benzo(b)Fluoranthene	23.7	1.56	4.71	3.92	2.37	0.089
Benzo(k)Fluoranthene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Benzo(a)fluorene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Benzo(b)fluorene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Benzo(g,h,i)Perylene	15.2	1.00	3.02	2.51	1.52	0.057
Benzo(a)Pyrene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Benzo(e)Pyrene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Biphenyl	464	30.5	92.2	76.7	46.4	1.74
2-Chloronaphthalene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Chrysene/Triphenylene/Benzo(b)anthracene	21.9	1.44	4.35	3.62	2.19	0.082
Coronene	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Dibenzo(a,c/a,h)Anthracene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Dibenzo(a,e)pyrene	<50	<3.29	<9.93	<8.27	<5.00	<0.19
9,10-dimethylanthracene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
7,12-Dimethylbenzo(a)anthracene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Fluoranthene	98.5	6.48	19.6	16.3	9.86	0.37
Fluorene	102	6.71	20.3	16.9	10.2	0.38
Indeno(1,2,3-cd)Pyrene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
2-methylanthracene	55.1	3.62	10.9	9.11	5.52	0.21
3-Methylcholanthrene	<50	<3.29	<9.93	<8.27	<5.00	<0.19
1-Methylnaphthalene	1140	74.9	226	189	114	4.28
2-Methylnaphthalene	1930	127	383	319	193	7.24
1-Methylphenanthrene	76.8	5.05	15.3	12.7	7.69	0.29
9-Methylphenanthrene	51.3	3.37	10.2	8.48	5.14	0.19
Naphthalene	5610	369	1114	928	562	21.1
Perylene	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Phenanthrene	276	18.1	54.8	45.6	27.6	1.04
Picene	<50	<3.29	<9.93	<8.27	<5.00	<0.19
Pyrene	61.0	4.01	12.1	10.1	6.11	0.23
Quinoline	<10	<0.66	<1.99	<1.65	<1.00	<0.038
m-terphenyl	26.0	1.71	5.16	4.30	2.60	0.098
o-Terphenyl	<10	<0.66	<1.99	<1.65	<1.00	<0.038
p-terphenyl	<10	<0.66	<1.99	<1.65	<1.00	<0.038
Tetralin	2890	190	574	478	289	10.8
Total	<13408	<881	<2663	<2217	<1342	<50.3

Dry Gas Volume Sampled (Rm^3*) :	5.035
Actual Flowrate (m^3/s) :	57.1
Dry Reference Flowrate (Rm^3/s*) :	18.9
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
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

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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/m³	ng/m³	ng/m³	ng/m³	%
Acenaphthene	3.62		4.38	4.00	13.6
Acenaphthylene	11.8		7.63	9.72	30.4
Anthracene	3.33		2.24	2.79	27.6
Benzo(a)Anthracene	0.76		<0.66	<0.71	9.9
Benzo(b)Fluoranthene	2.00		1.56	1.78	17.5
Benzo(k)Fluoranthene	0.72		<0.66	<0.69	6.7
Benzo(a)fluorene	<0.66		<0.66	<0.66	0.6
Benzo(b)fluorene	1.07		<0.66	<0.87	34.1
Benzo(g,h,i)Perylene	1.15		1.00	1.08	10.2
Benzo(a)Pyrene	<0.66		<0.66	<0.66	0.6
Benzo(e)Pyrene	<0.66		<0.66	<0.66	0.6
Biphenyl	59.0		30.5	44.7	45.0
2-Chloronaphthalene	<0.66		<0.66	<0.66	0.6
Chrysene/Triphenylene/Benzo(b)anthracene	3.39		1.44	2.41	57.1
Coronene	<3.32		<3.29	<3.30	0.6
Dibenzo(a,c/a,h)Anthracene	<0.66		<0.66	<0.66	0.6
Dibenzo(a,e)pyrene	<3.32		<3.29	<3.30	0.6
9,10-dimethylanthracene	<0.66		<0.66	<0.66	0.6
7,12-Dimethylbenzo(a)anthracene	<0.66		<0.66	<0.66	0.6
Fluoranthene	13.1		6.48	9.81	48.0
Fluorene	6.83		6.71	6.77	1.3
Indeno(1,2,3-cd)Pyrene	<0.66		<0.66	<0.66	0.6
2-methylanthracene	5.36		3.62	4.49	27.4
3-Methylcholanthrene	<3.32		<3.29	<3.30	0.6
1-Methylnaphthalene	98.9		74.9	86.9	19.5
2-Methylnaphthalene	67.7		127	97	43.0
1-Methylphenanthrene	25.7		5.05	15.4	95.0
9-Methylphenanthrene	3.65		3.37	3.51	5.6
Naphthalene	353		369	361	3.1
Perylene	<0.66		<0.66	<0.66	0.6
Phenanthrene	33.7		18.1	25.9	42.4
Picene	<3.32		<3.29	<3.30	0.6
Pyrene	8.16		4.01	6.09	48.2
Quinoline	<0.66		<0.66	<0.66	0.6
m-terphenyl	2.28		1.71	2.00	20.3
o-Terphenyl	<0.66		<0.66	<0.66	0.6
p-terphenyl	1.11		<0.66	<0.89	36.5
Tetralin	226		190	208	12.1
Total	<952		<881	<917	5.5

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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	10.9		13.2	12.1	13.8
Acenaphthylene	35.6		23.0	29.3	30.2
Anthracene	10.0		6.77	8.40	27.4
Benzo(a)Anthracene	2.28		<1.99	<2.13	9.6
Benzo(b)Fluoranthene	6.01		4.71	5.36	17.2
Benzo(k)Fluoranthene	2.18		<1.99	<2.08	6.5
Benzo(a)fluorene	<2.00		<1.99	<1.99	0.4
Benzo(b)fluorene	3.24		<1.99	<2.61	33.8
Benzo(g,h,i)Perylene	3.48		3.02	3.25	9.9
Benzo(a)Pyrene	<2.00		<1.99	<1.99	0.4
Benzo(e)Pyrene	<2.00		<1.99	<1.99	0.4
Biphenyl	178		92.2	135	44.8
2-Chloronaphthalene	<2.00		<1.99	<1.99	0.4
Chrysene/Triphenylene/Benzo(b)anthracene	10.2		4.35	7.28	56.9
Coronene	<9.99		<9.93	<9.96	0.4
Dibenzo(a,c/a,h)Anthracene	<2.00		<1.99	<1.99	0.4
Dibenzo(a,e)pyrene	<9.99		<9.93	<9.96	0.4
9,10-dimethylanthracene	<2.00		<1.99	<1.99	0.4
7,12-Dimethylbenzo(a)anthracene	<2.00		<1.99	<1.99	0.4
Fluoranthene	39.5		19.6	29.6	47.8
Fluorene	20.6		20.3	20.4	1.1
Indeno(1,2,3-cd)Pyrene	<2.00		<1.99	<1.99	0.4
2-methylanthracene	16.1		10.9	13.5	27.1
3-Methylcholanthrene	<9.99		<9.93	<9.96	0.4
1-Methylnaphthalene	298		226	262	19.2
2-Methylnaphthalene	204		383	294	43.3
1-Methylphenanthrene	77.5		15.3	46.4	94.9
9-Methylphenanthrene	11.0		10.2	10.6	5.3
Naphthalene	1063		1114	1088	3.4
Perylene	<2.00		<1.99	<1.99	0.4
Phenanthrene	101		54.8	78.1	42.2
Picene	<9.99		<9.93	<9.96	0.4
Pyrene	24.6		12.1	18.3	48.0
Quinoline	<2.00		<1.99	<1.99	0.4
m-terphenyl	6.87		5.16	6.02	20.1
o-Terphenyl	<2.00		<1.99	<1.99	0.4
p-terphenyl	3.36		<1.99	<2.67	36.3
Tetralin	679		574	627	11.9
Total	<2867		<2663	<2765	5.2

* 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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	8.97		11.0	10.0	14.6
Acenaphthylene	29.3		19.2	24.2	29.5
Anthracene	8.26		5.64	6.95	26.7
Benzo(a)Anthracene	1.88		<1.65	<1.76	8.9
Benzo(b)Fluoranthene	4.95		3.92	4.44	16.5
Benzo(k)Fluoranthene	1.79		<1.65	<1.72	5.8
Benzo(a)fluorene	<1.65		<1.65	<1.65	0.3
Benzo(b)fluorene	2.67		<1.65	<2.16	33.1
Benzo(g,h,i)Perylene	2.86		2.51	2.69	9.2
Benzo(a)Pyrene	<1.65		<1.65	<1.65	0.3
Benzo(e)Pyrene	<1.65		<1.65	<1.65	0.3
Biphenyl	146		76.7	112	44.1
2-Chloronaphthalene	<1.65		<1.65	<1.65	0.3
Chrysene/Triphenylene/Benzo(b)anthracene	8.41		3.62	6.02	56.3
Coronene	<8.23		<8.27	<8.25	0.3
Dibenzo(a,c/a,h)Anthracene	<1.65		<1.65	<1.65	0.3
Dibenzo(a,e)pyrene	<8.23		<8.27	<8.25	0.3
9,10-dimethylanthracene	<1.65		<1.65	<1.65	0.3
7,12-Dimethylbenzo(a)anthracene	<1.65		<1.65	<1.65	0.3
Fluoranthene	32.6		16.3	24.4	47.2
Fluorene	17.0		16.9	16.9	0.4
Indeno(1,2,3-cd)Pyrene	<1.65		<1.65	<1.65	0.3
2-methylanthracene	13.3		9.11	11.2	26.4
3-Methylcholanthrene	<8.23		<8.27	<8.25	0.3
1-Methylnaphthalene	245		189	217	18.5
2-Methylnaphthalene	168		319	244	43.9
1-Methylphenanthrene	63.9		12.7	38.3	94.5
9-Methylphenanthrene	9.05		8.48	8.77	4.6
Naphthalene	876		928	902	4.1
Perylene	<1.65		<1.65	<1.65	0.3
Phenanthrene	83.6		45.6	64.6	41.5
Picene	<8.23		<8.27	<8.25	0.3
Pyrene	20.2		10.1	15.2	47.4
Quinoline	<1.65		<1.65	<1.65	0.3
m-terphenyl	5.66		4.30	4.98	19.3
o-Terphenyl	<1.65		<1.65	<1.65	0.3
p-terphenyl	2.76		<1.65	<2.21	35.6
Tetralin	560		478	519	11.1
Total	<2363		<2217	<2290	4.5

* 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 of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
Acenaphthene	5.54		6.68	6.11	13.1
Acenaphthylene	18.1		11.6	14.9	30.9
Anthracene	5.11		3.41	4.26	28.1
Benzo(a)Anthracene	1.16		<1.00	<1.08	10.4
Benzo(b)Fluoranthene	3.06		2.37	2.72	17.9
Benzo(k)Fluoranthene	1.11		<1.00	<1.05	7.2
Benzo(a)fluorene	<1.02		<1.00	<1.01	1.1
Benzo(b)fluorene	1.65		<1.00	<1.32	34.5
Benzo(g,h,i)Perylene	1.77		1.52	1.65	10.7
Benzo(a)Pyrene	<1.02		<1.00	<1.01	1.1
Benzo(e)Pyrene	<1.02		<1.00	<1.01	1.1
Biphenyl	90.4		46.4	68.4	45.4
2-Chloronaphthalene	<1.02		<1.00	<1.01	1.1
Chrysene/Triphenylene/Benzo(b)anthracene	5.20		2.19	3.69	57.5
Coronene	<5.09		<5.00	<5.05	1.1
Dibenzo(a,c/a,h)Anthracene	<1.02		<1.00	<1.01	1.1
Dibenzo(a,e)pyrene	<5.09		<5.00	<5.05	1.1
9,10-dimethylanthracene	<1.02		<1.00	<1.01	1.1
7,12-Dimethylbenzo(a)anthracene	<1.02		<1.00	<1.01	1.1
Fluoranthene	20.1		9.86	15.0	48.5
Fluorene	10.5		10.2	10.3	1.8
Indeno(1,2,3-cd)Pyrene	<1.02		<1.00	<1.01	1.1
2-methylanthracene	8.22		5.52	6.87	27.8
3-Methylcholanthrene	<5.09		<5.00	<5.05	1.1
1-Methylnaphthalene	152		114	133	19.9
2-Methylnaphthalene	104		193	148	42.6
1-Methylphenanthrene	39.5		7.69	23.6	95.3
9-Methylphenanthrene	5.59		5.14	5.36	6.1
Naphthalene	541		562	551	2.6
Perylene	<1.02		<1.00	<1.01	1.1
Phenanthrene	51.7		27.6	39.6	42.9
Picene	<5.09		<5.00	<5.05	1.1
Pyrene	12.5		6.11	9.31	48.7
Quinoline	<1.02		<1.00	<1.01	1.1
m-terphenyl	3.50		2.60	3.05	20.8
o-Terphenyl	<1.02		<1.00	<1.01	1.1
p-terphenyl	1.71		<1.00	<1.35	36.9
Tetralin	346		289	318	12.6
Total	<1460		<1342	<1401	6.0

* 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	0.21		0.25	0.23	12.7
Acenaphthylene	0.68		0.44	0.56	31.3
Anthracene	0.19		0.13	0.16	28.5
Benzo(a)Anthracene	0.044		<0.038	<0.041	10.8
Benzo(b)Fluoranthene	0.12		0.089	0.10	18.3
Benzo(k)Fluoranthene	0.042		<0.038	<0.040	7.6
Benzo(a)fluorene	<0.038		<0.038	<0.038	1.5
Benzo(b)fluorene	0.062		<0.038	<0.050	34.9
Benzo(g,h,i)Perylene	0.067		0.057	0.062	11.0
Benzo(a)Pyrene	<0.038		<0.038	<0.038	1.5
Benzo(e)Pyrene	<0.038		<0.038	<0.038	1.5
Biphenyl	3.41		1.74	2.58	45.8
2-Chloronaphthalene	<0.038		<0.038	<0.038	1.5
Chrysene/Triphenylene/Benzo(b)anthracene	0.20		0.082	0.14	57.8
Coronene	<0.19		<0.19	<0.19	1.5
Dibenzo(a,c/a,h)Anthracene	<0.038		<0.038	<0.038	1.5
Dibenzo(a,e)pyrene	<0.19		<0.19	<0.19	1.5
9,10-dimethylanthracene	<0.038		<0.038	<0.038	1.5
7,12-Dimethylbenzo(a)anthracene	<0.038		<0.038	<0.038	1.5
Fluoranthene	0.76		0.37	0.56	48.8
Fluorene	0.39		0.38	0.39	2.2
Indeno(1,2,3-cd)Pyrene	<0.038		<0.038	<0.038	1.5
2-methylanthracene	0.31		0.21	0.26	28.2
3-Methylcholanthrene	<0.19		<0.19	<0.19	1.5
1-Methylnaphthalene	5.71		4.28	5.00	20.3
2-Methylnaphthalene	3.91		7.24	5.58	42.3
1-Methylphenanthrene	1.49		0.29	0.89	95.5
9-Methylphenanthrene	0.21		0.19	0.20	6.4
Naphthalene	20.4		21.1	20.7	2.2
Perylene	<0.038		<0.038	<0.038	1.5
Phenanthrene	1.95		1.04	1.49	43.2
Picene	<0.19		<0.19	<0.19	1.5
Pyrene	0.47		0.23	0.35	49.0
Quinoline	<0.038		<0.038	<0.038	1.5
m-terphenyl	0.13		0.098	0.11	21.1
o-Terphenyl	<0.038		<0.038	<0.038	1.5
p-terphenyl	0.064		<0.038	<0.051	37.3
Tetralin	13.0		10.8	11.9	13.0
Total	<55.0		<50.3	<52.7	6.3

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	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	ng/m³	ng/Rm³*	ng/Rm³**	ng/Rm³*	µg/s
Acenaphthene	4.00	12.1	10.0	6.11	0.23
Acenaphthylene	9.72	29.3	24.2	14.9	0.56
Anthracene	2.79	8.40	6.95	4.26	0.16
Benzo(a)Anthracene	<0.71	<2.13	<1.76	<1.08	<0.041
Benzo(b)Fluoranthene	1.78	5.36	4.44	2.72	0.10
Benzo(k)Fluoranthene	<0.69	<2.08	<1.72	<1.05	<0.040
Benzo(a)fluorene	<0.66	<1.99	<1.65	<1.01	<0.038
Benzo(b)fluorene	<0.87	<2.61	<2.16	<1.32	<0.050
Benzo(g,h,i)Perylene	1.08	3.25	2.69	1.65	0.062
Benzo(a)Pyrene	<0.66	<1.99	<1.65	<1.01	<0.038
Benzo(e)Pyrene	<0.66	<1.99	<1.65	<1.01	<0.038
Biphenyl	44.7	135	112	68.4	2.58
2-Chloronaphthalene	<0.66	<1.99	<1.65	<1.01	<0.038
Chrysene/Triphenylene/Benzo(b)anthracene	2.41	7.28	6.02	3.69	0.14
Coronene	<3.30	<9.96	<8.25	<5.05	<0.19
Dibenzo(a,c/a,h)Anthracene	<0.66	<1.99	<1.65	<1.01	<0.038
Dibenzo(a,e)pyrene	<3.30	<9.96	<8.25	<5.05	<0.19
9,10-dimethylanthracene	<0.66	<1.99	<1.65	<1.01	<0.038
7,12-Dimethylbenzo(a)anthracene	<0.66	<1.99	<1.65	<1.01	<0.038
Fluoranthene	9.81	29.6	24.4	15.0	0.56
Fluorene	6.77	20.4	16.9	10.3	0.39
Indeno(1,2,3-cd)Pyrene	<0.66	<1.99	<1.65	<1.01	<0.038
2-methylanthracene	4.49	13.5	11.2	6.87	0.26
3-Methylcholanthrene	<3.30	<9.96	<8.25	<5.05	<0.19
1-Methylnaphthalene	86.9	262	217	133	5.00
2-Methylnaphthalene	97	294	244	148	5.58
1-Methylphenanthrene	15.4	46.4	38.3	23.6	0.89
9-Methylphenanthrene	3.51	10.6	8.77	5.36	0.20
Naphthalene	361	1088	902	551	20.7
Perylene	<0.66	<1.99	<1.65	<1.01	<0.038
Phenanthrene	25.9	78.1	64.6	39.6	1.49
Picene	<3.30	<9.96	<8.25	<5.05	<0.19
Pyrene	6.09	18.3	15.2	9.31	0.35
Quinoline	<0.66	<1.99	<1.65	<1.01	<0.038
m-terphenyl	2.00	6.02	4.98	3.05	0.11
o-Terphenyl	<0.66	<1.99	<1.65	<1.01	<0.038
p-terphenyl	<0.89	<2.67	<2.21	<1.35	<0.051
Tetralin	208	627	519	318	11.9
Total	<917	<2765	<2290	<1401	<52.7

* 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	16.0	<10
Acenaphthylene	18.2	<10
Anthracene	<10	12.8
Benzo(a)Anthracene	<10	<10
Benzo(b)Fluoranthene	<10	<10
Benzo(k)Fluoranthene	<10	<10
Benzo(a)fluorene	<10	<10
Benzo(b)fluorene	<10	<10
Benzo(g,h,i)Perylene	178	<10
Benzo(a)Pyrene	<10	<10
Benzo(e)Pyrene	<10	<10
Biphenyl	72.2	35.2
2-Chloronaphthalene	<10	<10
Chrysene/Triphenylene/Benzo(b)anthracene	<10	<10
Coronene	151	<50
Dibenzo(a,c/a,h)Anthracene	<10	<10
Dibenzo(a,e)pyrene	<50	<50
9,10-dimethylanthracene	<10	<10
7,12-Dimethylbenzo(a)anthracene	<10	<10
Fluoranthene	19.6	17.0
Fluorene	21.2	<10
Indeno(1,2,3-cd)Pyrene	26.9	<10
2-methylanthracene	<10	<10
3-Methylcholanthrene	<50	<50
1-Methylnaphthalene	144	16.5
2-Methylnaphthalene	252	<10
1-Methylphenanthrene	12.6	<10
9-Methylphenanthrene	<10	<10
Naphthalene	491	59.3
Perylene	<10	<10
Phenanthrene	27.5	<10
Picene	<50	<50
Pyrene	22.7	<10
Quinoline	<10	<10
m-terphenyl	<10	<10
o-Terphenyl	<10	<10
p-terphenyl	<10	<10
Tetralin	672	567
Total	<2475	<1188

"<" 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. 1 Tube 1A/1B	Run No. 3 Tube 3A/3B	Run No. 4 Tube 4A/4B			
	µg	µg	µg	µg	%	µg
Benzene	0.85	0.71	0.63	0.73	15.1	2.19
Bromodichloromethane	0.044	0.035	0.041	0.040	11.5	0.12
Bromomethane	0.29	0.25	0.51	0.35	39.3	1.05
2-Butanone	0.47	0.38	0.32	0.39	18.4	1.17
Chloroethene	0.032	0.025	0.067	0.041	54.4	0.12
Dibromochloromethane	0.039	0.035	0.028	0.034	16.4	0.10
1,2-Dibromoethane	<0.02	<0.02	0.021	0.007	173	0.021
Dichlorodifluoromethane	0.038	0.037	0.20	0.091	102	0.27
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	0.045	0.015	173	0.045
Dichloromethane	0.57	1.44	1.09	1.03	42.6	3.10
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	0.19	0.084	0.13	0.13	38.4	0.40
Ethylbenzene	0.090	0.052	0.071	0.071	26.8	0.21
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	1.50	1.19	1.11	1.27	16.3	3.80
Styrene	0.18	0.12	0.14	0.15	20.9	0.44
Tetrachloroethene	0.016	0.031	0.019	0.022	36.1	0.066
Tetrachloromethane	<0.01	<0.01	<0.01	0	-	0
Toluene	0.89	0.52	0.34	0.58	48.4	1.74
Tribromomethane	0.040	0.043	0.033	0.039	13.3	0.12
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0	-	0
Trichloroethene	0.024	0.016	0.014	0.018	29.4	0.054
Trichlorofluoromethane	<0.02	<0.02	0.031	0.010	173	0.031
Trichloromethane	0.035	0.027	0.032	0.031	12.9	0.094
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	0.043	<0.02	<0.02	0.014	173	0.043
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
Xylenes (total)	0.41	0.24	0.27	0.31	29.2	0.93
Total	5.74	5.23	5.15	5.37	6.0	16.1

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0201
Run No. 3	0.0199
Run No. 4	0.0193

* 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			Average	Coefficient of Variation	Total Collected
	Run No. 1 Tube 6A/6B	Run No. 2 Tube 7A/7B	Run No. 3 Tube 8A/8B			
	µg	µg	µg	µg	%	µg
Benzene	0.40	0.63	0.55	0.53	22.2	1.59
Bromodichloromethane	0.012	0.054	0.040	0.035	60.5	0.11
Bromomethane	<0.09	0.27	0.27	0.18	86.6	0.54
2-Butanone	0.019	0.34	0.48	0.28	85.0	0.84
Chloroethene	<0.02	0.035	0.047	0.027	89.3	0.082
Dibromochloromethane	0.032	0.040	0.035	0.036	11.3	0.11
1,2-Dibromoethane	<0.02	<0.02	<0.02	0	-	0
Dichlorodifluoromethane	<0.02	0.053	0.063	0.039	87.6	0.12
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	2.35	1.54	1.44	1.78	27.8	5.33
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	0.021	0.16	0.22	0.13	75.9	0.40
Ethylbenzene	0.041	0.045	0.048	0.045	7.9	0.13
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	<0.1	1.03	1.23	0.75	87.6	2.25
Styrene	0.11	0.062	0.63	0.27	118	0.80
Tetrachloroethene	<0.01	<0.01	<0.01	0	-	0
Tetrachloromethane	<0.01	<0.01	<0.01	0	-	0
Toluene	0.53	0.50	0.62	0.55	10.7	1.65
Tribromomethane	0.032	0.027	0.034	0.031	11.6	0.093
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	0	-	0
Trichloroethene	0.015	0.034	0.024	0.024	39.1	0.073
Trichlorofluoromethane	<0.02	<0.02	<0.02	0	-	0
Trichloromethane	<0.01	0.025	0.025	0.017	86.6	0.050
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	0.021	<0.02	<0.02	0.0070	173	0.021
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	0	-	0
Xylenes (total)	0.37	0.18	0.17	0.24	46.8	0.72
Total	3.94	5.04	5.92	4.97	20.0	14.9

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0208
Run No. 2	0.0197
Run No. 3	0.0199

* 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. 1 Tube 11A/11B	Run No. 2 Tube 12A/12B	Run No. 3 Tube 13A/13B			
	µg	µg	µg	µg	%	µg
Benzene	0.52	0.40	0.57	0.50	17.3	1.49
Bromodichloromethane	0.061	0.060	0.055	0.059	5.5	0.18
Bromomethane	<0.09	0.19	0.32	0.17	95.8	0.51
2-Butanone	1.54	1.99	2.11	1.88	15.9	5.63
Chloroethene	<0.02	0.033	0.037	0.023	87.0	0.070
Dibromochloromethane	0.035	0.056	0.038	0.043	26.4	0.13
1,2-Dibromoethane	<0.02	<0.02	<0.02	0	-	0
Dichlorodifluoromethane	<0.02	0.069	0.072	0.047	86.7	0.14
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	0.019	0.015	0.014	0.016	16.5	0.048
Dichloromethane	2.12	1.46	1.01	1.53	36.4	4.59
1,2-Dichloropropane	<0.01	<0.01	<0.01	0	-	0
Ethyl Acetate	2.36	0.85	0.53	1.25	78.7	3.74
Ethylbenzene	0.28	0.38	0.25	0.30	22.3	0.90
Isopropylbenzene	<0.02	<0.02	<0.02	0	-	0
2-Propanone	0.93	1.40	0.94	1.09	24.5	3.26
Styrene	0.060	0.18	0.13	0.12	47.9	0.36
Tetrachloroethene	1.79	1.60	0.73	1.38	41.2	4.13
Tetrachloromethane	<0.01	<0.01	<0.01	0	-	0
Toluene	1.77	1.82	1.07	1.55	26.9	4.66
Tribromomethane	0.041	0.069	0.033	0.048	39.7	0.14
1,1,1-Trichloroethane	0.016	0.011	<0.01	0.0090	90.9	0.027
Trichloroethene	0.55	0.28	0.28	0.37	42.6	1.11
Trichlorofluoromethane	<0.02	<0.02	<0.02	0	-	0
Trichloromethane	0.067	0.061	0.052	0.060	12.6	0.18
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	0	-	0
1,2,4-Trimethylbenzene	0.19	0.19	0.13	0.17	18.3	0.51
1,3,5-Trimethylbenzene	0.069	0.076	0.051	0.065	19.7	0.20
Xylenes (total)	1.22	1.50	1.06	1.26	17.5	3.78
Total	13.6	12.7	9.47	11.9	18.3	35.8

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0203
Run No. 2	0.0216
Run No. 3	0.0200

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m^3	µg/Rm^3*	µg/Rm^3**	µg/Rm^3*	mg/s
Benzene	2.19	12.2	36.8	30.4	18.7	0.70
Bromodichloromethane	0.12	0.67	2.02	1.67	1.03	0.039
Bromomethane	1.05	5.84	17.7	14.6	8.98	0.34
2-Butanone	1.17	6.52	19.7	16.3	10.0	0.38
Chloroethene	0.12	0.69	2.09	1.73	1.06	0.040
Dibromochloromethane	0.10	0.57	1.72	1.42	0.87	0.033
1,2-Dibromoethane	0.021	0.12	0.35	0.29	0.18	0.0068
Dichlorodifluoromethane	0.27	1.53	4.62	3.82	2.34	0.088
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0.045	0.25	0.76	0.63	0.39	0.014
Dichloromethane	3.10	17.2	52.1	43.1	26.5	1.00
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0.40	2.24	6.79	5.61	3.45	0.13
Ethylbenzene	0.21	1.19	3.59	2.97	1.82	0.069
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	3.80	21.2	64.1	53.0	32.5	1.22
Styrene	0.44	2.42	7.33	6.06	3.72	0.14
Tetrachloroethene	0.066	0.37	1.11	0.92	0.56	0.021
Tetrachloromethane	0	0	0	0	0	0
Toluene	1.74	9.70	29.3	24.3	14.9	0.56
Tribromomethane	0.12	0.65	1.95	1.62	0.99	0.037
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0.054	0.30	0.91	0.75	0.46	0.017
Trichlorofluoromethane	0.031	0.17	0.52	0.43	0.27	0.010
Trichloromethane	0.094	0.52	1.58	1.31	0.80	0.030
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0.043	0.24	0.72	0.60	0.37	0.014
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.93	5.19	15.7	13.0	7.97	0.30
Total	16.1	89.7	272	225	138	5.19

Dry Gas Volume Sampled (Rm^3*) :	0.0594
Actual Flowrate (m^3/s) :	57.8
Dry Reference Flowrate (Rm^3/s*) :	19.1
Dry Adjusted Flowrate (Rm^3/s**) :	23.1
Wet Reference Flowrate (Rm^3/s*) :	37.6

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m^3	µg/Rm^3*	µg/Rm^3**	µg/Rm^3*	mg/s
Benzene	1.59	8.78	26.3	22.3	13.5	0.51
Bromodichloromethane	0.11	0.59	1.76	1.49	0.90	0.034
Bromomethane	0.54	2.99	8.97	7.61	4.62	0.17
2-Butanone	0.84	4.62	13.9	11.8	7.14	0.27
Chloroethene	0.082	0.45	1.36	1.15	0.70	0.026
Dibromochloromethane	0.11	0.59	1.77	1.50	0.91	0.035
1,2-Dibromoethane	0	0	0	0	0	0
Dichlorodifluoromethane	0.12	0.64	1.92	1.63	0.99	0.037
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	5.33	29.4	88.3	74.9	45.4	1.72
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0.40	2.23	6.69	5.67	3.44	0.13
Ethylbenzene	0.13	0.74	2.22	1.88	1.14	0.043
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	2.25	12.4	37.3	31.6	19.2	0.73
Styrene	0.80	4.39	13.2	11.2	6.77	0.26
Tetrachloroethene	0	0	0	0	0	0
Tetrachloromethane	0	0	0	0	0	0
Toluene	1.65	9.08	27.2	23.1	14.0	0.53
Tribromomethane	0.093	0.51	1.54	1.31	0.79	0.030
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0.073	0.40	1.21	1.02	0.62	0.024
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.050	0.28	0.83	0.70	0.43	0.016
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0.021	0.12	0.35	0.29	0.18	0.0068
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.72	3.96	11.9	10.1	6.11	0.23
Total	14.9	82.2	247	209	127	4.81

Dry Gas Volume Sampled (Rm^3*) :	0.0604
Actual Flowrate (m^3/s) :	58.5
Dry Reference Flowrate (Rm^3/s*) :	19.5
Dry Adjusted Flowrate (Rm^3/s**) :	23.0
Wet Reference Flowrate (Rm^3/s*) :	37.9

* 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	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg	µg/m^3	µg/Rm^3*	µg/Rm^3**	µg/Rm^3*	mg/s
Benzene	1.49	8.00	24.1	20.0	12.2	0.46
Bromodichloromethane	0.18	0.94	2.84	2.36	1.44	0.055
Bromomethane	0.51	2.73	8.21	6.83	4.16	0.16
2-Butanone	5.63	30.2	90.8	75.5	46.0	1.75
Chloroethene	0.070	0.38	1.13	0.94	0.57	0.022
Dibromochloromethane	0.13	0.69	2.08	1.73	1.05	0.040
1,2-Dibromoethane	0	0	0	0	0	0
Dichlorodifluoromethane	0.14	0.76	2.28	1.89	1.15	0.044
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0.048	0.26	0.77	0.64	0.39	0.015
Dichloromethane	4.59	24.6	74.0	61.6	37.5	1.43
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	3.74	20.0	60.3	50.2	30.5	1.16
Ethylbenzene	0.90	4.84	14.6	12.1	7.38	0.28
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	3.26	17.5	52.7	43.8	26.7	1.02
Styrene	0.36	1.94	5.84	4.86	2.96	0.11
Tetrachloroethene	4.13	22.1	66.6	55.4	33.7	1.28
Tetrachloromethane	0	0	0	0	0	0
Toluene	4.66	25.0	75.2	62.6	38.1	1.45
Tribromomethane	0.14	0.77	2.31	1.92	1.17	0.045
1,1,1-Trichloroethane	0.027	0.14	0.44	0.36	0.22	0.0084
Trichloroethene	1.11	5.95	17.9	14.9	9.07	0.35
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.18	0.96	2.90	2.42	1.47	0.056
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0.51	2.73	8.21	6.83	4.16	0.16
1,3,5-Trimethylbenzene	0.20	1.05	3.16	2.63	1.60	0.061
Xylenes (total)	3.78	20.2	60.9	50.7	30.9	1.18
Total	35.8	192	577	480	292	11.1

Dry Gas Volume Sampled (Rm^3*) :	0.0620
Actual Flowrate (m^3/s) :	58.1
Dry Reference Flowrate (Rm^3/s*) :	19.3
Dry Adjusted Flowrate (Rm^3/s**) :	23.2
Wet Reference Flowrate (Rm^3/s*) :	38.1

* 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/m^3	µg/m^3	µg/m^3	µg/m^3
Benzene	12.2	8.78	8.00	9.64
Bromodichloromethane	0.67	0.59	0.94	0.73
Bromomethane	5.84	2.99	2.73	3.85
2-Butanone	6.52	4.62	30.2	13.8
Chloroethene	0.69	0.45	0.38	0.51
Dibromochloromethane	0.57	0.59	0.69	0.62
1,2-Dibromoethane	0.12	0	0	0.039
Dichlorodifluoromethane	1.53	0.64	0.76	0.97
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0.25	0	0.26	0.17
Dichloromethane	17.2	29.4	24.6	23.8
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	2.24	2.23	20.0	8.17
Ethylbenzene	1.19	0.74	4.84	2.26
Isopropylbenzene	0	0	0	0
2-Propanone	21.2	12.4	17.5	17.0
Styrene	2.42	4.39	1.94	2.92
Tetrachloroethene	0.37	0	22.1	7.49
Tetrachloromethane	0	0	0	0
Toluene	9.70	9.08	25.0	14.6
Tribromomethane	0.65	0.51	0.77	0.64
1,1,1-Trichloroethane	0	0	0.14	0.048
Trichloroethene	0.30	0.40	5.95	2.22
Trichlorofluoromethane	0.17	0	0	0.058
Trichloromethane	0.52	0.28	0.96	0.59
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.24	0.12	2.73	1.03
1,3,5-Trimethylbenzene	0	0	1.05	0.35
Xylenes (total)	5.19	3.96	20.2	9.80
Total	89.7	82.2	192	121

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	36.8	26.3	24.1	29.1
Bromodichloromethane	2.02	1.76	2.84	2.21
Bromomethane	17.7	8.97	8.21	11.6
2-Butanone	19.7	13.9	90.8	41.5
Chloroethene	2.09	1.36	1.13	1.53
Dibromochloromethane	1.72	1.77	2.08	1.86
1,2-Dibromoethane	0.35	0	0	0.12
Dichlorodifluoromethane	4.62	1.92	2.28	2.94
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0.76	0	0.77	0.51
Dichloromethane	52.1	88.3	74.0	71.5
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	6.79	6.69	60.3	24.6
Ethylbenzene	3.59	2.22	14.6	6.79
Isopropylbenzene	0	0	0	0
2-Propanone	64.1	37.3	52.7	51.3
Styrene	7.33	13.2	5.84	8.78
Tetrachloroethene	1.11	0	66.6	22.6
Tetrachloromethane	0	0	0	0
Toluene	29.3	27.2	75.2	43.9
Tribromomethane	1.95	1.54	2.31	1.93
1,1,1-Trichloroethane	0	0	0.44	0.15
Trichloroethene	0.91	1.21	17.9	6.68
Trichlorofluoromethane	0.52	0	0	0.17
Trichloromethane	1.58	0.83	2.90	1.77
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.72	0.35	8.21	3.09
1,3,5-Trimethylbenzene	0	0	3.16	1.05
Xylenes (total)	15.7	11.9	60.9	29.5
Total	272	247	577	365

* 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	30.4	22.3	20.0	24.3
Bromodichloromethane	1.67	1.49	2.36	1.84
Bromomethane	14.6	7.61	6.83	9.68
2-Butanone	16.3	11.8	75.5	34.5
Chloroethene	1.73	1.15	0.94	1.27
Dibromochloromethane	1.42	1.50	1.73	1.55
1,2-Dibromoethane	0.29	0	0	0.097
Dichlorodifluoromethane	3.82	1.63	1.89	2.45
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0.63	0	0.64	0.42
Dichloromethane	43.1	74.9	61.6	59.9
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	5.61	5.67	50.2	20.5
Ethylbenzene	2.97	1.88	12.1	5.66
Isopropylbenzene	0	0	0	0
2-Propanone	53.0	31.6	43.8	42.8
Styrene	6.06	11.2	4.86	7.36
Tetrachloroethene	0.92	0	55.4	18.8
Tetrachloromethane	0	0	0	0
Toluene	24.3	23.1	62.6	36.6
Tribromomethane	1.62	1.31	1.92	1.61
1,1,1-Trichloroethane	0	0	0.36	0.12
Trichloroethene	0.75	1.02	14.9	5.56
Trichlorofluoromethane	0.43	0	0	0.14
Trichloromethane	1.31	0.70	2.42	1.48
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.60	0.29	6.83	2.58
1,3,5-Trimethylbenzene	0	0	2.63	0.88
Xylenes (total)	13.0	10.1	50.7	24.6
Total	225	209	480	305

* 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/Rm^3*	µg/Rm^3*	µg/Rm^3*	µg/Rm^3*
Benzene	18.7	13.5	12.2	14.8
Bromodichloromethane	1.03	0.90	1.44	1.12
Bromomethane	8.98	4.62	4.16	5.92
2-Butanone	10.0	7.14	46.0	21.1
Chloroethene	1.06	0.70	0.57	0.78
Dibromochloromethane	0.87	0.91	1.05	0.95
1,2-Dibromoethane	0.18	0	0	0.060
Dichlorodifluoromethane	2.34	0.99	1.15	1.50
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0.39	0	0.39	0.26
Dichloromethane	26.5	45.4	37.5	36.5
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	3.45	3.44	30.5	12.5
Ethylbenzene	1.82	1.14	7.38	3.45
Isopropylbenzene	0	0	0	0
2-Propanone	32.5	19.2	26.7	26.1
Styrene	3.72	6.77	2.96	4.48
Tetrachloroethene	0.56	0	33.7	11.4
Tetrachloromethane	0	0	0	0
Toluene	14.9	14.0	38.1	22.3
Tribromomethane	0.99	0.79	1.17	0.98
1,1,1-Trichloroethane	0	0	0.22	0.074
Trichloroethene	0.46	0.62	9.07	3.39
Trichlorofluoromethane	0.27	0	0	0.088
Trichloromethane	0.80	0.43	1.47	0.90
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.37	0.18	4.16	1.57
1,3,5-Trimethylbenzene	0	0	1.60	0.53
Xylenes (total)	7.97	6.11	30.9	15.0
Total	138	127	292	186

* 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	0.70	0.51	0.46	0.56
Bromodichloromethane	0.039	0.034	0.055	0.043
Bromomethane	0.34	0.17	0.16	0.22
2-Butanone	0.38	0.27	1.75	0.80
Chloroethene	0.040	0.026	0.022	0.029
Dibromochloromethane	0.033	0.035	0.040	0.036
1,2-Dibromoethane	0.0068	0	0	0.0023
Dichlorodifluoromethane	0.088	0.037	0.044	0.057
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0.014	0	0.015	0.0098
Dichloromethane	1.00	1.72	1.43	1.38
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0.13	0.13	1.16	0.47
Ethylbenzene	0.069	0.043	0.28	0.13
Isopropylbenzene	0	0	0	0
2-Propanone	1.22	0.73	1.02	0.99
Styrene	0.14	0.26	0.11	0.17
Tetrachloroethene	0.021	0	1.28	0.44
Tetrachloromethane	0	0	0	0
Toluene	0.56	0.53	1.45	0.85
Tribromomethane	0.037	0.030	0.045	0.037
1,1,1-Trichloroethane	0	0	0.0084	0.0028
Trichloroethene	0.017	0.024	0.35	0.13
Trichlorofluoromethane	0.010	0	0	0.0033
Trichloromethane	0.030	0.016	0.056	0.034
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.014	0.0068	0.16	0.060
1,3,5-Trimethylbenzene	0	0	0.061	0.020
Xylenes (total)	0.30	0.23	1.18	0.57
Total	5.19	4.81	11.1	7.05

TABLE 113
Clean Harbors Sarnia
Summary of Volatile Organic Emission Data

Compound	Actual Concentration	Dry Reference Concentration	Dry Adjusted Concentration	Wet Reference Concentration	Emission Rate
	µg/m^3	µg/Rm^3*	µg/Rm^3*	µg/Rm^3*	mg/s
Benzene	9.64	29.1	24.3	14.8	0.56
Bromodichloromethane	0.73	2.21	1.84	1.12	0.043
Bromomethane	3.85	11.6	9.68	5.92	0.22
2-Butanone	13.8	41.5	34.5	21.1	0.80
Chloroethene	0.51	1.53	1.27	0.78	0.029
Dibromochloromethane	0.62	1.86	1.55	0.95	0.036
1,2-Dibromoethane	0.039	0.12	0.097	0.060	0.0023
Dichlorodifluoromethane	0.97	2.94	2.45	1.50	0.057
1,1-Dichloroethane	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0
trans-1,2-Dichloroethene	0.17	0.51	0.42	0.26	0.0098
Dichloromethane	23.8	71.5	59.9	36.5	1.38
1,2-Dichloropropane	0	0	0	0	0
Ethyl Acetate	8.17	24.6	20.5	12.5	0.47
Ethylbenzene	2.26	6.79	5.66	3.45	0.13
Isopropylbenzene	0	0	0	0	0
2-Propanone	17.0	51.3	42.8	26.1	0.99
Styrene	2.92	8.78	7.36	4.48	0.17
Tetrachloroethene	7.49	22.6	18.8	11.4	0.44
Tetrachloromethane	0	0	0	0	0
Toluene	14.6	43.9	36.6	22.3	0.85
Tribromomethane	0.64	1.93	1.61	0.98	0.037
1,1,1-Trichloroethane	0.048	0.15	0.12	0.074	0.0028
Trichloroethene	2.22	6.68	5.56	3.39	0.13
Trichlorofluoromethane	0.058	0.17	0.14	0.088	0.0033
Trichloromethane	0.59	1.77	1.48	0.90	0.034
Trichlorotrifluoroethane	0	0	0	0	0
1,2,4-Trimethylbenzene	1.03	3.09	2.58	1.57	0.060
1,3,5-Trimethylbenzene	0.35	1.05	0.88	0.53	0.020
Xylenes (total)	9.80	29.5	24.6	15.0	0.57
Total	121	365	305	186	7.05

* 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
1	2-Butanone	470	0.0201	23.3	19.1	0.45
	Ethyl Acetate	190	0.0201	9.44	19.1	0.18
	Tetrachloroethene	16	0.0201	0.79	19.1	0.015
	Toluene	890	0.0201	44.2	19.1	0.84
	Total Xylenes	410	0.0201	20.4	19.1	0.39
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	380	0.0199	19.1	19.1	0.36
	Ethyl Acetate	84	0.0199	4.22	19.1	0.081
	Tetrachloroethene	31	0.0199	1.56	19.1	0.030
	Toluene	520	0.0199	26.1	19.1	0.50
	Total Xylenes	240	0.0199	12.1	19.1	0.23
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	320	0.0193	16.6	19.1	0.32
	Ethyl Acetate	130	0.0193	6.73	19.1	0.13
	Tetrachloroethene	19	0.0193	0.98	19.1	0.019
	Toluene	340	0.0193	17.6	19.1	0.34
	Total Xylenes	270	0.0193	14.0	19.1	0.27
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	1170	0.0594	19.7	19.1	0.38
	Ethyl Acetate	404	0.0594	6.81	19.1	0.13
	Tetrachloroethene	66	0.0594	1.11	19.1	0.021
	Toluene	1750	0.0594	29.5	19.1	0.56
	Total Xylenes	920	0.0594	15.5	19.1	0.30
	1,2,4-Trichlorobenzene**	1600	5.007	0.32	19.2	0.0061

* At 25°C and 1 atmosphere.

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

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
1	2-Butanone	19	0.0208	0.91	19.5	0.018
	Ethyl Acetate	21	0.0208	1.01	19.5	0.020
	Tetrachloroethene	< 10	0.0208	<0.48	19.5	<0.0094
	Toluene	530	0.0208	25.5	19.5	0.50
	Total Xylenes	370	0.0208	17.8	19.5	0.35
	1,2,4-Trichlorobenzene**	-	-	-	-	-
2	2-Butanone	340	0.0197	17.3	19.5	0.34
	Ethyl Acetate	160	0.0197	8.13	19.5	0.16
	Tetrachloroethene	< 10	0.0197	<0.51	19.5	<0.0099
	Toluene	500	0.0197	25.4	19.5	0.50
	Total Xylenes	180	0.0197	9.15	19.5	0.18
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	480	0.0199	24.1	19.5	0.47
	Ethyl Acetate	220	0.0199	11.0	19.5	0.22
	Tetrachloroethene	< 10	0.0199	<0.50	19.5	<0.0098
	Toluene	620	0.0199	31.1	19.5	0.61
	Total Xylenes	170	0.0199	8.52	19.5	0.17
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	839	0.0604	13.9	19.5	0.27
	Ethyl Acetate	401	0.0604	6.64	19.5	0.13
	Tetrachloroethene	< 30	0.0604	<0.50	19.5	<0.0097
	Toluene	1650	0.0604	27.3	19.5	0.53
	Total Xylenes	720	0.0604	11.9	19.5	0.23
	1,2,4-Trichlorobenzene**	-	-	-	-	-

* 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). SVOC Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available for 1,2,4-Trichlorobenzene.

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 $\mu g/Rm^3$ *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
1	2-Butanone	1540	0.0203	75.7	19.3	1.46
	Ethyl Acetate	2360	0.0203	116	19.3	2.24
	Tetrachloroethene	1790	0.0203	88.0	19.3	1.70
	Toluene	1770	0.0203	87.0	19.3	1.68
	Total Xylenes	1220	0.0203	60.0	19.3	1.16
	1,2,4-Trichlorobenzene**	-	-	-	-	-
2	2-Butanone	1990	0.0216	92.2	19.3	1.78
	Ethyl Acetate	850	0.0216	39.4	19.3	0.76
	Tetrachloroethene	1600	0.0216	74.1	19.3	1.43
	Toluene	1820	0.0216	84.3	19.3	1.63
	Total Xylenes	1500	0.0216	69.5	19.3	1.34
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	2110	0.0200	105	19.3	2.03
	Ethyl Acetate	530	0.0200	26.4	19.3	0.51
	Tetrachloroethene	730	0.0200	36.4	19.3	0.70
	Toluene	1070	0.0200	53.4	19.3	1.03
	Total Xylenes	1060	0.0200	52.9	19.3	1.02
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	5640	0.0620	91.0	19.3	1.76
	Ethyl Acetate	3740	0.0620	60.3	19.3	1.16
	Tetrachloroethene	4120	0.0620	66.5	19.3	1.28
	Toluene	4660	0.0620	75.2	19.3	1.45
	Total Xylenes	3780	0.0620	61.0	19.3	1.18
	1,2,4-Trichlorobenzene**	18100	5.035	3.59	18.9	0.068

* At 25°C and 1 atmosphere.

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

TABLE 118
Clean Harbors Sarnia
Summary of DRE Compound Emission Rates

Compound	Average Emission Rate				Coefficient of Variation
	Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s	%
2-Butanone	0.38	0.27	1.76	0.80	103
Ethyl Acetate	0.13	0.13	1.16	0.47	126
Tetrachloroethene	0.021	<0.0097	1.28	<0.44	167
Toluene	0.56	0.53	1.45	0.85	61.5
Total Xylenes	0.30	0.23	1.18	0.57	92.9
1,2,4-Trichlorobenzene	0.0061	-	0.068	0.037	118

TABLE 119
Clean Harbors Sarnia
Blank Volatile Organic Analyses

Compound	Field Blank Tube 10A/10B 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	29.6	0.91	0.45	<3500	<1.57
	Ethyl Acetate	29.6	0.91	0.45	<1300	<0.58
	Tetrachloroethene	29.6	0.91	0.45	160	0.072
	Toluene	29.6	0.91	0.45	15600	7.00
	Total Xylenes	29.6	0.91	0.45	9530	4.28
	1,2,4-Trichlorobenzene	29.6	0.91	0.45	<500	<0.22
Lean	2-Butanone	180	1.05	3.15	<1000	<3.15
	Ethyl Acetate	180	1.05	3.15	<1000	<3.15
	Tetrachloroethene	180	1.05	3.15	<100	<0.32
	Toluene	180	1.05	3.15	1050	3.31
	Total Xylenes	180	1.05	3.15	759	2.39
	1,2,4-Trichlorobenzene	180	1.05	3.15	<500	<1.58
Emulsion	2-Butanone	12.7	0.98	0.21	<6500	<1.35
	Ethyl Acetate	12.7	0.98	0.21	2200	0.46
	Tetrachloroethene	12.7	0.98	0.21	<100	<0.021
	Toluene	12.7	0.98	0.21	14500	3.01
	Total Xylenes	12.7	0.98	0.21	11250	2.33
	1,2,4-Trichlorobenzene	12.7	0.98	0.21	<500	<0.10
Alkaline	2-Butanone	193	1.00	3.21	<1000	<3.21
	Ethyl Acetate	193	1.00	3.21	<1000	<3.21
	Tetrachloroethene	193	1.00	3.21	<100	<0.32
	Toluene	193	1.00	3.21	<100	<0.32
	Total Xylenes	193	1.00	3.21	<100	<0.32
	1,2,4-Trichlorobenzene	193	1.00	3.21	<500	<1.61
Leachate	2-Butanone	16.2	1.00	0.27	<1000	<0.27
	Ethyl Acetate	16.2	1.00	0.27	<1000	<0.27
	Tetrachloroethene	16.2	1.00	0.27	<100	<0.027
	Toluene	16.2	1.00	0.27	<100	<0.027
	Total Xylenes	16.2	1.00	0.27	<100	<0.027
	1,2,4-Trichlorobenzene	16.2	1.00	0.27	<500	<0.14
Total	2-Butanone					<9.55
	Ethyl Acetate					<7.67
	Tetrachloroethene					<0.76
	Toluene					<13.7
	Total Xylenes					<9.35
	1,2,4-Trichlorobenzene					<3.64

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	31.6	0.91	0.48	<2200	<1.05
	Ethyl Acetate	31.6	0.91	0.48	<1000	<0.48
	Tetrachloroethene	31.6	0.91	0.48	210	0.10
	Toluene	31.6	0.91	0.48	20800	10.0
	Total Xylenes	31.6	0.91	0.48	12200	5.85
	1,2,4-Trichlorobenzene	31.6	0.91	0.48	<500	<0.24
Lean	2-Butanone	176	1.06	3.11	<1000	<3.11
	Ethyl Acetate	176	1.06	3.11	<1000	<3.11
	Tetrachloroethene	176	1.06	3.11	<100	<0.31
	Toluene	176	1.06	3.11	290	0.90
	Total Xylenes	176	1.06	3.11	205	0.64
	1,2,4-Trichlorobenzene	176	1.06	3.11	<500	<1.55
Emulsion	2-Butanone	10.9	0.98	0.18	<4600	<0.82
	Ethyl Acetate	10.9	0.98	0.18	<1200	<0.21
	Tetrachloroethene	10.9	0.98	0.18	<100	<0.018
	Toluene	10.9	0.98	0.18	6010	1.07
	Total Xylenes	10.9	0.98	0.18	4690	0.83
	1,2,4-Trichlorobenzene	10.9	0.98	0.18	<500	<0.089
Alkaline	2-Butanone	196	1.00	3.26	<1000	<3.26
	Ethyl Acetate	196	1.00	3.26	<1000	<3.26
	Tetrachloroethene	196	1.00	3.26	<100	<0.33
	Toluene	196	1.00	3.26	<100	<0.33
	Total Xylenes	196	1.00	3.26	<100	<0.33
	1,2,4-Trichlorobenzene	196	1.00	3.26	<500	<1.63
Leachate	2-Butanone	14.7	1.00	0.25	<1000	<0.25
	Ethyl Acetate	14.7	1.00	0.25	<1000	<0.25
	Tetrachloroethene	14.7	1.00	0.25	<100	<0.025
	Toluene	14.7	1.00	0.25	<100	<0.025
	Total Xylenes	14.7	1.00	0.25	<100	<0.025
	1,2,4-Trichlorobenzene	14.7	1.00	0.25	<500	<0.12
Total	2-Butanone					<8.49
	Ethyl Acetate					<7.31
	Tetrachloroethene					<0.78
	Toluene					<12.3
	Total Xylenes					<7.67
	1,2,4-Trichlorobenzene					<3.64

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	30.9	0.86	0.44	<4000	<1.77
	Ethyl Acetate	30.9	0.86	0.44	<1300	<0.58
	Tetrachloroethene	30.9	0.86	0.44	140	0.062
	Toluene	30.9	0.86	0.44	16300	7.22
	Total Xylenes	30.9	0.86	0.44	9570	4.24
	1,2,4-Trichlorobenzene	30.9	0.86	0.44	<500	<0.22
Lean	2-Butanone	180	1.05	3.16	<1000	<3.16
	Ethyl Acetate	180	1.05	3.16	<1000	<3.16
	Tetrachloroethene	180	1.05	3.16	160	0.50
	Toluene	180	1.05	3.16	3710	11.7
	Total Xylenes	180	1.05	3.16	2830	8.93
	1,2,4-Trichlorobenzene	180	1.05	3.16	<500	<1.58
Emulsion	2-Butanone	11.0	0.98	0.18	<5100	<0.92
	Ethyl Acetate	11.0	0.98	0.18	<1400	<0.25
	Tetrachloroethene	11.0	0.98	0.18	<100	<0.018
	Toluene	11.0	0.98	0.18	7630	1.37
	Total Xylenes	11.0	0.98	0.18	5800	1.04
	1,2,4-Trichlorobenzene	11.0	0.98	0.18	<500	<0.090
Alkaline	2-Butanone	199	1.00	3.32	<1000	<3.32
	Ethyl Acetate	199	1.00	3.32	<1000	<3.32
	Tetrachloroethene	199	1.00	3.32	<100	<0.33
	Toluene	199	1.00	3.32	<100	<0.33
	Total Xylenes	199	1.00	3.32	<100	<0.33
	1,2,4-Trichlorobenzene	199	1.00	3.32	<500	<1.66
Leachate	2-Butanone	13.7	1.00	0.23	<1000	<0.23
	Ethyl Acetate	13.7	1.00	0.23	<1000	<0.23
	Tetrachloroethene	13.7	1.00	0.23	<100	<0.023
	Toluene	13.7	1.00	0.23	<100	<0.023
	Total Xylenes	13.7	1.00	0.23	<100	<0.023
	1,2,4-Trichlorobenzene	13.7	1.00	0.23	<500	<0.11
Total	2-Butanone					<9.39
	Ethyl Acetate					<7.53
	Tetrachloroethene					<0.94
	Toluene					<20.7
	Total Xylenes					<14.6
	1,2,4-Trichlorobenzene					<3.66

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 %
1	2-Butanone	<9.55	0.45	99.9953
	Ethyl Acetate	<7.67	0.18	99.9977
	Tetrachloroethene	<0.76	0.015	99.9980
	Toluene	<13.7	0.84	99.9938
	Total Xylenes	<9.35	0.39	99.9958
3	2-Butanone	<9.55	0.36	99.9962
	Ethyl Acetate	<7.67	0.081	99.9989
	Tetrachloroethene	<0.76	0.030	99.9961
	Toluene	<13.7	0.50	99.9963
	Total Xylenes	<9.35	0.23	99.9975
4	2-Butanone	<9.55	0.32	99.9967
	Ethyl Acetate	<7.67	0.13	99.9983
	Tetrachloroethene	<0.76	0.019	99.9975
	Toluene	<13.7	0.34	99.9975
	Total Xylenes	<9.35	0.27	99.9971
Total	2-Butanone	<9.55	0.38	99.9961
	Ethyl Acetate	<7.67	0.13	99.9983
	Tetrachloroethene	<0.76	0.021	99.9972
	Toluene	<13.7	0.56	99.9959
	Total Xylenes	<9.35	0.30	99.9968
	1,2,4-Trichlorobenzene	<3.64	0.0061	99.9998

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 %
1	2-Butanone	<8.49	0.018	99.9998
	Ethyl Acetate	<7.31	0.020	99.9997
	Tetrachloroethene	<0.78	<0.0094	99.9988
	Toluene	<12.3	0.50	99.9960
	Total Xylenes	<7.67	0.35	99.9955
2	2-Butanone	<8.49	0.34	99.9960
	Ethyl Acetate	<7.31	0.16	99.9978
	Tetrachloroethene	<0.78	<0.0099	99.9987
	Toluene	<12.3	0.50	99.9960
	Total Xylenes	<7.67	0.18	99.9977
3	2-Butanone	<8.49	0.47	99.9945
	Ethyl Acetate	<7.31	0.22	99.9971
	Tetrachloroethene	<0.78	<0.0098	99.9987
	Toluene	<12.3	0.61	99.9951
	Total Xylenes	<7.67	0.17	99.9978
Total	2-Butanone	<8.49	0.27	99.9968
	Ethyl Acetate	<7.31	0.13	99.9982
	Tetrachloroethene	<0.78	<0.0097	99.9988
	Toluene	<12.3	0.53	99.9957
	Total Xylenes	<7.67	0.23	99.9970
	1,2,4-Trichlorobenzene	-	-	-

SVOC Test No. 2 was lost by the analytical laboratory during extraction and as a result no data is available for 1,2,4-Trichlorobenzene.

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 %
1	2-Butanone	<9.39	1.46	99.9845
	Ethyl Acetate	<7.53	2.24	99.9703
	Tetrachloroethene	<0.94	1.70	99.8194
	Toluene	<20.7	1.68	99.9919
	Total Xylenes	<14.6	1.16	99.9921
2	2-Butanone	<9.39	1.78	99.9811
	Ethyl Acetate	<7.53	0.76	99.9899
	Tetrachloroethene	<0.94	1.43	99.8478
	Toluene	<20.7	1.63	99.9921
	Total Xylenes	<14.6	1.34	99.9908
3	2-Butanone	<9.39	2.03	99.9784
	Ethyl Acetate	<7.53	0.51	99.9932
	Tetrachloroethene	<0.94	0.70	99.9252
	Toluene	<20.7	1.03	99.9950
	Total Xylenes	<14.6	1.02	99.9930
Total	2-Butanone	<9.39	1.76	99.9813
	Ethyl Acetate	<7.53	1.16	99.9845
	Tetrachloroethene	<0.94	1.28	99.8635
	Toluene	<20.7	1.45	99.9930
	Total Xylenes	<14.6	1.18	99.9919
	1,2,4-Trichlorobenzene	<3.66	0.068	99.9981

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

Compund	Destruction and Removal Efficiency				Coefficient of Variation
	Test No. 1	Test No. 2	Test No. 3	Average	
	%	%	%	%	%
2-Butanone	99.9961	99.9968	99.9813	99.9914	0.0087
Ethyl Acetate	99.9983	99.9982	99.9845	99.9937	0.0079
Tetrachloroethene	99.9972	99.9988	99.8635	99.9532	0.078
Toluene	99.9959	99.9957	99.9930	99.9948	0.0016
Total Xylenes	99.9968	99.9970	99.9919	99.9952	0.0029
1,2,4-Trichlorobenzene	99.9998	-	99.9981	99.9990	0.0012

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	0.15 g/s	0.071 µg/m^3	120 µg/m^3	0.060	S
Sulphur dioxide	1.61 g/s	0.77 µg/m^3	275 µg/m^3	0.28	S - 24 hour
Sulphur dioxide	1.61 g/s	2.86 µg/m^3	690 µg/m^3	0.41	S - 1 hour
Nitrogen oxides	3.70 g/s	1.76 µg/m^3	200 µg/m^3	0.88	S - 24 hour
Nitrogen oxides	3.70 g/s	6.57 µg/m^3	400 µg/m^3	1.64	S - 1 hour
Carbon monoxide	1.23 g/s	2.62 µg/m^3	6000 µg/m^3	0.044	S - 1/2 hour
Carbon dioxide	2950 g/s	1405 µg/m^3	255800 µg/m^3	0.55	SL
Hydrogen chloride	0.27 g/s	0.13 µg/m^3	20 µg/m^3	0.64	S
Fluorides (as hydrogen fluoride)	0.15 g/s	0.071 µg/m^3	0.86 µg/m^3	8.30	S - 24 hour
Fluorides (as hydrogen fluoride)	0.15 g/s	0.021 µg/m^3	0.34 µg/m^3	6.11	S - 30 day
Hydrogen bromide	<0.16 g/s	0.28 µg/m^3	668 µg/m^3	0.043	G - 1 hour
Hydrogen iodide	0.083 g/s	0.040 µg/m^3	0.5 µg/m^3	7.90	SL
Hydrogen cyanide	<0.0034 g/s	0.0016 µg/m^3	8 µg/m^3	0.020	S
Dioxins & Furans (TEQ) *	<0.071 ng TEQ/s	0.000034 pg TEQ/m^3			
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.070 ng TEQ/s	0.000033 pg TEQ/m^3	0.1 pg TEQ/m^3	0.033	S
Benzo(a)Pyrene	<0.038 µg/s	0.0000000018 µg/m^3	0.00001 µg/m^3	0.018	S - Annual
Biphenyl	2.58 µg/s	0.0000046 µg/m^3	60 µg/m^3	<0.0001	G - 1 hour
2-Chloronaphthalene	<0.038 µg/s	0.000000018 µg/m^3	1 µg/m^3	<0.0001	SL
1-Methylnaphthalene	5.00 µg/s	0.0000024 µg/m^3	35.5 µg/m^3	<0.0001	SL
Naphthalene	20.7 µg/s	0.0000099 µg/m^3	22.5 µg/m^3	<0.0001	G
Quinoline	<0.038 µg/s	0.000000018 µg/m^3	0.005 µg/m^3	0.00036	SL
Terphenyls (m, o, p)	<0.20 µg/s	0.000000095 µg/m^3	15 µg/m^3	<0.0001	SL
1,2-Dichlorobenzene	1.42 µg/s	0.0000025 µg/m^3	30500 µg/m^3	<0.0001	G - 1 hour
1,3-Dichlorobenzene	1.94 µg/s	0.00000092 µg/m^3	50 µg/m^3	<0.0001	SL
1,4-Dichlorobenzene	1.64 µg/s	0.00000078 µg/m^3	95 µg/m^3	<0.0001	S
1,3,5-Trichlorobenzene	0.33 µg/s	0.00000016 µg/m^3	3.6 µg/m^3	<0.0001	SL
1,2,4-Trichlorobenzene	37.00 µg/s	0.000018 µg/m^3	400 µg/m^3	<0.0001	G
1,2,3-Trichlorobenzene	9.82 µg/s	0.0000047 µg/m^3	135 µg/m^3	<0.0001	SL
1,2,4,5-Tetrachlorobenzene	0.29 µg/s	0.00000014 µg/m^3	1 µg/m^3	<0.0001	SL
1,2,3,4-Tetrachlorobenzene	0.10 µg/s	0.000000048 µg/m^3	600 µg/m^3	<0.0001	SL
Pentachlorobenzene	0.087 µg/s	0.000000041 µg/m^3	80 µg/m^3	<0.0001	SL
Hexachlorobenzene	<0.039 µg/s	0.000000019 µg/m^3	0.011 µg/m^3	0.00017	SL
2,4-Dichlorophenol	1.17 µg/s	0.00000056 µg/m^3	33.5 µg/m^3	<0.0001	SL
2,6-Dichlorophenol	<0.19 µg/s	0.000000090 µg/m^3	19 µg/m^3	<0.0001	SL
2,4,5-Trichlorophenol	<0.19 µg/s	0.000000090 µg/m^3	220 µg/m^3	<0.0001	SL
2,4,6-Trichlorophenol	0.25 µg/s	0.00000012 µg/m^3	1.5 µg/m^3	<0.0001	SL
2,3,4,6-Tetrachlorophenol	<0.19 µg/s	0.000000090 µg/m^3	0.75 µg/m^3	<0.0001	SL
Pentachlorophenol	<0.19 µg/s	0.000000090 µg/m^3	20 µg/m^3	<0.0001	G
Polychlorinated biphenyls	0.92 µg/s	0.00000044 µg/m^3	0.15 µg/m^3	0.00029	G
Hexachlorobutadiene	<0.040 µg/s	0.000000019 µg/m^3	0.225 µg/m^3	<0.0001	SL
Hexachloroethane	<0.038 µg/s	0.000000018 µg/m^3	115 µg/m^3	<0.0001	SL
Heptachlor	<0.0093 µg/s	0.0000000044 µg/m^3	0.004 µg/m^3	0.00011	SL
Toxaphene	<0.034 µg/s	0.000000016 µg/m^3	0.015 µg/m^3	<0.0001	SL
Hexachlorophene	<0.19 µg/s	0.000000090 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/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	2.05 mg/s	0.00098 µg/m^3	12 µg/m^3	0.0081	SL
Antimony	0.047 mg/s	0.000022 µg/m^3	25 µg/m^3	<0.0001	S
Arsenic	0.22 mg/s	0.00010 µg/m^3	0.3 µg/m^3	0.035	G
Barium (as water soluble)	0.11 mg/s	0.000052 µg/m^3	10 µg/m^3	0.00052	G
Beryllium*	<0.00074 mg/s	0.00000035 µg/m^3	0.01 µg/m^3	0.0035	S
Boron	33.5 mg/s	0.016 µg/m^3	120 µg/m^3	0.013	S
Cadmium	0.019 mg/s	0.0000090 µg/m^3	0.025 µg/m^3	0.036	S
Calcium oxide	5.64 mg/s	0.0027 µg/m^3	10 µg/m^3	0.027	S
Chromium	0.16 mg/s	0.000076 µg/m^3	0.5 µg/m^3	0.015	G
Cobalt	0.0056 mg/s	0.0000027 µg/m^3	0.1 µg/m^3	0.0027	G
Copper	0.23 mg/s	0.00011 µg/m^3	50 µg/m^3	0.00022	S
Iron (as metal)	22.6 mg/s	0.011 µg/m^3	4 µg/m^3	0.27	S
Lead	0.029 mg/s	0.000014 µg/m^3	0.5 µg/m^3	0.0028	S - 24 hour
Lead	0.029 mg/s	0.0000040 µg/m^3	0.2 µg/m^3	0.0020	S - 30 day
Lithium	0.029 mg/s	0.000014 µg/m^3	20 µg/m^3	<0.0001	S
Magnesium	0.48 mg/s	0.00023 µg/m^3	72 µg/m^3	0.00032	SL
Manganese (as compounds)	0.39 mg/s	0.00019 µg/m^3	0.4 µg/m^3	0.046	G
Mercury	0.041 mg/s	0.000020 µg/m^3	2 µg/m^3	0.00098	S
Molybdenum	0.12 mg/s	0.000057 µg/m^3	120 µg/m^3	<0.0001	G
Nickel	0.15 mg/s	0.0000072 µg/m^3	0.04 µg/m^3	0.018	S - Annual
Phosphorus	2.05 mg/s	0.00098 µg/m^3	0.5 µg/m^3	0.20	SL
Potassium	14.9 mg/s	0.0071 µg/m^3	1 µg/m^3	0.71	SL
Selenium	0.41 mg/s	0.00020 µg/m^3	10 µg/m^3	0.0020	G
Silicon	21.9 mg/s	0.010 µg/m^3	27 µg/m^3	0.039	SL
Silver	0.00069 mg/s	0.00000033 µg/m^3	1 µg/m^3	<0.0001	S
Sodium hydroxide	33.2 mg/s	0.016 µg/m^3	10 µg/m^3	0.16	G
Strontium	0.018 mg/s	0.0000086 µg/m^3	120 µg/m^3	<0.0001	G
Tin	0.35 mg/s	0.00017 µg/m^3	10 µg/m^3	0.0017	S
Titanium	0.56 mg/s	0.00027 µg/m^3	120 µg/m^3	0.00022	S
Vanadium	0.014 mg/s	0.0000067 µg/m^3	2 µg/m^3	0.00033	S
Zinc	0.39 mg/s	0.00019 µg/m^3	120 µg/m^3	0.00015	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/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	0.56 mg/s	0.000027 µg/m^3	0.45 µg/m^3	0.0060	S - Annual
Bromodichloromethane	0.043 mg/s	0.000020 µg/m^3	350 µg/m^3	<0.0001	SL
Bromomethane (methyl bromide)	0.22 mg/s	0.00010 µg/m^3	1350 µg/m^3	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.80 mg/s	0.00038 µg/m^3	1000 µg/m^3	<0.0001	S
Chloroethene (vinyl chloride)	0.029 mg/s	0.000014 µg/m^3	1 µg/m^3	0.0014	S
Dibromochloromethane	0.036 mg/s	0.000017 µg/m^3	0.2 µg/m^3	0.0086	SL
1,2-Dibromoethane (Ethylene dibromide)	0.0023 mg/s	0.0000011 µg/m^3	3 µg/m^3	<0.0001	G
Dichlorodifluoromethane	0.057 mg/s	0.000027 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	0.0098 mg/s	0.0000047 µg/m^3	105 µg/m^3	<0.0001	G
Dichloromethane (methylene chloride)	1.38 mg/s	0.00066 µg/m^3	220 µg/m^3	0.00030	G
1,2-Dichloropropane*	0 mg/s	0 µg/m^3	2400 µg/m^3	<0.0001	G
Ethyl Acetate	0.47 mg/s	0.00083 µg/m^3	19000 µg/m^3	<0.0001	G - 1 hour
Ethylbenzene	0.13 mg/s	0.000062 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)	0.99 mg/s	0.00047 µg/m^3	11880 µg/m^3	<0.0001	S
Styrene	0.17 mg/s	0.000081 µg/m^3	400 µg/m^3	<0.0001	S
Tetrachloroethene (perchloroethylene)	0.44 mg/s	0.00021 µg/m^3	360 µg/m^3	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0 mg/s	0 µg/m^3	2.4 µg/m^3	<0.0001	S
Toluene	0.85 mg/s	0.00040 µg/m^3	2000 µg/m^3	<0.0001	S
Tribromomethane (bromoform)	0.037 mg/s	0.000018 µg/m^3	55 µg/m^3	<0.0001	G
1,1,1-Trichloroethane (methyl chloroform)	0.0028 mg/s	0.0000013 µg/m^3	115000 µg/m^3	<0.0001	S
Trichloroethene	0.13 mg/s	0.000062 µg/m^3	12 µg/m^3	0.00052	S
Trichlorofluoromethane	0.0033 mg/s	0.0000016 µg/m^3	6000 µg/m^3	<0.0001	G
Trichloromethane (chloroform)	0.034 mg/s	0.000016 µg/m^3	1 µg/m^3	0.0016	S
Trichlorotrifluoroethane*	0 mg/s	0 µg/m^3	800000 µg/m^3	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene)	0.060 mg/s	0.000029 µg/m^3	220 µg/m^3	<0.0001	S
1,3,5-Trimethylbenzene	0.020 mg/s	0.0000095 µg/m^3	220 µg/m^3	<0.0001	S
Xylenes	0.57 mg/s	0.00027 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).

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	35.1	<50	0.91	0.31	64.25	12.52	0.47	19.93	0.52	2.31
2	33.5	<50	0.91	0.34	63.72	12.33	0.33	20.98	0.34	2.30
3	43.8	<50	0.86	0.13	63.51	12.30	0.38	21.16	0.32	2.33
Average	37.5	<50	0.89	0.26	63.83	12.38	0.39	20.69	0.39	2.31

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	4.14	-	1.05	0.73	8.68	11.57	0.86	74.38	0.25	4.26
2	5.04	-	1.06	0.49	8.32	11.22	0.90	76.47	0.39	2.70
3	5.09	-	1.05	0.39	10.79	11.07	0.93	74.04	0.37	2.80
Average	4.76	-	1.05	0.54	9.26	11.29	0.90	74.96	0.337	3.25

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	21.0	<100	0.98	0.41	42.47	11.25	0.45	40.72	0.41	4.70
2	20.5	<100	0.98	0.69	27.07	11.57	0.42	57.29	0.40	3.25
3	18.9	<100	0.98	0.65	32.08	11.48	0.65	51.89	0.28	3.62
Average	20.1	<100	0.98	0.58	33.87	11.43	0.51	49.97	0.36	3.86

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	674	728	<10	246	<10
Antimony	20.0	2.22	<0.4	16.3	<0.4
Arsenic	0.88	108	<0.4	1.88	1.98
Barium	38.5	25.6	1.5	70.0	<1
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	<10	21.8	<10	33.0	48.5
Cadmium	0.74	7.41	<0.1	3.88	2.23
Calcium	523	982	57.8	924	348
Chromium	6.39	62.8	<4	8.82	<4
Cobalt	1.20	2.42	<1	3.92	<1
Copper	27.4	76.2	<2.5	34.0	<2.5
Iron	540	449	<200	793	<200
Lead	5.66	3.40	<0.1	7.58	0.34
Lithium	4.87	15.3	<1	3.31	3.98
Magnesium	89.4	251	84.1	99.7	202
Manganese	<15	192	<15	16.9	<15
Mercury	0.34	0.56	<0.010	0.50	<0.010
Molybdenum	4.72	5.38	<1	17.7	7.34
Nickel	18.6	51.3	<0.5	12.7	4.03
Phosphorus	<100	985	<100	161	<100
Potassium	180	6890	<150	494	3810
Selenium	<2	6.23	<2	2.89	<2
Silicon	225	287	<150	522	<150
Silver	0.11	0.31	<0.1	<0.1	0.21
Sodium	966	9800	57.0	4710	15300
Strontium	9.45	6.33	<2	11.3	3.53
Sulphur	<3000	<3000	<3000	<3000	3610
Tin	3.82	3.18	<2	4.00	<2
Titanium	11.5	35.6	<1	6.10	1.06
Vanadium	17.2	2.00	<1	7.21	1.68
Zinc	59.7	104	<20	127	<20
Total	<6556	<24105	<3875	<11339	<23853

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	15400
Antimony	109
Arsenic	1300
Barium	583
Beryllium	<0.5
Boron	231
Cadmium	126
Calcium	16800
Chromium	788
Cobalt	36.9
Copper	1260
Iron	7980
Lead	84.3
Lithium	214
Magnesium	4630
Manganese	1650
Mercury	9.71
Molybdenum	149
Nickel	645
Phosphorus	12900
Potassium	120000
Selenium	59.8
Silicon	1428
Silver	8.70
Sodium	146000
Strontium	129
Sulphur	70300
Tin	36.9
Titanium	1550
Vanadium	151
Zinc	1240
Total	<405800

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	<2.2	2.74	<0.59	<0.95
Pentachlorodibenzo-p-dioxins	3.07	4.77	<0.81	<0.44
Hexachlorodibenzo-p-dioxins	12.6	63.9	<0.70	6.63
Heptachlorodibenzo-p-dioxins	89.6	1020	1.48	160
Octachlorodibenzo-p-dioxin	482	5000	8.94	976
Total	<589	6091	<12.5	<1144

Furans

Congener Group	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Tetrachlorodibenzofurans	10.9	74.7	<2.2	14.3
Pentachlorodibenzofurans	4.16	27.7	<0.77	3.89
Hexachlorodibenzofurans	33.2	42.5	0.92	18.0
Heptachlorodibenzofurans	111	280	<0.62	82.9
Octachlorodibenzofuran	516	501	1.50	160
Total	675	926	<6.01	279

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	<2.2	<1.1	<0.59	<0.95
12378-pentachlorodibenzo-p-dioxin	3.07	<1.3	<0.81	<0.44
123478-hexachlorodibenzo-p-dioxin	<2.5	4.45	<0.69	<0.68
123678-hexachlorodibenzo-p-dioxin	5.09	7.80	<0.70	3.05
123789-hexachlorodibenzo-p-dioxin	3.63	<2.7	<0.70	<0.89
1234678-heptachlorodibenzo-p-dioxin	55.1	574	1.48	84.4
Octachlorodibenzo-p-dioxin	482	5000	8.94	976
2378-tetrachlorodibenzofuran	4.70	3.55	<2.2	<1.3
12378-pentachlorodibenzofuran	<4.4	3.08	<0.77	<1.6
23478-pentachlorodibenzofuran	4.16	3.67	<0.67	<1.9
123478-hexachlorodibenzofuran	9.72	5.72	<0.49	<2.9
123678-hexachlorodibenzofuran	<5.0	<2.8	<0.45	1.99
234678-hexachlorodibenzofuran	4.08	<2.8	<0.47	<1.4
123789-hexachlorodibenzofuran	3.65	<2.4	0.92	<1.6
1234678-heptachlorodibenzofuran	57.1	56.2	<0.50	19.3
1234789-heptachlorodibenzofuran	<9.2	8.18	<0.62	3.24
Octachlorodibenzofuran	516	501	1.50	160
Total	<1172	<6181	<22.5	<1262

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	16100	3320	4.66	4060
Trichlorinated biphenyls	6980	2000	9.33	2930
Tetrachlorinated biphenyls	13600	4230	10.2	8990
Pentachlorinated biphenyls	30400	9680	12.3	26500
Hexachlorinated biphenyls	20600	7310	8.42	17100
Heptachlorinated biphenyls	7540	1940	6.60	5150
Octachlorinated biphenyls	1270	368	2.00	1140
Nonachlorinated biphenyls	222	55.4	<1.9	118
Decachlorinated biphenyl	305	161	<1.8	119
Total	97017	29064	<57.2	66107

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 136
Clean Harbors Sarnia
Gas Analyses Comparison

Test No.	Measurement Source	Carbon Dioxide %	Carbon Monoxide ppm	Oxygen %	Sulfur Dioxide ppm	Hydrogen Chloride * ppm	Moisture * %	Total Hydrocarbons ** ppm
1	ORTECH	8.51	54.4	8.91	53.6	10.3	49.3	12.6
1	Clean Harbors	7.7	44.8	9.2	19.0	11.3	47.7	7.6
2	ORTECH	8.41	63.3	9.18	28.2	9.2	48.7	5.7
2	Clean Harbors	7.3	57.9	9.5	4.9	10.1	46.3	4.5
3	ORTECH	8.58	49.0	8.99	13.9	8.7	49.3	7.5
3	Clean Harbors	7.5	42.4	9.3	1.6	4.4	46.8	5.1
Average	ORTECH	8.50	55.6	9.03	31.9	9.4	49.1	8.6
	Clean Harbors	7.50	48.4	9.33	8.5	8.6	46.9	5.7

* Measured using reference methods by ORTECH and a continuous emission monitor by Clean Harbors.

** Dry basis as methane

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
AIR
NUMBER 8-1030-94-OC
Page 1 of 1

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 1.8 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 8-1039-91-005 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;

e. "CEM-CSA" means Continuous Emission Monitoring Methods, Canadian Standards Method: CAN/CSA-Z223.2-M86, ISSN 0117-5669, 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 "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: stature or regulation.

Adverse Impact

8. The company shall take all reasonable steps to minimize any adver effect resulting from non-compliance with the requirements specified i this certificate including, but not limited to, such accelerated additional monitoring as may be necessary to determine the nature a 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 facilit 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 proces controls, quality assurance and quality control procedures, or in relation to the site and facility is adequate to achiev compliance with this certificate; and,

ii. equipment and material are kept on hand and in good repair fo 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 below 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, th 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 and time constraints, attempt to accumulate sufficient quantities of waste which are representative of waste causing highest stack emissions in 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 12 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 tasting. 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 compliance 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 the temperature of the scrubber outlet so as to minimize the emissions of 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 for 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 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 this 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
Aluminum Oxide	100
Arsenic	1
Barium-total water soluble	30
Chromium (Di,Tri and Hexavalent forms)	5
Manganese	0.5
Molybdenum	100
Nickel	5
Phosphorous Pentachloride	30
Potassium Hydroxide	28
Selenium	20
Sodium Hydroxide	20
Silica-respirable (d≤10 micron)	15
Strontium	100
Vinyl Chloride	3
Trichlorofluoromethane	18000
Trifluorotrichloroethane	2400000
Methylene Chloride	5300
Chloroform	150
1,1,1-Trichloroethane	350000
1,2-Dichloroethane	1200
Perchloroethylene	10000
Isopropyl Benzene(Cumene)	100
1,2,4-Trimethyl Benzene(Mesitylene)	500
Carbon Tetrachloride	1800
1,2,4-Trichlorobenzene	100
Naphthalene	36
Benzo(a)pyrene	3.3 ng/cubic metre**
Pentachlorophenol	60
Polychlorinated Biphenyls (PCBs)	0.45
Polychlorinated Dibenzodioxins (PCDD'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

* Concentration is in micrograms per cubic metre of air unless noted otherwise.

** ng/cubic metre = nanograms per cubic metre

SCHEDULE 8 - 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 1: 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.", 1977.

4. Air Emission Testing at the Tricil, Sarnia Incinerator, A Draft Report to: Tricil Limited, 89 The Queensway West, Mississauga, Ontario, P.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. 11-21, Site Plan.

10. Drawing no. 20L-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 1EA;

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
2St. 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 January, 2023

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
(14 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#:	L2151431		Mississauga, ON L5J 2Y4
Date of Report	17-Sep-18		Canada
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **CB by LRGC/MS - Isotope dilution**

Certified by: _____
Ron McLeod
Technical Director

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG2872289-1		L2151431-25	
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	12-Sep-18		12-Sep-18	
Target Analytes	**ng/sample**		**ng/sample**	
Chlorobenzene	<5	U	<5	U
1,3-Dichlorobenzene	<5	U	<5	U
1,4-Dichlorobenzene	5.05		6.05	
1,2-Dichlorobenzene	<5	U	<5	U
1,3,5-Trichlorobenzene	<5	U	<5	U
1,2,4-Trichlorobenzene	<5	U	<5	U
1,2,3-Trichlorobenzene	<5	U	<5	U
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<5	U	<5	U
1,2,3,4-Tetrachlorobenzene	<5	U	<5	U
Pentachlorobenzene	<5	U	<5	U
Hexachlorobenzene	<5	U	<5	U
Extraction Standards	**%Rec**		**%Rec**	
13C6-Chlorobenzene	74		72	
13C6-1,4-Dichlorobenzene	75		74	
13C6-1,2,3-Trichlorobenzene	67		69	
13C6-1,2,3,4-Tetrachlorobenzene	58		61	
13C6-Pentachlorobenzene	78		85	
13C6-Hexachlorobenzene	82		88	

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#:	L2151431		Mississauga, ON L5J 2Y4
Date of Report	17-Sep-18		Canada
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **Chlorophenols as acetate derivatives by SIM GC/MS**

Certified by:

Ron McLeod, PhD
Laboratory Manager and Technical Director

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG2872289-1		L2151431-25	
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	12-Sep-18		12-Sep-18	
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
Hexachlorophene	<50	U	<50	U
Extraction Standards	**% Rec**		**% Rec**	
2-Fluorophenol	42		47	
d5-Phenol	52		46	M
d4-2-Chlorophenol	58		46	
2,4,6-Tribromophenol	77		56	
13C-Pentachlorophenol	105		89	

U	Indicates that this compound was not detected above the LOR.
M	Indicates that a peak has been manually integrated.

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 Consulting
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Rd.
ALS WO#:	L2151431		Mississauga, ON
Date of Report	24-Sep-18		LYJ 2Y4
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **PCDD/F by EPA M23**

Low levels of selected targets were detected in the method blank. As a result, the low reported levels for the proof are likely elevated.
Glassware is approved for collection of samples for PCDD/F analysis

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	Method Blank	GLASSWARE PROOF
ALS Sample ID	WG2872289-1	L2151431-25
Sample Size	1	1
Sample size units	Train	Proof
Percent Moisture	n/a	n/a
Sample Matrix	QC	Media Prep
Sampling Date	n/a	n/a
Extraction Date	12-Sep-18	12-Sep-18
Target Analytes	**pg**	**pg**
2,3,7,8-TCDD	<2.3	<1.9
1,2,3,7,8-PeCDD	<1.5	<1.8
1,2,3,4,7,8-HxCDD	<2.0	<1.5
1,2,3,6,7,8-HxCDD	<2.8	<1.5
1,2,3,7,8,9-HxCDD	4.33	<1.5
1,2,3,4,6,7,8-HpCDD	5.80	4.59
OCDD	22.8	16.2
2,3,7,8-TCDF	<1.7	<1.5
1,2,3,7,8-PeCDF	<4.0	<1.7
2,3,4,7,8-PeCDF	<3.8	<1.7
1,2,3,4,7,8-HxCDF	<2.7	<1.5
1,2,3,6,7,8-HxCDF	<2.5	<1.4
2,3,4,6,7,8-HxCDF	<2.6	<1.4
1,2,3,7,8,9-HxCDF	<3.1	<1.7
1,2,3,4,6,7,8-HpCDF	<5.3	3.11
1,2,3,4,7,8,9-HpCDF	<1.8	2.26
OCDF	15.8	7.43
Extraction Standards		
13C12-2,3,7,8-TCDD	37	79
13C12-1,2,3,7,8-PeCDD	35	85
13C12-1,2,3,6,7,8-HxCDD	36	74
13C12-1,2,3,4,6,7,8-HpCDD	35	79
13C12-OCDD	35	77
13C12-2,3,7,8-TCDF	38	84
13C12-1,2,3,7,8-PeCDF	36	78
13C12-1,2,3,6,7,8-HxCDF	34	67
13C12-1,2,3,4,6,7,8-HpCDF	40	77
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	NS	NS
Homologue Group Totals	**pg**	**pg**
Total-TCDD	<2.3	<1.9
Total-PeCDD	2.57	<1.8
Total-HxCDD	10.1	<1.5
Total-HpCDD	12.0	4.59
Total-TCDF	<1.7	<1.5
Total-PeCDF	6.29	<1.7
Total-HxCDF	<3.1	<1.7
Total-HpCDF	<1.8	5.37
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.503	0.107
Mid Point PCDD/F TEQ (WHO 2005)	4.20	2.84
Upper Bound PCDD/F TEQ (WHO 2005)	7.37	5.57

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#:	L2151431-25		Mississauga, ON L5J 2Y4
Date of Report	24-Sep-18		Canada
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **Chlorinated Pesticides by EPA 1699 (modified)**

Low levels of selected targets were detected in the proof.
Glassware is approved for collection of samples for analysis of the reported targets.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	Method Blank	GLASSWARE PROOF
ALS Sample ID	WG2872289-1	L2151431-25
Sample Size	1	1
Sample size units	blank	proof
Percent Moisture	n/a	n/a
Sample Matrix	QC	Media Prep
Sampling Date	n/a	n/a
Extraction Date	12-sep-18	12-Sep-18
Target Analytes	**ng**	**ng**
Heptachlor	<0.063	<0.080
trans-Chlordane	<0.18	<0.22
cis-Chlordane	<0.17	<0.21
trans-Nonachlor	<0.16	<0.20
cis-Nonachlor	<0.10	0.130
Parlar 26	<0.50	<0.34
Parlar 50	<0.40	<1.6
Parlar 62	<0.69	<0.62
Extraction Standards	**% Rec**	**% Rec**
Heptachlor, 13C10-	65	86
trans-Nonachlor, 13C10-	73	83
Mirex, 13C10-	65	79

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#:	L2151431		Mississauga, ON L5J 2Y4
Date of Report	17-Sep-18		Canada
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **PAH by CARB method 429 (LR option)- Isotope dilution**

Certified by: _____
Ron McLeod
Technical Director

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		GLASSWARE PROOF	
ALS Sample ID	WG2872289-1		L2151431-25	
Sample Size	1		1	
Sample units	blank		proof	
Moisture Content	n/a		n/a	
Matrix	QC		Media Prep	
Sampling Date	n/a		n/a	
Extraction Date	12-Sep-18		12-Sep-18	
Target Analytes	**ng/sample**		**ng/sample**	
Naphthalene	<10	U	<10	U
2-Methylnaphthalene	<10	U	<10	U
1-Methylnaphthalene	<10	U	<10	U
Acenaphthylene	<10	U	<10	U
Acenaphthene	<10	U	<10	U
Fluorene	<10	U	<10	U
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	<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)Anthracene	<10	U	<10	U
Benzo(g,h,i)Perylene	<10	U	<10	U
Extraction Standards	**% Rec**		**% Rec**	
Naphthalene D8	77.5		86.2	
2-Methylnaphthalene-D10	75.3		85.6	
Acenaphthylene D8	75.7		87.2	
Phenanthrene D10	70.0		89.9	
Anthracene-D10	87.2		103.1	
Fluoranthene D10	76.6		88.6	
Benz(a)Anthracene-D12	75.5		96.2	
Chrysene D12	77.0		91.4	
Benzo(b)Fluoranthene-D12	69.8		76.5	
Benzo(k)Fluoranthene-D12	79.1		105.9	R
Benzo(a)Pyrene D12	96.1		107.1	R
Perylene D12	96.5		111.2	R
Indeno(1,2,3,cd)Pyrene-D12	86.9	M	93.8	M
Dibenz(a,h)Anthracene-D14	76.4		93.6	
Benzo(g,h,i)Perylene D12	74.8		88.9	

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.

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#:	L2151431		Mississauga, ON
Date of Report	24-Sep-18		L5J 2Y4
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 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

The target PCB-103 was not quantifiable due to an interfering peak from an internal standard not related to PCB analysis.
There were a number of targets detected in the method blank. Proof data are likely elevated as a result.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	Method Blank	GLASSWARE PROOF
ALS Sample ID	WG2872289-1	L2151431-25
Sample Size	1	1
Sample size units	blank	proof
Split Ratio	5	5
Percent Moisture	n/a	n/a
Sample Matrix	QC	Media Prep
Sampling Date	n/a	n/a
Extraction Date	12-Sep-18	12-Sep-18
Target Analytes	**pg**	**pg**
PCB-081	<15	4.96
PCB-077	<110	<56
PCB-123	13.1	<4.0
PCB-118	59.2	106
PCB-114	<2.7	6.22
PCB-105	<27	<36
PCB-126	<16	<5.7
PCB-167	11.6	5.47
PCB-156/157	28.9	13.2
PCB-169	17.8	<5.0
PCB-189	<7.7	<3.5
Homologue Group Totals	**pg**	**pg**
Total MonoCB	37.9	<2.3
Total DiCB	107	132
Total TriCB	318	286
Total TetraCB	782	1090
Total PentaCB	507	1660
Total HexaCB	247	361
Total HeptaCB	67.6	38.7
Total OctaCB	34.6	2.40
Total NonaCB	<6.6	<5.3
DecaCB	<2.5	<2.2
Total PCB	2100	3560
Toxic Equivalency - (WHO 2005)	**pg**	**pg**
Lower Bound PCB TEQ	0.537	0.00541
Mid Point PCB TEQ	2.15	0.732
Upper Bound PCB TEQ	2.15	0.732

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#:	L2078545		Mississauga, ON L5J 2Y4
Date of Report	18-Sep-18		CANADA
Date of Sample Receipt	22-Aug-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **VOCs via SW846 Method 5041A/8260C**

Ketone data by VOST analyses are estimated values only

Certified by:

Ron McLeod
Technical Director

ALS Environmental

Sample Analysis Summary Report

Sample Name	VOST PROOF 1/2		VOST PROOF 2/2	
ALS Sample ID	L2151431-52		L2151431-53	
Sample Size	1		1	
Sample units	sample		sample	
Moisture Content	n/a		n/a	
Matrix	Media Prep		Media Prep	
Sampling Date	n/a		n/a	
Extraction Date	17-Sep-18		17-Sep-18	
Target Analytes	**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	<0.02	U	<0.02	U
Vinyl Chloride	<0.02	U	<0.02	U
Bromomethane	<0.09	U	<0.09	U
Trichlorofluoromethane	<0.02	U	<0.02	U
1,1-Dichloroethene	<0.01	U	<0.01	U
Acetone	<0.1	U	<0.1	U
Methylene Chloride	<0.1	U	<0.1	U
trans,1,2-Dichloroethene	<0.01	U	<0.01	U
1,1-Dichloroethane	<0.01	U	<0.01	U
2-Butanone	<0.01	U	<0.01	U
Chloroform	<0.01	U	<0.01	U
1,1,1-Trichloroethane	<0.01	U	<0.01	U
Carbon Tetrachloride	<0.01	U	<0.01	U
Benzene	<0.05	U	<0.05	U
Trichloroethene	<0.01	U	<0.01	U
1,2-Dichloropropane	<0.01	U	<0.01	U
Bromodichloromethane	<0.01	U	<0.01	U
Toluene	<0.05	U	<0.05	U
Tetrachloroethene	<0.01	U	<0.01	U
Chlorodibromomethane	<0.01	U	<0.01	U
Ethylene Dibromide	<0.02	U	<0.02	U
Ethylbenzene	<0.01	U	<0.01	U
M&P-Xylene	<0.03	U	<0.03	U
O-Xylene	<0.01	U	<0.01	U
Styrene	<0.02	U	<0.02	U
Bromoform	<0.01	U	<0.01	U
Isopropylbenzene	<0.02	U	<0.02	U
1,3,5-Trimethylbenzene	<0.02	U	<0.02	U
1,2,4-Trimethylbenzene	<0.02	U	<0.02	U
1,2,4-Trichlorobenzene	<0.02	U	<0.02	U
Trichlorotrifluoroethane	<0.02	U	<0.02	U
Field Standard	**% Rec**		**% Rec**	
d10-Ethylbenzene(SPK)	80		79	
Surrogate Standards	**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	115.8		116	
d8-Toluene(SURR)	83.4		84	
4-Bromofluorobenzene(SURR)	85.5		83.5	
Internal Standards	**% Rec**		**% Rec**	
Bromochloromethane	131.7		137.7	
1,4-Difluorobenzene	114.1		115.9	
d5-Chlorobenzene	117.3		119.7	

U Indicates that this compound was not detected above the RL.

APPENDIX 4

Metals Train Field Data Sheets
(15 pages)

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	1 - metals and Particulate
Test Date	09/25/17
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21874
Page	1 of 5
Probe No.:	15D
Meter Box No.:	Team 3
Impinger Box No.:	___

Pitot Factor	.85	
DGMCF	1.003	
Barometric Pressure	29.27	"Hg
Static Pressure	+1.20	"H2O
Nozzle Size	.2571	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	31.8	mg
Probe	8.6	mg

Moisture Gain

CWTR	3775.6	g
WCBDA	40.8	g

Combustion Gas Concentration

Oxygen	8.91	%
Carbon Dioxide	8.51	%
Carbon Monoxide	54.4	ppm

Measuring Device	MII Numbers
Probe / Pitot	15D
Trendicator	Team 3
Control Box	COE 20093 (Team
Incline Manometer	COE 20093
Comb.Gas.Analyzer	MSML
Micromanometer	
Barometer	Env.Can
Calipers	B03906

Nozzle Measurements	
1	.2570
2	.2570
3	.2575
4	.2570
Average:	.2571

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: 9/25/18	Plant: Clean Harbors	Test No.: 1 - Metals and Particulate	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
			1.70	.76	352			69		75	76	2.0	
1	0	142.06	[illegible]	[illegible]	[illegible]	244	246	[illegible]	87	[illegible]	[illegible]	[illegible]	3.5
	3	144.27	1.50	.71	353	249	254	59	230	76	76	1.90	3.5
	6	146.47	1.50	.71	352	252	257	58	247	76	76	1.85	3.5
	9	148.65	1.40	.69	352	245	255	57	257	76	76	1.75	3.5
2	12	150.78	1.50	.71	352	244	248	58	245	76	76	1.80	3.5
	15	152.92	1.55	.72	353	245	250	58	245	76	76	1.90	3.5
	18	155.11	1.55	.72	353	242	252	60	235	76	76	1.90	3.5
	21	157.31	1.55	.72	349	240	250	60	228	76	76	1.90	3.5
3	24	159.51	1.65	.75	349	243	251	59	239	76	77	2.00	3.8
	27	161.77	1.60	.74	348	244	249	60	221	77	77	1.95	4.0
	30	164.02	1.60	.74	349	242	249	61	246	77	77	1.95	4.0
	33	166.26	1.65	.75	350	243	249	62	245	77	77	2.00	4.0
4	36	168.51	1.65	.75	350	243	250	64	246	77	77	2.00	4.0
	39	170.77	1.65	.75	351	243	252	63	247	77	77	2.00	4.0
	42	173.03	1.70	.76	352	242	250	55	220	77	78	2.05	4.0
	45	175.33	1.70	.76	352	242	249	54	248	77	78	2.05	4.0
5	48	177.63	2.00	.82	351	242	251	54	248	77	78	2.35	4.0
	51	180.09	2.00	.82	352	244	250	52	254	77	78	2.35	4.3
	54	182.57	1.90	.80	352	245	251	52	256	77	78	2.25	4.3
	57	185.01	1.90	.80	350	247	249	54	255	78	78	2.25	4.3
6	60	187.45	1.90	.80	350	248	250	55	254	78	78	2.25	4.3

Traverse: 1 (near wall)					
Start Time: 10:45	Initial Leak Check: .004	cfm@ 13	"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.: 21874

Operator: JB

Field Data Sheet

Date: 9/25/18	Plant: Clean Harbors	Test No.: 1- metals and particulate	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	189.89	1.90	.80	351	250	251	58	255	78	78	2.25	4.3
	66	192.33	1.90	.80	351	250	252	61	260	78	78	2.25	4.3
	69	194.76	2.00	.82	349	250	252	63	257	78	78	2.35	4.3
7	72	197.22	1.90	.80	350	252	250	65	255	78	78	2.25	4.3
	75	199.67	1.90	.80	352	252	251	60	252	78	78	2.25	4.5
	78	202.13	1.90	.80	349	249	250	60	252	78	78	2.25	4.5
	81	204.59	1.85	.79	350	251	251	60	254	78	78	2.20	4.3
8	84	207.02	1.90	.80	352	251	250	60	253	78	78	2.25	4.5
	87	209.45	1.90	.80	352	251	251	61	255	78	78	2.25	4.5
	90	211.89	1.90	.80	352	252	251	63	255	79	78	2.25	4.5
	93	214.32	1.90	.80	353	252	253	64	251	79	78	2.25	4.5
9	96	216.75	1.85	.79	354	252	251	60	257	79	78	2.20	4.3
	99	219.15	1.85	.79	355	252	251	59	250	79	78	2.20	4.3
	102	221.55	1.85	.79	355	253	251	59	253	79	78	2.20	4.3
	105	223.94	1.85	.79	354	252	251	59	253	79	79	2.20	4.3
10	108	226.31	1.85	.79	353	252	252	60	252	79	79	2.20	4.3
	111	228.72	1.85	.79	352	252	251	63	250	79	79	2.20	4.3
	114	231.13	1.90	.80	351	252	251	60	251	79	79	2.25	4.5
	117	233.57	1.85	.79	352	252	251	65	249	79	79	2.20	4.3
	120	235.99											

Traverse: 1 (near wall)			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 12:45	Final Leak Check: .004	cfm@ 13	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: JB

Field Data Sheet

Date: 9/25/18	Plant: Clean Harbors	Test No.: 1 - metals and Particulate	Page 4 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	236.74	1.90	.80	353	242	248	73	83	80	80	2.25	4.5
	3	239.15	1.85	.79	352	250	252	62	253	80	80	2.20	4.5
	6	241.58	1.85	.79	351	256	257	58	256	80	79	2.20	4.5
	9	244.01	1.90	.80	352	256	256	58	262	80	79	2.25	4.5
2	12	246.45	1.90	.80	352	252	252	60	257	80	79	2.25	4.5
	15	248.89	1.90	.80	352	252	252	59	256	80	79	2.25	4.5
	18	251.34	1.90	.80	352	252	250	59	255	80	79	2.25	4.8
	21	253.78	1.90	.80	353	251	252	60	256	80	79	2.25	4.8
3	24	256.21	1.85	.79	353	250	252	61	254	80	79	2.20	4.8
	27	258.65	1.90	.80	352	250	252	61	254	80	79	2.25	4.8
	30	261.10	1.90	.80	352	252	253	60	255	80	79	2.25	4.8
	33	263.53	1.90	.80	353	253	252	59	256	80	79	2.25	4.8
4	36	265.97	1.85	.79	351	253	251	59	254	80	79	2.20	4.8
	39	268.59	1.85	.79	351	253	253	59	253	80	79	2.20	4.8
	42	270.82	1.90	.80	353	254	253	60	252	80	79	2.25	4.8
	45	273.24	1.90	.80	352	254	251	62	252	80	79	2.25	4.8
5	48	275.67	2.00	.83	351	254	252	64	252	80	79	2.35	5.0
	51	278.17	1.90	.80	354	255	252	68	255	80	79	2.25	5.0
	54	280.65	1.90	.80	353	254	252	72	256	80	80	2.25	5.0
	57	283.11	1.90	.80	351	253	251	70	255	80	80	2.25	5.0
6	60	285.56	1.85	.79	352	252	251	64	255	80	80	2.20	5.0

Traverse: 2 (Far wall)					
Start Time: 13:44	Initial Leak Check:	.003	cfm@	15	"Hg
Finish Time: —	Final Leak Check:	—	cfm@	—	"Hg

Traverse:			
Start Time: X	Initial Leak Check:	cfm @	"Hg
Finish Time: X	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: JB, ~~BP~~

Field Data Sheet

Date: 9/25/18	Plant: Clean Harbors	Test No.: 1 - metals and Particulate	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	288.00	1.90	.80	352	254	252	62	254	80	80	2.25	5.0
	66	290.42	1.90	.80	351	251	252	62	255	80	80	2.25	5.0
	69	292.83	1.85	.79	353	252	251	62	254	80	80	2.20	5.0
7	72	295.24	1.70	.76	351	252	252	62	260	80	80	2.05	5.0
	75	297.59	1.70	.76	351	252	252	62	252	80	80	2.05	5.0
	78	299.90	1.70	.76	350	253	252	63	251	80	80	2.05	5.0
	81	302.23	1.70	.76	350	254	252	64	253	80	80	2.05	5.0
8	84	304.56	1.60	.74	349	254	252	67	262	80	80	1.95	5.0
	87	306.83	1.60	.74	348	253	250	70	247	80	80	1.95	5.0
	90	309.08	1.60	.74	348	253	248	66	255	80	80	1.95	5.0
	93	311.34	1.60	.74	348	251	249	65	249	80	80	1.95	5.0
9	96	313.60	1.50	.72	348	251	249	64	248	80	80	1.85	5.0
	99	315.82	1.50	.72	348	252	251	64	247	80	80	1.80	5.0
	102	317.98	1.55	.73	350	251	250	67	247	81	80	1.90	5.0
	105	320.19	1.55	.73	349	250	249	68	243	81	80	1.90	5.0
10	108	322.40	1.55	.73	349	250	249	65	240	81	80	1.90	5.0
	111	324.58	1.50	.72	351	250	250	64	247	81	81	1.85	4.8
	114	326.78	1.70	.76	351	248	251	69	237	81	81	2.05	5.0
	117	329.08	1.75	.77	351	250	253	69	250	81	81	2.10	5.0
	120	331.43											

Traverse: 2 (for wall)				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 15:52	Final Leak Check: .003	cfm@ 16	"Hg

Traverse:				
Start Time: X	Initial Leak Check: X	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: [redacted] 21874

Operator: JB

* stopped at 15:34 to empty impingers.

* re-started at 15:43

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	2 - metals and Particulate
Test Date	9/26/18
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21874
Page	1 of 5
Probe No.:	15D
Meter Box No.:	Team 3
Impinger Box No.:	5

Pitot Factor	.851	
DGMCF	1.003	
Barometric Pressure	29.31	"Hg
Static Pressure	1.200	"H2O
Nozzle Size	.2571	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	35.1	mg
Probe	3.7	mg

Moisture Gain

CWTR	3596.0	g
WCBDA	44.3	g

Combustion Gas Concentration

Oxygen	9.18	%
Carbon Dioxide	8.41	%
Carbon Monoxide	63.3	ppm

Measuring Device	MII Numbers
Probe / Pitot	15D
Trendicator	
Control Box	COF 2009 S (Team 3)
Incline Manometer	COF 2009 3
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	B03906

Nozzle Measurements	
1	.2570
2	.2570
3	.2575
4	.2570
Average:	.2571

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: 9/26/18	Plant: Clean Harbors	Test No.: 2- metals and particulate	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	332.22	1.90	.78	349	246	242	61	53	74	73	2.15	3.5
	3	324.59	1.50	.69	351	256	256	52	195	73	73	1.75	3.0
	6	336.75	1.40	.67	351	258	260	51	214	73	73	1.65	3.0
	9	338.82	1.50	.69	350	255	259	51	214	73	73	1.70	3.0
2	12	340.92	1.50	.69	352	255	254	51	214	73	73	1.70	3.0
	15	343.01	1.50	.69	351	253	250	51	213	74	73	1.70	3.0
	18	345.10	1.45	.68	351	252	246	51	213	74	73	1.70	3.3
	21	347.17	1.60	.72	351	252	245	51	213	74	73	1.85	3.5
3	24	349.34	1.80	.76	352	252	259	53	255	74	74	2.05	3.8
	27	351.64	1.75	.75	351	252	252	54	255	74	74	2.05	3.8
	30	353.95	1.70	.74	350	254	256	56	258	74	74	1.95	3.8
	33	356.21	1.65	.73	350	254	255	59	255	74	74	1.90	3.8
4	36	358.44	1.80	.76	348	255	248	56	251	74	74	2.05	3.8
	39	360.74	1.80	.76	347	253	247	55	255	74	74	2.05	3.8
	42	363.04	1.80	.76	348	253	252	54	257	74	74	2.05	3.8
	45	365.33	1.80	.76	352	254	252	54	255	74	74	2.05	3.8
5	48	367.64	1.80	.76	354	254	251	56	256	74	74	2.05	3.8
	51	369.97	1.75	.75	355	255	256	60	260	74	74	2.00	3.8
	54	372.28	1.85	.77	358	255	250	59	252	74	74	2.10	4.0
	57	374.61	1.85	.77	359	254	246	55	253	75	74	2.10	4.0
6	60	376.93	1.90	.78	359	255	261	55	260	75	74	2.15	4.0

Traverse: 2 (near wall)				
Start Time: 9:35	Initial Leak Check: .01	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.: 21874

Operator: JB

Field Data Sheet

Date: 9/26/18	Plant: Clean Harbors	Test No.: 2 - metals and particulate	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	379.30	2.00	.80	362	259	259	54	260	75	74	2.20	4.0
	66	381.71	2.00	.80	362	~~262~~ 258	258	54	257	75	75	2.20	4.0
	69	384.14	2.00	.80	363	257	254	52	256	75	75	2.20	4.0
7	72	386.56	2.00	.80	365	256	258	51	256	75	75	2.20	4.0
	75	388.97	2.00	.80	364	257	257	51	255	75	75	2.20	4.0
	78	391.39	2.00	.80	364	256	261	51	257	75	75	2.20	4.0
	81	393.82	2.00	.80	366	260	260	52	264	75	75	2.20	4.0
8	84	396.24	2.00	.80	366	261	262	54	270	75	75	2.20	4.0
	87	398.65	2.05	.81	366	261	260	53	258	75	75	2.25	4.0
	90	401.09	2.05	.81	364	260	260	53	261	75	75	2.25	4.0
	93	403.52	2.05	.81	363	260	257	53	260	75	76	2.25	4.0
9	96	405.96	2.05	.81	363	260	256	56	263	75	76	2.25	4.0
	99	408.39	2.00	.80	360	260	249	58	261	76	75	2.20	4.0
	102	410.82	2.00	.80	361	261	249	60	261	76	75	2.20	4.0
	105	413.26	2.00	.80	360	260	249	61	259	75	75	2.20	4.0
10	108	415.70	2.00	.80	359	261	258	62	265	75	75	2.20	4.0
	111	418.14	2.00	.80	359	262	254	64	267	75	75	2.20	4.0
	114	420.58	2.00	.80	360	263	263	62	267	75	75	2.20	4.0
	117	423.02	2.00	.80	358	265	265	61	270	76	75	2.20	4.0
	120	425.45											

Traverse: 2 (near wall)				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 11:35	Final Leak Check: .0116	cfm@ 17	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: JB

Field Data Sheet

Date: 9/26/18	Plant: Clean Harbors	Test No.: 2 - metals and Particulate	Page 4 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	427.44	2.00	.80	355	252	244	66	68	76	76	2.25	4.0
	3	429.89	2.00	.80	356	264	268	58	253	76	76	2.25	4.0
	6	432.34	2.00	.80	357	267	265	55	267	76	76	2.25	4.0
	9	434.77	2.00	.80	356	263	261	56	268	77	76	2.20	4.0
2	12	437.15	2.06	.81	355	261	259	55	265	77	76	2.25	4.0
	15	439.59	2.00	.80	357	262	254	56	260	77	76	2.25	4.0
	18	442.06	2.05	.81	356	262	255	58	263	77	76	2.30	4.3
	21	444.52	2.00	.80	355	262	263	65	269	77	76	2.25	4.3
3	24	446.97	2.05	.82	357	264	264	66	272	77	76	2.30	4.3
	27	449.43	2.00	.80	356	262	257	60	267	77	76	2.25	4.3
	30	451.87	2.05	.82	355	263	254	57	263	77	76	2.30	4.3
	33	454.32	2.05	.82	355	261	254	57	259	77	76	2.30	4.3
4	36	456.76	2.00	.81	355	258	254	57	257	77	76	2.25	4.3
	39	459.22	2.00	.81	354	260	260	57	261	77	77	2.25	4.3
	42	461.68	2.00	.81	356	263	260	54	267	77	77	2.25	4.3
	45	464.12	2.00	.81	356	262	260	53	261	77	77	2.25	4.3
5	48	466.56	2.00	.81	355	261	259	54	262	77	77	2.25	4.3
	51	468.99	2.05	.82	356	260	257	56	259	78	77	2.30	4.3
	54	471.45	2.00	.81	355	261	258	57	259	77	77	2.25	4.3
	57	473.90	2.00	.81	354	260	261	58	262	77	77	2.25	4.3
6	60	476.33	2.00	.81	355	262	257	63	258	77	77	2.25	4.3

Traverse: 1				
Start Time: 12:56	Initial Leak Check: .013	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.: 21874

Operator: JB

Field Data Sheet

Date: 9/26/18	Plant: Clean Harbors	Test No.: 2 metals and particulate	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	478.77	2.00	.81	354	262	257	62	258	78	77	2.25	4.3
	66	481.22	2.05	.82	355	261	260	59	266	77	77	2.30	4.3
	69	483.68	2.00	.81	353	260	254	58	254	78	77	2.25	4.3
7	72	486.12	1.70	.75	351	260	259	57	259	78	77	2.00	4.0
	75	488.42	1.80	.77	353	257	248	56	254	78	77	2.05	4.0
	78	490.70	1.70	.74	353	259	252	55	254	78	77	2.00	4.0
	81	492.99	1.70	.75	352	257	246	54	251	78	77	2.00	4.0
8	84	495.28	1.70	.74	353	255	241	54	250	78	77	2.00	4.0
	87	497.57	1.70	.75	351	256	252	55	254	78	77	2.00	4.0
	90	499.83	1.70	.75	351	258	254	57	259	78	77	2.00	4.0
	93	502.10	1.70	.75	352	257	259	58	260	78	77	2.00	4.0
9	96	504.37	1.80	.77	352	259	251	61	260	78	77	2.10	4.0
	99	506.68	1.70	.74	353	259	256	63	261	78	77	2.00	4.0
	102	508.96	1.70	.74	354	258	253	65	258	78	77	2.00	4.0
	105	511.24	1.70	.74	355	255	247	62	254	78	77	2.00	4.0
10	108	513.57	1.70	.74	356	256	247	63	254	78	78	2.00	4.0
	111	515.77	1.80	.77	355	255	251	64	254	78	78	2.10	4.0
	114	518.08	1.70	.74	355	257	258	67	259	78	78	2.00	4.0
	117	520.36	1.70	.74	356	257	256	65	258	78	78	2.00	4.0
	120	522.63											

Traverse: C				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 14:56	Final Leak Check: .019	cfm@ 15	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: JB

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 METALS + PARTICULATE
Test Date	9/27/18
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21874
Page	1 of 5
Probe No.:	15D
Meter Box No.:	Team 3
Impinger Box No.:	5

Pitot Factor	.851	
DGMCF	1.003	
Barometric Pressure	29.45	"Hg
Static Pressure	1.30	"H2O
Nozzle Size	.2571	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	33.0	mg
Probe	8.4	mg

Moisture Gain

CWTR	3658.6	g
WCBDA	44.0	g

Combustion Gas Concentration

Oxygen	8.99	%
Carbon Dioxide	8.58	%
Carbon Monoxide	49.0	ppm

Measuring Device	MII Numbers
Probe / Pitot	15D
Trendicator	
Control Box	COE 20093 (Team 3)
Incline Manometer	COE 20093
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	BG39016

Nozzle Measurements	
1	.2570
2	.2570
3	.2575
4	.2570
Average:	.2571

Probe Liner (Glass) / Metal /Teflon / Other_____

Nozzle (Glass) / Metal / Other_____

Union (None) /Metal / Teflon / Other_____

Pitot Leak Checked? (Yes) No

Site Diagram

Notes:

Blank train: initial DGM: 73.33 ft^3

(Sept. 27, 2018) final DGM: 75.55 ft^3

2.22 × 1.006 DGMCF = 2.23 ft^3

Field Data Sheet

Date: 9/27/18	Plant: Clean Harbors	Test No.: 3 - metals and particulate	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 (1.80)	Desired cfm (.71)	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	523.41	[illegible]	[illegible]	340	253	255	49	56	58	59	2.00	3.5
	3	525.71	1.70	.71	348	257	259	43	230	59	59	1.80	3.5
	6	527.83	1.70	.71	348	264	266	43	250	59	59	1.85	3.5
	9	529.95	1.70	.71	348	259	261	43	258	59	59	1.85	3.5
2	12	532.09	1.75	.72	349	259	260	44	260	59	59	1.85	3.5
	15	534.22	1.80	.73	348	259	262	45	264	59	60	1.95	3.8
	18	536.39	1.75	.72	349	260	262	45	266	60	61	1.90	3.8
	21	538.58	1.75	.72	348	260	262	46	267	60	61	1.90	3.8
3	24	540.75	1.75	.72	351	260	262	46	267	60	61	1.90	3.8
	27	542.92	1.75	.72	351	259	262	47	267	60	61	1.90	3.8
	30	545.07	1.80	.73	349	260	262	47	267	60	62	1.95	4.0
	33	547.26	1.80	.73	348	260	262	47	268	61	62	1.95	4.0
4	36	549.61	1.80	.73	348	260	262	48	269	61	62	1.95	4.0
	39	551.75	1.80	.73	349	258	261	50	266	61	62	1.95	4.0
	42	553.94	1.80	.73	349	259	261	51	267	64	62	1.95	4.0
	45	556.15	1.90	.75	349	259	261	54	253	62	63	2.05	4.0
5	48	558.41	1.85	.74	350	259	262	54	240	62	63	2.00	4.0
	51	560.68	1.85	.74	350	260	262	51	267	62	63	2.00	4.0
	54	562.93	1.85	.74	349	260	262	51	266	62	63	2.00	4.0
	57	565.17	1.85	.74	348	260	261	51	265	62	63	2.00	4.0
6	60	567.44	2.00	.77	347	259	261	50	263	62	63	2.10	4.5

Traverse: 1 (6pt wall)					
Start Time: 9:16	Initial Leak Check: .003	cfm@	16	"Hg
Finish Time:	Final Leak Check:	cfm@		"Hg

Traverse:				
Start Time: X	Initial Leak Check: X	cfm @		"Hg
Finish Time:	Final Leak Check:	cfm @		"Hg

Project No.: 21874

Operator: JB

Field Data Sheet

Date: 9/27/18	Plant: Clean Harbors	Test No.: 3-metals and particulate	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	569.78	2.00	.78	348	260	262	48	264	63	64	2.10	4.5
	66	572.13	2.00	.78	350	260	261	49	265	64	64	2.10	4.5
	69	574.48	2.00	.78	354	260	260	50	265	63	64	2.10	4.5
7	72	576.82	2.00	.77	350	259	260	50	261	63	64	2.10	4.5
	75	579.14	2.00	.77	351	257	259	50	259	63	64	2.10	4.5
	78	581.46	2.00	.77	350	256	260	52	261	63	65	2.10	4.5
	81	583.77	1.95	.77	348	257	260	54	263	64	65	2.10	4.5
8	84	586.10	1.95	.77	348	258	260	57	264	64	65	2.10	4.5
	87	588.42	1.95	.77	348	257	261	61	263	65	65	2.10	4.5
	90	590.75	1.95	.77	348	257	259	64	261	65	65	2.10	4.5
	93	593.08	1.95	.77	350	257	260	65	258	65	66	2.10	4.5
9	96	595.40	1.95	.77	348	256	259	61	258	65	66	2.10	4.5
	99	597.74	1.95	.77	347	255	259	60	259	67	66	2.10	4.5
	102	600.07	1.95	.77	348	257	259	60	261	65	66	2.10	4.5
	105	602.40	2.00	.78	348	257	259	62	262	66	66	2.15	4.5
10	108	604.75	1.95	.77	348	256	260	66	262	66	66	2.10	4.5
	111	607.08	1.95	.77	347	256	259	61	260	66	66	2.10	4.5
	114	609.44	1.95	.77	347	256	258	59	261	66	66	2.10	4.5
	117	611.77	1.95	.77	348	256	258	57	261	66	67	2.10	4.5
	120	614.10											

Traverse: 1 (for wall)				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 11:16	Final Leak Check: .002	cfm@ 16	"Hg

Traverse:			
Start Time: X	Initial Leak Check: X	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: JB

Field Data Sheet

Date: 9/27/18	Plant: Clean Harbors	Test No.: 3- metals and particulate	Page 4 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	614.85	~~1.80~~ 1.95	.74	351	249	256	65	126	68	68	2.00	4.3
	3	617.10	1.85	.75	351	251	264	54	239	68	69	2.00	4.3
	6	619.36	1.85	.75	351	262	261	49	263	68	69	2.00	4.3
	9	621.63	1.85	.75	351	258	260	49	263	68	69	2.00	4.3
2	12	623.91	1.85	.75	350	257	259	51	265	69	69	2.00	4.3
	15	626.23	1.90	.76	349	256	259	53	264	69	69	2.10	4.8
	18	628.55	1.85	.75	351	256	258	56	263	69	69	2.00	4.8
	21	630.77	1.85	.75	351	255	259	59	261	69	69	2.00	4.8
3	24	633.03	~~2.00~~ 1.95	.77	352	255	258	56	255	69	69	2.10	4.8
	27	635.37	1.95	.77	354	254	258	54	256	69	69	2.10	4.8
	30	637.71	1.95	.77	353	255	257	54	260	69	70	2.10	4.8
	33	640.06	1.95	.77	355	256	258	54	259	70	70	2.10	4.8
4	36	642.40	1.95	.77	354	256	258	54	254	70	70	2.10	4.8
	39	644.75	1.95	.77	355	254	256	53	254	70	70	2.10	4.8
	42	647.07	1.95	.77	354	256	258	52	260	70	70	2.10	4.8
	45	649.45	1.95	.77	353	256	258	52	261	70	70	2.10	4.8
5	48	651.65	1.95	.77	353	255	258	54	261	70	71	2.10	4.8
	51	653.97	2.00	.78	353	256	258	55	261	70	71	2.15	5.0
	54	656.37	2.00	.78	352	257	256	52	258	71	71	2.15	5.0
	57	658.70	2.00	.78	352	256	260	56	261	71	71	2.15	5.0
6	60	661.07	2.00	.78	352	256	259	58	259	71	71	2.15	5.0

Traverse: 2 (near wall)					
Start Time: 12:13	Initial Leak Check:	.002	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.: 21874

Operator: SB

Field Data Sheet

Date: 9/27/18	Plant: Clean Harbors	Test No.: 3-metals and Perchlorate	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	663.46	1.90	.77	353	257	258	58	259	71	71	2.10	5.0
	66	665.79	1.90	.77	353	257	258	55	259	72	71	2.10	5.0
	69	668.10	1.90	.77	354	256	258	54	261	71	71	2.10	5.0
7	72	670.38	1.85	.75	353	256	258	54	262	71	71	2.05	5.0
	75	672.71	1.85	.75	352	257	258	53	261	71	71	2.05	5.0
	78	675.02	1.85	.76	351	252	255	55	247	72	72	2.05	5.0
	81	677.31	1.85	.76	349	260	258	56	259	72	72	2.05	5.0
8	84	679.58	1.85	.76	349	259	260	60	263	73	72	2.05	5.0
	87	681.84	1.85	.76	350	260	260	63	263	73	72	2.05	5.0
	90	684.13	1.85	.76	349	260	258	57	263	73	72	2.05	5.0
	93	686.41	1.85	.76	350	258	259	55	263	72	72	2.05	5.0
9	96	688.70	1.85	.76	351	259	259	54	262	72	72	2.05	5.0
	99	690.97	1.85	.76	351	259	259	54	263	72	72	2.05	5.0
	102	693.27	1.80	.75	350	260	259	55	265	72	72	2.00	5.0
	105	695.55	1.80	.75	350	259	260	56	263	72	72	2.00	5.0
10	108	697.83	1.80	.75	350	258	259	58	263	73	73	2.00	5.0
	111	700.10	1.80	.75	352	258	259	56	262	73	73	2.00	5.0
	114	702.37	1.80	.75	351	258	257	56	265	73	73	2.00	5.0
	117	704.63	1.85	.76	353	257	259	56	266	73	73	2.05	5.0
	120	706.90											

Traverse: 2 (near wall)				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 14:16	Final Leak Check: .002	cfm@ 16	"Hg

Traverse:			
Start Time: X	Initial Leak Check: X	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

* temporarily stopped to oil pump. ~~@13:30~~ @13:29

Project No.: 21874

Operator: JB

* resumed 13:32

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	September 25, 2018
Test Location	Incinerator Exhaust Stack
Operator Signature	CR.

Project No.:	21874
Page	1 of 5
Probe No.:	—
Meter Box No.:	Team 1
Impinger Box No.:	—

Pitot Factor	0.840	
DGMCF	1.006	
Barometric Pressure	29.27	"Hg
Static Pressure	~~-0.45~~ +1.2	"H2O
Nozzle Size	0.250	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	mg
Probe	mg

Moisture Gain

CWTR	3507.6	g
WCBDA	11.6	g

Combustion Gas Concentration

Oxygen	8.91	%
Carbon Dioxide	8.51	%
Carbon Monoxide	54.4	ppm

Measuring Device	MII Numbers
Probe / Pitot	S8
Trendicator	Team 1
Control Box	Team 1/CAE 200
Incline Manometer	"
Comb.Gas.Analyzer	MSML
Micromanometer	B03936
Barometer	Env.Can
Calipers	B03906

Nozzle Measurements	
1	.250
2	.250
3	.250
4	.250
Average:	.250

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: Sept. 25/18	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 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	11.02	1.9	.75	350	259	265	68	68	75	74	1.9	5.6
	3	13.29	1.9	.75	350	252	266	67	48	74	74	1.9	5.6
	6	15.54	1.85	.74	351	252	264	61	46	74	74	1.9	5.6
	9	17.79	1.85	.74	351	253	264	60	46	74	74	1.9	5.6
2	12	20.03	1.7	.71	349	256	260	59	46	74	74	1.8	5.5
	15	22.26	1.7	.71	352	257	251	60	47	74	74	1.7	5.2
	18	24.45	1.75	.72	347	256	246	62	47	75	75	1.7	5.2
	21	26.64	1.75	.72	345	256	244	63	46	75	75	1.7	5.2
3	24	28.82	1.75	.72	345	256	246	63	46	75	75	1.7	5.2
	27	31.00	1.8	.74	347	256	261	63	47	75	75	1.7	5.2
	30	33.18	1.8	.74	347	256	263	62	47	75	75	1.7	5.2
	33	35.38	1.8	.74	347	257	261	61	47	75	75	1.7	5.2
4	36	37.56	1.75	.73	346	256	260	61	47	75	75	1.7	5.2
	39	39.77	1.8	.74	348	256	262	61	46	75	75	1.7	5.2
	42	41.97	1.9	.75	350	258	260	61	46	75	75	1.8	5.5
	45	44.22	1.9	.75	350	259	259	60	50	76	76	1.8	5.5
5	48	46.48	1.9	.75	350	258	259	60	50	76	76	1.8	5.5
	51	48.74	1.9	.75	348	257	261	59	54	76	76	1.8	5.5
	54	51.00	1.9	.76	348	257	264	58	59	76	76	1.8	5.5
	57	53.23	1.9	.76	349	258	259	59	62	76	76	1.8	5.5
6	60	55.48	1.85	.75	348	257	250	61	63	76	76	1.8	5.5

Traverse: 2 (far wall)				
Start Time: 10:45	Initial Leak Check: .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.: 21874

Operator: CHRIS RELYEA

Field Data Sheet

Date: Sept. 25/18	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 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	57.72	1.95	.75	347	257	244	62	54	77	77	1.8	5.5
	66	59.98	1.85	.75	349	256	263	64	52	77	77	1.8	5.5
	69	62.27	1.9	.76	342	258	272	64	51	77	76	1.8	5.5
7	72	64.52	1.9	.76	347	257	242	63	52	77	76	1.8	5.5
	75	66.78	2	.78	349	257	255	63	54	77	77	1.8	5.5
	78	69.05	2	.78	349	257	254	64	54	77	77	1.8	5.5
	81	71.28	2	.78	349	257	254	64	54	77	77	1.8	5.5
8	84	73.54	2.1	.78	349	256	249	64	60	77	77	2	6
	87	75.87	2.1	.78	350	256	249	66	66	77	77	2	6
	90	78.27	2	.78	350	256	255	66	63	77	77	2	6
	93	80.67	2	.78	350	256	255	66	63	77	77	2	6
9	96	82.98	1.9	.76	352	256	253	65	51	77	77	2	6
	99	85.32	1.9	.76	354	256	250	65	52	78	77	2	6
	102	87.67	1.9	.76	353	258	250	65	53	78	77	2	6
	105	90.02	1.9	.76	352	255	245	65	56	77	77	2	6
10	108	92.34	1.8	.73	351	256	255	66	60	78	77	1.8	5.5
	111	94.62	1.8	.73	350	255	250	66	53	78	78	1.8	5.5
	114	96.85	1.8	.73	349	255	253	66	51	78	78	1.8	5.5
	117	99.10	1.8	.73	349	258	258	66	56	78	78	1.8	5.5
	120	101.34											

Traverse: 2			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 12:45	Final Leak Check: .002	cfm@ 16	"Hg

Traverse:			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: CHRIS BELDORE

Field Data Sheet

Date: Sept. 25/18	Plant: Clean Harbors	Test No.: 1 SVOC	Page 4 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	101.91	1.8	.74	348	249	252	69	42	78	78	1.9	5
	3	104.06	2	.78	348	253	245	68	41	77	77	2	6
	6	106.39	2	.78	348	253	243	69	45	78	78	2	6
	9	108.72	1.9	.76	349	247	252	69	47	78	78	2	6
2	12	111.15	1.85	.75	349	247	252	67	47	78	78	1.9	5.8
	15	113.44	1.85	.75	351	253	254	66	43	78	78	1.9	5.8
	18	115.75	1.85	.75	351	253	252	65	42	78	78	1.9	5.8
	21	117.98	1.85	.75	350	254	251	63	42	78	78	1.9	5.8
3	24	120.34	1.8	.74	350	254	246	64	44	78	78	1.9	5.8
	27	122.62	1.8	.74	350	254	250	66	45	78	78	1.9	5.8
	30	124.83	1.8	.74	349	254	245	62	45	78	78	1.9	5.8
	33	127.13	1.9	.76	348	255	253	58	46	78	78	1.9	5.8
4	36	129.48	1.85	.75	348	253	250	56	45	78	78	1.9	5.8
	39	131.68	1.85	.75	348	255	252	57	46	79	79	1.9	5.8
	42	133.93	1.9	.76	348	255	246	57	45	79	79	1.9	5.8
	45	136.21	1.85	.75	349	255	253	56	46	79	79	1.9	5.8
5	48	138.49	1.85	.75	349	255	249	55	47	79	79	1.9	5.8
	51	140.73	1.85	.75	349	254	253	56	46	79	78	1.9	5.8
	54	142.94	1.80	.74	349	254	252	57	46	78	78	1.9	5.8
	57	145.17	1.85	.75	350	254	248	58	47	79	79	1.9	5.8
6	60	147.42	1.90	.76	349	255	252	61	48	80	79	1.9	5.8

Traverse: 1					
Start Time: 13:44	Initial Leak Check: .002	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.: 21874

Operator: CHRIS RELOTE

Field Data Sheet

Date: Sept. 25, 18	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 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	149.64	1.9	.76	349	256	255	61	48	79	79	1.9	5.8
	66	151.82	1.85	.75	350	256	255	61	48	79	79	1.9	5.8
	69	154.03	1.9	.76	349	255	257	63	54	80	80	1.9	5.8
7	72	156.22	1.75	.73	348	254	252	63	57	79	79	1.9	5.8
	75	158.43	1.75	.73	350	255	252	63	56	80	80	1.9	5.8
	78	160.66	1.8	.75	350	255	252	59	50	80	80	1.9	5.8
	81	162.88	1.75	.73	347	256	244	59	50	80	80	1.9	5.8
8	84	165.05	1.7	.72	348	256	256	61	51	81	80	1.9	5.8
	87	167.16	1.7	.72	346	255	253	62	50	82	80	1.9	5.8
	90	169.31	1.7	.72	345	256	253	57	47	81	79	1.9	5.8
	93	171.48	1.75	.73	345	256	248	52	44	81	80	1.9	5.8
9	96	173.58	1.7	.72	345	256	248	52	44	81	80	1.9	5.8
	99	175.58	1.7	.72	345	256	248	52	43	81	80	1.9	5.8
	102	177.68	1.7	.72	348	254	255	61	57	81	80	1.9	5.8
	105	179.64	1.7	.72	348	256	255	61	63	82	80	1.9	9
10	108	181.82	1.7	.72	349	256	262	62	64	81	80	1.9	9
	111	184.04	1.7	.72	349	256	261	62	65	81	80	1.8	9
	114	186.17	1.65	.71	352	256	256	62	65	81	81	1.8	9
	117	188.26	1.65	.71	352	256	259	62	53	81	80	1.8	9
	120	190.46											

Traverse:	1				
Start Time:	—	Initial Leak Check:	—	cfm@	— "Hg
Finish Time:	16:00	Final Leak Check:	.003	cfm@	21 "Hg

Traverse:				
Start Time:	X	Initial Leak Check:		cfm @ "Hg
Finish Time:	X	Final Leak Check:		cfm @ "Hg

1 off to empty moisture → back on at 15:44

Project No.: 21874

Operator: CHRIS BELORE

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	2 SVOC
Test Date	September 26, 2018
Test Location	Incinerator Exhaust Stack
Operator Signature	CHRIS BELDEN

Project No.:	21874
Page	1 of 5
Probe No.:	—
Meter Box No.:	Train 1
Impinger Box No.:	Train 1

Pitot Factor	0.847	
DGMCF	1.006	
Barometric Pressure	29.31	"Hg
Static Pressure	+ 1.20	"H2O
Nozzle Size	0.2566	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	mg
Probe	mg

Moisture Gain

CWTR	3586.2	g
WCBDA	17.1	g

Combustion Gas Concentration

Oxygen	9.18	%
Carbon Dioxide	8.41	%
Carbon Monoxide	63.3	ppm

Measuring Device	MII Numbers
Probe / Pitot	15A
Trendicator	Train 1
Control Box	CAE 20094
Incline Manometer	CAE 20094
Comb.Gas.Analyzer	005mL
Micromanometer	B03936
Barometer	Env.Can
Calipers	B03906

Nozzle Measurements	
1	0.2570
2	0.2560
3	0.2570
4	0.2565
Average:	0.2566

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: Sept. 26/18	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 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	91.66	1.75	.74	349	251	249	61	63	73	72	1.9	4.5
	3	93.97	1.8	.75	350	253	260	53	44	72	72	1.8	5
	6	96.10	1.5	.68	349	253	262	52	42	72	72	1.7	4.8
	9	98.20	1.1	.59	349	256	262	50	40	73	72	1.1	4
2	12	100.18	1.1	.59	349	256	262	50	40	73	72	1.1	4
	15	101.91	1.7	.73	349	256	260	50	40	73	72	1.9	5
	18	104.04	1.8	.75	349	255	254	50	44	73	72	1.9	5
	21	106.25	1.75	.74	349	254	262	49	44	73	72	1.9	5
3	24	108.42	1.8	.75	350	257	262	49	52	73	72	1.9	5
	27	110.62	1.8	.75	350	254	261	48	52	73	72	1.9	5
	30	112.82	1.8	.75	348	257	263	49	47	73	72	1.9	5
	33	115.03	1.8	.75	346	255	262	49	48	73	72	1.9	5
4	36	117.22	1.75	.74	344	255	262	49	48	73	72	1.9	5
	39	119.42	1.75	.74	346	258	262	48	43	73	73	1.9	5
	42	121.62	1.75	.74	346	254	263	47	43	73	73	1.9	5
	45	123.82	1.75	.74	350	256	260	47	46	73	73	1.9	5
5	48	126.02	1.75	.74	351	254	261	48	46	73	73	1.9	5
	51	128.22	1.75	.74	352	256	262	47	48	73	73	1.9	5
	54	130.44	1.75	.74	355	256	260	47	46	73	73	1.9	5
	57	132.65	1.75	.74	356	256	261	47	46	73	73	1.9	5
6	60	134.85	2.1	.81	358	257	262	47	46	73	73	2.3	6

Traverse: 1 (far wall)				
Start Time: 09:35	Initial Leak Check: .005	cfm@	13	"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.: 21874

Operator: CHRIS BELORE

Field Data Sheet

Date: Sept. 26/18	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 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	137.18	2.1	.81	358	256	260	47	50	73	73	2.3	6
	66	139.62	2.1	.81	359	257	261	46	49	73	73	2.3	6
	69	142.02	2.1	.81	362	256	260	46	46	74	73	2.3	6
7	72	144.41	1.9	.77	361	257	262	46	47	74	73	2.1	5.5
	75	146.71	1.9	.77	362	257	261	46	47	74	73	2.1	5.5
	78	149.03	1.9	.77	363	257	261	46	48	74	73	2.1	5.5
	81	151.33	1.9	.77	362	257	261	46	49	74	73	2.1	5.5
8	84	153.59	1.85	.76	363	256	262	46	49	74	73	2	5
	87	155.85	1.8	.75	363	256	262	46	49	74	73	2	5
	90	158.10	1.8	.75	361	254	262	46	47	74	73	2	5
	93	160.34	1.8	.75	360	256	262	45	47	74	73	2	5
9	96	162.59	1.8	.75	361	254	262	46	48	74	74	2	5
	99	164.83	1.8	.75	357	255	260	45	49	74	73	2	5
	102	167.09	1.8	.75	356	255	260	46	49	74	73	2	5
	105	169.37	1.85	.76	356	255	260	46	49	74	73	2	5
10	108	171.66	1.75	.74	357	254	261	46	51	73	73	2	4.8
	111	173.92	1.75	.74	356	254	262	47	51	73	73	2	4.8
	114	176.16	1.75	.74	356	254	263	47	46	73	74	2	4.8
	117	178.42	1.75	.74	355	255	260	47	44	73	73	2	4.8
	120	180.68											

Traverse:					
Start Time:	—	Initial Leak Check:	—	cfm@	— "Hg
Finish Time:	11:35	Final Leak Check:	.003	cfm@	15 "Hg

Traverse:			
Start Time:		Initial Leak Check:	cfm @ "Hg
Finish Time:		Final Leak Check:	cfm @ "Hg

Project No.: 21874

Operator: CHRIS BELCHE

Field Data Sheet

Date: Sept. 26/18	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 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	181.30	1.85	.78	351	245	260	65	48	74	73	2	5
	3	183.63	1.85	.76	352	251	261	52	44	73	73	2	5
	6	185.89	1.85	.76	353	252	263	52	43	74	74	2	5
	9	188.14	1.85	.76	352	253	265	52	44	75	74	2	5
2	12	190.40	1.85	.76	352	255	263	54	45	75	74	2	5
	15	192.63	1.85	.76	354	255	262	52	46	75	75	2	5
	18	194.90	1.85	.76	352	254	258	54	46	74	74	2	5
	21	197.16	1.85	.76	351	254	248	56	48	75	75	2	5
3	24	199.42	1.9	.77	352	255	246	56	48	75	75	2	5
	27	201.78	1.9	.77	353	255	260	56	46	74	75	2	5
	30	204.10	1.9	.77	353	253	260	57	49	74	74	2	5
	33	206.25	1.9	.77	351	253	262	51	48	74	74	2	5
4	36	208.54	1.9	.77	351	255	262	51	50	74	75	2	5
	39	210.82	1.9	.77	351	255	262	51	50	74	75	2	5
	42	213.15	1.9	.77	352	256	263	51	48	75	74	2	5
	45	215.46	1.9	.77	352	253	262	53	46	75	75	2	5
5	48	217.83	1.9	.77	352	253	262	53	46	75	75	2	5
	51	220.10	1.9	.77	352	256	264	52	49	75	75	2	5
	54	222.41	1.9	.77	352	256	261	52	50	75	75	2	5
	57	224.73	1.9	.77	353	255	262	54	51	75	74	2	5
6	60	227.07	1.9	.77	351	254	264	56	52	75	75	2	5

Traverse: 2				
Start Time: 12:56	Initial Leak Check: .0003	cfm@	15	"Hg
Finish Time: —	Final Leak Check: —	cfm@	—	"Hg

Traverse: X				
Start Time:	Initial Leak Check:	cfm @		"Hg
Finish Time:	Final Leak Check:	cfm @		"Hg

Project No.: 21874

Operator: CHRIS BELCOURT

Field Data Sheet

Date: Sept. 26/18	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 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	229.37	1.9	.77	351	254	262	57	51	75	74	2	5
	66	231.70	1.9	.77	350	256	262	60	49	75	75	2	5
	69	234.03	1.9	.77	350	256	258	61	50	75	75	2	5
7	72	236.36	1.9	.77	348	257	257	58	51	76	75	2	5
	75	238.77	1.8	.75	351	255	256	57	51	76	75	2	5
	78	240.97	1.8	.75	350	256	266	53	45	76	75	2	5
	81	243.27	1.8	.75	349	256	263	52	44	76	75	2	5
8	84	245.54	1.75	.74	347	255	264	52	44	76	75	2	5
	87	247.86	1.75	.74	347	256	264	52	44	76	76	2	4.5
	90	250.12	1.75	.74	349	257	266	54	46	76	75	2	4.5
	93	252.41	1.75	.74	349	256	265	53	48	76	75	2	4.5
9	96	254.66	1.75	.74	349	256	265	53	48	76	75	2	4.5
	99	256.92	1.75	.74	349	256	265	58	50	76	75	2	4.5
	102	259.17	1.75	.74	351	256	267	59	51	76	75	2	4.5
	105	261.45	1.75	.74	352	255	267	60	47	76	75	2	4.5
10	108	263.73	1.7	.73	354	257	263	57	47	76	75	2	4.5
	111	266.03	1.7	.73	353	257	263	60	47	76	75	2	4.5
	114	268.28	1.7	.73	352	257	264	61	46	76	76	2	4.5
	117	270.55	1.7	.73	352	258	261	61	49	76	75	2	4.5
	120	272.83											

Traverse: 2				
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 14:56	Final Leak Check: .001	cfm@ 15	"Hg

Traverse: X				
Start Time: X	Initial Leak Check:	~~cfm @~~	"Hg
Finish Time:	Final Leak Check:	~~cfm @~~	"Hg

Project No.: 21874

Operator: CHRIS BELORE

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 SVOC
Test Date	September 27, 2018
Test Location	Incinerator Exhaust Stack
Operator Signature	CHRIS RELOPE

Project No.:	21874
Page	1 of 5
Probe No.:	—
Meter Box No.:	Train 1
Impinger Box No.:	—

Pitot Factor	0.847	
DGMCF	1.006	
Barometric Pressure	29.45	"Hg
Static Pressure	+ 1.30	"H2O
Nozzle Size	0.2766	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		mg
Probe		mg

Moisture Gain

CWTR	3625.7	g
WCBDA	18.0	g

Combustion Gas Concentration

Oxygen	8.99	%
Carbon Dioxide	8.58	%
Carbon Monoxide	49.0	ppm

Measuring Device	MII Numbers
Probe / Pitot	REFER
Trendicator	TO
Control Box	
Incline Manometer	TEST #2
Comb.Gas.Analyzer	
Micromanometer	
Barometer	Env.Can
Calipers	

Nozzle Measurements	
1	REFER
2	TO
3	TEST #2
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:

Blank train : initial DGM : 75.55 ft3
(Sept. 27, 2018) final DGM : 77.45 ft3
volume: 1.90 x 1.006 = 1.91 ft3

Field Data Sheet

Date: Sept. 27 / 18	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 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	77.80	1.5	.66	345	247	259	57	44	58	57	1.5	3
	3	79.92	1.5	.66	346	254	263	51	40	58	57	1.5	3
	6	81.87	1.5	.66	347	254	265	51	41	58	58	1.5	3
	9	83.80	1.5	.66	347	253	262	53	41	58	58	1.5	3
2	12	85.75	1.5	.66	346	254	264	54	41	58	58	1.5	3
	15	87.66	1.65	.69	347	255	260	48	41	59	58	1.6	4
	18	89.71	1.65	.69	347	253	263	47	43	59	58	1.6	4
	21	91.80	1.65	.69	346	254	262	47	43	59	58	1.6	4
3	24	93.90	1.65	.69	348	254	261	47	43	59	58	1.6	4
	27	95.99	1.65	.69	348	254	261	47	43	59	58	1.6	4
	30	98.05	1.7	.70	346	255	263	50	45	60	59	1.8	4.5
	33	100.19	1.7	.70	346	255	264	50	46	60	59	1.8	4.5
4	36	102.33	1.7	.70	346	256	262	50	46	60	59	1.8	4.5
	39	104.46	1.7	.70	347	255	256	49	49	60	59	1.8	4.5
	42	106.61	1.7	.70	346	255	256	49	49	60	59	1.8	4.5
	45	108.75	1.7	.70	348	254	262	51	52	61	60	1.8	4.5
5	48	110.88	1.7	.70	350	256	262	52	45	61	60	1.8	4.5
	51	113.01	1.75	.71	348	256	259	52	42	62	60	1.8	4.5
	54	115.15	1.75	.71	346	255	260	50	45	62	60	1.8	4.5
	57	117.29	1.75	.71	348	255	251	51	45	63	61	1.8	4.5
6	60	119.43	1.9	.74	346	256	260	51	45	63	61	2	5

Traverse: 2 (far wall)					
Start Time: 09:16	Initial Leak Check: .001	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.: 21874

Operator: CHRIS RELAKE

Field Data Sheet

Date: Sept. 27/12	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 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	121.71	1.9	.75	345	255	264	50	46	62	61	2	5
	66	124.00	1.9	.75	347	254	262	50	45	63	61	2	5
	69	126.27	1.9	.75	349	257	257	51	44	63	61	2	5
7	72	128.54	1.9	.75	348	256	260	50	45	63	61	2	5
	75	130.80	2	.76	348	256	262	50	46	63	61	2.1	5
	78	133.14	2	.76	347	256	260	50	47	63	61	2.1	5
	81	135.52	2	.76	346	257	255	50	47	64	62	2.1	5
8	84	137.78	1.9	.75	346	255	260	49	47	64	62	2	5
	87	140.08	1.9	.75	346	256	258	49	48	64	62	2	5
	90	142.37	1.9	.75	348	257	260	48	46	64	62	2	5
	93	144.66	1.9	.75	346	256	264	48	45	64	62	2	5
9	96	146.95	1.9	.75	345	255	266	48	46	64	63	2	5
	99	149.21	1.9	.75	346	255	266	48	46	64	63	2	5
	102	151.48	1.95	.76	345	256	254	48	46	65	63	2	5
	105	153.77	1.95	.76	345	256	257	48	46	65	63	2	5
10	108	156.04	1.95	.76	347	256	260	49	48	65	63	2	5
	111	158.30	2.1	.79	345	256	258	48	47	65	63	2.1	5.2
	114	160.62	2.0	.77	345	256	258	48	47	65	63	2.0	5.2
	117	162.95	2.0	.77	345	256	258	49	46	65	64	2.0	5.2
	120	165.27											

Traverse: 2			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 11:16	Final Leak Check: .006	cfm@ 16	"Hg

Traverse: X			
Start Time:	Initial Leak Check:	cfm @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: CHRIS RECORE

Field Data Sheet

Date: Sept. 27/18	Plant: Clean Harbors	Test No.: 3 SVOC	Page 4 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	165.82	1.85	.74	345	248	242	66	43	67	66	2.0	4.2
	3	168.09	1.9	.75	349	253	263	48	42	67	66	1.9	4.5
	6	170.32	1.9	.75	348	256	270	47	45	67	67	1.9	4.5
	9	172.54	1.9	.75	348	254	268	47	45	67	66	1.9	4.5
2	12	174.80	1.95	.76	348	255	267	47	45	67	66	1.9	4.5
	15	177.04	1.95	.76	347	257	262	48	46	68	67	1.9	4.5
	18	179.36	1.95	.76	349	261	260	49	46	68	67	1.9	4.5
	21	181.62	1.95	.76	350	262	260	49	46	68	67	1.9	4.5
3	24	183.87	2.0	.77	351	258	268	49	47	69	68	2.05	5
	27	186.21	2.0	.77	352	263	265	49	46	69	68	2.05	5
	30	188.53	2.0	.77	352	263	261	50	47	69	68	2.05	5
	33	190.85	2.0	.77	353	258	264	49	47	69	68	2.05	5
4	36	193.16	1.9	.75	352	259	266	49	48	69	68	1.9	5
	39	195.45	1.9	.75	352	256	265	49	47	69	68	1.9	5
	42	197.67	1.9	.79	353	256	260	49	48	69	68	1.9	5
	45	199.93	1.9	.79	353	257	262	49	48	69	69	1.9	5
5	48	202.19	1.9	.79	351	258	266	50	51	71	70	1.9	5
	51	204.43	1.9	.79	352	257	268	50	49	71	69	1.9	5
	54	206.71	1.9	.79	350	256	265	50	47	71	69	1.9	5
	57	208.92	1.9	.79	348	258	265	50	47	70	69	1.9	5
6	60	211.16	1.9	.79	350	258	261	50	48	70	69	1.9	5

Traverse: 1 (far wall)				
Start Time: 12:13	Initial Leak Check:	.004	cfm@ 13	"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.: 21874

Operator: CHRIS BELLAIRE

Field Data Sheet

Date: Sept. 27/18	Plant: Clean Harbors	Test No.: 3 Subc	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	213.40	1.8	.73	351	257	251	49	47	70	69	1.85	5
	66	215.62	1.75	.73	350	256	246	50	47	71	70	1.85	5
	69	217.80	1.75	.73	350	257	246	49	47	72	71	1.85	5
7	72	220.05	1.65	.71	350	257	250	49	47	72	71	1.8	4.8
	75	222.23	1.65	.71	349	255	246	50	49	72	71	1.8	4.8
	78	224.37	1.65	.71	350	257	249	49	51	72	71	1.8	4.8
	81	226.54	1.65	.71	348	256	254	49	50	72	71	1.8	4.8
8	84	228.71	1.6	.69	348	255	259	49	47	71	70	1.7	4.5
	87	230.84	1.6	.69	346	256	259	49	48	71	70	1.7	4.5
	90	232.92	1.6	.69	346	257	250	49	51	72	70	1.7	4.5
	93	235.04	1.6	.69	348	255	244	50	48	73	72	1.7	4.5
9	96	237.13	1.5	.67	348	256	250	49	47	72	71	1.6	4.2
	99	239.17	1.5	.67	347	256	260	50	46	72	71	1.6	4.2
	102	241.19	1.5	.67	349	255	264	49	46	72	71	1.6	4.2
	105	243.20	1.5	.67	347	255	262	50	46	72	71	1.6	4.2
10	108	245.24	1.4	.65	347	256	252	52	50	73	72	1.5	4
	111	247.20	1.4	.65	349	256	256	51	53	73	72	1.5	4
	114	249.16	1.4	.65	349	254	262	51	55	73	72	1.5	4
	117	251.13	1.4	.65	348	256	263	52	57	73	72	1.5	4
	120	253.13											

Traverse: 1			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 14:13	Final Leak Check: .003	cfm@ 14	"Hg

Traverse: X			
Start Time:	Initial Leak Check:	~~cfm~~ @	"Hg
Finish Time:	Final Leak Check:	cfm @	"Hg

Project No.: 21874

Operator: CHRIS BELAIRE

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	0.980	43.00	164.40	121.4	29.30	4.6	22.5	0.1189
	2	0.980	37.80	158.00	120.2	29.33	4.5	21.2	0.1183
	3	0.980	58.40	178.70	120.3	29.49	4.5	17.3	0.1206

* 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:	SEPT 25/18
Project No.:	21874

Measuring Device	MII Number
Control Module	MOSY
Barometer	Env. Can.

P_{Bar}	29.30

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 Δ H "H_2O"	Pump Vacuum "Hg Gauge
0	43.00	142	176	131	16	16	19	4.6	2
5	53.5	140	176	132	18	18	19	4.6	2
10	64.0	141	176	131	18	19	19	4.4	2
15	74.1	142	176	131	18	20	22	4.6	2
20	84.2	140	174	131	18	21	23	4.6	2
25	94.2	140	174	130	18	21	23	4.6	2
30	104.1	140	174	130	18	21	23	4.6	2
35	114.2	141	176	134	17	16	25	4.6	2
40	124.5	140	176	136	17	24	27	4.6	2
45	134.6	140	176	136	17	24	27	4.6	2
50	144.5	140	176	135	17	24	27	4.6	2
55	154.5	140	175	135	18	24	27	4.6	2
60	164.4	140	176	135	18	24	27	4.6	2

Start Time:	1047
Finish Time:	1147
Initial Leak Check:	2.01 Lpm @ 10 "Hg
Final Leak Check:	2.01 Lpm @ 11 "Hg

DGMCF:	0.990
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	

Comments:

Probe Purge On: 1040 @ 2LPM

Off: 1105 @ 2LPM

~2 LPM for 60 min

Operator : RM

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	2
Test location:	Incinerator Exhaust Stack
Date:	SEPT 26/18
Project No.:	21874

Measuring Device	MII Number
Control Module	M054988
Barometer	Env. Can.

P_{Bar}	29.33

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 Δ H "H_2O"	Pump Vacuum "Hg Gauge
0	37.8	131	155	132	18	20	20	4.5	3
5	47.6	130	154	131	17	21	21	4.5	3
10	57.5	131	153	133	16	20	21	4.5	3
15	67.4	131	153	133	16	20	21	4.5	3
20	77.7	131	152	133	16	20	21	4.5	3
25	87.6	130	152	132	15	20	21	4.5	3
30	97.6	135	151	130	15	21	22	4.5	3
35	107.5	136	152	131	13	21	22	4.5	3
40	117.5	137	152	131	14	21	22	4.5	3
45	127.6	135	152	131	14	21	23	4.5	3
50	137.7	133	152	131	14	21	23	4.5	3
55	147.6	132	155	131	14	21	23	4.5	3
60	158.0	132	154	130	14	21	23	4.5	3

Start Time:	1325
Finish Time:	1429
Initial Leak Check:	0.01 Lpm @ 11 " Hg
Final Leak Check:	0.00 Lpm @ 12 " Hg

DGMCF:	0.950
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	4.5

Comments:

Probe Purge On: 1320 @ 2LPM

Off: 1325 @ 2LPM

~2 LPM for 60 min

Operator : RM

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	3
Test location:	Incinerator Exhaust Stack
Date:	SEPT 27 / 18
Project No.:	21874

Measuring Device	MII Number
Control Module	M05495
Barometer	Env. Can.

P_{Bar}	29.49

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 Δ H "H_2O"	Pump Vacuum "Hg Gauge
0	58.4	131	178	135	14	12	12	4.5	2
5	67.9	132	178	135	14	13	14	4.5	2
10	77.4	131	179	135	14	14	16	4.5	2
15	87.4	131	176	135	14	14	16	4.5	2
20	97.4	131	179	135	14	14	16	4.5	2
25	107.5	132	179	135	14	14	16	4.5	2
30	117.4	132	179	136	13	16	17	4.5	2
35	127.2	132	179	134	14	18	19	4.5	2
40	136.7	132	180	134	14	18	20	4.5	2
45	147.7	132	175	134	14	19	21	4.5	2
50	158.7	131	178	134	14	19	22	4.5	2
55	169.0	131	178	134	14	21	24	4.5	2
60	178.7	131	175	134	13	22	24	4.5	2

Start Time:	922		
Finish Time:	1022		
Initial Leak Check:	2.01	Lpm @ 12	" Hg
Final Leak Check:		Lpm @	" Hg

DGMCF:	0.980
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	4.5

Comments:

Probe Purge On: @

Off: @

~2 LPM for 60 min

Operator :

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	0.994	68.00	88.50	20.50	29.28	2.0	23.6	0.0201
	2	2A/2B	0.994	88.80	108.80	20.00	29.28	2.0	24.6	0.0196
	3	3A/3B	0.994	9.40	29.60	20.20	29.28	2.0	22.6	0.0199
	4	4A/4B	0.994	31.00	50.70	19.70	29.28	2.0	24.0	0.0193
2	1	6A/6B	0.994	51.00	71.70	20.70	29.30	2.0	17.4	0.0208
	2	7A/7B	0.994	72.20	92.00	19.80	29.30	2.0	20.4	0.0197
	3	8A/8B	0.994	93.20	113.30	20.10	29.30	2.0	20.8	0.0199
	4	9A/9B	0.994	14.00	34.20	20.20	29.30	2.0	20.8	0.0200
3	1	11A/11B	0.994	79.30	99.70	20.40	29.45	2.0	20.8	0.0203
	2	12A/12B	0.994	0.40	21.90	21.50	29.45	2.0	18.8	0.0216
	3	13A/13B	0.994	22.30	42.30	20.00	29.45	2.0	19.4	0.0200
	4	14A/14B	0.994	42.70	62.90	20.20	29.45	2.0	20.0	0.0202

* Dry at 25°C and 1 atmosphere

ORTECH Environmental

Vost Data Sheet

Plant:	Clean Harbors	Test Condition:	Compliance		
Plant Location:	Corunna, ON	Test No:	1	Control Box ID:	M05498
Test location:	Incinerator Exhaust Stack	DGMCF:	0.994	Operator:	DM
Date:	SEPT 25/18	Barometric:	29.38	Project No:	21874
~ 1 LPM for 20 minutes		NDL - No Dectectable Leak		Field Blank Pair ID:	5A/B -40

Tube Pair 1 Start Time:	1214	Initial Leak Check NDL @ 15 "Hg	Sample ID: 1A, 1B
Tube Pair 1 End Time:	1234	Final Leak Check NDL @ 10 "Hg	Lab ID: L2151431- 36

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	68.0	134	175	14	23	2	2
5	73.1	134	176	14	23	2	3
10	78.3	134	176	14	24	2	3
15	84.0	134	176	14	24	2	3
20	88.5	134	176	14	24	2	3

Tube Pair 2 Start Time:	1243	Initial Leak Check NDL @ 10 "Hg	Sample ID: 2A 2B
Tube Pair 2 End Time:	1303	Final Leak Check NDL @ 11 "Hg	Lab ID: -~~37~~ 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	89.8	134	176	12	24	2	2
5	93.7	134	175	11	24	2	3
10	98.6	135	174	11	25	2	3.5
15	103.5	136	174	11	25	2	3.5
20	108.8	134	174	11	25	2	3.5

Tube Pair 3 Start Time:	1346	Initial Leak Check NDL @ 11 "Hg	Sample ID: 3A/B
Tube Pair 3 End Time:	1406	Final Leak Check NDL @ 11 "Hg	Lab ID: -38

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	9.4	134	174	11	22	2	2
5	13.6	134	175	10	22	2	4
10	19.5	134	175	16	23	2	4
15	25.0	134	175	10	23	2	4
20	29.6	134	175	10	23	2	4

Tube Pair 4 Start Time:	1413	Initial Leak Check NDL @ 11 "Hg	Sample ID: 4A/B
Tube Pair 4 End Time:	1433	Final Leak Check NDL @ 12 "Hg	Lab ID: -39

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	31.0	133	176	10	24	2	2
5	35.8	131	175	10	24	2	3
10	40.7	132	175	11	24	2	3
15	45.7	133	176	10	24	2	3.5
20	50.7	132	176	10	24	2	3.5

ORTECH Environmental

Vost Data Sheet

Plant: Clean Harbors	Test Condition: Compliance		
Plant Location: Corunna, ON	Test No: 2	Control Box ID: MO5498	
Test location: Incinerator Exhaust Stack	DGMCF: 0.994	Operator: RM	
Date: SEPT 26/18	Barometric: 29.30	Project No: 21874	
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak	Field Blank Pair ID: 6A/B L715143 1-41 10A/B -45	

Tube Pair 1 Start Time: 943	Initial Leak Check NDL @ 14 "Hg	Sample ID: 6A/B	
Tube Pair 1 End Time: 1003	Final Leak Check NDL @ 14 "Hg	Lab ID: -41	

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	51.0	135	182	10	16	2	2
5	56.0	134	182	10	17	2	3.5
10	61.3	134	182	10	18	2	3.5
15	66.6	134	181	9	18	2	3.5
20	71.7	135	182	9	18	2	3.5

Tube Pair 2 Start Time: 1009	Initial Leak Check NDL @ 14 "Hg	Sample ID: 7A/B	
Tube Pair 2 End Time: 1029	Final Leak Check NDL @ 14 "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	72.2	134	182	11	19	2	2.5
5	77.0	134	182	10	20	2	3
10	81.8	134	181	10	21	2	3
15	86.5	134	181	10	21	2	3.5
20	92.0	134	181	10	21	2	3.5

Tube Pair 3 Start Time: 1037	Initial Leak Check NDL @ 14 "Hg	Sample ID: 8A/8B	
Tube Pair 3 End Time: 1057	Final Leak Check NDL @ 14 "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	93.2	134	181	10	20	2	2.5
5	98.3	134	181	10	21	2	3
10	103.2	134	181	10	21	2	3
15	108.3	133	182	9	21	2	3
20	113.3	133	181	10	21	2	3

Tube Pair 4 Start Time: 1104	Initial Leak Check NDL @ 16 "Hg	Sample ID: 9A/9B	
Tube Pair 4 End Time: 1124	Final Leak Check NDL @ 14 "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	14.0	134	181	10	20	2	2
5	19.1	134	180	9	21	2	2.5
10	24.0	134	181	9	21	2	2.5
15	29.0	134	181	9	21	2	2.5
20	34.2	134	181	9	21	2	2.5

ORTECH Environmental

Vost Data Sheet

Plant:	Clean Harbors	Test Condition:	Compliance		
Plant Location:	Corunna, ON	Test No:	3	Control Box ID:	MU5498
Test location:	Incinerator Exhuast Stack	DGMCF:	.994	Operator:	DM
Date:	SEPT 11/14	Barometric:	29.45	Project No:	21874
~ 1 LPM for 20 minutes		NDL - No Dectectable Leak		Field Blank Pair ID:	15A/B

L2/514731 - 49

Tube Pair 1 Start Time:	1040	Initial Leak Check NDL @ 22 "Hg 2'	Sample ID: 11A/B
Tube Pair 1 End Time:	1100	Final Leak Check NDL @ 14 "Hg	Lab ID: -46

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	79.3	131	179	10	20	2.0	2
5	84.5	132	179	10	20	2.0	2.5
10	89.6	132	179	10	21	2.0	2.5
15	94.7	132	179	11	22	2.0	2.5
20	99.7	131	178	9	21	2.0	3

Tube Pair 2 Start Time:	1216	Initial Leak Check NDL @ 14 "Hg	Sample ID: 12A/B
Tube Pair 2 End Time:	1236	Final Leak Check NDL @ 22 "Hg	Lab ID: -47

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	0.4	130	178	9	18	2	2
5	5.8	131	178	9	18	2	3
10	11.4	130	179	9	19	2	3
15	17.5	131	178	9	19	2	3
20	21.9	131	178	9	20	2	3

Tube Pair 3 Start Time:	1245	Initial Leak Check NDL @ 22 "Hg	Sample ID: 13A/B
Tube Pair 3 End Time:	1305	Final Leak Check NDL @ 22 "Hg	Lab ID: -48

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	22.3	130	180	8	18	2.0	2
5	27.3	132	180	8	19	2	4
10	32.3	132	180	8	20	2	4
15	37.3	132	180	8	20	2	4
20	42.3	132	181	9	20	2	4

Tube Pair 4 Start Time:	1341	Initial Leak Check NDL @ 22 "Hg	Sample ID: 14A/B
Tube Pair 4 End Time:	1361	Final Leak Check NDL @ 22 "Hg	Lab ID: -49

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	42.7	130	181	9	20	2	2
5	47.6	130	181	9	20	2	3.5
10	52.8	130	181	8	20	2	3.5
15	57.9	130	181	8	20	2	3.5
20	62.9	130	181	8	20	2	3.5

APPENDIX 8

Metals Train Recovery Data Sheets
(4 pages)

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21874
Date: 9/25/18

Test No. 1
Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing	Filter	Impingers 1, 2, 3, 4 & 5	Impinger 6 & 7
	Filter ID: 18-QF-3		

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	282.3
After Act. Rinse:	395.3
Total TS1:	113.0

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	282.7
with Nitric rinse	438.3
Total TS2:	155.6

MARK FLUID LEVEL

SEAL AND LABEL TS2

CONTAINER TS3

Initial Wt:	0.6824
Final Wt:	
Gain:	
Colour:	rust.

SEAL AND LABEL TS3

Sample Batch Number	18-21874-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)	4
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

CWTR = add 1 thru 7:	3775.6
WCBDA= 8:	40.8

Train Loaded By: DM / DP
Train Recovered By: JB / DP
Recovery Witnessed By: CB
Date: 9/25/18

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	602.4
Initial Wt:	707.4
Final Wt:	922.1
1 Gain:	214.7
Colour:	Clear

Impinger #2 Empty (Knock-out)	
Empty Wt:	774.8
Final Wt:	3179.7
2 Gain:	2404.9
Colour:	Clear

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	689.4
Initial Wt:	814.2
Final Wt:	992.2
3 Gain:	178.0
Colour:	Clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	658.3
Initial Wt:	748.3
Final Wt:	975.8
4 Gain:	227.5
Colour:	Clear

Impinger #5 Empty	
Empty Wt:	620.9
Final Wt:	~~873.7~~ 1374.4
5 Gain:	753.5
Colour:	Clear

1 of 2

CONTAINER TS4 WEIGHTS

Empty Wt:	1378.6
With Imp. 1 to 5 Soln:	4940.0
After HNO_3 Rinse:	5185.3
Total TS4:	3806.7

Box # 5
2 of 2
EMPTY 425.7
WITH SOLN 927.3
#5: 1374.4
(501.6)

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	670.3
Initial Wt:	789.2
Final Wt:	784.5
6 Gain:	-4.7
Colour:	Purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	567.1
Initial Wt:	676.0
Final Wt:	677.7
7 Gain:	1.7
Colour:	Purple

CONTAINER TS5-A	
Empty Wt:	431.1
With Imp. Soln:	641.5
Imp. 6&7 Volume:	210.4
After $KMnO_4$ Rinse:	757.6
After D.I. Water Rinse:	863.8
Total TS5-A:	432.7

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B

Empty Wt:	430.8
With 150 mL DI Water:	576.4
After HCl Rinse:	616.9
After D.I. Water Rinse:	744.9
Total TS5-B:	314.1

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	934.6
Final Wt:	975.4
8 Gain:	40.8
% spent :	80

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21874
Date: 9/25/18

Test No. 2
Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing	Filter	Impingers 1, 2, 3, 4 & 5	Impinger 6 & 7
	Filter ID: 18-GF-103		

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	282.2
After Act. Rinse:	373.7
Total TS1:	91.5

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	282.6
with Nitric rinse	556.5
Total TS2:	273.9

MARK FLUID LEVEL

SEAL AND LABEL TS2

CONTAINER TS3

Initial Wt:	
Final Wt:	
Gain:	
Colour:	rust

SEAL AND LABEL TS3

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	604.9
Initial Wt:	704.8
Final Wt:	891.6
1 Gain:	186.8
Colour:	clear

Impinger #2 Empty (Knock-out)	
Empty Wt:	774.1
Final Wt:	2998.3
2 Gain:	2224.2
Colour:	Clear

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	690.2
Initial Wt:	790.2
Final Wt:	983.3
3 Gain:	193.1
Colour:	Clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	660.9
Initial Wt:	763.9
Final Wt:	858.9
4 Gain:	95.0
Colour:	Clear

Impinger #5 Empty	
Empty Wt:	621.4
Final Wt:	624.6
5 Gain:	3.2
Colour:	Clear

1 of 2

CONTAINER TS4 WEIGHTS

Empty Wt:	1346.7
With Imp. 1 to 5 Soln:	4349.9
After HNO_3 Rinse:	4579.0
Total TS4:	3232.3

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	671.8
Initial Wt:	785.2
Final Wt:	773.5
6 Gain:	-11.7
Colour:	purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	568.0
Initial Wt:	675.0
Final Wt:	676.6
7 Gain:	1.6
Colour:	purple

CONTAINER TS5-A	
Empty Wt:	429.3
With Imp. Soln:	631.6
Imp. 6&7 Volume:	202.3
After $KMnO_4$ Rinse:	750.7
After D.I. Water Rinse:	854.8
Total TS5-A:	425.5

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B

Empty Wt:	429.5
With 150 mL DI Water:	576.8
After HCl Rinse:	609.7
After D.I. Water Rinse:	740.5
Total TS5-B:	311.0

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	1007.1
Final Wt:	1051.4
8 Gain:	44.3
% spent:	20 %

Sample Batch Number	18-21874-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)	11
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:	~~2692.2~~	3596.0 ✓
WCBDA= 8:	44.3	

Train Loaded By: DP JB
Train Recovered By: DP, JB
Recovery Witnessed By:
Date: 9/26/18

Box # 5

2 of 2

Empty wt: 425.5
Final wt: 1329.3
gain: 903.8
total: 903.8

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21874
Date: 9/26/18

Test No. 3
Test Location: Incinerator Exhaust

Nozzle, Probe Liner Cyclone Bypass & F.H. Filter Housing

Filter
Filter ID: 18-GF-104

Impingers 1, 2, 3, 4 & 5

Impinger 6 & 7

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	282.1
After Act. Rinse:	395.2
Total TS1:	113.1

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	281.8
with Nitric rinse	502.8
Total TS2:	221.0

MARK FLUID LEVEL

SEAL AND LABEL TS2

CONTAINER TS3

Initial Wt:	
Final Wt:	
Gain:	
Colour:	rusty

SEAL AND LABEL TS3

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	601.9
Initial Wt:	702.6
Final Wt:	890.1
1 Gain:	187.5
Colour:	clear

Impinger #2 Empty (Knock-out)	
Empty Wt:	774.1
Final Wt:	2914.1
2 Gain:	2140.0
Colour:	clear

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	688.7
Initial Wt:	803.7
Final Wt:	981.0
3 Gain:	177.3
Colour:	clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	659.3
Initial Wt:	752.2
Final Wt:	966.0
4 Gain:	213.8
Colour:	clear

Impinger #5 Empty	
Empty Wt:	620.9
Final Wt:	660.3
5 Gain:	39.4
Colour:	clear

1 of 2

CONTAINER TS4 WEIGHTS	
Empty Wt:	1356.9
With Imp. 1 to 5 Soln:	4417.3
After HNO_3 Rinse:	4634.1
Total TS4:	3277.2

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	567.8
Initial Wt:	681.4
Final Wt:	674.4
6 Gain:	-7.0
Colour:	purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	670.8
Initial Wt:	780.7
Final Wt:	787.8
7 Gain:	7.1
Colour:	purple

CONTAINER TS5-A	
Empty Wt:	431.1
With Imp. Soln:	646.5
Imp. 6&7 Volume:	215.4
After $KMnO_4$ Rinse:	761.5
After D.I. Water Rinse:	862.9
Total TS5-A:	431.8

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B

Empty Wt:	429.3
With 150 mL DI Water:	581.0
After HCl Rinse:	623.5
After D.I. Water Rinse:	727.7
Total TS5-B:	298.4

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	936.7
Final Wt:	980.7
8 Gain:	44.0
% spent :	

Sample Batch Number	18-21874-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:	3658.6
WCBDA= 8:	44.0

Train Loaded By: JB, DP
Train Recovered By: JB, DP
Recovery Witnessed By: CB
Date: 9/27/18

Box # 5 2 of 2
Empty wt: 429.6
with Solution: 1530.1
Gain: 900.5

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21874
Date: 09/27/18

Test No. Blank
Test Location: Incinerator Exhaust

Nozzle, Probe Liner
Cyclone Bypass & F.H.
Filter Housing

Filter

Filter ID: 17-DF-13

Impingers 1, 2, 3, 4 & 5

Impinger 6 & 7

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	282.3
After Act. Rinse:	463.8
Total TS1:	181.5

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	282.9
with Nitric rinse	490.6
Total TS2:	207.7

MARK FLUID LEVEL

SEAL AND LABEL TS2

CONTAINER TS3

Initial Wt:	0.7847
Final Wt:	
Gain:	
Colour:	white

SEAL AND LABEL TS3

Sample Batch Number	18-21874-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:	-1.4
WCBDA= 8:	1.2

Train Loaded By: JB.
Train Recovered By: JB, DP
Recovery Witnessed By: CS
Date: 09/27/18

CONTAINER TS4

Impinger #1 (100 ml H_2O)	
Empty Wt:	659.9
Initial Wt:	755.6
Final Wt:	755.3
1 Gain:	-0.3
Colour:	clear

Impinger #2 Empty (Knock-out)	
Empty Wt:	708.7
Final Wt:	708.7
2 Gain:	0
Colour:	clear

Impinger #3 HNO_3/H_2O_2	
Empty Wt:	506.1
Initial Wt:	631.1
Final Wt:	631.1
3 Gain:	0
Colour:	clear

Impinger #4 HNO_3/H_2O_2	
Empty Wt:	652.4
Initial Wt:	739.8
Final Wt:	739.9
4 Gain:	0.1
Colour:	clear

Impinger #5 Empty	
Empty Wt:	620.7
Final Wt:	620.7
5 Gain:	0
Colour:	clear

CONTAINER TS4 WEIGHTS	
Empty Wt:	424.2
With Imp. 1 to 5 Soln:	730.8
After HNO_3 Rinse:	935.0
Total TS4:	510.8

Box # 9

CONTAINER TS5-A

Impinger #6 $KMnO_4/H_2SO_4$	
Empty Wt:	663.3
Initial Wt:	775.9
Final Wt:	775.3
6 Gain:	-0.6
Colour:	purple

Impinger #7 $KMnO_4/H_2SO_4$	
Empty Wt:	678.8
Initial Wt:	795.2
Final Wt:	794.6
7 Gain:	-0.6
Colour:	purple

CONTAINER TS5-A	
Empty Wt:	424.4
With Imp. Soln:	632.7
Imp. 6&7 Volume:	208.3
After $KMnO_4$ Rinse:	767.8
After D.I. Water Rinse:	868.8
Total TS5-A:	444.4

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B

Empty Wt:	429.0
With 150 mL DI Water:	581.6
After HCl Rinse:	640.3
After D.I. Water Rinse:	779.0
Total TS5-B:	350.0

MARK FLUID LEVEL

SEAL & LABEL TS5-B

Impinger #8 Silica Gel	
Initial Wt:	908.9
Final Wt:	910.1
8 Gain:	1.2
% spent :	

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#:	L2172838		Mississauga, ON L5J 2Y4
Date of Report	22-Oct-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS:

Sample Particulate Analysis via Gravimetric USEPA Method 5 (SR 19-Oct-18)

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		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(8 THRU 13) TEST#2	18-21874-PM-(15 THRU 20) TEST#3	18-21874-PM-(22 THRU 27) BLANK	MB	
ALS Sample ID		L2172838-1	L2172838-2	L2172838-3	L2172838-4	L2172838-MB	
Matrix		Stack	Stack	Stack	Stack	n/a	
Analysis type		Sample	Sample	Sample	Sample	Sample	
Sampling Date/Time		25-Sep-18	26-Sep-18	27-Sep-18	27-Sep-18	n/a	
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	n/a	
PM via Gravimetric Analysis Method 5	**LOR**						
	mg	**mg**	**mg**	**mg**	**mg**	**mg**	
Filter Particulate Matter	0.8	31.8	35.1	33.0	4.2	0.7	J
Acetone Particulate Matter	0.4	8.6	3.7	8.4	1.2	<0.1	
	g	**g**	**g**	**g**	**g**	**g**	
Acetone Mass	0.02	113	91.2	110	180	31.4	

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#:	L2172838		Mississauga, ON L5J 2Y4
Date of Report	14-Nov-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS:

Metals analysed via ICP-MS Method USEPA 6020A (SA 25-Oct-18 to 7-Nov-18)

Sample Preparation via USEPA Method 29 (SR 24-Oct-18)

ANALYST COMMENTS:

1A HNO3:

Cu observed in the method blank significantly above the LOR. Data for this target are likely to be biased high as a result of this background.

Ag recoveries in the LCS and LCSD show high variability (found: 90, 11%, limits: 85-115%). This is likely due to silver binding other elements in solution. Data for this target may show higher than normal variability.

Ba recoveries in the MS and MSD are outside ALS DQOs (found: 71, 71%, limits: 75-125%). This may point to a matrix interference, which is providing an overall low bias to this analyte.

1A HF:

Si cannot be quantified in this fraction due to the significant background from the filter matrix.

Sb, Mo observed in the Method blank (MB) above the LOR. Low levels of these same analytes were observed in the reagent blank (RB). The difference between these QC types is the presence of a representative, unsampled filter in the method blank. Data for these targets is likely to be biased high as a result of these backgrounds.

Ag recoveries in the LCS and LCSD show high variability (found: 93, 61%, limits: 85-115%). This is likely due to silver binding other elements in solution. Data for this target may show higher than normal variability.

2A:

Pb, Mo, Sn, Si observed in the reagent blank (RB) significantly above their LORs. Data for these targets is likely to be biased high.

Al recovery in the LCS and LCSD is outside ALS DQOs (found: 133, 120%, limits: 85-115%). Data for this target is likely to be biased high.

Al, B, Fe, Si recoveries in the MS and MSD cannot be quantified due to high concentrations of these analytes in the sample relative to the spiked amount. This is not expected to have an impact on data quality.

PE 11-Nov-18

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		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(8 THRU 13) TEST#2	18-21874-PM-(15 THRU 20) TEST#3	18-21874-PM-(22 THRU 27) BLANK	MB
ALS Sample ID		L2172838-1	L2172838-2	L2172838-3	L2172838-4	L2172838-MB
Matrix		Stack	Stack	Stack	Stack	n/a
Analysis Type		Sample	Sample	Sample	Sample	Sample
Sampling Date		25-Sep-18	26-Sep-18	27-Sep-18	27-Sep-18	n/a
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	n/a
Multi-Metals via ICP-MS	**LOR**					
	ug	**ug**	**ug**	**ug**	**ug**	**ug**
Front Half HNO3 Fraction 1A						
Aluminum	20	382	265	296	<	<
Antimony	0.2	8.76	5.38	4.81	<	<
Arsenic	1	52.6	33.5	34.5	<	<
Barium	5	18.5	15.2	16.4	5.31	<
Beryllium	0.2	<	<	<	<	<
Boron	30	<	<	<	<	<
Cadmium	0.1	3.88	2.65	3.80	0.264	<
Calcium	500	510	<	<	<	<
Chromium	1	27.4	19.9	20.0	<	<
Cobalt	0.2	0.886	0.632	0.681	<	<
Copper	1	44.7	34.5	40.7	1.34	2.94
Iron	200	2180	2530	1960	<	<
Lead	0.5	4.29	2.69	2.51	<	<
Lithium	0.5	6.26	4.75	5.12	<	<
Magnesium	10	120	91.2	112	<	<
Manganese	0.5	70.0	44.9	51.7	<	<
Molybdenum	0.2	4.38	3.24	4.11	<	<
Nickel	0.2	21.9	13.8	13.7	0.766	<
Phosphorus	100	400	307	360	<	<
Potassium	100	2790	2620	3640	<	<
Selenium	2	32.5	24.7	22.4	<	<
Silver	0.2	<	<	<	<	<
Sodium	30	4920	3570	4170	335	50.9
Strontium	0.2	3.09	2.27	2.49	<	<
Tin	0.3	17.0	28.3	25.3	4.01	<
Titanium	10	80.4	56.0	64.2	<	<
Vanadium	1	3.33	2.51	3.01	<	<
Zinc	6	84.5	34.3	31.1	<	<
Sulphur	10000	<	<	<	<	<
Silicon	150	353	274	235	171	<

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	<	119	101	123	104
Antimony	0.2	<	10.6	88	11.8	99
Arsenic	1	<	53.5	89	53.5	89
Barium	5	<	57.4	96	57.2	95
Beryllium	0.2	<	59.5	99	57.1	95
Boron	30	<	60.0	95	61.3	97
Cadmium	0.1	<	27.9	93	27.2	91
Calcium	500	<	1420	93	1450	96
Chromium	1	<	52.2	87	54.9	92
Cobalt	0.2	<	54.6	91	56.7	94
Copper	1	<	57.1	95	56.8	95
Iron	200	<	251	87	272	94
Lead	0.5	<	56.5	94	56.6	94
Lithium	0.5	<	10.3	87	10.6	89
Magnesium	10	<	289	97	289	97
Manganese	0.5	<	53.6	90	56.5	95
Molybdenum	0.2	<	27.1	91	28.1	94
Nickel	0.2	<	54.7	91	55.9	93
Phosphorus	100	<	1420	95	1440	96
Potassium	100	<	1410	95	1380	92
Selenium	2	<	52.3	87	53.8	90
Silver	0.2	<	27.0	90	3.11	11
Sodium	30	<	1600	106	1600	106
Strontium	0.2	<	54.9	92	58.2	97
Tin	0.3	<	27.6	92	28.4	95
Titanium	10	<	51.2	85	50.9	84
Vanadium	1	<	51.4	86	53.4	89
Zinc	6	<	117	98	113	95
Sulphur	10000	<	12800	85	14700	98
Silicon	150	<	2785	92	2751	91

ALS Environmental

Sample QC Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2172838-1	L2172838-1	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		25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HNO3 Fraction 1A							
Aluminum	20	382	381	646	110	632	104
Antimony	0.2	8.76	8.47	31.1	93	31.5	95
Arsenic	1	52.6	52.1	166	95	165	93
Barium	5	18.5	18.7	104	71	104	71
Beryllium	0.2	<	<	120	100	120	100
Boron	30	<	<	134	101	135	102
Cadmium	0.1	3.88	3.87	61.4	96	60.6	94
Calcium	500	510	505	3470	99	3450	98
Chromium	1	27.4	27.8	143	96	140	94
Cobalt	0.2	0.886	0.893	119	99	119	99
Copper	1	44.7	44.7	164	100	165	100
Iron	200	2180	2150	2820	107	2770	97
Lead	0.5	4.29	4.28	108	87	108	87
Lithium	0.5	6.26	6.18	28.6	93	28.9	94
Magnesium	10	120	120	728	101	720	100
Manganese	0.5	70.0	69.8	189	99	186	97
Molybdenum	0.2	4.38	4.37	62.3	96	63.1	98
Nickel	0.2	21.9	21.2	139	97	140	98
Phosphorus	100	400	397	3470	102	3470	102
Potassium	100	2790	2740	5910	104	5900	104
Selenium	2	32.5	33.2	150	98	149	97
Silver	0.2	<	<	59.4	99	59.2	98
Sodium	30	4920	4920	8070	105	7970	102
Strontium	0.2	3.09	3.10	119	97	122	99
Tin	0.3	17.0	16.8	74.5	96	74.9	97
Titanium	10	80.4	78.6	188	90	187	89
Vanadium	1	3.33	3.33	117	95	115	93
Zinc	6	84.5	84.2	324	100	323	99
Sulphur	10000	<	<	32700	99	32800	100
Silicon	150	328	353	8207	88	8469	90

ALS Environmental

Sample Analysis Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(8 THRU 13) TEST#2	18-21874-PM-(15 THRU 20) TEST#3	18-21874-PM-(22 THRU 27) BLANK	MB
ALS Sample ID		L2172838-1	L2172838-2	L2172838-3	L2172838-4	L2172838-MB
Matrix		Stack	Stack	Stack	Stack	n/a
Analysis Type		Sample	Sample	Sample	Sample	Sample
Sampling Date		25-Sep-18	26-Sep-18	27-Sep-18	27-Sep-18	n/a
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	n/a
Multi-Metals via ICP-MS	**LOR**					
	ug	**ug**	**ug**	**ug**	**ug**	**ug**
Front Half HF Fraction 1A						
Aluminum	20	215	319	297	171	26.8
Antimony	0.2	7.21	6.44	4.53	<	1.98
Arsenic	1	15.1	16.6	11.6	<	<
Barium	5	6.22	11.5	10.5	7.41	<
Beryllium	0.2	<	<	<	<	<
Boron	30	<	<	42.5	<	<
Cadmium	0.1	1.17	1.56	1.32	<	<
Calcium	500	<	<	<	<	<
Chromium	1	21.9	18.5	15.6	1.99	<
Cobalt	0.2	0.644	0.776	0.851	<	<
Copper	1	14.2	18.5	15.9	<	<
Iron	200	1920	3290	5550	<	<
Lead	0.5	2.07	2.61	2.17	0.571	<
Lithium	0.5	1.76	2.43	1.49	<	<
Magnesium	10	53.0	67.9	60.8	21.1	<
Manganese	0.5	42.5	49.1	49.0	0.780	<
Molybdenum	0.2	39.1	22.5	22.2	21.3	9.35
Nickel	0.2	28.0	18.2	17.9	3.53	<
Phosphorus	100	106	181	126	<	<
Potassium	100	697	1180	974	<	<
Selenium	2	12.4	14.6	13.7	<	<
Silver	0.2	<	<	<	<	<
Sodium	30	1330	1820	1210	130	<
Strontium	0.2	0.885	1.33	1.06	0.294	<
Tin	0.3	4.79	7.04	6.99	1.41	0.408
Titanium	10	49.9	48.1	41.4	<	<
Vanadium	1	<	1.38	1.04	<	<
Zinc	6	46.3	44.0	36.8	<	<
Sulphur	10000	<	<	<	<	<
Silicon	150	nq	nq	nq	nq	nq

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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	<	114	98	113	97
Antimony	0.2	0.440	10.9	87	10.5	84
Arsenic	1	<	54.4	91	54.0	90
Barium	5	<	53.4	89	52.9	88
Beryllium	0.2	<	54.8	91	54.7	91
Boron	30	<	48.5	81	48.3	81
Cadmium	0.1	<	26.4	88	25.5	85
Calcium	500	<	1330	89	1310	87
Chromium	1	<	56.7	94	57.2	95
Cobalt	0.2	<	56.9	95	56.5	94
Copper	1	<	56.3	94	55.6	93
Iron	200	<	281	94	279	94
Lead	0.5	<	57.6	96	56.9	95
Lithium	0.5	<	11.2	93	11.4	95
Magnesium	10	<	272	91	266	90
Manganese	0.5	<	56.6	95	56.6	95
Molybdenum	0.2	0.227	27.7	92	27.1	90
Nickel	0.2	<	55.7	93	55.3	92
Phosphorus	100	<	1430	95	1410	94
Potassium	100	<	1320	89	1290	87
Selenium	2	<	56.1	94	56.9	95
Silver	0.2	<	27.9	93	18.3	61
Sodium	30	<	1580	104	1540	102
Strontium	0.2	<	54.8	92	53.8	90
Tin	0.3	<	27.2	90	26.7	89
Titanium	10	<	57.2	96	55.1	92
Vanadium	1	<	57.3	95	56.6	94
Zinc	6	<	108	91	107	90
Sulphur	10000	<	11100	84	11200	84
Silicon	150	nq	nq	nq	nq	nq

ALS Environmental

Sample QC Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2172838-1	L2172838-1	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		25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HF Fraction 1A							
Aluminum	20	215	225	486	113	480	110
Antimony	0.2	7.21	7.48	29.4	92	29.6	93
Arsenic	1	15.1	15.4	126	93	124	90
Barium	5	6.22	6.45	84.8	65	85.8	66
Beryllium	0.2	<	<	113	94	119	99
Boron	30	<	<	108	86	111	89
Cadmium	0.1	1.17	1.22	53.0	86	53.9	88
Calcium	500	<	<	2940	93	2990	95
Chromium	1	21.9	22.0	141	99	136	95
Cobalt	0.2	0.644	0.675	117	97	117	97
Copper	1	14.2	14.5	127	94	127	94
Iron	200	1920	1990	2580	110	2540	103
Lead	0.5	2.07	2.09	108	88	108	88
Lithium	0.5	1.76	1.60	24.7	96	25.0	97
Magnesium	10	53.0	56.4	646	99	647	99
Manganese	0.5	42.5	44.1	164	102	159	97
Molybdenum	0.2	39.1	41.1	96.0	95	96.5	96
Nickel	0.2	28.0	29.1	143	96	142	95
Phosphorus	100	106	116	3260	105	3290	106
Potassium	100	697	733	3450	92	3550	95
Selenium	2	12.4	12.8	128	96	124	93
Silver	0.2	<	<	57.2	95	56.3	94
Sodium	30	1330	1390	4110	93	4110	93
Strontium	0.2	0.885	0.924	113	94	112	92
Tin	0.3	4.79	4.95	60.0	92	60.3	93
Titanium	10	49.9	53.2	167	98	167	97
Vanadium	1	<	<	118	97	115	95
Zinc	6	46.3	47.5	268	92	267	92
Sulphur	10000	<	<	26800	94	26600	94
Silicon	150	nq	nq	nq	nq	nq	nq

ALS Environmental

Sample Analysis Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(8 THRU 13) TEST#2	18-21874-PM-(15 THRU 20) TEST#3	18-21874-PM-(22 THRU 27) BLANK
ALS Sample ID		L2172838-1	L2172838-2	L2172838-3	L2172838-4
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample
Sampling Date		25-Sep-18	26-Sep-18	27-Sep-18	27-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**ug**
Back Half (HNO3 / H2O2) Fraction 2A					
Aluminum	5	291	263	173	18.4
Antimony	0.1	0.261	0.200	0.279	<
Arsenic	0.2	9.61	6.28	2.02	<
Barium	0.5	4.53	4.25	3.28	2.14
Beryllium	0.1	<	<	<	<
Boron	10	9190	9090	8870	43.3
Cadmium	0.05	0.384	0.235	0.120	0.301
Calcium	100	949	944	878	253
Chromium	0.15	2.97	2.12	2.11	1.28
Cobalt	0.1	0.111	<	<	<
Copper	0.3	8.92	7.73	5.13	2.40
Iron	15	468	119	264	43.3
Lead	0.05	2.22	2.44	2.84	0.700
Lithium	0.25	0.673	0.627	0.449	<
Magnesium	5	28.5	18.1	18.2	10.7
Manganese	0.15	6.12	2.67	2.88	2.68
Molybdenum	0.1	0.324	0.132	0.113	<
Nickel	0.1	3.58	2.46	1.86	1.63
Phosphorus	25	67.0	53.6	60.6	50.5
Potassium	100	131	<	<	<
Selenium	1	98.3	84.6	31.1	2.17
Silver	0.1	0.226	0.236	0.102	<
Sodium	20	1070	1100	655	359
Strontium	0.1	1.30	1.36	1.15	0.430
Tin	0.1	61.7	70.0	58.2	42.4
Titanium	1	57.6	31.4	24.1	<
Vanadium	0.1	0.181	<	<	<
Zinc	3	20.8	11.3	10.0	18.3
Sulphur	3000	520000	279000	229000	<
Silicon	75	5782	6921	4240	662

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**
Back Half (HNO3 / H2O2) Fraction 2A						
Aluminum	5	<	80.1	133	72.4	120
Antimony	0.1	<	5.68	95	5.15	86
Arsenic	0.2	<	29.7	99	26.8	89
Barium	0.5	<	29.8	99	27.0	90
Beryllium	0.1	<	36.3	121	32.4	108
Boron	10	<	39.5	129	33.1	108
Cadmium	0.05	<	14.5	97	13.4	89
Calcium	100	<	853	113	761	101
Chromium	0.15	<	32.9	109	29.9	99
Cobalt	0.1	<	34.1	114	30.3	101
Copper	0.3	<	32.7	109	28.9	96
Iron	15	<	171	113	154	102
Lead	0.05	0.119	30.7	102	28.2	94
Lithium	0.25	<	6.64	110	5.87	98
Magnesium	5	<	180	120	164	110
Manganese	0.15	<	33.6	112	30.8	103
Molybdenum	0.1	0.186	16.2	107	14.2	94
Nickel	0.1	<	33.4	111	29.5	98
Phosphorus	25	<	964	126	887	115
Potassium	100	<	861	113	782	103
Selenium	1	<	29.6	99	27.1	90
Silver	0.1	<	16.2	108	14.7	98
Sodium	20	<	851	113	782	104
Strontium	0.1	<	31.1	104	27.6	92
Tin	0.1	10.1	20.3	102	18.8	94
Titanium	1	<	34.2	114	30.5	102
Vanadium	0.1	<	32.9	110	29.6	99
Zinc	3	<	60.7	101	54.4	91
Sulphur	3000	<	8680	116	7880	105
Silicon	75	87	1640	104	1592	100

ALS Environmental

Sample QC Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2172838-1	L2172838-1	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		25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Back Half (HNO3 / H2O2) Fraction 2A							
Aluminum	5	291	297	409	nq	405	nq
Antimony	0.1	0.261	0.256	11.0	90	11.4	93
Arsenic	0.2	9.61	9.32	66.9	96	66.8	95
Barium	0.5	4.53	4.74	44.1	66	44.7	67
Beryllium	0.1	<	<	66.7	111	66.7	111
Boron	10	9190	10000	9480	nq	9560	nq
Cadmium	0.05	0.384	0.423	26.8	88	27.6	91
Calcium	100	949	1060	2560	107	2560	107
Chromium	0.15	2.97	3.10	60.4	96	60.4	96
Cobalt	0.1	0.111	0.112	59.6	99	60.6	101
Copper	0.3	8.92	9.25	65.6	94	66.9	97
Iron	15	468	482	741	nq	754	nq
Lead	0.05	2.22	2.30	51.1	82	52.3	83
Lithium	0.25	0.673	0.663	12.4	98	12.2	96
Magnesium	5	28.5	29.6	347	106	346	106
Manganese	0.15	6.12	6.31	64.2	97	64.8	98
Molybdenum	0.1	0.324	0.311	29.3	96	29.2	96
Nickel	0.1	3.58	3.77	61.9	97	62.4	98
Phosphorus	25	67.0	68.8	1880	121	1870	120
Potassium	100	131	135	1680	103	1690	104
Selenium	1	98.3	99.3	160	103	161	104
Silver	0.1	0.226	0.191	29.1	96	29.0	96
Sodium	20	1070	1100	2380	88	2360	86
Strontium	0.1	1.30	1.33	57.0	93	56.6	92
Tin	0.1	61.7	64.4	87.1	85	91.3	99
Titanium	1	57.6	57.4	114	94	114	94
Vanadium	0.1	0.181	0.137	58.4	97	57.5	95
Zinc	3	20.8	21.3	128	89	127	89
Sulphur	3000	520000	512000	1230000	94	1280000	102
Silicon	75	5782	6052	15465	nq	16075	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
ALS WO#:	L2172838		Mississauga, ON L5J 2Y4
Date of Report	14-Nov-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS:

Sample Preparation via USEPA Method 29 (SR 24-Oct-18)
Mercury Analysis via CVAA using Method USEPA 7470A (GN 6-Nov-18)

ANALYST COMMENTS:

MS and MSD recoveries in fraction 2B are at the low limit of ALS DQOs. LCS and LCSD recoveries are within ranges. This may point to a matrix interference that is providing a low bias to this fraction. **PE 11-Nov**

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		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(8 THRU 13) TEST#2	18-21874-PM-(15 THRU 20) TEST#3	18-21874-PM-(22 THRU 27) BLANK
ALS Sample ID		L2172838-1	L2172838-2	L2172838-3	L2172838-4
Matrix		Stack	Stack	Stack	Stack
Analysis type		Sample	Sample	Sample	Sample
Sampling Date/Time		25-Sep-18	26-Sep-18	27-Sep-18	27-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Mercury via CVAA	**LOR**				
Method 29	**ug**	**ug**	**ug**	**ug**	**ug**
Analytical Fraction 1B (HF)	0.005	0.199	0.230	0.166	<0.015
Analytical Fraction 1B (HNO_3)	0.015	0.687	0.498	0.582	<0.015
Analytical Fraction 2B	0.050	14.1	7.00	7.24	0.711
Analytical Fraction 3B	0.025	<0.025	<0.025	<0.025	<0.025
Analytical Fraction 3C	0.25	1.58	0.293	0.752	0.689

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 (HF)	0.005	<0.015	0.321	107%	0.315	105%
Analytical Fraction 1B (HNO_3)	0.015	<0.015	0.303	101%	0.315	105%
Analytical Fraction 2B	0.050	<0.05	0.979	98%	0.986	98%
Analytical Fraction 3B	0.025	<0.025	0.454	90%	0.447	89%
Analytical Fraction 3C	0.25	<0.25	5.00	100%	4.93	99%

ALS Environmental

Sample QC Summary Report

Sample Name		18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1	18-21874-PM-(1 THRU 6) TEST#1
ALS Sample ID		L2172838-1	L2172838-1DUP	L2172838-1MS	L2172838-1MS	L2172838-1MSD	L2172838-1MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date/Time		25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18
Date of Receipt		28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Mercury via CVAA	LOR						
Method 29	**ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Analytical Fraction 1B (HF)	0.005	0.199	0.195	0.477	93%	0.483	95%
Analytical Fraction 1B (HNO_3)	0.015	0.687	0.663	0.999	104%	0.990	101%
Analytical Fraction 2B	0.050	14.06	9.42	45.6	73%	46.4	75%
Analytical Fraction 3B	0.025	<0.025	<0.025	0.459	88%	0.470	91%
Analytical Fraction 3C	0.250	1.58	1.57	5.94	97%	5.85	95%

APPENDIX 10

Semi-Volatile Organics Train
Recovery Data Sheets
(4 pages)

Semi-Volatile Organics Train Recovery Data Sheet

Client :	Clean Habors
Project No.:	21874
Sample Batch No.:	18-21874-SVOC-

Test No.:	1
Test Date:	Sept. 25, 2018
Test Location:	Incinerator Stack

Sample ID – 1	Sample ID – 2	Sample ID – 3	Sample ID – 4	Sample ID – 5	
Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser	Filter	XAD-II Trap	Impingers 1, 2 & 3	Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers	Impinger 4 Silica Gel
CONTAINER TS1	CONTAINER TS2	CONTAINER TS3	CONTAINER TS4	CONTAINER TS5	CONTAINER TS6 (Impinger)
Empty Wt: 423.4	Colour: light red	Initial Wt: 669.8	Impinger #1 Jumbo K.O.	Empty Wt: 439.4	Initial Wt: 910.4
After Acetone/ Hexane Rinse: 614.0	FOLD IN FOIL	1 Final Wt: 686.9	Empty Wt: 699.2	After Acetone/ Hexane Rinse: 687.4	Final Wt: 1206.1
Total TS1:		Gain: 17.1	2 Final Wt: 3107.6	Total TS5: 248.0	5 Gain: 295.7
	SEAL AND LABEL CONTAINER TS2	Colour: white	Gain: 2408.4		% Spent:
		SEAL TRAP	Colour: clear		
MARK FLUID LEVEL		WRAP IN FOIL	Impinger #2 Ethylene Glycol		silica gel 851.8 863.4 gain 11.6
SEAL AND LABEL CONTAINER TS1		LABEL AS CONTAINER TS3	Empty Wt: 661.2		
			Initial Wt: 270.7		
			Final Wt: [illegible] 1166.3		
			3 Gain: 395.6		
			Colour: clear		
			Impinger #3 Empty		
			Empty Wt: 551.0		
			Final Wt: [illegible] 941.8		
			4 Gain: 390.8	Impinger Box ID: 4 11	
			Colour: clear		
			Container TS4 Weights		
			Empty Wt: 1358.6		
			With Imp Soln: 4657.7		
			Imp Volume: 3293.1		
			After ~100g H_2O Rinse: 4948.7		
			Total TS4: 3390.1		

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	FF
Trap ID:	2
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	177179
Hexane Batch No.:	183303
Acetone Batch No.:	182576

Train Loaded By:	JG.
Train Recovered By:	CB.
Recovery Witnessed By:	
Date:	25/2018

CWTR = 1 + 2 + 3 + 4:	3587.6 ✓
WCBDA=5:	11.6

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.:	21874
Sample Batch No.:	18-21874-SVOC-

Test No.:	2 SVOC
Test Date:	SEPT. 26, 2018
Test Location:	Incinerator Stack

Sample ID -6	Sample ID -7	Sample ID -8	Sample ID -9	Sample ID -10	
Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser	Filter	XAD-II Trap	Impingers 1, 2 & 3	Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers	Impinger 4 Silica Gel
CONTAINER TS1	CONTAINER TS2	CONTAINER TS3	CONTAINER TS4	CONTAINER TS5	CONTAINER TS6 (Impinger)
Empty Wt: 424.2	Colour: rusty	Initial Wt: ~~620~~ 664.7	Impinger #1 Jumbo K.O.	Empty Wt: 429.0	Initial Wt: 837.2
After Acetone/ Hexane Rinse: 818.6	FOLD IN FOIL	Final Wt: 685.2	Empty Wt: 736.2	After Acetone/ Hexane Rinse: 766.3	Final Wt: 854.3
Total TS1: 394.4	SEAL AND LABEL CONTAINER TS2	1 Gain: 20.5	Final Wt: 3281.0	Total TS5: 337.3	5 Gain: 17.1
MARK FLUID LEVEL		Colour: off white	2 Gain: 2544.8		% Spent: 15 %
SEAL AND LABEL CONTAINER TS1		SEAL TRAP	Colour: clear		
		WRAP IN FOIL	Impinger #2 Ethylene Glycol	+ 424.0	
		LABEL AS CONTAINER TS3	Empty Wt: 535.5	1358.0	
			Initial Wt: 664.6	GAIN: 934.0	
			Final Wt: 750.8		
			3 Gain: 86.3		
			Colour: clear		
			Impinger #3 Empty		
			Empty Wt: 480.7		
			Final Wt: 481.3		
			4 Gain: 0.6	Impinger Box ID: 12	
			Colour: clear		
			Container TS4 Weights		
			Empty Wt: 1357.9		
			With Imp Soln: 5043.1		
			Imp Volume: 3685.2		
			After ~100g H_2O Rinse: 5111.4		
			Total TS4: 3753.5		

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	
Trap ID:	#1 #3
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	177179
Hexane Batch No.:	183263
Acetone Batch No.:	182576

Train Loaded By:	JG
Train Recovered By:	CB.
Recovery Witnessed By:	
Date:	Sept. 26, 2018

CWTR = 1 + 2 + 3 + 4:	3586.2 ✓
WCBDA=5:	12.1

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.:	21874
Sample Batch No.:	18-21874-SVOC-

Test No.: 3
Test Date: SEPTEMBER 27, 2018
Test Location: Incinerator Stack

Sample ID -11	Sample ID -12	Sample ID -13	Sample ID -14	Sample ID -15	
Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser	Filter	XAD-II Trap	Impingers 1, 2 & 3	Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers	Impinger 4 Silica Gel
CONTAINER TS1	CONTAINER TS2	CONTAINER TS3	CONTAINER TS4	CONTAINER TS5	CONTAINER TS6 (Impinger)
Empty Wt: 420.0	Colour: rusty	Initial Wt: 668.0	Impinger #1 Jumbo K.O.	Empty Wt: 429.5	Initial Wt: 854.0 863.3
After Acetone/ Hexane Rinse: 772.2	FOLD IN FOIL	1 Final Wt: 687.1	Empty Wt: 722.7	After Acetone/ Hexane Rinse: 754.4	Final Wt: 881.3
Total TS1: 352.2		Gain: AP 19.1	Final Wt: 3230.3	5 Total TS5: 324.9	Gain: 18.0
	SEAL AND LABEL CONTAINER TS2	2 Colour: off white	2 Gain: 2507.6		% Spent: 15 %
MARK FLUID LEVEL		SEAL TRAP	Colour: clear		
		WRAP IN FOIL	Impinger #2 Ethylene Glycol	+ 428.1	
SEAL AND LABEL CONTAINER TS1		LABEL AS CONTAINER TS3	Empty Wt: 657.2	1339.4	
			Initial Wt: 782.5	Cation 911.3	
			Final Wt: 946.5		
			3 Gain: 159.0		
			Colour: clear		
			Impinger #3 Empty		
			Empty Wt: 561.6		
			Final Wt: 590.3	Impinger Box ID: 1	
			4 Gain: 28.7		
			Colour: clear		
			Container TS4 Weights		
			Empty Wt: 1354.6		
			With Imp Soln: 5078.1		
			Imp Volume: 3723.5		
			After ~100g H_2O Rinse: 5210.6		
			Total TS4: 3856		

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	JJ
Trap ID:	4
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	177 179
Hexane Batch No.:	183 263
Acetone Batch No.:	182 576

Train Loaded By:	DM
Train Recovered By:	CB
Recovery Witnessed By:	
Date:	Sept. 27, 2018

CWTR = 1 + 2 + 3 + 4:	3625.7 ✓
WCBDA=5:	18.0

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.:	21874
Sample Batch No.:	18-21874-SVOC-

Test No.:	Blank
Test Date:	Sept. 27, 2018
Test Location:	Incinerator Stack

Sample ID -16	Sample ID -17	Sample ID -18	Sample ID -19	Sample ID -20	
Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser	Filter	XAD-II Trap	Impingers 1, 2 & 3	Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers	Impinger 4 Silica Gel
CONTAINER TS1	CONTAINER TS2	CONTAINER TS3	CONTAINER TS4	CONTAINER TS5	CONTAINER TS6 (Impinger)
Empty Wt: 431.8	Colour: White	Initial Wt: ~~664.2~~ 672.0	Impinger #1 Jumbo K.O.	Empty Wt: 431.7	Initial Wt: 949.5
After Acetone/ Hexane Rinse: 626.9	FOLD IN FOIL	Final Wt: 670.0	Empty Wt: 708.8	After Acetone/ Hexane Rinse: 756.0	Final Wt: 950.4
Total TS1: 195.1	SEAL AND LABEL CONTAINER TS2	1 Gain: 0	Final Wt: 780.7	Total TS5: 324.8	5 Gain: 0.9
MARK FLUID LEVEL	SEAL TRAP	Colour: white	2 Gain: 71.9		% Spent: —
SEAL AND LABEL CONTAINER TS1	WRAP IN FOIL		Colour: clear		
	LABEL AS CONTAINER TS3		Impinger #2 Ethylene Glycol		
			Empty Wt: 564.1		
			Initial Wt: 692.0		
			Final Wt: 620.4		
			3 Gain: -71.6		
			Colour: clear		
			Impinger #3 Empty		
			Empty Wt: 617.0		
			Final Wt: 617.0		
			4 Gain: 0		
			Colour: empty		

Train & Proofing Identification	
Glassware Train Proofing Provided By:	ALS
Glassware Train ID:	GG
Trap ID:	2
HPLC Batch No.:	ALS
Ethylene Gylcol Batch No.:	177179
Hexane Batch No.:	183263
Acetone Batch No.:	182576

Container TS4 Weights	
Empty Wt:	430.0
With Imp Soln:	558.5
Imp Volume:	128.5
After ~100g H_2O Rinse:	934.7
Total TS4:	304.7

Impinger Box ID: 4

Train Loaded By:	JG
Train Recovered By:	CB / DM
Recovery Witnessed By:	
Date:	Sept. 27, 2018

CWTR = 1 + 2 + 3 + 4:	0.3
WCBDA=5:	0.9

TS1, TS4, TS5 - 1L Amber Glass Bottle
TS2 - Glass Petri Dish
TS3 - Glass Trap

APPENDIX 11

Semi-Volatile Organics Analytical Reports
(67 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 Consulting
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Rd.
ALS WO#:	L2172987		Mississauga, ON
Date of Report	29-Oct-18		LYJ 2Y4
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **PCDD/F by EPA M23**

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	18-21874-SVOC-(1 THRU 5) TEST#1	18-21874-SVOC-(11 THRU 15) TEST#3	18-21874-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2172987-1	L2172987-3	L2172987-4
Sample Size	1	1	1
Sample size units	Train	Train	Train
Percent Moisture	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack
Sampling Date	25-Sep-18	27-Sep-18	27-Sep-18
Extraction Date	16-Oct-18	16-Oct-18	16-Oct-18
Target Analytes	**pg**	**pg**	**pg**
2,3,7,8-TCDD	<3.1	<2.0	<1.3
1,2,3,7,8-PeCDD	<4.9	2.38	<0.62
1,2,3,4,7,8-HxCDD	12.4	<2.0	<0.60
1,2,3,6,7,8-HxCDD	25.2	<2.1	<0.58
1,2,3,7,8,9-HxCDD	20.3	<2.0	<0.59
1,2,3,4,6,7,8-HpCDD	514	17.7	<0.87
OCDD	1040	40.6	<2.8
2,3,7,8-TCDF	8.49	<2.5	<1.1
1,2,3,7,8-PeCDF	7.50	<2.4	<1.4
2,3,4,7,8-PeCDF	8.57	<2.0	<0.78
1,2,3,4,7,8-HxCDF	12.0	<1.3	<0.69
1,2,3,6,7,8-HxCDF	15.2	<1.3	<0.65
2,3,4,6,7,8-HxCDF	27.0	<1.3	<0.68
1,2,3,7,8,9-HxCDF	11.1	<2.1	<1.0
1,2,3,4,6,7,8-HpCDF	101	4.61	<0.52
1,2,3,4,7,8,9-HpCDF	21.7	<1.1	<0.66
OCDF	136	<3.3	<0.95
Field Spike Standards	**% Rec**	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	97	96	112
13C12-1,2,3,4,7,8-HxCDD	81	87	98
13C12-2,3,4,7,8-PeCDF	92	103	110
13C12-1,2,3,4,7,8-HxCDF	79	77	89
13C12-1,2,3,4,7,8,9-HpCDF	94	94	105
Extraction Standards			
13C12-2,3,7,8-TCDD	48	76	84
13C12-1,2,3,7,8-PeCDD	54	75	101
13C12-1,2,3,6,7,8-HxCDD	52	78	104
13C12-1,2,3,4,6,7,8-HpCDD	47	73	98
13C12-OCDD	49	82	101
13C12-2,3,7,8-TCDF	54	75	85
13C12-1,2,3,7,8-PeCDF	52	67	83
13C12-1,2,3,6,7,8-HxCDF	48	74	100
13C12-1,2,3,4,6,7,8-HpCDF	44	70	93
Cleanup Standard			
13C12-1,2,3,7,8,9-HxCDF	60	62	73
Homologue Group Totals	**pg**	**pg**	**pg**
Total-TCDD	85.3	38.8	<1.3
Total-PeCDD	61.0	14.1	<0.62
Total-HxCDD	245	6.70	<0.60
Total-HpCDD	948	32.6	<0.64
Total-TCDF	91.4	16.4	<1.1
Total-PeCDF	55.8	<1.8	<0.81
Total-HxCDF	65.2	2.14	<0.79
Total-HpCDF	149	6.71	<0.66
Toxic Equivalency - (WHO 2005)			
Lower Bound PCDD/F TEQ (WHO 2005)	22.7	2.62	0.00
Mid Point PCDD/F TEQ (WHO 2005)	26.7	5.30	1.48
Upper Bound PCDD/F TEQ (WHO 2005)	30.7	6.76	2.81

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2902026-1	WG2902026-2
Sample Size	1	1
Sample size units	Train	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	16-Oct-18	16-Oct-18
Target Analytes	**pg**	**% Rec**
2,3,7,8-TCDD	<2.1	100
1,2,3,7,8-PeCDD	<1.0	102
1,2,3,4,7,8-HxCDD	<2.1	91
1,2,3,6,7,8-HxCDD	2.72	106
1,2,3,7,8,9-HxCDD	<2.1	108
1,2,3,4,6,7,8-HpCDD	<2.1	96
OCDD	<8.1	95
2,3,7,8-TCDF	<1.4	85
1,2,3,7,8-PeCDF	2.23	88
2,3,4,7,8-PeCDF	<1.2	85
1,2,3,4,7,8-HxCDF	1.37	93
1,2,3,6,7,8-HxCDF	<1.0	112
2,3,4,6,7,8-HxCDF	<1.0	106
1,2,3,7,8,9-HxCDF	3.57	109
1,2,3,4,6,7,8-HpCDF	<1.1	95
1,2,3,4,7,8,9-HpCDF	<1.4	100
OCDF	<5.5	88
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	55	63
13C12-1,2,3,7,8-PeCDD	60	74
13C12-1,2,3,6,7,8-HxCDD	52	65
13C12-1,2,3,4,6,7,8-HpCDD	49	74
13C12-OCDD	51	83
13C12-2,3,7,8-TCDF	60	65
13C12-1,2,3,7,8-PeCDF	55	69
13C12-1,2,3,6,7,8-HxCDF	48	60
13C12-1,2,3,4,6,7,8-HpCDF	49	65
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	53	61
Homologue Group Totals	**pg**	
Total-TCDD	<2.1	
Total-PeCDD	<1.0	
Total-HxCDD	2.72	
Total-HpCDD	<1.1	
Total-TCDF	<1.4	
Total-PeCDF	2.23	
Total-HxCDF	4.94	
Total-HpCDF	<1.4	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.833	
Mid Point PCDD/F TEQ (WHO 2005)	3.03	
Upper Bound PCDD/F TEQ (WHO 2005)	5.10	

Sample Analysis Report

Sample Name	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18		Approved:
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18		*T.Patterson*
Analysis Method	EPA M23	Sample Size	1	Train	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		24-Oct-2018
Sample Matrix	Stack	Split Ratio	5		

Run Information	**Run 1**
Filename	7-181023A27
Run Date	24-Oct-18 05:25
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR512413H

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		25
1,2,3,7,8-PeCDD	1	31.84	<4.9	4.9	M,U	4.2	130
1,2,3,4,7,8-HxCDD	0.1	33.94	12.4	3.1	M,J		130
1,2,3,6,7,8-HxCDD	0.1	34.00	25.2	3.0	M,J,B		130
1,2,3,7,8,9-HxCDD	0.1	34.13	20.3	3.1	M,J		130
1,2,3,4,6,7,8-HpCDD	0.01	35.62	514	3.7			130
OCDD	0.0003	37.10	1040	3.5			250
2,3,7,8-TCDF	0.1	26.53	8.49	3.4	M,J		25
1,2,3,7,8-PeCDF	0.03	30.86	7.50	3.2	M,J,B		130
2,3,4,7,8-PeCDF	0.3	31.54	8.57	3.1	M,J		130
1,2,3,4,7,8-HxCDF	0.1	33.45	12.0	3.6	M,J,B		130
1,2,3,6,7,8-HxCDF	0.1	33.52	15.2	3.4	M,J		130
2,3,4,6,7,8-HxCDF	0.1	33.85	27.0	3.6	M,J		130
1,2,3,7,8,9-HxCDF	0.1	34.29	11.1	4.2	M,J,B		130
1,2,3,4,6,7,8-HpCDF	0.01	35.06	101	2.2	J		130
1,2,3,4,7,8,9-HpCDF	0.01	35.86	21.7	2.7	M,J		130
OCDF	0.0003	37.19	136	2.8	J		250

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.45	97	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	33.94	81	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.60	92	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.43	79	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.85	94	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	10000	27.44	48	40-130
13C12-1,2,3,7,8-PeCDD	10000	31.83	54	40-130
13C12-1,2,3,6,7,8-HxCDD	10000	33.99	52	40-130
13C12-1,2,3,4,6,7,8-HpCDD	10000	35.61	47	25-130
13C12-OCDD	20000	37.10	49	25-130
13C12-2,3,7,8-TCDF	10000	26.52	54	40-130
13C12-1,2,3,7,8-PeCDF	10000	30.85	52	40-130
13C12-1,2,3,6,7,8-HxCDF	10000	33.51	48	40-130
13C12-1,2,3,4,6,7,8-HpCDF	10000	35.05	44	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	10000	34.26	60	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**	
Total-TCDD	3	85.3	3.1	25
Total-PeCDD	2	61.0	4.9	130
Total-HxCDD	5	245	3.1	130
Total-HpCDD	2	948	3.7	130
Total-TCDF	8	91.4	3.4	25
Total-PeCDF	5	55.8	3.2	130
Total-HxCDF	4	65.2	4.2	130
Total-HpCDF	3	149	2.7	130

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	22.7
Mid Point PCDD/F TEQ (WHO 2005)	26.7
Upper Bound PCDD/F TEQ (WHO 2005)	30.7

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.
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	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18		
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18		Approved:
Analysis Method	EPA M23	Sample Size	1	Train	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Stack	Split Ratio	5		24-Oct-2018

Run Information	**Run 1**
Filename	7-181023A29
Run Date	24-Oct-18 06:51
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR512413H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<2.0	2.0	U		25
1,2,3,7,8-PeCDD	1	31.85	2.38	1.9	M,J		130
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<2.0	2.0	U		130
1,2,3,6,7,8-HxCDD	0.1	34.02	<2.1	1.9	M,J,R	2.1	130
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<2.0	2.0	U		130
1,2,3,4,6,7,8-HpCDD	0.01	35.62	17.7	1.8	J		130
OCDD	0.0003	37.10	40.6	1.5	J		250
2,3,7,8-TCDF	0.1	NotFnd	<2.5	2.5	U		25
1,2,3,7,8-PeCDF	0.03	30.87	<2.4	1.8	M,J,R	2.4	130
2,3,4,7,8-PeCDF	0.3	31.60	<2.0	1.7	M,J,R	2.0	130
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<1.3	1.3	U		130
1,2,3,6,7,8-HxCDF	0.1	33.50	<1.3	1.3	M,J,R	1.3	130
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<1.3	1.3	U		130
1,2,3,7,8,9-HxCDF	0.1	34.27	<2.1	1.5	M,J,R	2.1	130
1,2,3,4,6,7,8-HpCDF	0.01	35.06	4.61	0.86	M,J		130
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<1.1	1.1	U		130
OCDF	0.0003	37.19	<3.3	1.8	M,J,R	3.3	250
Field Spike Standards	**pg**		**% Rec**	**Limits**			
37Cl4-2,3,7,8-TCDD	1000	27.47	96	70-130			
13C12-1,2,3,4,7,8-HxCDD	10000	33.94	87	70-130			
13C12-2,3,4,7,8-PeCDF	10000	31.60	103	70-130			
13C12-1,2,3,4,7,8-HxCDF	10000	33.43	77	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.85	94	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	10000	27.44	76	40-130			
13C12-1,2,3,7,8-PeCDD	10000	31.83	75	40-130			
13C12-1,2,3,6,7,8-HxCDD	10000	33.99	78	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	10000	35.61	73	25-130			
13C12-OCDD	20000	37.10	82	25-130			
13C12-2,3,7,8-TCDF	10000	26.53	75	40-130			
13C12-1,2,3,7,8-PeCDF	10000	30.85	67	40-130			
13C12-1,2,3,6,7,8-HxCDF	10000	33.51	74	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	10000	35.05	70	25-130			
Cleanup Standard	**pg**						
13C12-1,2,3,7,8,9-HxCDF	10000	34.26	62	40-130			

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		**LQL**
Total-TCDD	2	38.8	2.0		25
Total-PeCDD	2	14.1	1.9		130
Total-HxCDD	1	6.70	2.0		130
Total-HpCDD	2	32.6	1.8		130
Total-TCDF	3	16.4	2.5		25
Total-PeCDF	0	<1.8	1.8	U	130
Total-HxCDF	1	2.14	1.5		130
Total-HpCDF	2	6.71	1.1		130

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	2.62
Mid Point PCDD/F TEQ (WHO 2005)	5.30
Upper Bound PCDD/F TEQ (WHO 2005)	6.76

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

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Sample Analysis Report

Sample Name	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18		Approved:
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18		*T.Patterson*
Analysis Method	EPA M23	Sample Size	1	Train	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		24-Oct-2018
Sample Matrix	Stack	Split Ratio	5		

Run Information	**Run 1**
Filename	7-181023A26
Run Date	24-Oct-18 04:43
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR512413H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<1.3	1.3	U		25
1,2,3,7,8-PeCDD	1	NotFnd	<0.62	0.62	U		130
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.60	0.60	U		130
1,2,3,6,7,8-HxCDD	0.1	34.00	<0.58	0.58	M,U	0.54	130
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.59	0.59	U		130
1,2,3,4,6,7,8-HpCDD	0.01	35.62	<0.87	0.64	M,J,R	0.87	130
OCDD	0.0003	37.11	<2.8	0.61	M,J,R	2.8	250
2,3,7,8-TCDF	0.1	NotFnd	<1.1	1.1	U		25
1,2,3,7,8-PeCDF	0.03	30.87	<1.4	0.81	M,J,R	1.4	130
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.78	0.78	U		130
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.69	0.69	U		130
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.65	0.65	U		130
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.68	0.68	U		130
1,2,3,7,8,9-HxCDF	0.1	34.26	<1.0	0.79	M,J,R	1.0	130
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.52	0.52	U		130
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.66	0.66	U		130
OCDF	0.0003	37.19	<0.95	0.66	M,J,R	0.95	250
Field Spike Standards	**pg**		**% Rec**	**Limits**			
37Cl4-2,3,7,8-TCDD	1000	27.45	112	70-130			
13C12-1,2,3,4,7,8-HxCDD	10000	33.94	98	70-130			
13C12-2,3,4,7,8-PeCDF	10000	31.59	110	70-130			
13C12-1,2,3,4,7,8-HxCDF	10000	33.43	89	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.85	105	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	10000	27.42	84	40-130			
13C12-1,2,3,7,8-PeCDD	10000	31.83	101	40-130			
13C12-1,2,3,6,7,8-HxCDD	10000	33.99	104	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	10000	35.61	98	25-130			
13C12-OCDD	20000	37.10	101	25-130			
13C12-2,3,7,8-TCDF	10000	26.50	85	40-130			
13C12-1,2,3,7,8-PeCDF	10000	30.85	83	40-130			
13C12-1,2,3,6,7,8-HxCDF	10000	33.51	100	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	10000	35.05	93	25-130			
Cleanup Standard	**pg**						
13C12-1,2,3,7,8,9-HxCDF	10000	34.26	73	40-130			

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<1.3	1.3	U	25
Total-PeCDD	0	<0.62	0.62	U	130
Total-HxCDD	0	<0.60	0.60	U	130
Total-HpCDD	0	<0.64	0.64	U	130
Total-TCDF	0	<1.1	1.1	U	25
Total-PeCDF	0	<0.81	0.81	U	130
Total-HxCDF	0	<0.79	0.79	U	130
Total-HpCDF	0	<0.66	0.66	U	130

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.00
Mid Point PCDD/F TEQ (WHO 2005)	1.48
Upper Bound PCDD/F TEQ (WHO 2005)	2.81

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	WG2902026-1	Extraction Date	16-Oct-18		Approved:
Analysis Method	EPA M23	Sample Size	1	Train	*T.Patterson*
Analysis Type	Blank	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	5		24-Oct-2018

Run Information	**Run 1**
Filename	7-181023A21
Run Date	24-Oct-18 01:09
Final Volume	10 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSR512413H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<2.1	2.1	U		25
1,2,3,7,8-PeCDD	1	NotFnd	<1.0	1.0	U		130
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<2.1	2.1	U		130
1,2,3,6,7,8-HxCDD	0.1	33.99	2.72	2.0	M,J		130
1,2,3,7,8,9-HxCDD	0.1	34.11	<2.1	2.1	M,U	1.6	130
1,2,3,4,6,7,8-HpCDD	0.01	35.61	<2.1	1.1	M,J,R	2.1	130
OCDD	0.0003	37.09	<8.1	1.4	M,J,R	8.1	250
2,3,7,8-TCDF	0.1	NotFnd	<1.4	1.4	U		25
1,2,3,7,8-PeCDF	0.03	30.84	2.23	1.2	M,J		130
2,3,4,7,8-PeCDF	0.3	NotFnd	<1.2	1.2	U		130
1,2,3,4,7,8-HxCDF	0.1	33.45	1.37	1.0	M,J		130
1,2,3,6,7,8-HxCDF	0.1	33.51	<1.0	0.98	M,J,R	1.0	130
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<1.0	1.0	U		130
1,2,3,7,8,9-HxCDF	0.1	34.25	3.57	1.2	M,J		130
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<1.1	1.1	U		130
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<1.4	1.4	U		130
OCDF	0.0003	37.17	<5.5	1.0	M,J,R	5.5	250
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	10000	27.42	55	40-130			
13C12-1,2,3,7,8-PeCDD	10000	31.82	60	40-130			
13C12-1,2,3,6,7,8-HxCDD	10000	33.98	52	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	10000	35.60	49	25-130			
13C12-OCDD	20000	37.09	51	25-130			
13C12-2,3,7,8-TCDF	10000	26.50	60	40-130			
13C12-1,2,3,7,8-PeCDF	10000	30.84	55	40-130			
13C12-1,2,3,6,7,8-HxCDF	10000	33.49	48	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	10000	35.04	49	25-130			
Cleanup Standard	**pg**						
13C12-1,2,3,7,8,9-HxCDF	10000	34.25	53	40-130			

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**	**Flags**	**LQL**
Total-TCDD	0	<2.1	2.1	U	25
Total-PeCDD	0	<1.0	1.0	U	130
Total-HxCDD	1	2.72	2.1		130
Total-HpCDD	0	<1.1	1.1	U	130
Total-TCDF	0	<1.4	1.4	U	25
Total-PeCDF	1	2.23	1.2		130
Total-HxCDF	2	4.94	1.2		130
Total-HpCDF	0	<1.4	1.4	U	130

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.833
Mid Point PCDD/F TEQ (WHO 2005)	3.03
Upper Bound PCDD/F TEQ (WHO 2005)	5.10

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
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
NS	Indicates that this standard was not spiked to sample

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a		
ALS Sample ID	WG2902026-2	Extraction Date	16-Oct-18		Approved:
Analysis Method	EPA M23	Sample Size	1	0	*T.Patterson*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	5		24-Oct-2018

Run Information	**Run 1**
Filename	7-181023A18
Run Date	23-Oct-18 23:02
Final Volume	10 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSR512413H

Target Analytes	pg	Ret. Time	% Rec	Limits	Flags
2,3,7,8-TCDD	1000	27.45	100	70-130	
1,2,3,7,8-PeCDD	5000	31.84	102	70-130	
1,2,3,4,7,8-HxCDD	5000	33.94	91	70-130	
1,2,3,6,7,8-HxCDD	5000	34.00	106	70-130	
1,2,3,7,8,9-HxCDD	5000	34.13	108	70-130	
1,2,3,4,6,7,8-HpCDD	5000	35.62	96	70-130	
OCDD	10000	37.10	95	70-130	
2,3,7,8-TCDF	1000	26.53	85	70-130	
1,2,3,7,8-PeCDF	5000	30.86	88	70-130	
2,3,4,7,8-PeCDF	5000	31.62	85	70-130	
1,2,3,4,7,8-HxCDF	5000	33.44	93	70-130	
1,2,3,6,7,8-HxCDF	5000	33.51	112	70-130	
2,3,4,6,7,8-HxCDF	5000	33.85	106	70-130	
1,2,3,7,8,9-HxCDF	5000	34.27	109	70-130	
1,2,3,4,6,7,8-HpCDF	5000	35.06	95	70-130	
1,2,3,4,7,8,9-HpCDF	5000	35.86	100	70-130	
OCDF	10000	37.19	88	70-130	
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	10000	27.44	63	40-130	
13C12-1,2,3,7,8-PeCDD	10000	31.83	74	40-130	
13C12-1,2,3,6,7,8-HxCDD	10000	33.99	65	40-130	
13C12-1,2,3,4,6,7,8-HpCDD	10000	35.61	74	25-130	
13C12-OCDD	20000	37.10	83	25-130	
13C12-2,3,7,8-TCDF	10000	26.52	65	40-130	
13C12-1,2,3,7,8-PeCDF	10000	30.85	69	40-130	
13C12-1,2,3,6,7,8-HxCDF	10000	33.50	60	40-130	
13C12-1,2,3,4,6,7,8-HpCDF	10000	35.05	65	25-130	
Cleanup Standard	**pg**				
13C12-1,2,3,7,8,9-HxCDF	10000	34.25	61	40-130	

NS Indicates that this standard was not spiked to sample

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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#:	L2172987		Mississauga, ON
Date of Report	30-Oct-18		L5J 2Y4
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **Toxic PCB Congeners, PCB Congener Group Totals and Total PCB**

PCB Congener Group Totals and Total PCB are a sum of detected values, including EMPC values, consistent with USEPA CLP SOW CBC1.2

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported. As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

Certified by:

Steve Kennedy
Technical Supervisor

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Sample Analysis summary Report

Sample Name	18-21874-SVOC-(1 THRU 5) TEST#1	18-21874-SVOC-(11 THRU 15) TEST#3	18-21874-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2172987-1	L2172987-3	L2172987-4
Sample Size	1	1	1
Sample size units	Sample	Sample	Sample
Percent Moisture	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack
Sampling Date	25-Sep-18	27-Sep-18	27-Sep-18
Extraction Date	16-Oct-18	16-Oct-18	16-Oct-18
Target Analytes	**pg**	**pg**	**pg**
PCB-081	21.4	23.3	<2.8
PCB-077	735	1510	31.0
PCB-123	149	65.9	<20
PCB-118	11100	4430	1680
PCB-114	274	104	41.9
PCB-105	3600	1290	401
PCB-126	<34	<53	<3.1
PCB-167	89.0	31.7	<8.2
PCB-156/157	287	78.6	22.2
PCB-169	<5.6	<13	<2.0
PCB-189	9.29	3.42	<2.4
Extraction Standards	**% Rec**	**% Rec**	**% Rec**
13C12-PCB-001	34	40	54
13C12-PCB-003	34	42	54
13C12-PCB-004	44	50	62
13C12-PCB-015	48	57	66
13C12-PCB-019	53	61	71
13C12-PCB-037	55	64	72
13C12-PCB-054	55	63	73
13C12-PCB-081	63	69	82
13C12-PCB-077	63	72	85
13C12-PCB-104	64	74	84
13C12-PCB-123	62	70	84
13C12-PCB-118	64	71	84
13C12-PCB-114	63	71	85
13C12-PCB-105	64	72	85
13C12-PCB-126	66	75	89
13C12-PCB-155	71	79	94
13C12-PCB-167	72	80	99
13C12-PCB-156/157	76	83	99
13C12-PCB-169	83	93	111
13C12-PCB-188	76	81	99
13C12-PCB-189	82	92	106
13C12-PCB-202	84	91	116
13C12-PCB-205	77	86	101
13C12-PCB-208	83	95	115
13C12-PCB-206	87	95	114
13C12-PCB-209	83	88	102
Field Spike Standards			
13C12-PCB-031	84	82	93
13C12-PCB-095	86	83	90
13C12-PCB-153	82	77	89
Cleanup Standards			
13C12-PCB-028	59	48	50
13C12-PCB-111	77	57	63
13C12-PCB-178	93	66	74
Homologue Group Totals			
Total MonoCB	3070	960	69.2
Total DiCB	32600	7380	7450
Total TriCB	18000	12800	863
Total TetraCB	97300	47700	8410
Total PentaCB	149000	69900	23000
Total HexaCB	33100	12100	4200
Total HeptaCB	2820	1000	254
Total OctaCB	582	150	26.3
Total NonaCB	94.4	10.1	<2.8
DecaCB	17.6	4.90	<1.4
Total PCB	337000	152000	44200
Toxic Equivalency - (WHO 2005)			
Lower Bound PCB TEQ	0.545	0.338	0.0675
Mid Point PCB TEQ	4.11	6.03	0.254
Upper Bound PCB TEQ	4.11	6.03	0.439

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Quality Control Summary Report

Sample Name	Method Blank
ALS Sample ID	WG2902026-1
Sample Size	1
Sample size units	Sample
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	16-Oct-18
Target Analytes	**pg**
PCB-081	<5.6
PCB-077	<5.8
PCB-123	<5.1
PCB-118	<13
PCB-114	<5.1
PCB-105	<12
PCB-126	<5.1
PCB-167	<3.4
PCB-156/157	<5.2
PCB-169	<3.6
PCB-189	3.68
Extraction Standards	**% Rec**
13C12-PCB-001	43
13C12-PCB-003	40
13C12-PCB-004	49
13C12-PCB-015	47
13C12-PCB-019	55
13C12-PCB-037	51
13C12-PCB-054	55
13C12-PCB-081	56
13C12-PCB-077	58
13C12-PCB-104	61
13C12-PCB-123	57
13C12-PCB-118	57
13C12-PCB-114	57
13C12-PCB-105	58
13C12-PCB-126	59
13C12-PCB-155	64
13C12-PCB-167	64
13C12-PCB-156/157	64
13C12-PCB-169	72
13C12-PCB-188	65
13C12-PCB-189	71
13C12-PCB-202	72
13C12-PCB-205	66
13C12-PCB-208	68
13C12-PCB-206	73
13C12-PCB-209	70
Field Spike Standards	
13C12-PCB-031	NS
13C12-PCB-095	NS
13C12-PCB-153	NS
Cleanup Standards	
13C12-PCB-028	47
13C12-PCB-111	56
13C12-PCB-178	62
Homologue Group Totals	
Total MonoCB	8.60
Total DiCB	63.0
Total TriCB	106
Total TetraCB	93.1
Total PentaCB	107
Total HexaCB	43.2
Total HeptaCB	20.6
Total OctaCB	8.90
Total NonaCB	<5.3
DecaCB	<1.9
Total PCB	451
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.000110
Mid Point PCB TEQ	0.311
Upper Bound PCB TEQ	0.622

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Sample Analysis summary Report

Sample Name	Laboratory Control Sample
ALS Sample ID	WG2902026-2
Sample Size	1
Sample size units	n/a
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	16-Oct-18

Target Analytes	% Rec
PCB-081	95
PCB-077	100
PCB-104	90
PCB-123	104
PCB-118	104
PCB-114	104
PCB-105	99
PCB-126	103
PCB-167	88
PCB-156/157	88
PCB-169	87
PCB-189	107
Extraction Standards	**% Rec**
13C12-PCB-001	48
13C12-PCB-003	47
13C12-PCB-004	56
13C12-PCB-015	57
13C12-PCB-019	61
13C12-PCB-037	66
13C12-PCB-054	65
13C12-PCB-081	81
13C12-PCB-077	85
13C12-PCB-104	73
13C12-PCB-123	86
13C12-PCB-118	87
13C12-PCB-114	86
13C12-PCB-105	89
13C12-PCB-126	95
13C12-PCB-155	88
13C12-PCB-167	100
13C12-PCB-156/157	103
13C12-PCB-169	118
13C12-PCB-188	98
13C12-PCB-189	115
13C12-PCB-202	117
13C12-PCB-205	107
13C12-PCB-208	111
13C12-PCB-206	122
13C12-PCB-209	114
Field Spike Standards	
13C12-PCB-031	NS
13C12-PCB-095	NS
13C12-PCB-153	NS
Cleanup Standards	
13C12-PCB-028	51
13C12-PCB-111	71
13C12-PCB-178	83

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Sample Analysis Report

Sample Name	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18		Approved:
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18		*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	1	Sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		26-Oct-2018
Sample Matrix	Stack	Split Ratio	10		

Run Information	**Run 1**
Filename	5-181023A27
Run Date	24-Oct-18 06:13
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.71	21.4	4.4	M,J		250
PCB-077	0.0001	22.03	735	4.8			250
PCB-123	0.00003	23.00	149	5.9	M,J		250
PCB-118	0.00003	23.18	11100	5.5			250
PCB-114	0.00003	23.48	274	5.8			250
PCB-105	0.00003	23.83	3600	5.7			250
PCB-126	0.1	25.41	<34	5.7	M,J,R	34	250
PCB-167	0.00003	26.31	89.0	4.7	J		250
PCB-156/157	0.00003	26.93	287	6.9	J		500
PCB-169	0.03	28.58	<5.6	4.9	J,R	5.6	250
PCB-189	0.00003	29.86	9.29	2.6	J,B		250

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	10000	8.86	34	5-145
13C12-PCB-003	10000	10.39	34	5-145
13C12-PCB-004	10000	10.57	44	5-145
13C12-PCB-015	10000	14.22	48	5-145
13C12-PCB-019	10000	12.55	53	5-145
13C12-PCB-037	10000	18.15	55	5-145
13C12-PCB-054	10000	14.42	55	5-145
13C12-PCB-081	10000	21.71	63	10-145
13C12-PCB-077	10000	22.02	63	10-145
13C12-PCB-104	10000	17.45	64	10-145
13C12-PCB-123	10000	23.00	62	10-145
13C12-PCB-118	10000	23.17	64	10-145
13C12-PCB-114	10000	23.47	63	10-145
13C12-PCB-105	10000	23.82	64	10-145
13C12-PCB-126	10000	25.40	66	10-145
13C12-PCB-155	10000	20.41	71	10-145
13C12-PCB-167	10000	26.30	72	10-145
13C12-PCB-156/157	20000	26.94	76	10-145
13C12-PCB-169	10000	28.58	83	10-145
13C12-PCB-188	10000	23.40	76	10-145
13C12-PCB-189	10000	29.85	82	10-145
13C12-PCB-202	10000	26.18	84	10-145
13C12-PCB-205	10000	31.23	77	10-145
13C12-PCB-208	10000	29.59	83	10-145
13C12-PCB-206	10000	32.29	87	10-145
13C12-PCB-209	10000	33.39	83	10-145

Field Spike Standards				
13C12-PCB-031	10000	15.74	84	70-130
13C12-PCB-095	10000	19.05	86	70-130
13C12-PCB-153	10000	24.09	82	70-130

Cleanup Standards				
13C12-PCB-028	10000	15.91	59	5-145
13C12-PCB-111	10000	21.93	77	10-145
13C12-PCB-178	10000	24.97	93	10-145

Homologue Group Totals				
Total MonoCB	3070	3.9	J	1000
Total DiCB	32600	11	J	2000
Total TriCB	18000	3.4	J	2000
Total TetraCB	97300	2.6	J	4000
Total PentaCB	149000	2.8	J	4000
Total HexaCB	33100	2.5	J	4000
Total HeptaCB	2820	2.6	J	2000
Total OctaCB	582	1.8	J	2000
Total NonaCB	94.4	3.4	J	1000
DecaCB	17.6	1.7	J	1000
Total PCB	337000		J	8000

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.545
Mid Point PCB TEQ	4.11
Upper Bound PCB TEQ	4.11

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.
B	Indicates that this target was detected in the blank at greater than 10% of the sample 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	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18		Approved:
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18		*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	1	Sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		26-Oct-2018
Sample Matrix	Stack	Split Ratio	10		

Run Information	**Run 1**
Filename	5-181023A29
Run Date	24-Oct-18 07:32
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.71	23.3	4.8	M,J		250
PCB-077	0.0001	22.05	1510	5.0			250
PCB-123	0.00003	23.02	65.9	4.7	J		250
PCB-118	0.00003	23.19	4430	4.4			250
PCB-114	0.00003	23.49	104	4.6	J		250
PCB-105	0.00003	23.84	1290	4.5			250
PCB-126	0.1	25.43	<53	4.4	J,R	53	250
PCB-167	0.00003	26.32	31.7	2.1	J		250
PCB-156/157	0.00003	26.94	78.6	3.2	J		500
PCB-169	0.03	28.61	<13	2.2	J,R	13	250
PCB-189	0.00003	29.87	3.42	2.2	M,J,B		250

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	10000	8.88	40	5-145
13C12-PCB-003	10000	10.40	42	5-145
13C12-PCB-004	10000	10.58	50	5-145
13C12-PCB-015	10000	14.23	57	5-145
13C12-PCB-019	10000	12.57	61	5-145
13C12-PCB-037	10000	18.16	64	5-145
13C12-PCB-054	10000	14.43	63	5-145
13C12-PCB-081	10000	21.72	69	10-145
13C12-PCB-077	10000	22.03	72	10-145
13C12-PCB-104	10000	17.46	74	10-145
13C12-PCB-123	10000	23.01	70	10-145
13C12-PCB-118	10000	23.18	71	10-145
13C12-PCB-114	10000	23.48	71	10-145
13C12-PCB-105	10000	23.83	72	10-145
13C12-PCB-126	10000	25.42	75	10-145
13C12-PCB-155	10000	20.43	79	10-145
13C12-PCB-167	10000	26.31	80	10-145
13C12-PCB-156/157	20000	26.95	83	10-145
13C12-PCB-169	10000	28.59	93	10-145
13C12-PCB-188	10000	23.42	81	10-145
13C12-PCB-189	10000	29.86	92	10-145
13C12-PCB-202	10000	26.19	91	10-145
13C12-PCB-205	10000	31.24	86	10-145
13C12-PCB-208	10000	29.60	95	10-145
13C12-PCB-206	10000	32.30	95	10-145
13C12-PCB-209	10000	33.41	88	10-145

Field Spike Standards				
13C12-PCB-031	10000	15.76	82	70-130
13C12-PCB-095	10000	19.07	83	70-130
13C12-PCB-153	10000	24.10	77	70-130

Cleanup Standards				
13C12-PCB-028	10000	15.93	48	5-145
13C12-PCB-111	10000	21.94	57	10-145
13C12-PCB-178	10000	24.98	66	10-145

Homologue Group Totals				
Total MonoCB	960	2.5	J	1000
Total DiCB	7380	6.4	J	2000
Total TriCB	12800	3.1	J	2000
Total TetraCB	47700	2.0	J	4000
Total PentaCB	69900	2.3	J	4000
Total HexaCB	12100	1.7	J	4000
Total HeptaCB	1000	2.0	J	2000
Total OctaCB	150	1.4	J	2000
Total NonaCB	10.1	3.3	J	1000
DecaCB	4.90	1.2	J	1000
Total PCB	152000		J	8000

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.338
Mid Point PCB TEQ	6.03
Upper Bound PCB TEQ	6.03

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
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.
B	Indicates that this target was detected in the blank at greater than 10% of the sample 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	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18		Approved:
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18		*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	1	Sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		26-Oct-2018
Sample Matrix	Stack	Split Ratio	10		

Run Information	**Run 1**
Filename	5-181023A26
Run Date	24-Oct-18 05:33
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.70	<2.8	2.8	M,U	1.9	250
PCB-077	0.0001	22.04	31.0	2.9	J		250
PCB-123	0.00003	23.00	<20	3.2	M,J,R	20	250
PCB-118	0.00003	23.18	1680	3.0			250
PCB-114	0.00003	23.49	41.9	3.2	J		250
PCB-105	0.00003	23.84	401	3.0			250
PCB-126	0.1	NotFnd	<3.1	3.1	U		250
PCB-167	0.00003	26.31	<8.2	1.8	J,R	8.2	250
PCB-156/157	0.00003	26.93	22.2	2.8	J		500
PCB-169	0.03	NotFnd	<2.0	2.0	U		250
PCB-189	0.00003	NotFnd	<2.4	2.4	U		250

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	10000	8.86	54	5-145	
13C12-PCB-003	10000	10.39	54	5-145	
13C12-PCB-004	10000	10.57	62	5-145	
13C12-PCB-015	10000	14.22	66	5-145	
13C12-PCB-019	10000	12.57	71	5-145	
13C12-PCB-037	10000	18.15	72	5-145	
13C12-PCB-054	10000	14.42	73	5-145	
13C12-PCB-081	10000	21.71	82	10-145	
13C12-PCB-077	10000	22.02	85	10-145	
13C12-PCB-104	10000	17.45	84	10-145	
13C12-PCB-123	10000	23.00	84	10-145	
13C12-PCB-118	10000	23.17	84	10-145	
13C12-PCB-114	10000	23.47	85	10-145	
13C12-PCB-105	10000	23.83	85	10-145	
13C12-PCB-126	10000	25.40	89	10-145	
13C12-PCB-155	10000	20.42	94	10-145	
13C12-PCB-167	10000	26.30	99	10-145	
13C12-PCB-156/157	20000	26.94	99	10-145	
13C12-PCB-169	10000	28.58	111	10-145	R
13C12-PCB-188	10000	23.41	99	10-145	
13C12-PCB-189	10000	29.86	106	10-145	
13C12-PCB-202	10000	26.18	116	10-145	
13C12-PCB-205	10000	31.23	101	10-145	
13C12-PCB-208	10000	29.59	115	10-145	
13C12-PCB-206	10000	32.29	114	10-145	
13C12-PCB-209	10000	33.39	102	10-145	

Field Spike Standards					
13C12-PCB-031	10000	15.74	93	70-130	
13C12-PCB-095	10000	19.06	90	70-130	
13C12-PCB-153	10000	24.10	89	70-130	

Cleanup Standards					
13C12-PCB-028	10000	15.92	50	5-145	
13C12-PCB-111	10000	21.93	63	10-145	
13C12-PCB-178	10000	24.98	74	10-145	

Homologue Group Totals				
Total MonoCB	69.2	2.4	J	1000
Total DiCB	7450	12	J	2000
Total TriCB	863	3.3	J	2000
Total TetraCB	8410	2.3	J	4000
Total PentaCB	23000	2.1	J	4000
Total HexaCB	4200	1.5	J	4000
Total HeptaCB	254	1.3	J	2000
Total OctaCB	26.3	1.5	J	2000
Total NonaCB	<2.8	2.8	U	1000
DecaCB	<1.4	1.4	U	1000
Total PCB	44200		J	8000

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0675
Mid Point PCB TEQ	0.254
Upper Bound PCB TEQ	0.439

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

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a		Approved:
ALS Sample ID	WG2902026-1	Extraction Date	16-Oct-18		*E. Sabljic*
Analysis Method	EPA 1668C	Sample Size	1	Sample	--e-signature--
Analysis Type	Blank	Percent Moisture	n/a		26-Oct-2018
Sample Matrix	XAD	Split Ratio	10		

Run Information	**Run 1**
Filename	5-181023A23
Run Date	24-Oct-18 03:34
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	NotFnd	<5.6	5.6	U		250
PCB-077	0.0001	NotFnd	<5.8	5.8	U		250
PCB-123	0.00003	NotFnd	<5.1	5.1	U		250
PCB-118	0.00003	23.20	<13	4.8	M,J,R	13	250
PCB-114	0.00003	NotFnd	<5.1	5.1	U		250
PCB-105	0.00003	23.83	<12	4.9	J,R	12	250
PCB-126	0.1	NotFnd	<5.1	5.1	U		250
PCB-167	0.00003	NotFnd	<3.4	3.4	U		250
PCB-156/157	0.00003	NotFnd	<5.2	5.2	U		500
PCB-169	0.03	NotFnd	<3.6	3.6	U		250
PCB-189	0.00003	29.88	3.68	3.6	J		250

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	10000	8.86	43	5-145	
13C12-PCB-003	10000	10.40	40	5-145	
13C12-PCB-004	10000	10.57	49	5-145	
13C12-PCB-015	10000	14.23	47	5-145	
13C12-PCB-019	10000	12.57	55	5-145	
13C12-PCB-037	10000	18.16	51	5-145	
13C12-PCB-054	10000	14.43	55	5-145	
13C12-PCB-081	10000	21.72	56	10-145	
13C12-PCB-077	10000	22.03	58	10-145	
13C12-PCB-104	10000	17.46	61	10-145	
13C12-PCB-123	10000	23.01	57	10-145	
13C12-PCB-118	10000	23.18	57	10-145	
13C12-PCB-114	10000	23.48	57	10-145	
13C12-PCB-105	10000	23.83	58	10-145	
13C12-PCB-126	10000	25.42	59	10-145	
13C12-PCB-155	10000	20.43	64	10-145	
13C12-PCB-167	10000	26.31	64	10-145	
13C12-PCB-156/157	20000	26.95	64	10-145	
13C12-PCB-169	10000	28.59	72	10-145	R
13C12-PCB-188	10000	23.42	65	10-145	
13C12-PCB-189	10000	29.86	71	10-145	
13C12-PCB-202	10000	26.19	72	10-145	
13C12-PCB-205	10000	31.24	66	10-145	
13C12-PCB-208	10000	29.60	68	10-145	
13C12-PCB-206	10000	32.30	73	10-145	
13C12-PCB-209	10000	33.41	70	10-145	

Field Spike Standards					
13C12-PCB-031			NS		
13C12-PCB-095			NS		
13C12-PCB-153			NS		

Cleanup Standards					
13C12-PCB-028	10000	15.92	47	5-145	
13C12-PCB-111	10000	21.94	56	10-145	
13C12-PCB-178	10000	24.99	62	10-145	

Homologue Group Totals				
Total MonoCB	8.60	2.7	J	1000
Total DiCB	63.0	14	J	2000
Total TriCB	106	5.1	J	2000
Total TetraCB	93.1	4.2	J	4000
Total PentaCB	107	3.2	J	4000
Total HexaCB	43.2	2.7	J	4000
Total HeptaCB	20.6	2.8	J	2000
Total OctaCB	8.90	2.3	J	2000
Total NonaCB	<5.3	5.3	U	1000
DecaCB	<1.9	1.9	U	1000
Total PCB	451		J	8000

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.000110
Mid Point PCB TEQ	0.311
Upper Bound PCB TEQ	0.622

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.
NS	Indicates that this standard was not spiked to sample
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	WG2902026-2	Extraction Date	16-Oct-18		Approved:
Analysis Method	EPA 1668C	Sample Size	1	n/a	*E. Sabljic*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	1		26-Oct-2018

Run Information	**Run 1**
Filename	5-181023A20
Run Date	24-Oct-18 01:35
Final Volume	25 ul
Dilution Factor	1
Analysis Units	% Rec
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
PCB-081	5000	21.73	95	60-135	
PCB-077	5000	22.04	100	60-135	
PCB-123	5000	23.02	104	60-135	
PCB-118	5000	23.19	104	60-135	
PCB-114	5000	23.49	104	60-135	
PCB-105	5000	23.84	99	60-135	
PCB-126	5000	25.43	103	60-135	
PCB-167	5000	26.32	88	60-135	
PCB-156/157	10000	26.96	88	60-135	
PCB-169	5000	28.61	87	60-135	
PCB-189	5000	29.87	107	60-135	
Extraction Standards		**Time**	**% Rec**	**Limits**	
13C12-PCB-001	10000	8.86	48	15-145	
13C12-PCB-003	10000	10.39	47	15-145	
13C12-PCB-004	10000	10.57	56	15-145	
13C12-PCB-015	10000	14.23	57	15-145	
13C12-PCB-019	10000	12.57	61	15-145	
13C12-PCB-037	10000	18.15	66	15-145	
13C12-PCB-054	10000	14.42	65	15-145	
13C12-PCB-081	10000	21.72	81	40-145	
13C12-PCB-077	10000	22.03	85	40-145	
13C12-PCB-104	10000	17.46	73	40-145	
13C12-PCB-123	10000	23.01	86	40-145	
13C12-PCB-118	10000	23.18	87	40-145	
13C12-PCB-114	10000	23.48	86	40-145	
13C12-PCB-105	10000	23.83	89	40-145	
13C12-PCB-126	10000	25.42	95	40-145	
13C12-PCB-155	10000	20.42	88	40-145	
13C12-PCB-167	10000	26.31	100	40-145	
13C12-PCB-156/157	20000	26.94	103	40-145	
13C12-PCB-169	10000	28.59	118	40-145	
13C12-PCB-188	10000	23.41	98	40-145	
13C12-PCB-189	10000	29.86	115	40-145	
13C12-PCB-202	10000	26.19	117	40-145	
13C12-PCB-205	10000	31.24	107	40-145	
13C12-PCB-208	10000	29.60	111	40-145	
13C12-PCB-206	10000	32.30	122	40-145	
13C12-PCB-209	10000	33.41	114	40-145	
Field Spike Standards					
13C12-PCB-031			NS		
13C12-PCB-095			NS		
13C12-PCB-153			NS		
Cleanup Standards					
13C12-PCB-028	10000	15.92	51	15-145	
13C12-PCB-111	10000	21.94	71	40-145	
13C12-PCB-178	10000	24.98	83	40-145	

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#:	L2172987		Mississauga, ON L5J 2Y4
Date of Report	7-Nov-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **CB by LRGC/MS - Isotope dilution**

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported. As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

Certified by: _____

Ron McLeod, Ph.D.
Technical Director

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Media Blank		18-21874-SVOC-(1 THRU 5) TEST#1		18-21874-SVOC-(11 THRU 15) TEST#3		18-21874-SVOC-(16 THRU 20) BLANK		Laboratory Control Sample	
ALS Sample ID	WG2902026-1		L2172987-1		L2172987-3		L2172987-4		WG2902026-2	
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		25-Sep-18		27-Sep-18		27-Sep-18		n/a	
Extraction Date	16-Oct-18		16-Oct-18		16-Oct-18		16-Oct-18		16-Oct-18	
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**% Recovery**	
Chlorobenzene	<10	U	2710		1390		14.3	M,R	72	R
1,3-Dichlorobenzene	<10	U	601		421		<10	U	99	
1,4-Dichlorobenzene	13.3		201		670		34.9	B	95	
1,2-Dichlorobenzene	<10	U	246		506		10.7		93	
1,3,5-Trichlorobenzene	<10	U	85.9		89.3		<10	U	96	
1,2,4-Trichlorobenzene	<10	U	1600		18100		718		93	
1,2,3-Trichlorobenzene	<10	U	521		4700		220		94	
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<10	U	87.1		67.6		<10	U	98	
1,2,3,4-Tetrachlorobenzene	<10	U	24.5		29.8		<10	U	98	
Pentachlorobenzene	<10	U	29.6		16.1		<10	U	109	
Hexachlorobenzene	<10	U	10.4		<10	U	<10	U	115	
Hexachloroethane	<10	U	<10	U	<10	U	<10	U	88	R
Hexachlorobutadiene	<10	U	10.9		<10	U	<10	U	91	
a,2,6-Trichlorotoluene	<10	U	<10	U	<10	U	<10	U	NS	
Octachlorostyrene	<10	U	<10	U	<10	U	<10	U	109	
Field Sampling Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**	
1-Bromo-2,3-Dichlorobenzene	NS		109		107		98		NS	
Extraction Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**	
13C6-Chlorobenzene	82		37		53		63		88	
13C6-1,4-Dichlorobenzene	91		55		66		76		90	
13C6-1,2,3-Trichlorobenzene	87		59		68		71		81	
13C6-1,2,3,4-Tetrachlorobenzene	92		44		59		70		83	
13C6-Pentachlorobenzene	86		43		57		65		76	
13C6-Hexachlorobenzene	73		36		49		56		63	

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.
NS	Indicates that this compound was not spiked in.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Media Blank**	Sampling Date	n/a
ALS Sample ID	WG2902026-1	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	Blank		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
05-Nov-2018

Run Information	**Run 1**
Filename	18110508.D
Run Date	11/5/2018 11:58
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Chlorobenzene	NotFnd	<10	U
1,3-Dichlorobenzene	6.80	<10	U
1,4-Dichlorobenzene	6.86	13.3	
1,2-Dichlorobenzene	7.04	<10	U
1,3,5-Trichlorobenzene	NotFnd	<10	U
1,2,4-Trichlorobenzene	8.77	<10	U
1,2,3-Trichlorobenzene	9.13	<10	U
1,2,3,5/1,2,4,5-Tetrachlorobenzen	NotFnd	<10	U
1,2,3,4-Tetrachlorobenzene	NotFnd	<10	U
Pentachlorobenzene	NotFnd	<10	U
Hexachlorobenzene	NotFnd	<10	U
Hexachloroethane	NotFnd	<10	U
Hexachlorobutadiene	NotFnd	<10	U
a,2,6-Trichlorotoluene	NotFnd	<10	U
Octachlorostyrene	NotFnd	<10	U

Field Sampling Standards	**ng spiked**		**%Rec**
1-Bromo-2,3-Dichlorobenzene	NS		
Extraction Standards			**%Rec**
13C6-Chlorobenzene	250	4.66	82
13C6-1,4-Dichlorobenzene	250	6.86	91
13C6-1,2,3-Trichlorobenzene	250	9.16	87
13C6-1,2,3,4-Tetrachlorobenzene	250	10.84	92
13C6-Pentachlorobenzene	875	12.16	86
13C6-Hexachlorobenzene	875	13.78	73

U	Indicates that this compound was not detected above the MDL.
NS	Indicates that this compound was not spiked in.

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
05-Nov-2018

Run Information	**Run 1**
Filename	18110511.D
Run Date	11/5/2018 13:12
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Chlorobenzene	4.70	2710	
1,3-Dichlorobenzene	6.78	601	
1,4-Dichlorobenzene	6.86	201	
1,2-Dichlorobenzene	7.14	246	
1,3,5-Trichlorobenzene	8.26	85.9	
1,2,4-Trichlorobenzene	8.77	1600	
1,2,3-Trichlorobenzene	9.16	521	
1,2,3,5/1,2,4,5-Tetrachlorobenzen	10.35	87.1	
1,2,3,4-Tetrachlorobenzene	10.85	24.5	
Pentachlorobenzene	12.17	29.6	
Hexachlorobenzene	13.78	10.4	
Hexachloroethane	NotFnd	<10	U
Hexachlorobutadiene	9.19	10.9	
a,2,6-Trichlorotoluene	NotFnd	<10	U
Octachlorostyrene	NotFnd	<10	U

Field Sampling Standards	**ng spiked**		**%Rec**
1-Bromo-2,3-Dichlorobenzene	500	10.15	109

Extraction Standards			**%Rec**
13C6-Chlorobenzene	250	4.70	37
13C6-1,4-Dichlorobenzene	250	6.86	55
13C6-1,2,3-Trichlorobenzene	250	9.16	59
13C6-1,2,3,4-Tetrachlorobenzene	250	10.84	44
13C6-Pentachlorobenzene	875	12.16	43
13C6-Hexachlorobenzene	875	13.78	36

U Indicates that this compound was not detected above the MDL.

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
05-Nov-2018

Run Information	**Run 1**	**Run 2**
Filename	18110512.D	18110503.D
Run Date	11/5/2018 13:37	05-Nov-18 09:01
Final Volume	1 mL	1 mL
Dilution Factor	1	10
Analysis Units	ng/sample	ng/sample
Instrument	MSD-4	MSD-4
Column	HP-5MS USR326446H	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**	**Ret. Time.**	**Concentration ng/sample**	**Flags**
Chlorobenzene	4.72	1390				
1,3-Dichlorobenzene	6.81	421				
1,4-Dichlorobenzene	6.89	670				
1,2-Dichlorobenzene	7.16	506				
1,3,5-Trichlorobenzene	8.27	89.3				
1,2,4-Trichlorobenzene	8.77	14900	E	8.76	18100	
1,2,3-Trichlorobenzene	9.17	4700				
1,2,3,5/1,2,4,5-Tetrachlorobenzen	10.37	67.6				
1,2,3,4-Tetrachlorobenzene	10.85	29.8				
Pentachlorobenzene	12.16	16.1				
Hexachlorobenzene	13.78	<10	U			
Hexachloroethane	NotFnd	<10	U			
Hexachlorobutadiene	9.20	<10	U			
a,2,6-Trichlorotoluene	NotFnd	<10	U			
Octachlorostyrene	NotFnd	<10	U			

Field Sampling Standards	**ng spiked**		**%Rec**
1-Bromo-2,3-Dichlorobenzene	500	10.15	107

Extraction Standards			**%Rec**
13C6-Chlorobenzene	250	4.72	53
13C6-1,4-Dichlorobenzene	250	6.89	66
13C6-1,2,3-Trichlorobenzene	250	9.17	68
13C6-1,2,3,4-Tetrachlorobenzene	250	10.85	59
13C6-Pentachlorobenzene	875	12.16	57
13C6-Hexachlorobenzene	875	13.78	49

U Indicates that this compound was not detected above the MDL.
E Indicates that this compound was detected above the calibrated range.

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
05-Nov-2018

Run Information	**Run 1**
Filename	18110510.D
Run Date	11/5/2018 12:47
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Chlorobenzene	4.84	14.3	M R
1,3-Dichlorobenzene	6.85	<10	U
1,4-Dichlorobenzene	6.92	34.9	B
1,2-Dichlorobenzene	7.18	10.7	
1,3,5-Trichlorobenzene	8.23	<10	U
1,2,4-Trichlorobenzene	8.78	718	
1,2,3-Trichlorobenzene	9.17	220	
1,2,3,5/1,2,4,5-Tetrachlorobenzen	10.37	<10	U
1,2,3,4-Tetrachlorobenzene	NotFnd	<10	U
Pentachlorobenzene	NotFnd	<10	U
Hexachlorobenzene	NotFnd	<10	U
Hexachloroethane	NotFnd	<10	U
Hexachlorobutadiene	NotFnd	<10	U
a,2,6-Trichlorotoluene	NotFnd	<10	U
Octachlorostyrene	NotFnd	<10	U

Field Sampling Standards	**ng spiked**		**%Rec**
1-Bromo-2,3-Dichlorobenzene	500	10.15	98

Extraction Standards			**%Rec**
13C6-Chlorobenzene	250	4.84	63
13C6-1,4-Dichlorobenzene	250	6.92	76
13C6-1,2,3-Trichlorobenzene	250	9.17	71
13C6-1,2,3,4-Tetrachlorobenzene	250	10.85	70
13C6-Pentachlorobenzene	875	12.16	65
13C6-Hexachlorobenzene	875	13.78	56

U	Indicates that this compound was not detected above the MDL.
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.

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2902026-2	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 n/a		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
05-Nov-2018

Run Information	**Run 1**
Filename	18110212.D
Run Date	11/2/2018 17:29
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**ug spiked**	**Ret. Time**	**% Recovery**	**Flags**
Chlorobenzene	250	4.55	72	R
1,3-Dichlorobenzene	250	6.85	99	
1,4-Dichlorobenzene	250	6.92	95	
1,2-Dichlorobenzene	250	7.19	93	
1,3,5-Trichlorobenzene	250	8.28	96	
1,2,4-Trichlorobenzene	250	8.78	93	
1,2,3-Trichlorobenzene	250	9.17	94	
1,2,3,5/1,2,4,5-Tetrachlorobenzen	625	10.37	98	
1,2,3,4-Tetrachlorobenzene	375	10.85	98	
Pentachlorobenzene	375	12.16	109	
Hexachlorobenzene	375	13.78	115	
Hexachloroethane	250	7.63	88	R
Hexachlorobutadiene	375	9.20	91	
a,2,6-Trichlorotoluene	NS			
Octachlorostyrene	125	16.23	109	
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-Dichlorobenzene	NS			
Extraction Standards			**%Rec**	
13C6-Chlorobenzene	250	4.76	88	
13C6-1,4-Dichlorobenzene	250	6.92	90	
13C6-1,2,3-Trichlorobenzene	250	9.17	81	M
13C6-1,2,3,4-Tetrachlorobenzene	250	10.85	83	
13C6-Pentachlorobenzene	875	12.16	76	
13C6-Hexachlorobenzene	875	13.78	63	

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 spiked in.

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#:	L2172987		Mississauga, ON L5J 2Y4
Date of Report	2-Nov-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **Chlorophenols as acetate derivatives by SIM GC/MS**

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported. As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank	18-21874-SVOC- (1 THRU 5) TEST#1	18-21874-SVOC- (11 THRU 15) TEST#3	18-21874-SVOC- (16 THRU 20) BLANK	Laboratory Control Sample
ALS Sample ID	WG2902026-1	L2172987-1	L2172987-3	L2172987-4	WG2902026-2
Sample Size	1	1	1	1	1
Sample units	sample	sample	sample	sample	sample
Moisture Content	n/a	n/a	n/a	n/a	n/a
Matrix	QC	Stack	Stack	Stack	QC
Sampling Date	n/a	25-Sep-18	27-Sep-18	27-Sep-18	n/a
Extraction Date	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18
Target Analytes	**ng/sample**	**ng/sample**	**ng/sample**	**ng/sample**	**% Recovery**
2-Chlorophenol	<50 U	239 M	192	<50 U	61 M,R
3-Chlorophenol	<50 U	103 M	<50 U	<50 U	53
4-Chlorophenol	<50 U	84.1 M	<50 U	<50 U	62
2,6-Dichlorophenol	<50 U	<50 U	<50 U	<50 U	65
2,4/2,5-Dichlorophenol	<50 U	499	114 R	<50 U	59
3,5-Dichlorophenol	<50 U	90	<50 U	52 M	52
2,3-Dichlorophenol	<50 U	<50 U	<50 U	<50 U	88
3,4-Dichlorophenol	<50 U	<50 U	<50 U	<50 U	48
2,4,6-Trichlorophenol	<50 U	70.1	62.8	<50 U	59
2,3,6-Trichlorophenol	<50 U	<50 U	<50 U	<50 U	59
2,3,5-Trichlorophenol	<50 U	<50 U	127 R	<50 U	56 M
2,4,5-Trichlorophenol	<50 U	<50 U	<50 U	<50 U	57
2,3,4-Trichlorophenol	<50 U	<50 U	<50 U	<50 U	62
3,4,5-Trichlorophenol	<50 U	<50 U	<50 U	<50 U	50
2,3,5,6/2,3,4,6-Tetrachlorophenol	<50 U	<50 U	<50 U	<50 U	75 M
2,3,4,5-Tetrachlorophenol	<50 U	<50 U	<50 U	139 M	60
Pentachlorophenol	<50 U	<50 U	<50 U	<50 U	84
Hexachlorophene	<50 U	<50 U	<50 U	<50 U	118
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
2-Fluorophenol	20	34 M	59 M	50 M	45
d5-Phenol	37 M	33 M,R	46 M,R	48 M	55 M
d4-2-Chlorophenol	66 R	67 R	77 M,R	51 M	80
2,4,6-Tribromophenol	30	85	64	64	59
13C-Pentachlorophenol	74	33	27	66	73
Field Spike	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	NS	36	31	39	NS

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	Indicates that this compound was not spiked in.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a
ALS Sample ID	WG2902026-1	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	blank		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
01-Nov-2018

Run Information	**Run 1**
Filename	18102210.D
Run Date	10/22/2018 16:31
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
2-Chlorophenol	8.09	<50	U
3-Chlorophenol	8.38	<50	U
4-Chlorophenol	8.43	<50	U
2,6-Dichlorophenol	NotFnd	<50	U
2,4/2,5-Dichlorophenol	9.60	<50	U
3,5-Dichlorophenol	9.73	<50	U
2,3-Dichlorophenol	9.94	<50	U
3,4-Dichlorophenol	10.19	<50	U
2,4,6-Trichlorophenol	10.54	<50	U
2,3,6-Trichlorophenol	NotFnd	<50	U
2,3,5-Trichlorophenol	NotFnd	<50	U
2,4,5-Trichlorophenol	11.10	<50	U
2,3,4-Trichlorophenol	NotFnd	<50	U
3,4,5-Trichlorophenol	NotFnd	<50	U
2,3,5,6/2,3,4,6-Tetrachlorophenol	NotFnd	<50	U
2,3,4,5-Tetrachlorophenol	NotFnd	<50	U
Pentachlorophenol	NotFnd	<50	U
Hexachlorophene	NotFnd	<50	U

Extraction Standards			**% Rec**	
2-Fluorophenol	1000	6.37	20	
d5-Phenol	1000	6.48	37	M
d4-2-Chlorophenol	1000	8.09	66	R
2,4,6-Tribromophenol	1000	13.01	30	
13C-Pentachlorophenol	1000	13.66	74	

Field Spike		**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	NS	NS

M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the LOR.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
NS	Indicates that this compound was not spiked in.

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
01-Nov-2018

Run Information	**Run 1**
Filename	18102214.D
Run Date	10/22/2018 18:11
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
2-Chlorophenol	8.11	239	M
3-Chlorophenol	8.38	103	M
4-Chlorophenol	8.45	84.1	M
2,6-Dichlorophenol	9.42	<50	U
2,4/2,5-Dichlorophenol	9.62	499	
3,5-Dichlorophenol	9.74	90	
2,3-Dichlorophenol	9.94	<50	U
3,4-Dichlorophenol	NotFnd	<50	U
2,4,6-Trichlorophenol	10.55	70.1	
2,3,6-Trichlorophenol	10.95	<50	U
2,3,5-Trichlorophenol	NotFnd	<50	U
2,4,5-Trichlorophenol	11.09	<50	U
2,3,4-Trichlorophenol	NotFnd	<50	U
3,4,5-Trichlorophenol	NotFnd	<50	U
2,3,5,6/2,3,4,6-Tetrachlorophenol	NotFnd	<50	U
2,3,4,5-Tetrachlorophenol	NotFnd	<50	U
Pentachlorophenol	13.65	<50	U
Hexachlorophene	NotFnd	<50	U

Extraction Standards			**% Rec**		
2-Fluorophenol	1000	6.42	34	M	
d5-Phenol	1000	6.52	33	M	R
d4-2-Chlorophenol	1000	8.10	67		R
2,4,6-Tribromophenol	1000	13.01	85		
13C-Pentachlorophenol	1000	13.66	33		

Field Spike			**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.72	36

M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the LOR.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

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Sample Analysis Report

Sample Name	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
01-Nov-2018

Run Information	**Run 1**
Filename	18102216.D
Run Date	10/22/2018 19:00
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
2-Chlorophenol	8.15	192	
3-Chlorophenol	8.41	<50	U
4-Chlorophenol	8.48	<50	U
2,6-Dichlorophenol	9.43	<50	U
2,4/2,5-Dichlorophenol	9.64	114	R
3,5-Dichlorophenol	9.75	<50	U
2,3-Dichlorophenol	9.96	<50	U
3,4-Dichlorophenol	NotFnd	<50	U
2,4,6-Trichlorophenol	10.56	62.8	
2,3,6-Trichlorophenol	NotFnd	<50	U
2,3,5-Trichlorophenol	11.02	127	R
2,4,5-Trichlorophenol	NotFnd	<50	U
2,3,4-Trichlorophenol	NotFnd	<50	U
3,4,5-Trichlorophenol	NotFnd	<50	U
2,3,5,6/2,3,4,6-Tetrachlorophenol	NotFnd	<50	U
2,3,4,5-Tetrachlorophenol	NotFnd	<50	U
Pentachlorophenol	NotFnd	<50	U
Hexachlorophene	NotFnd	<50	U

Extraction Standards			**% Rec**	
2-Fluorophenol	1000	6.55	59 M	
d5-Phenol	1000	6.64	46 M	R
d4-2-Chlorophenol	1000	8.15	77 M	R
2,4,6-Tribromophenol	1000	13.02	64	
13C-Pentachlorophenol	1000	13.68	27	

Field Spike			**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.75	31

M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the LOR.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
01-Nov-2018

Run Information	**Run 1**
Filename	18102213.D
Run Date	10/22/2018 17:46
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
2-Chlorophenol	8.10	<50	U
3-Chlorophenol	8.40	<50	U
4-Chlorophenol	8.45	<50	U
2,6-Dichlorophenol	NotFnd	<50	U
2,4/2,5-Dichlorophenol	9.60	<50	U
3,5-Dichlorophenol	9.74	52	M
2,3-Dichlorophenol	9.95	<50	U
3,4-Dichlorophenol	10.20	<50	U
2,4,6-Trichlorophenol	10.55	<50	U
2,3,6-Trichlorophenol	NotFnd	<50	U
2,3,5-Trichlorophenol	NotFnd	<50	U
2,4,5-Trichlorophenol	11.10	<50	U
2,3,4-Trichlorophenol	NotFnd	<50	U
3,4,5-Trichlorophenol	11.60	<50	U
2,3,5,6/2,3,4,6-Tetrachlorophenol	NotFnd	<50	U
2,3,4,5-Tetrachlorophenol	12.69	139	M
Pentachlorophenol	13.65	<50	U
Hexachlorophene	NotFnd	<50	U

Extraction Standards			**% Rec**	
2-Fluorophenol	1000	6.48	50	M
d5-Phenol	1000	6.57	48	M
d4-2-Chlorophenol	1000	8.10	51	M
2,4,6-Tribromophenol	1000	13.01	64	
13C-Pentachlorophenol	1000	13.66	66	

Field Spike			**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.73	39

M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the LOR.

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2902026-2	Extraction Date	16-Oct-18
Analysis Method	SIM GC/MS		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5		

Approved:
S. Jin
--e-signature--
01-Nov-2018

Run Information	**Run 1**
Filename	18102207.D
Run Date	10/22/2018 15:16
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-4
Column	HP-5MS USR326446H

Target Analytes	**ug spiked**	**Ret. Time**	**% Recovery**	**Flags**
2-Chlorophenol	1000	8.10	61	M R
3-Chlorophenol	1000	8.38	53	
4-Chlorophenol	1000	8.45	62	
2,6-Dichlorophenol	1000	9.42	65	
2,4/2,5-Dichlorophenol	2000	9.62	59	
3,5-Dichlorophenol	1000	9.74	52	
2,3-Dichlorophenol	1000	9.93	88	
3,4-Dichlorophenol	1000	10.17	48	
2,4,6-Trichlorophenol	1000	10.55	59	
2,3,6-Trichlorophenol	1000	10.96	59	
2,3,5-Trichlorophenol	1000	11.02	56	M
2,4,5-Trichlorophenol	1000	11.08	57	
2,3,4-Trichlorophenol	1000	11.48	62	
3,4,5-Trichlorophenol	1000	11.60	50	
2,3,5,6/2,3,4,6-Tetrachlorophenol	2000	12.20	75	M
2,3,4,5-Tetrachlorophenol	1000	12.68	60	
Pentachlorophenol	1000	13.66	84	
Hexachlorophene	1000	18.82	118	
Extraction Standards			**% Rec**	
2-Fluorophenol	1000	6.40	45	
d5-Phenol	1000	6.50	55	M
d4-2-Chlorophenol	1000	8.09	80	
2,4,6-Tribromophenol	1000	13.01	59	
13C-Pentachlorophenol	1000	13.66	73	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	NS		NS	

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 spiked in.

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 Consulting
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Rd.
ALS WO#:	L2172987		Mississauga, ON
Date of Report	30-Oct-18		LYJ 2Y4
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **Chlorinated Pesticides by EPA 1699 (modified)**

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported.
As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	18-21874-SVOC-(1 THRU 5) TEST#1	18-21874-SVOC-(11 THRU 15) TEST#3	18-21874-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2172987-1	L2172987-3	L2172987-4
Sample Size	1	1	1
Sample size units	sample	sample	sample
Percent Moisture	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack
Sampling Date	25-Sep-18	27-Sep-18	27-Sep-18
Extraction Date	16-Oct-18	16-Oct-18	16-Oct-18
Target Analytes	**ng**	**ng**	**ng**
Heptachlor	<0.25	<0.11	<0.11
Heptachlor Epoxide B	<0.40	<0.22	<0.21
Heptachlor Epoxide A	<2.5	<1.4	<1.3
Oxychlordane	<0.62	<0.42	<0.44
trans-Chlordane	<1.4	<0.74	<0.75
cis-Chlordane	<1.4	<0.72	<0.73
Parlar 26	<4.8	<3.3	<2.3
Parlar 50	<2.6	<1.3	<1.2
Parlar 62	<4.0	<1.9	<1.8
Extraction Standards	**% Rec**	**% Rec**	**% Rec**
Heptachlor, 13C10-	47	88	75
Oxychlordane, 13C10-	50	77	67
trans-Nonachlor, 13C10-	64	72	69
Mirex, 13C10-	59	68	67

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2902026-1	WG2902026-2
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	16-Oct-2018	16-Oct-2018
Target Analytes	**ng**	**% Rec**
Heptachlor	<0.10	96
Heptachlor Epoxide B	<0.14	99
Heptachlor Epoxide A	<0.90	88
Oxychlordane	<0.30	94
trans-Chlordane	<0.67	89
cis-Chlordane	<0.66	100
Parlar 26	<2.5	94
Parlar 50	<0.90	101
Parlar 62	<1.4	103
Extraction Standards	**% Rec**	**% Rec**
Heptachlor, 13C10-	91	87
Oxychlordane, 13C10-	90	87
trans-Nonachlor, 13C10-	89	85
Mirex, 13C10-	87	87

ALS Life Sciences

Sample Analysis Report

Sample Name	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18		Approved:
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18		*Ella Gdyczynski*
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		25-Oct-2018
Sample Matrix	Stack	Split Ratio	5		

Run Information	**Run 1**
Filename	6-181024A27
Run Date	25-Oct-18 12:57
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-6 HP5ms USR427822H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Heptachlor	NotFnd	<0.25	0.25	U		10
Heptachlor Epoxide B	NotFnd	<0.40	0.40	U		10
Heptachlor Epoxide A	NotFnd	<2.5	2.5	U		10
Oxychlordane	NotFnd	<0.62	0.62	U		10
trans-Chlordane	NotFnd	<1.4	1.4	U		10
cis-Chlordane	NotFnd	<1.4	1.4	U		10
Parlar 26	NotFnd	<4.8	4.8	U		10
Parlar 50	NotFnd	<2.6	2.6	U		10
Parlar 62	NotFnd	<4.0	4.0	U		38

Extraction Standards	**ng**			
Heptachlor, 13C10-	625	17.82	47	5-120
Oxychlordane, 13C10-	625	20.12	50	23-135
trans-Nonachlor, 13C10-	625	21.39	64	14-136
Mirex, 13C10-	625	26.83	59	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.
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

Sample Analysis Report

Sample Name	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18		
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18		Approved:
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample	*Ella Gdyczynski*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Stack	Split Ratio	5		25-Oct-2018

Run Information	**Run 1**
Filename	6-181024A21
Run Date	25-Oct-18 04:26
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-6 HP5ms USR427822H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Heptachlor	NotFnd	<0.11	0.11	U		10
Heptachlor Epoxide B	NotFnd	<0.22	0.22	U		10
Heptachlor Epoxide A	NotFnd	<1.4	1.4	U		10
Oxychlordane	NotFnd	<0.42	0.42	U		10
trans-Chlordane	NotFnd	<0.74	0.74	U		10
cis-Chlordane	NotFnd	<0.72	0.72	U		10
Parlar 26	NotFnd	<3.3	3.3	U		10
Parlar 50	NotFnd	<1.3	1.3	U		10
Parlar 62	NotFnd	<1.9	1.9	U		38
Extraction Standards	**ng**					
Heptachlor, 13C10- 625	17.81	88	5-120			
Oxychlordane, 13C10- 625	20.11	77	23-135			
trans-Nonachlor, 13C10- 625	21.39	72	14-136			
Mirex, 13C10- 625	26.83	68	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.
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

Sample Analysis Report

Sample Name	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18		Approved:
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18		*Ella Gdyczynski*
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample	--e-signature--
Analysis Type	Sample	Percent Moisture	n/a		25-Oct-2018
Sample Matrix	Stack	Split Ratio	5		

Run Information	**Run 1**
Filename	6-181024A19
Run Date	25-Oct-18 03:20
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-6 HP5ms USR427822H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Heptachlor	NotFnd	<0.11	0.11	U		10
Heptachlor Epoxide B	NotFnd	<0.21	0.21	U		10
Heptachlor Epoxide A	NotFnd	<1.3	1.3	U		10
Oxychlordane	NotFnd	<0.44	0.44	U		10
trans-Chlordane	NotFnd	<0.75	0.75	U		10
cis-Chlordane	NotFnd	<0.73	0.73	U		10
Parlar 26	NotFnd	<2.3	2.3	U		10
Parlar 50	NotFnd	<1.2	1.2	U		10
Parlar 62	NotFnd	<1.8	1.8	U		38
Extraction Standards	**ng**					
Heptachlor, 13C10- 625	17.81	75	5-120			
Oxychlordane, 13C10- 625	20.11	67	23-135			
trans-Nonachlor, 13C10- 625	21.39	69	14-136			
Mirex, 13C10- 625	26.83	67	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.
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

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a		Approved:
ALS Sample ID	WG2902026-1	Extraction Date	16-Oct-2018		*Ella Gdyczynski*
Analysis Method	EPA 1699 (mod)	Sample Size	1	sample	--e-signature--
Analysis Type	Blank	Percent Moisture	n/a		25-Oct-2018
Sample Matrix	QC	Split Ratio	5		

Run Information	**Run 1**
Filename	6-181024A17
Run Date	25-Oct-18 02:14
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-6 HP5ms USR427822H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**	**EMPC ng**	**LQL**
Heptachlor	NotFnd	<0.10	0.10	U		10
Heptachlor Epoxide B	NotFnd	<0.14	0.14	U		10
Heptachlor Epoxide A	NotFnd	<0.90	0.90	U		10
Oxychlordane	NotFnd	<0.30	0.30	U		10
trans-Chlordane	NotFnd	<0.67	0.67	U		10
cis-Chlordane	NotFnd	<0.66	0.66	U		10
Parlar 26	NotFnd	<2.5	2.5	U		10
Parlar 50	NotFnd	<0.90	0.90	U		10
Parlar 62	NotFnd	<1.4	1.4	U		38

Extraction Standards	**ng**			
Heptachlor, 13C10-	625	17.83	91	5-120
Oxychlordane, 13C10-	625	20.12	90	23-135
trans-Nonachlor, 13C10-	625	21.40	89	14-136
Mirex, 13C10-	625	26.85	87	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.
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

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a		
ALS Sample ID	WG2902026-2	Extraction Date	16-Oct-2018		Approved:
Analysis Method	EPA 1699 (mod)	Sample Size	1	n/a	*Ella Gdyczynski*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	5		25-Oct-2018

Run Information	**Run 1**
Filename	6-181024A13
Run Date	25-Oct-18 00:02
Final Volume	1020 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-6 HP5ms USR427822H

Target Analytes	**ng**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
Heptachlor	125	17.84	96	50-120	
Heptachlor Epoxide B	125	20.10	99	20-200	
Heptachlor Epoxide A	125	20.24	88	50-120	
Oxychlordane	125	20.13	94	50-120	
trans-Chlordane	125	20.81	89	50-120	
cis-Chlordane	125	21.26	100	50-120	
Parlar 26	125	22.54	94	20-200	
Parlar 50	125	25.10	101	20-200	
Parlar 62	125	26.53	103	20-200	
Extraction Standards	**ng**				
Heptachlor, 13C10-	625	17.82	87	5-128	
Oxychlordane, 13C10-	625	20.12	87	5-144	
trans-Nonachlor, 13C10-	625	21.40	85	17-154	
Mirex, 13C10-	625	26.85	87	5-138	

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 Mississauga, ON L5J 2Y4
ALS WO#:	L2172987		
Date of Report	8-Dec-18		
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 CLEAN HARBORS

COMMENTS: **Organotins via GC (Extract analyzed by the ALS Kelso WA laboratory)**

SVOC trains were extracted in ALS Burlington and a portion of the raw extract sent to ALS Kelso WA for analysis of organotins.

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported. As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

Certified by:

Ron McLeod, PhD
Director, Air Toxics and Special Chemistries, Life Sciences

ALS Life sciences

Sample Analysis summary Report

Sample Name	18-21874-SVOC-(1 THRU 5) TEST#1	18-21874-SVOC-(11 THRU 15) TEST#3	18-21874-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L2172987-1	L2172987-3	L2172987-4
Sample Size	1	1	1
Sample size units	sample	sample	sample
Sample Matrix	Stack	Stack	Stack
Sampling Date	25-Sep-18	27-Sep-18	27-Sep-18
Extraction Date	16-Oct-18	16-Oct-18	16-Oct-18
Analysis Date	4-Dec-18	4-Dec-18	4-Dec-18
Target Analytes	**ug**	**ug**	**ug**
n-Butyltin Cation	<0.5	<0.5	<0.5
Di-n-butyltin Cation	<0.5	<0.5	<0.5
Tri-n-butyltin Cation	<0.5	<0.5	<0.5
Tetrabutyltin	<0.5	<0.5	<0.5

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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
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L2172987		Mississauga, ON L5J 2Y4
Date of Report Revision	22-Nov-18		Canada
Date of Sample Receipt	28-Sep-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **PAH by CARB method 429 (LR option)- Isotope dilution**

*** REVISED REPORT ***

This report supersedes all prior reports for the above-noted workorder and test. The report has been revised as follows:

The target naming has been amended to reflect coeluting analytes.
Benzo(b)anthracene was not adequately separated from Chrysene/Triphenylene. The group has been reported as Chrysene/Triphenylene/Benzo(b)anthracene.

*** ORIGINAL COMMENTS ***

The extract for the sample 18-21874-SVOC-(6 THRU 10) TEST#2 was lost during preparation. This sample has not been reported.
As part of the procedure, the solid components are extracted via Soxhlet for a minimum of 16 hours. During the night, a crack developed in the extraction flask and the extract was lost. Efforts made to recover what residue remained were not successful.

The recoveries of selected labelled extraction standards were marginally below the method control limit. However, Reported native target data are not expected to be biased as a result.

The recovery of d8-naphthalene was above the method control limit for the reagent blank. However, naphthalene was not detected.

Certified by: _____
Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	Method Blank		18-21874-SVOC-(1 THRU 5) TEST#1		18-21874-SVOC-(11 THRU 15) TEST#3		18-21874-SVOC-(16 THRU 20) BLANK		Laboratory Control Sample	
ALS Sample ID	WG2902026-1		L2172987-1		L2172987-3		L2172987-4		WG2902026-2	
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		25-Sep-18		27-Sep-18		27-Sep-18		n/a	
Extraction Date	16-Oct-18		16-Oct-18		16-Oct-18		16-Oct-18		16-Oct-18	
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**% Rec**	
Naphthalene	59.3		5320		5610		491	B	106.3	
2-Methylnaphthalene	<10	U	1020		1930		252		96.8	
1-Methylnaphthalene	16.5		1490		1140		144		91.2	
Acenaphthylene	<10	U	178	M	116		18.2		86.7	
Acenaphthene	<10	U	54.5	M	66.7	M	16.0		129.5	
Fluorene	<10	U	103		102		21.2		128.2	
Phenanthrene	<10	U	508		276		27.5		96.9	
Anthracene	12.8		50.2	M,B	34.1	M,B	<10	U	92.9	
Fluoranthene	17.0		198	B	98.5	M,B	19.6	B	91.0	
Pyrene	<10	U	123	M	61.0	M	22.7		88.2	
Benzo(a)Anthracene	<10	U	11.4	R	<10	U	<10	U	90.3	
Chrysene/Triphenylene/Benzo(b)anthracene	<10	U	51.1	M	21.9	M	<10	U	94.0	
Benzo(b)Fluoranthene	<10	U	30.1	M	23.7	M,R	<10	U	88.6	
Benzo(k)Fluoranthene	<10	U	10.9	M	<10	U	<10	U	100.0	
Benzo(e)Pyrene	<10	U	<10	U	<10	U	<10	U	102.8	
Benzo(a)Pyrene	<10	U	<10	U	<10	U	<10	U	91.1	
Perylene	<10	U	<10	U	<10	U	<10	U	94.7	
Indeno(1,2,3-cd)Pyrene	<10	U	<10	U	<10	U	26.9	M	86.7	M
Dibenzo(a,h/a,c)Anthracene	<10	U	<10	U	<10	U	<10	U	83.0	M
Benzo(g,h,i)Perylene	<10	U	17.4	M	15.2	M	178		86.3	
Additional Analytes										
Tetralin	567	R	3400	M,R,B	2890	M,B	672	R,B		
Quinoline	<10	U	<10	U	<10	U	<10	U		
2-Chloronaphthalene	<10	U	<10	U	<10	U	<10	U		
Biphenyl	35.2	M	889	M	464	M,R	72.2	M,B		
o-Terphenyl	<10	U	<10	U	<10	U	<10	U		
1-Methylphenanthrene	<10	U	388	R	76.8	R	12.6	R		
9-Methylphenanthrene	<10	U	55.0		51.3		<10	U		
2-methylanthracene	<10	U	80.8		55.1		<10	U		
9,10-dimethylanthracene	<10	U	<10	U	<10	U	<10	U		
m-terphenyl	<10	U	34.4	M	26.0	M	<10	U		
p-terphenyl	<10	U	16.8	M,R	<10	U	<10	U		
Benzo(a)fluorene	<10	U	<10	U	<10	U	<10	U		
Benzo(b)fluorene	<10	U	16.2	M	<10	U	<10	U		
7,12-Dimethylbenzo(a)anthracene	<10	U	<10	U	<10	U	<10	U		
3-Methylcholanthrene	<50	U	<50	U	<50	U	<50	U		
Picene	<50	U	<50	U	<50	U	<50	U		
Dibenzo(a,e)pyrene	<50	U	<50	U	<50	U	<50	U		
Coronene	<50	U	<50	U	<50	U	151	M,R		
Field Sampling Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
1-Methylnaphthalene-D10	NS		68.2		98.3	M	86.9		NS	
Fluorene D10	NS		88.3		110.5		127.1		NS	
Terphenyl D14(Surr.)	NS		84.5		97.8		99.1		NS	
Extraction Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Naphthalene D8	93.5		29.9	R	44.1	R	56.2	R	79.3	R
2-Methylnaphthalene-D10	98.4		37.6		51.7		63.3		84.9	
Acenaphthylene D8	118.5		62.9		96.1		81.0		101.5	
Phenanthrene D10	125.8		55.0		72.5	M	66.6		98.7	
Anthracene-D10	121.5		47.4		81.4		67.6		102.0	
Fluoranthene D10	109.6		59.6	R	77.9	R	72.1		92.3	
Benz(a)Anthracene-D12	43.1		68.6		81.7		66.9		44.9	
Chrysene D12	47.4		49.8		65.1		55.0	R	49.9	
Benzo(b)Fluoranthene-D12	61.8		57.5		74.9		58.4		57.5	
Benzo(k)Fluoranthene-D12	72.9		56.8		74.6		62.1		78.1	
Benzo(a)Pyrene D12	58.6	R	45.9		66.0		52.8		61.4	
Perylene D12	64.5		46.1		71.3		58.7		61.4	
Indeno(1,2,3,cd)Pyrene-D12	60.4	M	52.3	M	74.8	M	50.3	M	59.4	M
Dibenz(a,h)Anthracene-D14	44.2	M	57.0		80.8		53.1		41.4	M
Benzo(g,h,i)Perylene D12	70.7	M	56.7		74.0		62.4		51.5	

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.
NS	Indicates that this compound was not spiked in.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a
ALS Sample ID	WG2902026-1	Extraction Date	16-Oct-18
Analysis Method	PAH by CARB 429		
Analysis Type	blank		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5	Workgroup	WG2902026

Approved:
Andrew Reid
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	18103157.D
Run Date	11/1/2018 21:47
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USR621564

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	9.01	59.3	
2-Methylnaphthalene	10.18	<10	U
1-Methylnaphthalene	10.36	16.5	
Acenaphthylene	11.69	<10	U
Acenaphthene	NotFnd	<10	U
Fluorene	12.88	<10	U
Phenanthrene	14.48	<10	U
Anthracene	14.56	12.8	
Fluoranthene	16.57	17.0	
Pyrene	16.95	<10	U
Benzo(a)Anthracene	NotFnd	<10	U
Chrysene/Triphenylene/Benzo(b)anthracene	NotFnd	<10	U
Benzo(b)Fluoranthene	NotFnd	<10	U
Benzo(k)Fluoranthene	NotFnd	<10	U
Benzo(e)Pyrene	NotFnd	<10	U
Benzo(a)Pyrene	NotFnd	<10	U
Perylene	NotFnd	<10	U
Indeno(1,2,3-cd)Pyrene	NotFnd	<10	U
Dibenzo(a,h/a,c)Anthracene	NotFnd	<10	U
Benzo(g,h,i)Perylene	NotFnd	<10	U
Additional Analytes			
Tetralin	8.75	567	R
Quinoline	NotFnd	<10	U
2-Chloronaphthalene	NotFnd	<10	U
Biphenyl	11.01	35.2	M
o-Terphenyl	15.29	<10	U
1-Methylphenanthrene	15.43	<10	U
9-Methylphenanthrene	15.52	<10	U
2-methylanthracene	NotFnd	<10	U
9,10-dimethylanthracene	17.07	<10	U
m-terphenyl	17.14	<10	U
p-terphenyl	17.43	<10	U
Benzo(a)fluorene	NotFnd	<10	U
Benzo(b)fluorene	17.78	<10	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<10	U
3-Methylcholanthrene	NotFnd	<50	U
Picene	NotFnd	<50	U
Dibenzo(a,e)pyrene	NotFnd	<50	U
Coronene	NotFnd	<50	U

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	500	8.97	93.5		50-150
2-Methylnaphthalene-D10	500	10.12	98.4		50-150
Acenaphthylene D8	500	11.67	118.5		50-150
Phenanthrene D10	500	14.44	125.8		50-150
Anthracene-D10	500	14.52	121.5		50-150
Fluoranthene D10	500	16.53	109.6		50-150
Benz(a)Anthracene-D12	500	19.39	43.1		50-150
Chrysene D12	500	19.47	47.4		50-150
Benzo(b)Fluoranthene-D12	500	21.63	61.8		50-150
Benzo(k)Fluoranthene-D12	500	21.68	72.9		50-150
Benzo(a)Pyrene D12	500	22.25	58.6	R	50-150
Perylene D12	500	22.41	64.5		50-150
Indeno(1,2,3,cd)Pyrene-D12	500	24.32	60.4	M	50-150
Dibenz(a,h)Anthracene-D14	500	24.38	44.2	M	50-150
Benzo(g,h,i)Perylene D12	500	24.69	70.7	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	**18-21874-SVOC-(1 THRU 5) TEST#1**	Sampling Date	25-Sep-18 00:00
ALS Sample ID	L2172987-1	Extraction Date	16-Oct-18
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5	Workgroup	WG2902026

Approved:
Andrew Reid
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	18103165.D
Run Date	11/2/2018 2:11
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USR621564

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	9.00	5320	
2-Methylnaphthalene	10.18	1020	
1-Methylnaphthalene	10.36	1490	
Acenaphthylene	11.70	178	M
Acenaphthene	12.01	54.5	M
Fluorene	12.88	103	
Phenanthrene	14.48	508	
Anthracene	14.56	50.2	M B
Fluoranthene	16.56	198	B
Pyrene	16.96	123	M
Benzo(a)Anthracene	19.42	11.4	R
Chrysene/Triphenylene/Benzo(b)anthracene	19.49	51.1	M
Benzo(b)Fluoranthene	21.64	30.1	M
Benzo(k)Fluoranthene	21.68	10.9	M
Benzo(e)Pyrene	22.17	<10	U
Benzo(a)Pyrene	NotFnd	<10	U
Perylene	NotFnd	<10	U
Indeno(1,2,3-cd)Pyrene	24.30	<10	U
Dibenzo(a,h/a,c)Anthracene	NotFnd	<10	U
Benzo(g,h,i)Perylene	24.71	17.4	M
Additional Analytes			
Tetralin	8.75	3400	M R B
Quinoline	NotFnd	<10	U
2-Chloronaphthalene	NotFnd	<10	U
Biphenyl	11.01	889	M
o-Terphenyl	15.27	<10	U
1-Methylphenanthrene	15.43	388	R
9-Methylphenanthrene	15.52	55.0	
2-methylanthracene	15.56	80.8	
9,10-dimethylanthracene	NotFnd	<10	U
m-terphenyl	17.14	34.4	M
p-terphenyl	17.45	16.8	M R
Benzo(a)fluorene	NotFnd	<10	U
Benzo(b)fluorene	17.80	16.2	M
7,12-Dimethylbenzo(a)anthracene	NotFnd	<10	U
3-Methylcholanthrene	NotFnd	<50	U
Picene	NotFnd	<50	U
Dibenzo(a,e)pyrene	NotFnd	<50	U
Coronene	NotFnd	<50	U

Field Sampling Standards	**ng spiked**		**% Rec**
1-Methylnaphthalene-D10	500	10.29	68.2
Fluorene D10	500	12.83	88.3
Terphenyl D14(Surr.)	500	17.40	84.5

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	500	8.97	29.9	R	50-150
2-Methylnaphthalene-D10	500	10.12	37.6		50-150
Acenaphthylene D8	500	11.68	62.9		50-150
Phenanthrene D10	500	14.45	55.0		50-150
Anthracene-D10	500	14.53	47.4		50-150
Fluoranthene D10	500	16.53	59.6	R	50-150
Benz(a)Anthracene-D12	500	19.38	68.6		50-150
Chrysene D12	500	19.45	49.8		50-150
Benzo(b)Fluoranthene-D12	500	21.61	57.5		50-150
Benzo(k)Fluoranthene-D12	500	21.67	56.8		50-150
Benzo(a)Pyrene D12	500	22.23	45.9		50-150
Perylene D12	500	22.38	46.1		50-150
Indeno(1,2,3,cd)Pyrene-D12	500	24.27	52.3	M	50-150
Dibenz(a,h)Anthracene-D14	500	24.32	57.0		50-150
Benzo(g,h,i)Perylene D12	500	24.67	56.7		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	**18-21874-SVOC-(11 THRU 15) TEST#3**	Sampling Date	27-Sep-18 00:00
ALS Sample ID	L2172987-3	Extraction Date	16-Oct-18
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5	Workgroup	WG2902026

Approved:
Andrew Reid
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	18103169.D
Run Date	11/2/2018 4:23
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USR621564

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**	
Naphthalene	9.00	5610		
2-Methylnaphthalene	10.18	1930		
1-Methylnaphthalene	10.35	1140		
Acenaphthylene	11.69	116		
Acenaphthene	12.01	66.7	M	
Fluorene	12.87	102		
Phenanthrene	14.48	276		
Anthracene	14.56	34.1	M	B
Fluoranthene	16.56	98.5	M	B
Pyrene	16.96	61.0	M	
Benzo(a)Anthracene	19.43	<10	U	
Chrysene/Triphenylene/Benzo(b)anthracene	19.50	21.9	M	
Benzo(b)Fluoranthene	21.65	23.7	M	R
Benzo(k)Fluoranthene	21.68	<10	U	
Benzo(e)Pyrene	22.17	<10	U	
Benzo(a)Pyrene	NotFnd	<10	U	
Perylene	NotFnd	<10	U	
Indeno(1,2,3-cd)Pyrene	NotFnd	<10	U	
Dibenzo(a,h/a,c)Anthracene	NotFnd	<10	U	
Benzo(g,h,i)Perylene	24.71	15.2	M	
Additional Analytes				
Tetralin	8.75	2890	M	B
Quinoline	NotFnd	<10	U	
2-Chloronaphthalene	NotFnd	<10	U	
Biphenyl	11.00	464	M	R
o-Terphenyl	15.27	<10	U	
1-Methylphenanthrene	15.43	76.8		R
9-Methylphenanthrene	15.52	51.3		
2-methylanthracene	15.56	55.1		
9,10-dimethylanthracene	NotFnd	<10	U	
m-terphenyl	17.14	26.0	M	
p-terphenyl	17.45	<10	U	
Benzo(a)fluorene	NotFnd	<10	U	
Benzo(b)fluorene	NotFnd	<10	U	
7,12-Dimethylbenzo(a)anthracene	NotFnd	<10	U	
3-Methylcholanthrene	NotFnd	<50	U	
Picene	NotFnd	<50	U	
Dibenzo(a,e)pyrene	NotFnd	<50	U	
Coronene	NotFnd	<50	U	

Field Sampling Standards	**ng spiked**		**% Rec**		
1-Methylnaphthalene-D10	500	10.29	98.3	M	
Fluorene D10	500	12.83	110.5		
Terphenyl D14(Surr.)	500	17.41	97.8		

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	500	8.97	44.1	R	50-150
2-Methylnaphthalene-D10	500	10.12	51.7		50-150
Acenaphthylene D8	500	11.67	96.1		50-150
Phenanthrene D10	500	14.45	72.5	M	50-150
Anthracene-D10	500	14.53	81.4		50-150
Fluoranthene D10	500	16.53	77.9	R	50-150
Benz(a)Anthracene-D12	500	19.38	81.7		50-150
Chrysene D12	500	19.45	65.1		50-150
Benzo(b)Fluoranthene-D12	500	21.61	74.9		50-150
Benzo(k)Fluoranthene-D12	500	21.67	74.6		50-150
Benzo(a)Pyrene D12	500	22.23	66.0		50-150
Perylene D12	500	22.38	71.3		50-150
Indeno(1,2,3,cd)Pyrene-D12	500	24.27	74.8	M	50-150
Dibenz(a,h)Anthracene-D14	500	24.32	80.8		50-150
Benzo(g,h,i)Perylene D12	500	24.67	74.0		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	**18-21874-SVOC-(16 THRU 20) BLANK**	Sampling Date	27-Sep-18 00:00
ALS Sample ID	L2172987-4	Extraction Date	16-Oct-18
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	5	Workgroup	WG2902026

Approved:
Andrew Reid
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	18103159.D
Run Date	11/1/2018 22:53
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USR621564

Target Analytes	**Ret. Time**	**Concentration ng/sample**	**Flags**
Naphthalene	9.00	491	B
2-Methylnaphthalene	10.18	252	
1-Methylnaphthalene	10.35	144	
Acenaphthylene	11.69	18.2	
Acenaphthene	12.01	16.0	
Fluorene	12.87	21.2	
Phenanthrene	14.48	27.5	
Anthracene	14.56	<10	U
Fluoranthene	16.57	19.6	B
Pyrene	16.95	22.7	
Benzo(a)Anthracene	NotFnd	<10	U
Chrysene/Triphenylene/Benzo(b)anthracene	NotFnd	<10	U
Benzo(b)Fluoranthene	NotFnd	<10	U
Benzo(k)Fluoranthene	NotFnd	<10	U
Benzo(e)Pyrene	NotFnd	<10	U
Benzo(a)Pyrene	NotFnd	<10	U
Perylene	NotFnd	<10	U
Indeno(1,2,3-cd)Pyrene	24.30	26.9 M	
Dibenzo(a,h/a,c)Anthracene	24.31	<10	U
Benzo(g,h,i)Perylene	24.71	178	
Additional Analytes			
Tetralin	8.75	672	R ,B
Quinoline	NotFnd	<10	U
2-Chloronaphthalene	NotFnd	<10	U
Biphenyl	11.01	72.2 M	B
o-Terphenyl	15.29	<10	U
1-Methylphenanthrene	15.43	12.6	R
9-Methylphenanthrene	15.52	<10	U
2-methylanthracene	15.55	<10	U
9,10-dimethylanthracene	17.09	<10	U
m-terphenyl	17.14	<10	U
p-terphenyl	NotFnd	<10	U
Benzo(a)fluorene	NotFnd	<10	U
Benzo(b)fluorene	17.78	<10	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<10	U
3-Methylcholanthrene	NotFnd	<50	U
Picene	NotFnd	<50	U
Dibenzo(a,e)pyrene	NotFnd	<50	U
Coronene	27.35	151 M	R

Field Sampling Standards	**ng spiked**		**% Rec**
1-Methylnaphthalene-D10	500	10.29	86.9
Fluorene D10	500	12.83	127.1
Terphenyl D14(Surr.)	500	17.41	99.1

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	500	8.97	56.2	R	50-150
2-Methylnaphthalene-D10	500	10.12	63.3		50-150
Acenaphthylene D8	500	11.67	81.0		50-150
Phenanthrene D10	500	14.44	66.6		50-150
Anthracene-D10	500	14.52	67.6		50-150
Fluoranthene D10	500	16.53	72.1		50-150
Benz(a)Anthracene-D12	500	19.37	66.9		50-150
Chrysene D12	500	19.45	55.0	R	50-150
Benzo(b)Fluoranthene-D12	500	21.61	58.4		50-150
Benzo(k)Fluoranthene-D12	500	21.67	62.1		50-150
Benzo(a)Pyrene D12	500	22.22	52.8		50-150
Perylene D12	500	22.38	58.7		50-150
Indeno(1,2,3,cd)Pyrene-D12	500	24.27	50.3 M		50-150
Dibenz(a,h)Anthracene-D14	500	24.33	53.1		50-150
Benzo(g,h,i)Perylene D12	500	24.67	62.4		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	WG2902026-2	Extraction Date	16-Oct-18
Analysis Method	PAH by CARB 429		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 n/a		
Percent Moisture	n/a		
Split Ratio	5	Workgroup	WG2902026

Approved:
Andrew Reid
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	18103155.D
Run Date	11/1/2018 20:41
Final Volume	1 mL
Dilution Factor	1
Analysis Units	% Rec
Instrument	MSD-2
Column	HP-5MS USR621564

Target Analytes	**ug spiked**	**Ret. Time**	**% Rec**	**Flags**	**Limits**
Naphthalene	500	9.00	106.3		50-150
2-Methylnaphthalene	500	10.18	96.8		50-150
1-Methylnaphthalene	500	10.35	91.2		50-150
Acenaphthylene	500	11.69	86.7		50-150
Acenaphthene	500	12.01	129.5		50-150
Fluorene	500	12.87	128.2		50-150
Phenanthrene	500	14.48	96.9		50-150
Anthracene	500	14.55	92.9		50-150
Fluoranthene	500	16.55	91		50-150
Pyrene	500	16.95	88.2		50-150
Benzo(a)Anthracene	500	19.43	90.3		50-150
Chrysene/Triphenylene/Benzo(b)anthracene	500	19.51	94		50-150
Benzo(b)Fluoranthene	500	21.67	88.6		50-150
Benzo(k)Fluoranthene	500	21.72	100		50-150
Benzo(e)Pyrene	500	22.18	102.8		50-150
Benzo(a)Pyrene	500	22.29	91.1		50-150
Perylene	500	22.44	94.7		50-150
Indeno(1,2,3-cd)Pyrene	500	24.33	86.7	M	50-150
Dibenzo(a,h/a,c)Anthracene	500	24.42	83	M	50-150
Benzo(g,h,i)Perylene	500	24.72	86.3		50-150
Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	500	8.97	79.3	R	30-150
2-Methylnaphthalene-D10	500	10.12	84.9		30-150
Acenaphthylene D8	500	11.67	101.5		30-150
Phenanthrene D10	500	14.44	98.7		50-150
Anthracene-D10	500	14.52	102.0		50-150
Fluoranthene D10	500	16.53	92.3		50-150
Benz(a)Anthracene-D12	500	19.39	44.9		50-150
Chrysene D12	500	19.46	49.9		50-150
Benzo(b)Fluoranthene-D12	500	21.62	57.5		50-150
Benzo(k)Fluoranthene-D12	500	21.68	78.1		50-150
Benzo(a)Pyrene D12	500	22.24	61.4		30-150
Perylene D12	500	22.39	61.4		50-150
Indeno(1,2,3,cd)Pyrene-D12	500	24.30	59.4	M	50-150
Dibenz(a,h)Anthracene-D14	500	24.37	41.4	M	50-150
Benzo(g,h,i)Perylene D12	500	24.68	51.5		50-150

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.

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 Rd.
ALS WO#:	L2179971		Mississauga, ON
Date of Report	8-Nov-18		LYJ 2Y4
Date of Sample Receipt	12-Oct-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS: **PCDD/F by EPA 1613B via Isotope Dilution**

All results have been reported on an as-received basis in pg/g

The recoveries of selected labelled extraction standards are below the method control limit. As a result, the detection limits for the associated native targets may be elevated. Reported native target data are not expected to be biased.

For the method blank and the sample 18-21874-AC-4 ALKALINE FEED, TCDD has been reported from the analysis of an extract where a cleanup column was further eluted in order to better recover this target.

Steve Kennedy, C.Chem.
Technical Supervisor

ALS Life Sciences

Sample Analysis summary Report

Sample Name	18-21874-RC-4 RICH FEED	Duplicate	18-21874-LC-4 LEAN FEED	18-21874-AC-4 ALKALINE FEED	18-21874-EC-4 EMULSION FEED
ALS Sample ID	L2179971-1	WG2906906-5	L2179971-2	L2179971-3	L2179971-4
Sample Size	1.0043	1.0076	1.0027	1.0233	1.0511
Sample size units	g	g	g	g	g
Percent Moisture	38.9%	38.0%	88.0%	100.0%	33.6%
Sample Matrix	Solid	QC	Solid	Solid	Solid
Sampling Date	n/a	n/a	n/a	n/a	n/a
Extraction Date	23-Oct-18	23-Oct-18	23-Oct-18	23-Oct-18	23-Oct-18
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**	**pg/g**
2,3,7,8-TCDD	<2.2	<0.74	<1.1	<0.59	<0.95
1,2,3,7,8-PeCDD	3.07	<0.60	<1.3	<0.81	<0.44
1,2,3,4,7,8-HxCDD	<2.5	<0.99	4.45	<0.69	<0.68
1,2,3,6,7,8-HxCDD	5.09	<2.8	7.80	<0.70	3.05
1,2,3,7,8,9-HxCDD	3.64	<0.98	<2.7	<0.70	<0.89
1,2,3,4,6,7,8-HpCDD	55.1	64.2	574	1.48	88.4
OCDD	482	629	5000	8.94	976
2,3,7,8-TCDF	4.70	3.90	3.55	<2.2	<1.3
1,2,3,7,8-PeCDF	<4.4	2.85	3.08	<0.77	<1.6
2,3,4,7,8-PeCDF	4.16	1.97	3.67	<0.67	<1.9
1,2,3,4,7,8-HxCDF	9.72	10.7	5.72	<0.49	<2.9
1,2,3,6,7,8-HxCDF	<5.0	5.09	<2.8	<0.45	1.99
2,3,4,6,7,8-HxCDF	4.08	<1.8	<2.8	<0.47	<1.4
1,2,3,7,8,9-HxCDF	3.65	2.27	<2.4	0.919	<1.6
1,2,3,4,6,7,8-HpCDF	57.1	67.5	56.2	<0.50	19.3
1,2,3,4,7,8,9-HpCDF	<9.2	9.22	8.18	<0.62	3.24
OCDF	516	528	501	1.50	160
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	59	70	62	20	64
13C12-1,2,3,7,8-PeCDD	77	61	66	66	67
13C12-1,2,3,4,7,8-HxCDD	48	28	60	55	64
13C12-1,2,3,6,7,8-HxCDD	59	31	57	56	68
13C12-1,2,3,4,6,7,8-HpCDD	45	21	56	69	70
13C12-OCDD	21	17	57	79	71
13C12-2,3,7,8-TCDF	56	63	55	41	60
13C12-1,2,3,7,8-PeCDF	65	58	56	55	57
13C12-2,3,4,7,8-PeCDF	68	45	55	56	59
13C12-1,2,3,4,7,8-HxCDF	43	28	44	46	53
13C12-1,2,3,6,7,8-HxCDF	48	33	49	46	57
13C12-2,3,4,6,7,8-HxCDF	35	23	48	48	56
13C12-1,2,3,7,8,9-HxCDF	42	27	46	49	56
13C12-1,2,3,4,6,7,8-HpCDF	46	22	45	54	57
13C12-1,2,3,4,7,8,9-HpCDF	43	19	48	62	60
Cleanup Standard					
37Cl4-2,3,7,8-TCDD (Cleanup)	54	66	60	19	61
Homologue Group Totals	**pg/g**	**pg/g**	**pg/g**	**pg/g**	**pg/g**
Total-TCDD	<2.2	<0.74	2.74	<0.59	<0.95
Total-PeCDD	3.07	<0.49	4.77	<0.81	<0.44
Total-HxCDD	12.6	4.88	63.9	<0.70	6.63
Total-HpCDD	89.6	121	1020	1.48	160
Total-TCDF	10.9	30.4	74.7	<2.2	14.3
Total-PeCDF	4.16	13.9	27.7	<0.77	3.89
Total-HxCDF	33.2	32.2	42.5	0.919	18.0
Total-HpCDF	111	144	280	<0.62	82.9
Toxic Equivalency - (WHO 2005)					
Lower Bound PCDD/F TEQ (WHO 2005)	8.83	4.63	11.4	0.110	1.95
Mid Point PCDD/F TEQ (WHO 2005)	10.9	6.21	14.3	1.21	4.14
Upper Bound PCDD/F TEQ (WHO 2005)	12.0	6.63	14.8	2.32	4.84

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2906906-1	WG2906906-2
Sample Size	1.00	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	23-Oct-18	23-Oct-18
Target Analytes	**pg/g**	**% Rec**
2,3,7,8-TCDD	<0.28	101
1,2,3,7,8-PeCDD	<1.6	100
1,2,3,4,7,8-HxCDD	<1.3	92
1,2,3,6,7,8-HxCDD	<1.3	95
1,2,3,7,8,9-HxCDD	<1.3	98
1,2,3,4,6,7,8-HpCDD	<0.85	93
OCDD	<1.1	92
2,3,7,8-TCDF	<3.2	85
1,2,3,7,8-PeCDF	<1.2	93
2,3,4,7,8-PeCDF	<1.0	89
1,2,3,4,7,8-HxCDF	<1.1	94
1,2,3,6,7,8-HxCDF	<1.0	96
2,3,4,6,7,8-HxCDF	<1.0	91
1,2,3,7,8,9-HxCDF	<1.3	98
1,2,3,4,6,7,8-HpCDF	1.11	90
1,2,3,4,7,8,9-HpCDF	<0.87	95
OCDF	<1.4	88
Extraction Standards	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	51	19
13C12-1,2,3,7,8-PeCDD	50	59
13C12-1,2,3,4,7,8-HxCDD	45	57
13C12-1,2,3,6,7,8-HxCDD	48	59
13C12-1,2,3,4,6,7,8-HpCDD	55	64
13C12-OCDD	62	75
13C12-2,3,7,8-TCDF	40	47
13C12-1,2,3,7,8-PeCDF	45	51
13C12-2,3,4,7,8-PeCDF	44	51
13C12-1,2,3,4,7,8-HxCDF	39	51
13C12-1,2,3,6,7,8-HxCDF	42	52
13C12-2,3,4,6,7,8-HxCDF	41	53
13C12-1,2,3,7,8,9-HxCDF	40	52
13C12-1,2,3,4,6,7,8-HpCDF	49	56
13C12-1,2,3,4,7,8,9-HpCDF	52	60
Cleanup Standard		
37Cl4-2,3,7,8-TCDD (Cleanup)	51	19
Homologue Group Totals	**pg/g**	
Total-TCDD	<0.28	
Total-PeCDD	<1.6	
Total-HxCDD	<1.3	
Total-HpCDD	<0.85	
Total-TCDF	<3.2	
Total-PeCDF	<1.2	
Total-HxCDF	<1.3	
Total-HpCDF	1.11	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.0111	
Mid Point PCDD/F TEQ (WHO 2005)	1.70	
Upper Bound PCDD/F TEQ (WHO 2005)	3.40	

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Sample Analysis Report

Sample Name	**18-21874-RC-4 RICH FEED**	Sampling Date	n/a		
ALS Sample ID	L2179971-1	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1613B	Sample Size	1.0043	g	*T.Patterson*
Analysis Type	Sample	Percent Moisture	38.9%		--e-signature--
Sample Matrix	Solid	Split Ratio	2		07-Nov-2018

Run Information	**Run 1**
Filename	7-181102A22
Run Date	03-Nov-18 00:49
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H

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	<2.2	2.2	U		20
1,2,3,7,8-PeCDD	1	31.97	3.07	1.0	M,J		100
1,2,3,4,7,8-HxCDD	0.1	34.04	<2.5	0.96	M,J,R	2.5	100
1,2,3,6,7,8-HxCDD	0.1	34.09	5.09	0.91	M,J		100
1,2,3,7,8,9-HxCDD	0.1	34.22	3.64	0.93	M,J		100
1,2,3,4,6,7,8-HpCDD	0.01	35.72	55.1	1.5	J		100
OCDD	0.0003	37.21	482	3.9			200
2,3,7,8-TCDF	0.1	26.83	4.70	2.4	M,J		20
1,2,3,7,8-PeCDF	0.03	31.02	<4.4	0.89	M,J,R	4.4	100
2,3,4,7,8-PeCDF	0.3	31.75	4.16	0.83	M,J		100
1,2,3,4,7,8-HxCDF	0.1	33.54	9.72	1.0	M,J		100
1,2,3,6,7,8-HxCDF	0.1	33.62	<5.0	1.0	M,J,R	5.0	100
2,3,4,6,7,8-HxCDF	0.1	33.94	4.08	1.3	M,J		100
1,2,3,7,8,9-HxCDF	0.1	34.36	3.65	1.4	M,J		100
1,2,3,4,6,7,8-HpCDF	0.01	35.16	57.1	0.83	J		100
1,2,3,4,7,8,9-HpCDF	0.01	35.96	<9.2	1.2	M,J,R	9.2	100
OCDF	0.0003	37.30	516	4.8			200

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.72	59	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.96	77	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	34.04	48	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	59	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.71	45	23-140
13C12-OCDD	8000	37.21	21	17-157
13C12-2,3,7,8-TCDF	4000	26.80	56	24-169
13C12-1,2,3,7,8-PeCDF	4000	31.00	65	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.73	68	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	43	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.61	48	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.94	35	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.35	42	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.15	46	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.95	43	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.74	54	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		**LQL**
Total-TCDD	0	<2.2	2.2	U	20
Total-PeCDD	1	3.07	1.0		100
Total-HxCDD	3	12.6	0.96		100
Total-HpCDD	2	89.6	1.5		100
Total-TCDF	3	10.9	2.4		20
Total-PeCDF	1	4.16	0.89		100
Total-HxCDF	5	33.2	1.4		100
Total-HpCDF	2	111	1.2		100

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	8.83
Mid Point PCDD/F TEQ (WHO 2005)	10.9
Upper Bound PCDD/F TEQ (WHO 2005)	12.0

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

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Sample Analysis Report

Sample Name	**Duplicate**	Sampling Date	n/a		
ALS Sample ID	WG2906906-5	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1613B	Sample Size	1.0076	g	*T.Patterson*
Analysis Type	Sample	Percent Moisture	38.0%		--e-signature--
Sample Matrix	QC	Split Ratio	2		07-Nov-2018

Run Information	**Run 1**
Filename	7-181102A23
Run Date	03-Nov-18 01:32
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H

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	<0.74	0.74	U		20
1,2,3,7,8-PeCDD	1	31.97	<0.60	0.49	M,J,R	0.60	99
1,2,3,4,7,8-HxCDD	0.1	34.04	<0.99	0.99	M,U		99
1,2,3,6,7,8-HxCDD	0.1	34.09	<2.8	0.94	M,J,R	2.8	99
1,2,3,7,8,9-HxCDD	0.1	34.24	<0.98	0.96	M,J,R	0.98	99
1,2,3,4,6,7,8-HpCDD	0.01	35.72	64.2	1.4	J		99
OCDD	0.0003	37.23	629	4.3			200
2,3,7,8-TCDF	0.1	26.80	3.90	1.2	M,J		20
1,2,3,7,8-PeCDF	0.03	31.02	2.85	0.47	J		99
2,3,4,7,8-PeCDF	0.3	31.74	1.97	0.54	M,J		99
1,2,3,4,7,8-HxCDF	0.1	33.55	10.7	0.73	M,J		99
1,2,3,6,7,8-HxCDF	0.1	33.62	5.09	0.65	M,J		99
2,3,4,6,7,8-HxCDF	0.1	33.94	<1.8	0.87	M,J,R	1.8	99
1,2,3,7,8,9-HxCDF	0.1	34.37	2.27	0.97	M,J		99
1,2,3,4,6,7,8-HpCDF	0.01	35.16	67.5	1.4	J		99
1,2,3,4,7,8,9-HpCDF	0.01	35.97	9.22	2.2	J		99
OCDF	0.0003	37.31	528	2.3			200

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.71	70	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.96	61	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	34.04	28	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	31	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.72	21	23-140
13C12-OCDD	8000	37.22	17	17-157
13C12-2,3,7,8-TCDF	4000	26.78	63	24-169
13C12-1,2,3,7,8-PeCDF	4000	31.00	58	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.74	45	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	28	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.62	33	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.94	23	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.36	27	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.16	22	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.96	19	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.72	66	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0	<0.74	0.74	U	20
Total-PeCDD	0	<0.49	0.49	U	99
Total-HxCDD	2	4.88	0.99		99
Total-HpCDD	2	121	1.4		99
Total-TCDF	7	30.4	1.2		20
Total-PeCDF	4	13.9	0.54		99
Total-HxCDF	5	32.2	0.97		99
Total-HpCDF	3	144	2.2		99

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	4.63
Mid Point PCDD/F TEQ (WHO 2005)	6.21
Upper Bound PCDD/F TEQ (WHO 2005)	6.63

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

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Sample Analysis Report

Sample Name	**18-21874-LC-4 LEAN FEED**	Sampling Date	n/a		
ALS Sample ID	L2179971-2	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1613B	Sample Size	1.0027	g	*T.Patterson*
Analysis Type	Sample	Percent Moisture	88.0%		--e-signature--
Sample Matrix	Solid	Split Ratio	2		07-Nov-2018

Run Information	**Run 1**
Filename	7-181102A24
Run Date	03-Nov-18 02:15
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H

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	<1.1	1.1	U		20
1,2,3,7,8-PeCDD	1	31.96	<1.3	0.84	M,J,R	1.3	100
1,2,3,4,7,8-HxCDD	0.1	34.04	4.45	0.49	M,J		100
1,2,3,6,7,8-HxCDD	0.1	34.09	7.80	0.49	J		100
1,2,3,7,8,9-HxCDD	0.1	34.22	<2.7	0.49	M,J,R	2.7	100
1,2,3,4,6,7,8-HpCDD	0.01	35.71	574	1.3			100
OCDD	0.0003	37.20	5000	1.9			200
2,3,7,8-TCDF	0.1	26.80	3.55	1.7	M,J		20
1,2,3,7,8-PeCDF	0.03	31.00	3.08	0.73	J		100
2,3,4,7,8-PeCDF	0.3	31.74	3.67	0.66	J		100
1,2,3,4,7,8-HxCDF	0.1	33.54	5.72	0.64	J		100
1,2,3,6,7,8-HxCDF	0.1	33.62	<2.8	0.57	J,R	2.8	100
2,3,4,6,7,8-HxCDF	0.1	33.94	<2.8	0.55	J,R	2.8	100
1,2,3,7,8,9-HxCDF	0.1	34.36	<2.4	0.74	M,J,R	2.4	100
1,2,3,4,6,7,8-HpCDF	0.01	35.15	56.2	0.95	J		100
1,2,3,4,7,8,9-HpCDF	0.01	35.95	8.18	1.2	J		100
OCDF	0.0003	37.29	501	0.87			200

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.69	62	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.95	66	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	34.03	60	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	57	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.71	56	23-140
13C12-OCDD	8000	37.20	57	17-157
13C12-2,3,7,8-TCDF	4000	26.77	55	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.99	56	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.73	55	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	44	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.60	49	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.93	48	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.35	46	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.15	45	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.95	48	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.72	60	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**	**LQL**
Total-TCDD	1	2.74	1.1	20
Total-PeCDD	2	4.77	0.84	100
Total-HxCDD	4	63.9	0.49	100
Total-HpCDD	2	1020	1.3	100
Total-TCDF	10	74.7	1.7	20
Total-PeCDF	6	27.7	0.73	100
Total-HxCDF	5	42.5	0.74	100
Total-HpCDF	3	280	1.2	100

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	11.4
Mid Point PCDD/F TEQ (WHO 2005)	14.3
Upper Bound PCDD/F TEQ (WHO 2005)	14.8

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.
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

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Sample Analysis Report

Sample Name	**18-21874-AC-4 ALKALINE FEED**	Sampling Date	n/a		Approved:
ALS Sample ID	L2179971-3	Extraction Date	23-Oct-18		*T.Patterson*
Analysis Method	EPA 1613B	Sample Size	1.0233	g	--e-signature--
Analysis Type	Sample	Percent Moisture	100.0%		07-Nov-2018
Sample Matrix	Solid	Split Ratio	2		

Run Information	**Run 1**	**Run 2**
Filename	7-181102A25	7-181106A20
Run Date	03-Nov-18 02:57	07-Nov-18 00:54
Final Volume	20 uL	20 uL
Dilution Factor	1	1
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H	HRMS-7 DB5MSUSR304714H

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**
2,3,7,8-TCDD	1							NotFnd	<0.59	0.59	U		20
1,2,3,7,8-PeCDD	1	NotFnd	<0.81	0.81	U		98						
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.69	0.69	U		98						
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.70	0.70	U		98						
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.70	0.70	U		98						
1,2,3,4,6,7,8-HpCDD	0.01	35.72	1.48	0.62	M,J		98						
OCDD	0.0003	37.23	8.94	0.60	J		200						
2,3,7,8-TCDF	0.1	NotFnd	<2.2	2.2	U		20						
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.77	0.77	U		98						
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.67	0.67	U		98						
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.49	0.49	U		98						
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.45	0.45	U		98						
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.47	0.47	U		98						
1,2,3,7,8,9-HxCDF	0.1	34.38	0.919	0.56	M,J		98						
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.50	0.50	U		98						
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.62	0.62	U		98						
OCDF	0.0003	37.30	1.50	0.60	M,J		200						

Extraction Standards	**pg**		**% Rec**	**Limits**		**% Rec**
13C12-2,3,7,8-TCDD	4000			25-164	27.47	20
13C12-1,2,3,7,8-PeCDD	4000	31.97	66	25-181		
13C12-1,2,3,4,7,8-HxCDD	4000	34.05	55	32-141		
13C12-1,2,3,6,7,8-HxCDD	4000	34.10	56	28-130		
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.72	69	23-140		
13C12-OCDD	8000	37.21	79	17-157		
13C12-2,3,7,8-TCDF	4000	26.81	41	24-169		
13C12-1,2,3,7,8-PeCDF	4000	31.02	55	24-185		
13C12-2,3,4,7,8-PeCDF	4000	31.75	56	21-178		
13C12-1,2,3,4,7,8-HxCDF	4000	33.55	46	26-152		
13C12-1,2,3,6,7,8-HxCDF	4000	33.62	46	26-123		
13C12-2,3,4,6,7,8-HxCDF	4000	33.95	48	29-147		
13C12-1,2,3,7,8,9-HxCDF	4000	34.37	49	28-136		
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.16	54	28-143		
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.96	62	26-138		

Cleanup Standard	**pg**					
37Cl4-2,3,7,8-TCDD (Cleanup)	80				27.50	19

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**			**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD						0	<0.59	0.59	U	20
Total-PeCDD	0	<0.81	0.81	U	98					
Total-HxCDD	0	<0.70	0.70	U	98					
Total-HpCDD	1	1.48	0.62		98					
Total-TCDF	0	<2.2	2.2	U	20					
Total-PeCDF	0	<0.77	0.77	U	98					
Total-HxCDF	1	0.919	0.56		98					
Total-HpCDF	0	<0.62	0.62	U	98					

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.110
Mid Point PCDD/F TEQ (WHO 2005)	1.21
Upper Bound PCDD/F TEQ (WHO 2005)	2.32

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
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.
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	**18-21874-EC-4 EMULSION FEED**	Sampling Date	n/a		
ALS Sample ID	L2179971-4	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1613B	Sample Size	1.0511	g	*T.Patterson*
Analysis Type	Sample	Percent Moisture	33.6%		--e-signature--
Sample Matrix	Solid	Split Ratio	2		07-Nov-2018

Run Information	**Run 1**
Filename	7-181102A26
Run Date	03-Nov-18 03:40
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H

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	<0.95	0.95	U		19
1,2,3,7,8-PeCDD	1	31.96	<0.44	0.44	M,U	0.31	95
1,2,3,4,7,8-HxCDD	0.1	34.04	<0.68	0.63	M,J,R	0.68	95
1,2,3,6,7,8-HxCDD	0.1	34.09	3.05	0.57	M,J		95
1,2,3,7,8,9-HxCDD	0.1	34.22	<0.89	0.60	M,J,R	0.89	95
1,2,3,4,6,7,8-HpCDD	0.01	35.71	88.4	0.66	J		95
OCDD	0.0003	37.20	976	1.1			190
2,3,7,8-TCDF	0.1	26.78	<1.3	1.2	M,J,R	1.3	19
1,2,3,7,8-PeCDF	0.03	31.00	<1.6	0.52	M,J,R	1.6	95
2,3,4,7,8-PeCDF	0.3	31.74	<1.9	0.45	M,J,R	1.9	95
1,2,3,4,7,8-HxCDF	0.1	33.54	<2.9	0.49	M,J,R	2.9	95
1,2,3,6,7,8-HxCDF	0.1	33.61	1.99	0.48	M,J		95
2,3,4,6,7,8-HxCDF	0.1	33.93	<1.4	0.48	M,J,R	1.4	95
1,2,3,7,8,9-HxCDF	0.1	34.38	<1.6	0.59	M,J,R	1.6	95
1,2,3,4,6,7,8-HpCDF	0.01	35.15	19.3	0.43	J		95
1,2,3,4,7,8,9-HpCDF	0.01	35.96	3.24	0.55	M,J		95
OCDF	0.0003	37.30	160	0.64	J		190

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.69	64	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.95	67	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	34.04	64	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	68	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.71	70	23-140
13C12-OCDD	8000	37.20	71	17-157
13C12-2,3,7,8-TCDF	4000	26.77	60	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.99	57	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.73	59	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	53	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.60	57	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.93	56	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.35	56	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.15	57	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.95	60	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.72	61	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0	<0.95	0.95	U	19
Total-PeCDD	0	<0.44	0.44	U	95
Total-HxCDD	2	6.63	0.63		95
Total-HpCDD	2	160	0.66		95
Total-TCDF	3	14.3	1.2		19
Total-PeCDF	2	3.89	0.52		95
Total-HxCDF	5	18.0	0.59		95
Total-HpCDF	3	82.9	0.55		95

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	1.95
Mid Point PCDD/F TEQ (WHO 2005)	4.14
Upper Bound PCDD/F TEQ (WHO 2005)	4.84

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	WG2906906-1	Extraction Date	23-Oct-18	Approved:
Analysis Method	EPA 1613B	Sample Size	1 g	*T.Patterson*
Analysis Type	Blank	Percent Moisture	n/a	--e-signature--
Sample Matrix	QC	Split Ratio	2	07-Nov-2018

Run Information	**Run 1**	**Run 2**
Filename	7-181102A08	7-181106A19
Run Date	02-Nov-18 14:43	07-Nov-18 00:11
Final Volume	20 uL	20 uL
Dilution Factor	1	1
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS-7 DB5MSUSR304714H	HRMS-7 DB5MSUSR304714H

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**
2,3,7,8-TCDD	1							NotFnd	<0.28	0.28	U		20
1,2,3,7,8-PeCDD	1	NotFnd	<1.6	1.6	U		100						
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<1.3	1.3	U		100						
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<1.3	1.3	U		100						
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<1.3	1.3	U		100						
1,2,3,4,6,7,8-HpCDD	0.01	NotFnd	<0.85	0.85	U		100						
OCDD	0.0003	37.21	<1.1	1.1	M,U	1.1	200						
2,3,7,8-TCDF	0.1	NotFnd	<3.2	3.2	U		20						
1,2,3,7,8-PeCDF	0.03	31.04	<1.2	1.2	M,U	1.2	100						
2,3,4,7,8-PeCDF	0.3	NotFnd	<1.0	1.0	U		100						
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<1.1	1.1	U		100						
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<1.0	1.0	U		100						
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<1.0	1.0	U		100						
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<1.3	1.3	U		100						
1,2,3,4,6,7,8-HpCDF	0.01	35.17	1.11	0.70	M,J		100						
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.87	0.87	U		100						
OCDF	0.0003	37.30	<1.4	1.4	M,U	0.89	200						

Extraction Standards	**pg**		**% Rec**	**Limits**		**% Rec**
13C12-2,3,7,8-TCDD	4000			25-164	27.48	51
13C12-1,2,3,7,8-PeCDD	4000	31.96	50	25-181		
13C12-1,2,3,4,7,8-HxCDD	4000	34.04	45	32-141		
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	48	28-130		
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.72	55	23-140		
13C12-OCDD	8000	37.21	62	17-157		
13C12-2,3,7,8-TCDF	4000	26.81	40	24-169		
13C12-1,2,3,7,8-PeCDF	4000	31.02	45	24-185		
13C12-2,3,4,7,8-PeCDF	4000	31.74	44	21-178		
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	39	26-152		
13C12-1,2,3,6,7,8-HxCDF	4000	33.62	42	26-123		
13C12-2,3,4,6,7,8-HxCDF	4000	33.94	41	29-147		
13C12-1,2,3,7,8,9-HxCDF	4000	34.36	40	28-136		
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.16	49	28-143		
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.96	52	26-138		

Cleanup Standard	**pg**					
37Cl4-2,3,7,8-TCDD (Cleanup)	80				27.50	51

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**			**# peaks**	**Conc. pg/g**	**EDL pg/g**	
Total-TCDD					20	0	<0.28	0.28	U
Total-PeCDD	0	<1.6	1.6	U	100				
Total-HxCDD	0	<1.3	1.3	U	100				
Total-HpCDD	0	<0.85	0.85	U	100				
Total-TCDF	0	<3.2	3.2	U	20				
Total-PeCDF	0	<1.2	1.2	U	100				
Total-HxCDF	0	<1.3	1.3	U	100				
Total-HpCDF	1	1.11	0.87		100				

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.0111
Mid Point PCDD/F TEQ (WHO 2005)	1.70
Upper Bound PCDD/F TEQ (WHO 2005)	3.40

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.
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	WG2906906-2	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1613B	Sample Size	1	n/a	*T.Patterson*
Analysis Type	LCS	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	2		07-Nov-2018

Run Information	**Run 1**
Filename	7-181102A03
Run Date	02-Nov-18 11:08
Final Volume	20 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSR304714H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	400	27.75	101	67-158	
1,2,3,7,8-PeCDD	2000	31.98	100	70-142	
1,2,3,4,7,8-HxCDD	2000	34.05	92	70-164	
1,2,3,6,7,8-HxCDD	2000	34.10	95	76-134	
1,2,3,7,8,9-HxCDD	2000	34.23	98	64-162	
1,2,3,4,6,7,8-HpCDD	2000	35.72	93	70-140	
OCDD	4000	37.21	92	78-144	
2,3,7,8-TCDF	400	26.83	85	75-158	
1,2,3,7,8-PeCDF	2000	31.03	93	80-134	
2,3,4,7,8-PeCDF	2000	31.75	89	68-160	
1,2,3,4,7,8-HxCDF	2000	33.56	94	72-134	
1,2,3,6,7,8-HxCDF	2000	33.62	96	84-130	
2,3,4,6,7,8-HxCDF	2000	33.95	91	70-156	
1,2,3,7,8,9-HxCDF	2000	34.37	98	78-130	
1,2,3,4,6,7,8-HpCDF	2000	35.16	90	82-122	
1,2,3,4,7,8,9-HpCDF	2000	35.96	95	78-138	
OCDF	4000	37.30	88	63-170	

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.74	19	20-175
13C12-1,2,3,7,8-PeCDD	4000	31.96	59	21-227
13C12-1,2,3,4,7,8-HxCDD	4000	34.04	57	21-193
13C12-1,2,3,6,7,8-HxCDD	4000	34.09	59	25-163
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.72	64	26-166
13C12-OCDD	8000	37.20	75	13-138
13C12-2,3,7,8-TCDF	4000	26.81	47	22-152
13C12-1,2,3,7,8-PeCDF	4000	31.02	51	21-192
13C12-2,3,4,7,8-PeCDF	4000	31.74	51	13-328
13C12-1,2,3,4,7,8-HxCDF	4000	33.54	51	19-202
13C12-1,2,3,6,7,8-HxCDF	4000	33.62	52	21-159
13C12-2,3,4,6,7,8-HxCDF	4000	33.94	53	17-205
13C12-1,2,3,7,8,9-HxCDF	4000	34.36	52	22-176
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.16	56	21-158
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.96	60	20-186

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.75	19	31-191

ALS Life Sciences
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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 Rd.
ALS WO#:	L2179971		Mississauga, ON
Date of Report	8-Nov-18		LYJ 2Y4
Date of Sample Receipt	12-Oct-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 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:

Ron McLeod, PhD
Director, Air Toxics & Special Chemistries, Life Sciences

ALS Life Sciences

Sample Analysis summary Report

Sample Name	18-21874-RC-4 RICH FEED	Duplicate	18-21874-LC-4 LEAN FEED	18-21874-AC-4 ALKALINE FEED	18-21874-EC-4 EMULSION FEED
ALS Sample ID	L2179971-1	WG2906906-5	L2179971-2	L2179971-3	L2179971-4
Sample Size	1.0043	1.0076	1.0027	1.0233	1.0511
Sample size units	g	g	g	g	g
Percent Moisture	n/a	n/a	n/a	n/a	n/a
Sample Matrix	Solid	QC	Solid	Solid	Solid
Sampling Date	n/a	n/a	n/a	n/a	n/a
Extraction Date	23-Oct-18	23-Oct-18	23-Oct-18	23-Oct-18	23-Oct-18
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**	**pg/g**
PCB-081	4.89	<4.9	<3.6	<1.0	<11
PCB-077	205	282	91.6	<1.1	84.6
PCB-123	79.2	101	<20	<0.85	46.1
PCB-118	4140	5820	1260	4.07	3740
PCB-114	119	153	<26	<0.81	<82
PCB-105	1870	2520	535	<1.6	1490
PCB-126	18.4	18.1	20.6	<0.84	15.0
PCB-167	177	243	63.4	<0.72	144
PCB-156/157	604	839	180	<0.96	527
PCB-169	<8.8	<11	<3.0	<0.80	<5.6
PCB-189	37.2	52.0	<9.5	<1.3	<33
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-PCB-001	49	31	39	24	38
13C12-PCB-003	41	27	39	23	37
13C12-PCB-004	63	39	54	31	55
13C12-PCB-015	44	34	58	28	52
13C12-PCB-019	64	23	61	36	83
13C12-PCB-037	69	43	65	32	63
13C12-PCB-054	46	24	77	40	88
13C12-PCB-081	67	42	65	38	67
13C12-PCB-077	66	40	65	40	65
13C12-PCB-104	58	40	81	38	59
13C12-PCB-123	64	39	62	40	64
13C12-PCB-118	61	36	60	41	63
13C12-PCB-114	63	38	60	41	64
13C12-PCB-105	59	37	59	44	65
13C12-PCB-126	56	35	54	42	65
13C12-PCB-155	69	37	78	40	73
13C12-PCB-167	88	43	69	66	68
13C12-PCB-156/157	82	41	73	67	70
13C12-PCB-169	73	39	77	70	78
13C12-PCB-188	98	45	92	70	77
13C12-PCB-189	65	34	72	65	72
13C12-PCB-202	107	51	93	86	91
13C12-PCB-205	57	43	71	53	75
13C12-PCB-208	64	36	66	60	80
13C12-PCB-206	86	52	88	60	87
13C12-PCB-209	74	39	89	60	79
Cleanup Standards					
13C12-PCB-028	59	38	56	29	56
13C12-PCB-111	65	37	61	36	61
13C12-PCB-178	64	43	75	62	68
Homologue Group Totals					
Total MonoCB	13800	18200	20700	9.86	4700
Total DiCB	16100	19700	3320	4.66	4060
Total TriCB	6980	11400	2000	9.33	2930
Total TetraCB	13600	20500	4230	10.2	8990
Total PentaCB	30400	42500	9680	12.3	26500
Total HexaCB	20600	31000	7310	8.42	17100
Total HeptaCB	7540	11000	1940	6.60	5150
Total OctaCB	1270	1740	368	2.00	1140
Total NonaCB	222	313	55.4	<1.9	118
DecaCB	305	415	161	<1.8	191
Total PCB	111000	157000	49800	63.4	70800
Toxic Equivalency - (WHO 2005)					
Lower Bound PCB TEQ	2.07	2.13	2.13	0.000122	1.69
Mid Point PCB TEQ	2.34	2.46	2.22	0.0544	1.78
Upper Bound PCB TEQ	2.34	2.46	2.22	0.109	1.86

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Quality Control Summary Report

Sample Name	Method Blank
ALS Sample ID	WG2906906-1
Sample Size	1.00
Sample size units	g
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	23-Oct-18

Target Analytes	pg/g
PCB-081	<0.71
PCB-077	<0.74
PCB-123	<1.1
PCB-118	2.30
PCB-114	<1.0
PCB-105	<0.95
PCB-126	<0.99
PCB-167	<0.52
PCB-156/157	<0.69
PCB-169	<0.50
PCB-189	<0.75
Extraction Standards	**% Rec**
13C12-PCB-001	30
13C12-PCB-003	28
13C12-PCB-004	33
13C12-PCB-015	28
13C12-PCB-019	35
13C12-PCB-037	35
13C12-PCB-054	48
13C12-PCB-081	47
13C12-PCB-077	48
13C12-PCB-104	42
13C12-PCB-123	48
13C12-PCB-118	49
13C12-PCB-114	48
13C12-PCB-105	51
13C12-PCB-126	53
13C12-PCB-155	45
13C12-PCB-167	55
13C12-PCB-156/157	58
13C12-PCB-169	67
13C12-PCB-188	52
13C12-PCB-189	75
13C12-PCB-202	62
13C12-PCB-205	59
13C12-PCB-208	55
13C12-PCB-206	63
13C12-PCB-209	69
Cleanup Standards	
13C12-PCB-028	35
13C12-PCB-111	41
13C12-PCB-178	48

Homologue Group Totals	
Total MonoCB	1.50
Total DiCB	8.20
Total TriCB	4.40
Total TetraCB	6.61
Total PentaCB	6.68
Total HexaCB	3.15
Total HeptaCB	3.13
Total OctaCB	2.20
Total NonaCB	<0.86
DecaCB	0.690
Total PCB	36.6
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0000690
Mid Point PCB TEQ	0.0573
Upper Bound PCB TEQ	0.115

ALS Life Sciences

Sample Analysis summary Report

Sample Name	Laboratory Control Sample
ALS Sample ID	WG2906906-2
Sample Size	1
Sample size units	n/a
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	23-Oct-18
Target Analytes	**% Rec**
PCB-001	113
PCB-003	111
PCB-004	95
PCB-015	113
PCB-019	96
PCB-037	97
PCB-054	99
PCB-081	99
PCB-077	102
PCB-104	91
PCB-123	109
PCB-118	111
PCB-114	110
PCB-105	104
PCB-126	108
PCB-155	94
PCB-167	90
PCB-156/157	92
PCB-169	91
PCB-188	91
PCB-189	108
PCB-202	98
PCB-205	107
PCB-208	96
PCB-206	101
PCB-209	109
Extraction Standards	**% Rec**
13C12-PCB-001	45
13C12-PCB-003	42
13C12-PCB-004	50
13C12-PCB-015	43
13C12-PCB-019	54
13C12-PCB-037	47
13C12-PCB-054	69
13C12-PCB-081	59
13C12-PCB-077	61
13C12-PCB-104	75
13C12-PCB-123	64
13C12-PCB-118	62
13C12-PCB-114	62
13C12-PCB-105	66
13C12-PCB-126	71
13C12-PCB-155	63
13C12-PCB-167	77
13C12-PCB-156/157	81
13C12-PCB-169	97
13C12-PCB-188	72
13C12-PCB-189	111
13C12-PCB-202	88
13C12-PCB-205	81
13C12-PCB-208	80
13C12-PCB-206	85
13C12-PCB-209	89
Field Spike Standards	
13C12-PCB-031	0
13C12-PCB-095	0
13C12-PCB-153	1
Cleanup Standards	
13C12-PCB-028	96
13C12-PCB-111	106
13C12-PCB-178	135

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Sample Analysis Report

Sample Name	**18-21874-RC-4 RICH FEED**	Sampling Date	n/a		
ALS Sample ID	L2179971-1	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1668C	Sample Size	1.0043	g	*E. Sabljic*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Solid	Split Ratio	2		02-Nov-2018

Run Information	**Run 1**
Filename	5-181028A10
Run Date	29-Oct-18 00:21
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	21.88	4.89	1.4	M,J		50
PCB-077	0.0001	22.18	205	1.6			50
PCB-123	0.00003	23.14	79.2	2.7	M		50
PCB-118	0.00003	23.32	4140	2.6			50
PCB-114	0.00003	23.64	119	2.6			50
PCB-105	0.00003	23.99	1870	2.8			50
PCB-126	0.1	25.57	18.4	3.1	M,J		50
PCB-167	0.00003	26.47	177	1.9			50
PCB-156/157	0.00003	27.09	604	2.8			100
PCB-169	0.03	28.75	<8.8	2.8	J,R	8.8	50
PCB-189	0.00003	30.04	37.2	2.8	J		50

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.93	49	5-145
13C12-PCB-003	4000	10.48	41	5-145
13C12-PCB-004	4000	10.64	63	5-145
13C12-PCB-015	4000	14.37	44	5-145
13C12-PCB-019	4000	12.67	64	5-145
13C12-PCB-037	4000	18.30	69	5-145
13C12-PCB-054	4000	14.55	46	5-145
13C12-PCB-081	4000	21.87	67	10-145
13C12-PCB-077	4000	22.17	66	10-145
13C12-PCB-104	4000	17.58	58	10-145
13C12-PCB-123	4000	23.16	64	10-145
13C12-PCB-118	4000	23.31	61	10-145
13C12-PCB-114	4000	23.63	63	10-145
13C12-PCB-105	4000	23.98	59	10-145
13C12-PCB-126	4000	25.56	56	10-145
13C12-PCB-155	4000	20.56	69	10-145
13C12-PCB-167	4000	26.45	88	10-145
13C12-PCB-156/157	8000	27.09	82	10-145
13C12-PCB-169	4000	28.75	73	10-145
13C12-PCB-188	4000	23.54	98	10-145
13C12-PCB-189	4000	30.02	65	10-145
13C12-PCB-202	4000	26.32	107	10-145
13C12-PCB-205	4000	31.44	57	10-145
13C12-PCB-208	4000	29.74	64	10-145
13C12-PCB-206	4000	32.50	86	10-145
13C12-PCB-209	4000	33.63	74	10-145

Cleanup Standards				
13C12-PCB-028	4000	16.05	59	5-145
13C12-PCB-111	4000	22.08	65	10-145
13C12-PCB-178	4000	25.13	64	10-145

Homologue Group Totals				
Total MonoCB	13800	2.4	J	200
Total DiCB	16100	1.1	J	400
Total TriCB	6980	0.72	J	400
Total TetraCB	13600	1.0	J	800
Total PentaCB	30400	0.55	J	800
Total HexaCB	20600	0.45	J	800
Total HeptaCB	7540	0.74	J	400
Total OctaCB	1270	0.74	J	400
Total NonaCB	222	1.9	J	200
DecaCB	305	1.2	J	200
Total PCB	111000		J	1600

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	2.07
Mid Point PCB TEQ	2.34
Upper Bound PCB TEQ	2.34

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	**Duplicate**	Sampling Date	n/a		
ALS Sample ID	WG2906906-5	Extraction Date	23-Oct-18		Approved:
Analysis Method	EPA 1668C	Sample Size	1.0076	g	*E. Sabijic*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	QC	Split Ratio	2		02-Nov-2018

Run Information	**Run 1**
Filename	5-181028A11
Run Date	29-Oct-18 01:00
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	21.85	<4.9	1.9	M,J,R	4.9	50
PCB-077	0.0001	22.17	282	2.1			50
PCB-123	0.00003	23.13	101	2.5	M		50
PCB-118	0.00003	23.31	5820	2.4			50
PCB-114	0.00003	23.61	153	2.5			50
PCB-105	0.00003	23.98	2520	2.5			50
PCB-126	0.1	25.56	18.1	2.9	J		50
PCB-167	0.00003	26.44	243	2.3			50
PCB-156/157	0.00003	27.07	839	3.3			99
PCB-169	0.03	28.71	<11	3.1	J,R	11	50
PCB-189	0.00003	30.01	52.0	3.9			50

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.93	31	5-145
13C12-PCB-003	4000	10.46	27	5-145
13C12-PCB-004	4000	10.64	39	5-145
13C12-PCB-015	4000	14.35	34	5-145
13C12-PCB-019	4000	12.70	23	5-145
13C12-PCB-037	4000	18.29	43	5-145
13C12-PCB-054	4000	14.53	24	5-145
13C12-PCB-081	4000	21.85	42	10-145
13C12-PCB-077	4000	22.16	40	10-145
13C12-PCB-104	4000	17.57	40	10-145
13C12-PCB-123	4000	23.13	39	10-145
13C12-PCB-118	4000	23.30	36	10-145
13C12-PCB-114	4000	23.60	38	10-145
13C12-PCB-105	4000	23.96	37	10-145
13C12-PCB-126	4000	25.55	35	10-145
13C12-PCB-155	4000	20.55	37	10-145
13C12-PCB-167	4000	26.43	43	10-145
13C12-PCB-156/157	8000	27.07	41	10-145
13C12-PCB-169	4000	28.73	39	10-145
13C12-PCB-188	4000	23.53	45	10-145
13C12-PCB-189	4000	29.99	34	10-145
13C12-PCB-202	4000	26.30	51	10-145
13C12-PCB-205	4000	31.39	43	10-145
13C12-PCB-208	4000	29.71	36	10-145
13C12-PCB-206	4000	32.46	52	10-145
13C12-PCB-209	4000	33.57	39	10-145

Cleanup Standards				
13C12-PCB-028	4000	16.04	38	5-145
13C12-PCB-111	4000	22.07	37	10-145
13C12-PCB-178	4000	25.10	43	10-145

Homologue Group Totals				
Total MonoCB	18200	84	J	200
Total DiCB	19700	0.86	J	400
Total TriCB	11400	0.68	J	400
Total TetraCB	20500	1.3	J	790
Total PentaCB	42500	0.91	J	790
Total HexaCB	31000	1.5	J	790
Total HeptaCB	11000	1.9	J	400
Total OctaCB	1740	2.3	J	400
Total NonaCB	313	4.9	J	200
DecaCB	415	3.5	J	200
Total PCB	157000		J	1600

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	2.13
Mid Point PCB TEQ	2.46
Upper Bound PCB TEQ	2.46

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

Sample Analysis Report

Sample Name	**18-21874-LC-4 LEAN FEED**		Sampling Date	n/a	
ALS Sample ID	L2179971-2		Extraction Date	23-Oct-18	
Analysis Method	EPA 1668C		Sample Size	1.0027	g
Analysis Type	Sample		Percent Moisture	n/a	
Sample Matrix	Solid		Split Ratio	2	

Approved:
E. Sabljic
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	5-181028A12
Run Date	29-Oct-18 01:40
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	21.81	<3.6	1.0	J,R	3.6	50
PCB-077	0.0001	22.12	91.6	1.1			50
PCB-123	0.00003	23.09	<20	0.92	M,J,R	20	50
PCB-118	0.00003	23.28	1260	0.89			50
PCB-114	0.00003	23.58	<26	0.93	J,R	26	50
PCB-105	0.00003	23.93	535	0.91			50
PCB-126	0.1	25.52	20.6	1.1	M,J		50
PCB-167	0.00003	26.41	63.4	0.87			50
PCB-156/157	0.00003	27.02	180	1.2			100
PCB-169	0.03	28.67	<3.0	0.93	J,R	3.0	50
PCB-189	0.00003	29.96	<9.5	0.99	J,R	9.5	50

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.92	39	5-145
13C12-PCB-003	4000	10.45	39	5-145
13C12-PCB-004	4000	10.62	54	5-145
13C12-PCB-015	4000	14.29	58	5-145
13C12-PCB-019	4000	12.63	61	5-145
13C12-PCB-037	4000	18.23	65	5-145
13C12-PCB-054	4000	14.48	77	5-145
13C12-PCB-081	4000	21.81	65	10-145
13C12-PCB-077	4000	22.11	65	10-145
13C12-PCB-104	4000	17.52	81	10-145
13C12-PCB-123	4000	23.09	62	10-145
13C12-PCB-118	4000	23.26	60	10-145
13C12-PCB-114	4000	23.57	60	10-145
13C12-PCB-105	4000	23.92	59	10-145
13C12-PCB-126	4000	25.50	54	10-145
13C12-PCB-155	4000	20.51	78	10-145
13C12-PCB-167	4000	26.38	69	10-145
13C12-PCB-156/157	8000	27.03	73	10-145
13C12-PCB-169	4000	28.68	77	10-145
13C12-PCB-188	4000	23.49	92	10-145
13C12-PCB-189	4000	29.94	72	10-145
13C12-PCB-202	4000	26.26	93	10-145
13C12-PCB-205	4000	31.34	71	10-145
13C12-PCB-208	4000	29.67	66	10-145
13C12-PCB-206	4000	32.40	88	10-145
13C12-PCB-209	4000	33.52	89	10-145

Cleanup Standards				
13C12-PCB-028	4000	15.99	56	5-145
13C12-PCB-111	4000	22.03	61	10-145
13C12-PCB-178	4000	25.06	75	10-145

Homologue Group Totals				
Total MonoCB	20700	0.53	J	200
Total DiCB	3320	0.37	J	400
Total TriCB	2000	0.44	J	400
Total TetraCB	4230	0.38	J	800
Total PentaCB	9680	0.32	J	800
Total HexaCB	7310	0.41	J	800
Total HeptaCB	1940	0.99	J	400
Total OctaCB	368	0.82	J	400
Total NonaCB	55.4	1.5	J	200
DecaCB	161	1.0	J	200
Total PCB	49800		J	1600

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	2.13
Mid Point PCB TEQ	2.22
Upper Bound PCB TEQ	2.22

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

Sample Analysis Report

Sample Name	**18-21874-AC-4 ALKALINE FEED**	Sampling Date	n/a	
ALS Sample ID	L2179971-3	Extraction Date	23-Oct-18	
Analysis Method	EPA 1668C	Sample Size	1.0233 g	Approved:
Analysis Type	Sample	Percent Moisture	n/a	*E. Sabljic*
Sample Matrix	Solid	Split Ratio	2	--e-signature--
				02-Nov-2018

Run Information	**Run 1**
Filename	5-181028A13
Run Date	29-Oct-18 02:20
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<1.0	1.0	U		49
PCB-077	0.0001	NotFnd	<1.1	1.1	U		49
PCB-123	0.00003	NotFnd	<0.85	0.85	U		49
PCB-118	0.00003	23.28	4.07	0.77	J,B		49
PCB-114	0.00003	NotFnd	<0.81	0.81	U		49
PCB-105	0.00003	23.92	<1.6	0.74	M,J,R	1.6	49
PCB-126	0.1	NotFnd	<0.84	0.84	U		49
PCB-167	0.00003	NotFnd	<0.72	0.72	U		49
PCB-156/157	0.00003	NotFnd	<0.96	0.96	U		98
PCB-169	0.03	NotFnd	<0.80	0.80	U		49
PCB-189	0.00003	NotFnd	<1.3	1.3	U		49

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.92	24	5-145
13C12-PCB-003	4000	10.44	23	5-145
13C12-PCB-004	4000	10.62	31	5-145
13C12-PCB-015	4000	14.29	28	5-145
13C12-PCB-019	4000	12.62	36	5-145
13C12-PCB-037	4000	18.23	32	5-145
13C12-PCB-054	4000	14.47	40	5-145
13C12-PCB-081	4000	21.80	38	10-145
13C12-PCB-077	4000	22.10	40	10-145
13C12-PCB-104	4000	17.52	38	10-145
13C12-PCB-123	4000	23.08	40	10-145
13C12-PCB-118	4000	23.25	41	10-145
13C12-PCB-114	4000	23.55	41	10-145
13C12-PCB-105	4000	23.92	44	10-145
13C12-PCB-126	4000	25.50	42	10-145
13C12-PCB-155	4000	20.48	40	10-145
13C12-PCB-167	4000	26.38	66	10-145
13C12-PCB-156/157	8000	27.02	67	10-145
13C12-PCB-169	4000	28.67	70	10-145
13C12-PCB-188	4000	23.48	70	10-145
13C12-PCB-189	4000	29.93	65	10-145
13C12-PCB-202	4000	26.25	86	10-145
13C12-PCB-205	4000	31.33	53	10-145
13C12-PCB-208	4000	29.66	60	10-145
13C12-PCB-206	4000	32.39	60	10-145
13C12-PCB-209	4000	33.49	60	10-145

Cleanup Standards				
13C12-PCB-028	4000	15.98	29	5-145
13C12-PCB-111	4000	22.01	36	10-145
13C12-PCB-178	4000	25.05	62	10-145

Homologue Group Totals				
Total MonoCB	9.86	0.43	J	200
Total DiCB	4.66	0.64	J	390
Total TriCB	9.33	0.54	J	390
Total TetraCB	10.2	0.45	J	780
Total PentaCB	12.3	0.49	J	780
Total HexaCB	8.42	0.67	J	780
Total HeptaCB	6.60	0.67	J	390
Total OctaCB	2.00	0.98	J	390
Total NonaCB	<1.9	1.9	U	200
DecaCB	<1.8	1.8	U	200
Total PCB	63.4		J	1600

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.000122
Mid Point PCB TEQ	0.0544
Upper Bound PCB TEQ	0.109

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.
B	Indicates that this target was detected in the blank at greater than 10% of the sample 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	**18-21874-EC-4 EMULSION FEED**		Sampling Date	n/a	
ALS Sample ID	L2179971-4		Extraction Date	23-Oct-18	
Analysis Method	EPA 1668C		Sample Size	1.0511	g
Analysis Type	Sample		Percent Moisture	n/a	
Sample Matrix	Solid		Split Ratio	2	

Approved:
E. Sabljic
--e-signature--
02-Nov-2018

Run Information	**Run 1**
Filename	5-181101A05
Run Date	01-Nov-18 13:38
Final Volume	25 ul
Dilution Factor	10
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL62502-01B

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<11	11	U		480
PCB-077	0.0001	22.03	84.6	12	J		480
PCB-123	0.00003	23.03	46.1	8.2	M,J		480
PCB-118	0.00003	23.22	3740	8.0	M		480
PCB-114	0.00003	23.51	<82	8.2	J,R	82	480
PCB-105	0.00003	23.86	1490	7.8			480
PCB-126	0.1	25.44	15.0	8.1	M,J		480
PCB-167	0.00003	26.37	144	5.2	J		480
PCB-156/157	0.00003	26.97	527	6.6	J		950
PCB-169	0.03	28.64	<5.6	5.6	M,U	5.3	480
PCB-189	0.00003	29.93	<33	5.8	J,R	33	480

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.76	38	5-145
13C12-PCB-003	4000	10.30	37	5-145
13C12-PCB-004	4000	10.48	55	5-145
13C12-PCB-015	4000	14.18	52	5-145
13C12-PCB-019	4000	12.49	83	5-145
13C12-PCB-037	4000	18.13	63	5-145
13C12-PCB-054	4000	14.37	88	5-145
13C12-PCB-081	4000	21.72	67	10-145
13C12-PCB-077	4000	22.02	65	10-145
13C12-PCB-104	4000	17.46	59	10-145
13C12-PCB-123	4000	23.03	64	10-145
13C12-PCB-118	4000	23.20	63	10-145
13C12-PCB-114	4000	23.49	64	10-145
13C12-PCB-105	4000	23.84	65	10-145
13C12-PCB-126	4000	25.43	65	10-145
13C12-PCB-155	4000	20.49	73	10-145
13C12-PCB-167	4000	26.36	68	10-145
13C12-PCB-156/157	8000	26.97	70	10-145
13C12-PCB-169	4000	28.63	78	10-145
13C12-PCB-188	4000	23.46	77	10-145
13C12-PCB-189	4000	29.92	72	10-145
13C12-PCB-202	4000	26.22	91	10-145
13C12-PCB-205	4000	31.31	75	10-145
13C12-PCB-208	4000	29.66	80	10-145
13C12-PCB-206	4000	32.40	87	10-145
13C12-PCB-209	4000	33.54	79	10-145

Cleanup Standards				
13C12-PCB-028	4000	15.90	56	5-145
13C12-PCB-111	4000	21.98	61	10-145
13C12-PCB-178	4000	25.03	68	10-145

Homologue Group Totals

Total MonoCB	4700	8.5	J	1900
Total DiCB	4060	41	J	3800
Total TriCB	2930	10	J	3800
Total TetraCB	8990	5.7	J	7600
Total PentaCB	26500	5.1	J	7600
Total HexaCB	17100	3.2	J	7600
Total HeptaCB	5150	4.3	J	3800
Total OctaCB	1140	3.6	J	3800
Total NonaCB	118	13	J	1900
DecaCB	191	4.5	J	1900
Total PCB	70800		J	15000

Toxic Equivalency - (WHO 2005)

Lower Bound PCB TEQ	1.69
Mid Point PCB TEQ	1.78
Upper Bound PCB TEQ	1.86

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

APPENDIX 12

Acid Gases Train Recovery Data Sheet
(1 page)

ORTECH Environmental Recovery & Sample Log
Method 26
Incinerator Stack

Client: Clean Harbors Sarnia
Job/Report Number: 21874
Received By: CHRIS RECORE
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21874 - J2526

Test Number	ORTECH Sample ID 18-21874-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	09 25 18	0.1N H2SO4	30.0	116	86	25	141	Halides
	2	09 25 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
2	3	09 26 18	0.1N H2SO4	30.0	110	80	26	136	Halides
	4	09 26 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
3	5	09 27 18	0.1N H2SO4	30.0	113	83	25	138	Halides
	6	09 27 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
Blank	7	09 26 18	0.1N H2SO4	30.0	30	0	25	55	Halides
	8	09 26 18	0.1N NaOH	15.0	15	0	6	21	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: _____ **Date:** _____

Relinquished to: _____ **Date:** _____

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#:	L2174374		Mississauga, ON l5J 2Y4
Date of Report	5-Nov-18		Canada
Date of Sample Receipt	28-Oct-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS:

F as HF Anion Analysed via Ion Chromatography USEPA Method 26 (PE 26-Oct-18)
Cl as HCl Anion Analysed via Ion Chromatography USEPA Method 26 (PE 26-Oct-18)
Br as HBr Anion Analysed via Ion Chromatography USEPA Method 26 (PE 26-Oct-18)
I as HI Anion Analysed via Ion Chromatography USEPA Method 26 (PE 2-Nov-18)

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	18-21874-M26-1 TEST#1	18-21874-M26-3 TEST#2	18-21874-M26-5 TEST#3	18-21874-M26-7 BLANK
	ALS Sample ID	L2173474-1	L2173474-3	L2173474-5	L2173474-7
	Matrix	Stack	Stack	Stack	Stack
	Analysis type	Sample	Sample	Sample	Sample
	Sampling Date/Time	25-Sep-18	26-Sep-18	27-Sep-18	26-Sep-18
	Date of Receipt	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
	Ion Chromatography Analysis				
	USEPA Method 26	**mg**	**mg**	**mg**	**mg**
	Total F^- as HF (ave)	1.07	0.910	0.858	<0.0786
	Analysis 1	1.07	0.908	0.858	<0.0786
F	Analysis 2	1.06	0.912	0.858	<0.0786
	Total Cl^- as HCl (ave)	1.82	1.62	1.57	<0.115
	Analysis 1	1.82	1.62	1.57	<0.115
	Analysis 2	1.82	1.63	1.57	<0.115
	Total Br^- as HBr (ave)	<0.950	0.994	<0.936	<0.380
	Analysis 1	<0.950	0.996	<0.936	<0.380
	Analysis 2	<0.950	0.993	0.939	<0.380
	Total I^- as HI (ave)	0.533	0.463	0.555	<0.0282
	Analysis 1	0.533	0.463	0.555	<0.0282
	Analysis 2	0.533	0.463	0.555	<0.0282

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 26	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	<0.00702	0.0530	99%
Analysis 1	<0.00702	0.0533	
F Analysis 2	<0.00702	0.0528	
Total Cl^- as HCl (ave)	<0.0103	0.0761	97%
Analysis 1	<0.0103	0.0764	
Analysis 2	<0.0103	0.0757	
Total Br^- as HBr (ave)	<0.0339	0.246	96%
Analysis 1	<0.0339	0.247	
Analysis 2	<0.0339	0.246	
Total I^- as HI (ave)	<0.00252	0.0733	97%
Analysis 1	<0.00252	0.0733	
Analysis 2	<0.00252	0.0733	

ALS Environmental

Sample QC Summary Report

Sample Name	18-21874-M26-1 TEST#1	18-21874-M26-1 TEST#1	18-21874-M26-1 TEST#1	18-21874-M26-1 TEST#1
ALS Sample ID	L2173474-1	L2173474-1DUP	L2173474-1MS	L2173474-1MS
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date/Time	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18
Date of Receipt	28-Sep-18	28-Sep-18	28-Sep-18	28-Sep-18
Ion Chromatography Analysis				
USEPA Method 26	**mg**	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	1.07	1.09	2.57	102%
Analysis 1	1.07	1.10	2.57	
F Analysis 2	1.06	1.08	2.58	
Total Cl^- as HCl (ave)	1.82	1.85	4.01	101%
Analysis 1	1.82	1.87	4.01	
Analysis 2	1.82	1.84	4.00	
Total Br^- as HBr (ave)	<0.950	<0.950	7.64	98%
Analysis 1	<0.950	<0.950	7.65	
Analysis 2	<0.950	<0.950	7.63	
Total I^- as HI (ave)	0.533	0.546	2.57	96%
Analysis 1	0.533	0.546	2.57	
Analysis 2	0.533	0.546	2.57	

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 28-SEP-18
Report Date: 05-NOV-18 16:51 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2173474
Project P.O. #: 21874-J2526
Job Reference: 21874 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
L2173474-2 18-21874-M26-2 TEST#1 Sampled By: Client on 25-SEP-18 Matrix: Stack **Miscellaneous Parameters** Cyanide, Total	<20	DLM	20	ug	16-OCT-18	18-OCT-18	R4285114
L2173474-4 18-21874-M26-4 TEST#2 Sampled By: Client on 26-SEP-18 Matrix: Stack **Miscellaneous Parameters** Cyanide, Total	<20	DLM	20	ug	16-OCT-18	18-OCT-18	R4285114
L2173474-6 18-21874-M26-6 TEST#3 Sampled By: Client on 27-SEP-18 Matrix: Stack **Miscellaneous Parameters** Cyanide, Total	<20	DLM	20	ug	16-OCT-18	18-OCT-18	R4285114
L2173474-8 18-21874-M26-8 BLANK Sampled By: Client on 26-SEP-18 Matrix: Stack **Miscellaneous Parameters** Cyanide, Total	<20	DLM	20	ug	16-OCT-18	18-OCT-18	R4285114

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

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.

Quality Control Report

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 R4285114								
WG2905008-3 DUP		**L2173474-2**						
Cyanide, Total		<20	<20	RPD-NA	ug	N/A	25	18-OCT-18
WG2905008-2 LCS								
Cyanide, Total			88.0		%		70-130	18-OCT-18
Cyanide, Total			<0.020		ug		70-130	18-OCT-18
WG2905008-1 MB								
Cyanide, Total			<0.020		ug		0.02	18-OCT-18
WG2905008-4 MS		**L2173474-2**						
Cyanide, Total			88.6		%		70-130	18-OCT-18
Cyanide, Total			<0.020		ug		70-130	18-OCT-18

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.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Cyanides							
Cyanide, Total							
	2	25-SEP-18	18-OCT-18 14:00	14	23	days	EHT
	4	26-SEP-18	18-OCT-18 14:00	14	22	days	EHT
	6	27-SEP-18	18-OCT-18 14:00	14	21	days	EHT
	8	26-SEP-18	18-OCT-18 14:00	14	22	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 L2173474 were received on 28-SEP-18 13:00.

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
(15 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 Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L2172830		
Date of Report	16-Oct-18	**Client Contact:**	Chris Belore
Date of Sample Receipt	28-Sep-18	**Client Project ID:**	21874 Clean Harbors

COMMENTS: **VOCs via SW846 Method 5041A/8260C**

Ketone data by VOST analyses are estimated values only

L-3, L-5 and L-9 have siloxane interferences which are supressing the intertnal standard 1,4-Difluorobenzene. Therefore the targets that are reported relative to this internal standard (i.e carbon tetrachloride, benzene, trichloroethene, 1,2-dichloropropane and bromodichloromethane and 1,2-dichloroethane-d4) maybe biased high on these samples.

Certified by:

Ron McLeod, Ph.D.
Technical Director

ALS Environmental

Sample Analysis Summary Report

Sample Name	18-21874-VOST-1A/1B TEST#1		18-21874-VOST-3A/3B TEST#1		18-21874-VOST-4A/4B TEST#1		18-21874-VOST-6A/6B TEST#2		18-21874-VOST-7A/7B TEST#2		18-21874-VOST-8A/8B TEST#2	
ALS Sample ID	L2172830-1		L2172830-2		L2172830-3		L2172830-4		L2172830-5		L2172830-6	
Dilution Factor	1		1		1		1		1		1	
Sample units	sample		sample		sample		sample		sample		sample	
Moisture Content	n/a		n/a		n/a		n/a		n/a		n/a	
Matrix	VOST		VOST		VOST		VOST		VOST		VOST	
Sampling Date	25-Sep-18		25-Sep-18		25-Sep-18		26-Sep-18		26-Sep-18		26-Sep-18	
Extraction Date	10-Oct-18		10-Oct-18		10-Oct-18		10-Oct-18		10-Oct-18		10-Oct-18	
Target Analytes	**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	0.038		0.037		0.199		<0.02	U	0.053		0.063	
Vinyl Chloride	0.032	M	0.025		0.067		<0.02	U	0.035		0.047	
Bromomethane	0.29		0.252		0.507		<0.09	U	0.274		0.268	
Trichlorofluoromethane	<0.02	U	<0.02	U	0.031		<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	1.502		1.19		1.112		<0.1	U	1.026		1.225	
Methylene Chloride	0.565		1.437		1.093		2.346	E	1.544		1.444	
trans,1,2-Dichloroethene	<0.01	U	<0.01	U	0.045		<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	0.466		0.383		0.323		0.019		0.335		0.484	
Chloroform	0.035		0.027		0.032		<0.01	U	0.025		0.025	
1,1,1-Trichloroethane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Carbon Tetrachloride	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Benzene	0.848		0.705		0.632		0.402		0.634		0.554	
Trichloroethene	0.024		0.016		0.014		0.015		0.034		0.024	
1,2-Dichloropropane	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Bromodichloromethane	0.044		0.035		0.041		0.012		0.054		0.04	
Toluene	0.889		0.515		0.338		0.526		0.504		0.615	
Tetrachloroethene	0.016		0.031		0.019		<0.01	U	<0.01	U	<0.01	U
Chlorodibromomethane	0.039		0.035		0.028		0.032		0.04		0.035	
Ethylene Dibromide	<0.02	U	<0.02	U	0.021		<0.02	U	<0.02	U	<0.02	U
Ethylbenzene	0.09		0.052		0.071		0.041		0.045		0.048	
M&P-Xylene	0.328		0.189		0.216		0.291		0.139		0.133	
O-Xylene	0.086		0.055		0.058		0.077		0.04		0.037	
Styrene	0.179		0.121		0.135		0.107		0.062		0.626	
Bromoform	0.04		0.043		0.033		0.032		0.027		0.034	
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	0.043	M,R	<0.02	U	<0.02	U	0.021		<0.02	U	<0.02	U
Ethyl Acetate	0.187	EC	0.084	EC	0.132	EC	0.021	EC	0.164	EC	0.219	EC
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)	63.1		64.3		83.7		53.6		57.5		67.3	
Surrogate Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	113.4		99.4		75.8		90		129.8		85.4	R
d8-Toluene(SURR)	86.2		77.9		52.3		80.2		58.4		70.6	
4-Bromofluorobenzene(SURR)	99.5		93.7		118.5		104.5		94.9		93.8	
Internal Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Bromochloromethane	97.2		97.2		97.2		97.2		97.2		97.2	
1,4-Difluorobenzene	100.7		139.8		30.8	L	76.1		37.1	L	139.4	
d5-Chlorobenzene	104.8		141.8		61		82.1		85.1		170.9	

U	Indicates that this compound was not detected above the RL.
M	Indicates that a peak has been manually integrated.
EC	Indicates that this compound is an estimated concentration, concentration was calculated against the response factor of a related compound.
L	Indicates this value is below the control limit.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental

Sample Analysis Summary Report

Sample Name	18-21874-VOST-11A/11B TEST#3		18-21874-VOST-12A/12B TEST#3		18-21874-VOST-13A/13B TEST#3		18-21874-VOST-15A/15B TEST#3 FIELD		18-21874-VOST-16A/16B TRIP BLANK	
ALS Sample ID	L2172830-7		L2172830-8		L2172830-9		L2172830-10		L2172830-11	
Dilution Factor	1		1		1		1		1	
Sample units	sample		sample		sample		sample		sample	
Moisture Content	n/a		n/a		n/a		n/a		n/a	
Matrix	VOST		VOST		VOST		VOST		VOST	
Sampling Date	27-Sep-18		27-Sep-18		27-Sep-18		27-Sep-18		27-Sep-18	
Extraction Date	10-Oct-18		10-Oct-18		10-Oct-18		10-Oct-18		10-Oct-18	
Target Analytes	**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**		**ug/sample**	
Dichlorodifluoromethane	<0.02	U	0.069		0.072		<0.02	U	<0.02	U
Vinyl Chloride	<0.02	U	0.033	M	0.037		<0.02	U	<0.02	U
Bromomethane	<0.09	U	0.185		0.324		<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	0.931		1.396		0.937		<0.1	U	<0.1	U
Methylene Chloride	2.117	E	1.462	M	1.01		<0.1	U	<0.1	U
trans,1,2-Dichloroethene	0.019		0.015		0.014		<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	1.538		1.985	M	2.105	E	<0.01	U	<0.01	U
Chloroform	0.067		0.061		0.052		<0.01	U	<0.01	U
1,1,1-Trichloroethane	0.016		0.011		<0.01	U	<0.01	U	<0.01	U
Carbon Tetrachloride	<0.01	U	<0.01	U	<0.01	U	<0.01	U	<0.01	U
Benzene	0.52		0.402		0.57		<0.05	U	<0.05	U
Trichloroethene	0.552		0.283		0.275		<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	0.061		0.06		0.055		<0.01	U	<0.01	U
Toluene	1.773		1.817		1.071		<0.05	U	<0.05	U
Tetrachloroethene	1.793		1.602		0.731		<0.01	U	<0.01	U
Chlorodibromomethane	0.035		0.056		0.038		<0.01	U	<0.01	U
Ethylene Dibromide	<0.02	U	<0.02	U	<0.02	U	<0.02	U	<0.02	U
Ethylbenzene	0.281		0.376		0.246		<0.01	U	<0.01	U
M&P-Xylene	0.948		1.125		0.812		<0.03	U	<0.03	U
O-Xylene	0.274		0.371		0.247		<0.01	U	<0.01	U
Styrene	0.06		0.175		0.127		<0.02	U	<0.02	U
Bromoform	0.041		0.069		0.033		<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	0.069		0.076		0.051		<0.02	U	<0.02	U
1,2,4-Trimethylbenzene	0.185		0.19		0.134		<0.02	U	<0.02	U
Ethyl Acetate	2.362	E, EC	0.847	EC	0.528	EC	<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)	71.5		68.9		59		55.6		107.9	
Surrogate Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
d4-1,2-Dichloroethane(SURR)	88.9		93.7		115.8		97.6		99.3	
d8-Toluene(SURR)	85.3		84		59.8		95.5		72.3	
4-Bromofluorobenzene(SURR)	96.7		97.3		89.5		100.6		74.8	
Internal Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Bromochloromethane	106.7		97.2		106.7		97.2		97.2	
1,4-Difluorobenzene	90.1		151.2		29.8	L	163.7		121.3	
d5-Chlorobenzene	172.7		156.1		65		128.8		122.3	

U	Indicates that this compound was not detected above the RL.
M	Indicates that a peak has been manually integrated.
EC	Indicates that this compound is an estimated value, concentration was calculated against the response factor of a related compound.
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	WG2898017-1		WG2898017-2
Sample units	sample		n/a
Moisture Content	n/a		n/a
Matrix	QC		QC
Sampling Date	n/a		n/a
Extraction Date	10-Oct-18		10-Oct-18
Target Analytes	**ug/sample**		**% Rec**
Dichlorodifluoromethane	<0.02	U	102.8
Vinyl Chloride	<0.02	U	94.6
Bromomethane	<0.09	U	118.6
Trichlorofluoromethane	<0.02	U	96.9
1,1-Dichloroethene	<0.01	U	85.4
Acetone	<0.1	U	86.6
Methylene Chloride	<0.1	U	80.8
trans,1,2-Dichloroethene	<0.01	U	103.9
1,1-Dichloroethane	<0.01	U	104.8
2-Butanone	<0.01	U	69.1
Chloroform	<0.01	U	110.4
1,1,1-Trichloroethane	<0.01	U	110.4
Carbon Tetrachloride	<0.01	U	118
Benzene	<0.05	U	91.9
Trichloroethene	<0.01	U	104.6
1,2-Dichloropropane	<0.01	U	96.6
Bromodichloromethane	<0.01	U	122.9
Toluene	<0.05	U	88.6
Tetrachloroethene	<0.01	U	98.1
Chlorodibromomethane	<0.01	U	102.8
Ethylene Dibromide	<0.02	U	100
Ethylbenzene	<0.01	U	90.6
M&P-Xylene	<0.03	U	92.6
O-Xylene	<0.01	U	91.9
Styrene	<0.02	U	83.6
Bromoform	<0.01	U	114.1
Isopropylbenzene	<0.02	U	95.5
1,3,5-Trimethylbenzene	<0.02	U	95.3
1,2,4-Trimethylbenzene	<0.02	U	98.2
1,2,4-Trichlorobenzene	<0.02	U	101.1
Trichlorotrifluoroethane	<0.02	U	
Field Standard	**% Rec**		**% Rec**
d10-Ethylbenzene(SPK)	63.8		97.8
Surrogate Standards	**% Rec**		**% Rec**
d4-1,2-Dichloroethane(SURR)	100.5		64
d8-Toluene(SURR)	96.6		57.4
4-Bromofluorobenzene(SURR)	93.4		114.3
Internal Standards	**% Rec**		**% Rec**
Bromochloromethane	170.8		109.7
1,4-Difluorobenzene	158.4		123.2
d5-Chlorobenzene	120	M	169.9

M Indicates that a peak has been manually integrated.

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 12-OCT-18
Report Date: 26-OCT-18 17:52 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2179938

Project P.O. #: NOT SUBMITTED
Job Reference: 21874 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
L2179938-1 18-21874-FR-3 (RICH FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1300	RRR	1300	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	1820		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	7160		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<3500	DLQ	3500	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	2370		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	160		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	15600		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Note: RL raised due to Verification Standard failure.							
L2179938-2 18-21874-FL-3 (LEAN FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	150		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	565		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	194		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	1050		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-3 18-21874-FE-3 (EMULSION FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<2200	RRR	2200	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	2100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	8440		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<6500	DLQ	6500	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	2810		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	14500		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-4 18-21874-FA-3 (ALKALINE FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							

* 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
L2179938-4 18-21874-FA-3 (ALKALINE FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-5 18-21874-LW-3 (LEACHATE FEED) TEST#1							
Sampled By: Client on 25-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-6 18-21874-FR-8 (RICH FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	2360		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	9190		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<2200	DLQ	2200	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	3010		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	210		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	20800		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-7 18-21874-FL-8 (LEAN FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917

* 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
L2179938-7 18-21874-FL-8 (LEAN FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	151		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	54		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	290		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-8 18-21874-FE-8 (EMULSION FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1200	RRR	1200	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	880		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	3530		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<4600	DLQ	4600	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	1160		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	6010		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Note: RL raised due to Verification Standard failure.							
L2179938-9 18-21874-FA-8 (ALKALINE FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-10 18-21874-LW-8 (LEACHATE FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917

* 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
L2179938-10 18-21874-LW-8 (LEACHATE FEED) TEST#2							
Sampled By: Client on 26-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-11 18-21874-FR-13 (RICH FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1300	RRR	1300	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	1830		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	7170		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<4000	DLQ	4000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	2400		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	140		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	16300		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Note: RL raised due to Verification Standard failure.							
L2179938-12 18-21874-FL-13 (LEAN FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	530		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	2130		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	700		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	160		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	3710		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-13 18-21874-FE-13 (EMULSION FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1400	RRR	1400	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	1090		100	mg/kg	16-OCT-18	26-OCT-18	R4299917

* 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
L2179938-13 18-21874-FE-13 (EMULSION FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
m+p-Xylenes	4360		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<5100	DLQ	5100	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	1440		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	7630		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Note: RL raised due to Verification Standard failure.							
L2179938-14 18-21874-FA-13 (ALKALINE FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
L2179938-15 18-21874-LW-13 (LEACHATE FEED) TEST#3							
Sampled By: Client on 27-SEP-18							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<500		500	mg/kg	16-OCT-18	26-OCT-18	R4299917
1,2-Dichlorobenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethyl Acetate	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
Ethylbenzene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
m+p-Xylenes	<60		60	mg/kg	16-OCT-18	26-OCT-18	R4299917
Methyl Ethyl Ketone	<1000		1000	mg/kg	16-OCT-18	26-OCT-18	R4299917
o-Xylene	<40		40	mg/kg	16-OCT-18	26-OCT-18	R4299917
Tetrachloroethylene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Toluene	<100		100	mg/kg	16-OCT-18	26-OCT-18	R4299917
Surrogate: 1,4-Difluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917
Surrogate: 4-Bromofluorobenzene	N/A	SDO:RNA	50-150	%	16-OCT-18	26-OCT-18	R4299917

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
RRR	Refer to Report Remarks for issues regarding this analysis
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: L2179938 Report Date: 26-OCT-18

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 R4299917								
WG2904996-4 DUP		**L2179938-1**						
1,2,4-Trichlorobenzene		<500	<500	RPD-NA	mg/kg	N/A	50	26-OCT-18
1,2-Dichlorobenzene		<100	<100	RPD-NA	mg/kg	N/A	50	26-OCT-18
Ethyl Acetate		<1300	<1300	RPD-NA	mg/kg	N/A	50	26-OCT-18
Ethylbenzene		1820	1850		mg/kg	1.4	50	26-OCT-18
m+p-Xylenes		7160	7270		mg/kg	1.5	50	26-OCT-18
Methyl Ethyl Ketone		<3500	<4000	RPD-NA	mg/kg	N/A	50	26-OCT-18
o-Xylene		2370	2400		mg/kg	1.2	50	26-OCT-18
Tetrachloroethylene		160	160		mg/kg	1.5	50	26-OCT-18
Toluene		15600	15900		mg/kg	1.7	50	26-OCT-18
WG2904996-1 MB								
1,2,4-Trichlorobenzene			<500		mg/kg		500	26-OCT-18
1,2-Dichlorobenzene			<100		mg/kg		100	26-OCT-18
Ethyl Acetate			<1000		mg/kg		1000	26-OCT-18
Ethylbenzene			<100		mg/kg		100	26-OCT-18
m+p-Xylenes			<60		mg/kg		60	26-OCT-18
Methyl Ethyl Ketone			<1000		mg/kg		1000	26-OCT-18
o-Xylene			<40		mg/kg		40	26-OCT-18
Tetrachloroethylene			<100		mg/kg		100	26-OCT-18
Toluene			<100		mg/kg		100	26-OCT-18
Surrogate: 1,4-Difluorobenzene			0.0	SDO:RNA	%		50-150	26-OCT-18
Surrogate: 4-Bromofluorobenzene			0.0	SDO:RNA	%		50-150	26-OCT-18

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	25-SEP-18	16-OCT-18 00:00	7	21	days	EHTR
	2	25-SEP-18	16-OCT-18 00:00	7	21	days	EHTR
	3	25-SEP-18	16-OCT-18 00:00	7	21	days	EHTR
	4	25-SEP-18	16-OCT-18 00:00	7	21	days	EHTR
	5	25-SEP-18	16-OCT-18 00:00	7	21	days	EHTR
	6	26-SEP-18	16-OCT-18 00:00	7	20	days	EHTR
	7	26-SEP-18	16-OCT-18 00:00	7	20	days	EHTR
	8	26-SEP-18	16-OCT-18 00:00	7	20	days	EHTR
	9	26-SEP-18	16-OCT-18 00:00	7	20	days	EHTR
	10	26-SEP-18	16-OCT-18 00:00	7	20	days	EHTR
	11	27-SEP-18	16-OCT-18 00:00	7	19	days	EHTR
	12	27-SEP-18	16-OCT-18 00:00	7	19	days	EHTR
	13	27-SEP-18	16-OCT-18 00:00	7	19	days	EHTR
	14	27-SEP-18	16-OCT-18 00:00	7	19	days	EHTR
	15	27-SEP-18	16-OCT-18 00:00	7	19	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 L2179938 were received on 12-OCT-18 10:40.

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.

L2179938

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for ALS DRE Analysis

Test Number	Test Date	ORTECH Sample Identification	Sample Description
1	Sept 25, 18	18- 21874- FR-3	Rich Feed (250 ml bottle) 1
1		18- 21874- FL-3	Lean Feed (250 ml bottle) 2
1		18- 21874- FE-3	Emulsion Feed (250 ml bottle) 3
1		18- 21874- FA-3	Alkaline Feed (250 ml bottle) 4
1		18- 21874- LW-3	Leachate Feed (250 ml bottle) 5
2	Sept 26, 18	18- 21874- FR-8	Rich Feed (250 ml bottle) 6
2		18- 21874- FL-8	Lean Feed (250 ml bottle) 7
2		18- 21874- FE-8	Emulsion Feed (250 ml bottle) 8
2		18- 21874- FA-8	Alkaline Feed (250 ml bottle) 9
2		18- 21874- LW-8	Leachate Feed (250 ml bottle) 10
3	Sept 27, 18	18- 21874- FR-13	Rich Feed (250 ml bottle) 11
3		18- 21874- FL-13	Lean Feed (250 ml bottle) 12
3		18- 21874- FE-13	Emulsion Feed (250 ml bottle) 13
3		18- 21874- FA-13	Alkaline Feed (250 ml bottle) 14
3		18- 21874- LW-13	Leachate Feed (250 ml bottle) 15

Custody Relinquished by: _____ Date: oct 12, 18

Custody Received by: ARRAW BURTAW Date: 12-oct-2018

10:40

19.6°C

APPENDIX 15

Feed and Baghouse Dust Metals Analytical Report
(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#:	L2179959		Mississauga, ON L5J 2Y4
Date of Report	26-Oct-18		Canada
Date of Sample Receipt	12-Oct-18	**Client Contact:**	Chris Belore
		Client Project ID:	21874 Clean Harbors

COMMENTS:

Metals analysed via ICP-MS Method USEPA 6020A (SA 23-Oct-18)
Sample Preparation via Hotblock Digestion for Metals in Soils USEPA 200.2 (SA 23-Oct-18)

ANALYST COMMENTS:

S and Al recoveries in the MS cannot be quantified due to high concentrations of these target analytes in the sample, relative to the spiked amount. This is not expected to have an impact on data quality. **PE 26-Nov-18**

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			18-21874-RC-1 RICH FEED	18-21874-LC-1 LEAN FEED	18-21874-AC-1 ALKALINE FEED	18-21874-EC-1 EMULSION FEED	18-21874-BDC-1 BAGHOUSE DUST	18-21874-LWC-1 LEACHATE FEED
ALS Sample ID			L2179959-1	L2179959-2	L2179959-3	L2179959-4	L2179959-5	L2179959-6
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			12-Oct-18	12-Oct-18	12-Oct-18	12-Oct-18	12-Oct-18	12-Oct-18
Multi-Metals via ICP-MS		**LOR**						
		mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Solids								
	Aluminum	10	674	728	<	246	15400	<
	Antimony	0.4	20.0	2.22	<	16.3	109	<
	Arsenic	0.4	0.883	108	<	1.88	1300	1.98
	Barium	1	38.5	25.6	1.51	70.0	583	<
	Beryllium	0.5	<	<	<	<	<	<
	Boron	10	<	21.8	<	33.0	231	48.5
	Cadmium	0.1	0.739	7.41	<	3.88	126	2.23
	Calcium	50	523	982	57.8	924	16800	348
	Chromium	4	6.39	62.8	<	8.82	788	<
	Cobalt	1	1.20	2.42	<	3.92	36.9	<
	Copper	2.5	27.4	76.2	<	34.0	1260	<
	Iron	200	540	449	<	793	7980	<
	Lead	0.1	5.66	3.40	<	7.58	84.3	0.337
	Lithium	1	4.87	15.3	<	3.31	214	3.98
	Magnesium	15	89.4	251	84.1	99.7	4630	202
	Manganese	15	<	192	<	16.9	1650	<
	Molybdenum	1	4.72	5.38	<	17.7	149	7.34
	Nickel	0.5	18.6	51.3	<	12.7	645	4.03
	Phosphorus	100	<	985	<	161	12900	<
	Potassium	150	180	6890	<	494	120000	3810
	Selenium	2	<	6.23	<	2.89	59.8	<
	Silver	0.1	0.111	0.306	<	<	8.70	0.212
	Sodium	10	966	9800	57.0	4710	146000	15300
	Strontium	2	9.45	6.33	<	11.3	129	3.53
	Tin	2	3.82	3.18	<	4.00	36.9	<
	Titanium	1	11.5	35.6	<	6.10	1550	1.06
	Vanadium	1	17.2	2.00	<	7.21	151	1.68
	Zinc	20	59.7	104	<	127	1240	<
	Sulphur	3000	<	<	<	<	70300	3610
	Silicon	150	225	287	<	522	1428	<

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	<	61.0	89
	Antimony	0.4	<	6.57	98
	Arsenic	0.4	<	31.1	93
	Barium	1	<	31.3	94
	Beryllium	0.5	<	33.0	99
	Boron	10	<	32.3	98
	Cadmium	0.1	<	15.9	95
	Calcium	50	<	786	92
	Chromium	4	<	30.1	90
	Cobalt	1	<	30.5	92
	Copper	2.5	<	30.3	91
	Iron	200	<	<	92
	Lead	0.1	<	33.4	100
	Lithium	1	<	6.47	96
	Magnesium	15	<	143	86
	Manganese	15	<	30.9	90
	Molybdenum	1	<	15.5	92
	Nickel	0.5	<	29.8	90
	Phosphorus	100	<	759	88
	Potassium	150	<	808	96
	Selenium	2	<	31.2	94
	Silver	0.1	<	15.4	93
	Sodium	10	<	806	97
	Strontium	2	<	32.4	97
	Tin	2	<	16.3	98
	Titanium	1	<	29.5	89
	Vanadium	1	<	29.2	89
	Zinc	20	<	59.5	89
	Sulphur	3000	<	2510	112
	Silicon	150	<	4791	96

ALS Environmental

Sample QC Summary Report

Sample Name		18-21874-RC 1 RICH FEED	18-21874-RC 1 RICH FEED	18-21874-RC 1 RICH FEED	18-21874-RC 1 RICH FEED
ALS Sample ID		L2179959-1	L2179959-1	MS	MS
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date		n/a	n/a	n/a	n/a
Date of Receipt		12-Oct-18	12-Oct-18	12-Oct-18	12-Oct-18
Multi-Metals via ICP-MS	**LOR mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**% Rec**
Solids					
Aluminum	10	674	844	933	nq
Antimony	0.4	20.0	29.6	27.2	99
Arsenic	0.4	0.883	0.982	32.5	92
Barium	1	38.5	70.8	73.7	100
Beryllium	0.5	<	<	34.9	102
Boron	10	<	<	39.7	93
Cadmium	0.1	0.739	0.776	17.0	95
Calcium	50	523	499	1320	92
Chromium	4	6.39	7.91	39.0	95
Cobalt	1	1.20	1.48	33.0	93
Copper	2.5	27.4	29.1	60.0	93
Iron	200	540	763	728	103
Lead	0.1	5.66	6.40	38.9	97
Lithium	1	4.87	4.47	11.6	97
Magnesium	15	89.4	92.9	245	90
Manganese	15	<	<	39.0	94
Molybdenum	1	4.72	6.07	20.5	92
Nickel	0.5	18.6	21.7	54.0	102
Phosphorus	100	<	113	840	88
Potassium	150	180	152	938	88
Selenium	2	<	<	33.7	96
Silver	0.1	0.111	<	15.9	92
Sodium	10	966	867	1790	93
Strontium	2	9.45	10.8	42.3	95
Tin	2	3.82	4.77	20.7	98
Titanium	1	11.5	14.3	43.0	91
Vanadium	1	17.2	20.7	51.7	100
Zinc	20	59.7	66.1	125	93
Sulphur	3000	<	<	<	nq
Silicon	150	225	396	14346	97

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 12-OCT-18
Report Date: 26-NOV-18 15:11 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L2179959
Project P.O. #: NOT SUBMITTED
Job Reference: 21874 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
L2179959-1 18-21874-RC-1 RICH FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.340		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922
L2179959-2 18-21874-LC-1 LEAN FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.557		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922
L2179959-3 18-21874-AC-1 ALKALINE FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	<0.010		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922
L2179959-4 18-21874-EC-1 EMULSION FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	0.504		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922
L2179959-5 18-21874-BDC-1 BAGHOUSE DUST Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	9.71		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922
L2179959-6 18-21874-LWC-1 LEACHATE FEED Sampled By: Client Matrix: Stack **Miscellaneous Parameters** Mercury (Hg)	<0.010		0.010	mg/kg wwt	05-NOV-18	08-NOV-18	R4328922

* 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.

MET-WET-200.2-MS-BU	Solid	Metals in Solids by ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures adapted from US EPA method 200.2. A homogenized sample is digested in acidic media in an open vessel at high temperatures. Instrumental analysis follows using an ICP-MS. This method is not a total digestion technique.

** 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.

Quality Control Report

Workorder: L2179959 Report Date: 26-NOV-18

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 R4328922								
WG2924373-3 DUP		**L2179959-1**						
Mercury (Hg)		0.340	0.325		mg/kg wwt	4.5	20	08-NOV-18
WG2924373-2 LCS								
Mercury (Hg)			94.4		%		85-115	08-NOV-18
WG2924373-1 MB								
Mercury (Hg)			<0.010		mg/kg wwt		0.01	08-NOV-18
WG2924373-4 MS		**L2179959-1**						
Mercury (Hg)			N/A	MS-B	%		-	08-NOV-18

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.

L2179959

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for ALS Metals Analysis

ORTECH Sample Identification	Sample Description
18- 21874- RC-1	Rich Feed (500 ml bottle) 1
18- 21874- LC-1	Lean Feed (500 ml bottle) 2
18- 21874- AC-1	Alkaline Feed (500 ml bottle) 3
18- 21874- EC-1	Emulsion Feed (500 ml bottle) 4
18- 21874- BDC-1	Baghouse Dust (500 ml bottle) 5
18- 21874- LWC-1	Leachate Feed (500 ml bottle) 6

Custody Relinquished by: [signature] Date: oct 12, 18

Custody Received by: AARON BURTON Date: 12-oct-2018 10:40

19.6°C

APPENDIX 16

Master Sample Log/Chains of Custody Forms
(8 pages)

ORTECH Environmental Sample Log
Particulate and Metals Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21874
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21874 - J2526

ORTECH Sample ID 18-21874-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 A/4B		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
11A/11B		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 A! B		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: Sept 28/18

Relinquished To: AARON BURTON Date: 28-Sept-2018 13:00 9.4°C

ORTECH Environmental Sample Log
Semi-Volatile Organics Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21874
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21874 - J2526

ORTECH Sample ID 18-21874-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: [signature] Date: SEPT 28/18

Relinquished To: AARON BURTON Date: 28-~~Sept~~-2018 13:00 9.4°C

ORTECH Environmental Recovery & Sample Log
Method 26
Incinerator Stack

Client: Clean Harbors Sarnia
Job/Report Number: 21874
Received By: CHRIS RELOTE
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21874 - J2526

Test Number	ORTECH Sample ID 18-21874-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	09 25 18	0.1N H2SO4	30.0	116	86	25	141	Halides
	2	09 25 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
2	3	09 26 18	0.1N H2SO4	30.0	110	80	26	136	Halides
	4	09 26 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
3	5	09 27 18	0.1N H2SO4	30.0	113	83	25	138	Halides
	6	09 27 18	0.1N NaOH	15.0	15	0	6	21	Cyanide
Blank	7	09 26 18	0.1N H2SO4	30.0	30	0	25	55	Halides
	8	09 26 18	0.1N NaOH	15.0	15	0	6	21	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: SEPT 28/18 Date:

Relinquished to: AARON BURTON Date: 28-Sept-2018 13:00 9.4°C

ORTECH Environmental
Project # 21874
Vost Sample List
Clean Harbors Sarnia

Test Number	ORTECH Sample ID 18-21874-VOST-	Sample Date	Sample Description	Sample Analysis
1	1A/1B		Tenax and Tenax/Charcoal (Pair 1)	VOCs
1	2A/2B		Tenax and Tenax/Charcoal (Pair 2)	Archive
1	3A/3B		Tenax and Tenax/Charcoal (Pair 3)	VOCs
1	4A/4B		Tenax and Tenax/Charcoal (Pair 4)	VOCs
1	5A/5B		Field Blank	Archive
2	6A/6B		Tenax and Tenax/Charcoal (Pair 1)	VOCs
2	7A/7B		Tenax and Tenax/Charcoal (Pair 2)	VOCs
2	8A/8B		Tenax and Tenax/Charcoal (Pair 3)	VOCs
2	9A/9B		Tenax and Tenax/Charcoal (Pair 4)	Archive
2	10A/10B		Field Blank	Archive
3	11A/11B		Tenax and Tenax/Charcoal (Pair 1)	VOCs
3	12A/12B		Tenax and Tenax/Charcoal (Pair 2)	VOCs
3	13A/13B		Tenax and Tenax/Charcoal (Pair 3)	VOCs
4	14A/14B		Tenax and Tenax/Charcoal (Pair 4)	Archive
3	15A/15B		Field Blank	VOCs
Blank	16A/16B		Trip Blank	VOCs

* Archived samples to be held for future reference

Custody Relinquished by: SEPT 28/18 Date: SEPT 28/18

Custody Received by: Aaron Burton Date: 28-Sept-2018 13:00 9.4°C

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for ALS
for Dioxin, Furan and PCB analysis

ORTECH Sample Identification	Sample Description
18- 21874- RC-4	Rich Feed (500ml Bottle)
18- 21874- LC-4	Lean Feed (500ml Bottle)
18- 21874- AC-4	Alkaline Feed (500mL Bottle)
18- 21874- EC-4	Emulsion Feed(500ml Bottle)

Custody Relinquished by: [signature] Date: oct 12, 18

Custody Received by: ARRAN BURTON Date: 12-oct-2018 10:40

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for ALS Metals Analysis

ORTECH Sample Identification	Sample Description
18- 21874- RC-1	Rich Feed (500 ml bottle)
18- 21874- LC-1	Lean Feed (500 ml bottle)
18- 21874- AC-1	Alkaline Feed (500 ml bottle)
18- 21874- EC-1	Emulsion Feed (500 ml bottle)
18- 21874- BDC-1	Baghouse Dust (500 ml bottle)
18- 21874- LWC-1	Leachate Feed (500 ml bottle)

Custody Relinquished by: _____ Date: oct 12, 18

Custody Received by: AARON BURTON Date: 12-oct-208

10:40

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for ALS DRE Analysis

Test Number	Test Date	ORTECH Sample Identification	Sample Description
1	sept 25, 18	18- 21874- FR-3	Rich Feed (250 ml bottle)
1		18- 21874- FL-3	Lean Feed (250 ml bottle)
1		18- 21874- FE-3	Emulsion Feed (250 ml bottle)
1		18- 21874- FA-3	Alkaline Feed (250 ml bottle)
1		18- 21874- LW-3	Leachate Feed (250 ml bottle)
2	sept 26, 18	18- 21874- FR-8	Rich Feed (250 ml bottle)
2		18- 21874- FL-8	Lean Feed (250 ml bottle)
2		18- 21874- FE-8	Emulsion Feed (250 ml bottle)
2		18- 21874- FA-8	Alkaline Feed (250 ml bottle)
2		18- 21874- LW-8	Leachate Feed (250 ml bottle)
3	sept 27, 18	18- 21874- FR-13	Rich Feed (250 ml bottle)
3		18- 21874- FL-13	Lean Feed (250 ml bottle)
3		18- 21874- FE-13	Emulsion Feed (250 ml bottle)
3		18- 21874- FA-13	Alkaline Feed (250 ml bottle)
3		18- 21874- LW-13	Leachate Feed (250 ml bottle)

Custody Relinquished by: _____ Date: oct 12, 18

Custody Received by: ARRaw BURTAW Date: 12-oct-208 10:40

Clean Harbors Lambton
ORTECH Project # 21874
Process Samples
Sample List for Petro Labs

PO: 21874- J2542

Test Number	Test Date	ORTECH Sample Identification	Sample Description
1	sept 25, 18	18- 21874- FR-4	Rich Feed (250 ml bottle)
1		18- 21874- FL-4	Lean Feed (250 ml bottle)
1		18- 21874- FE-4	Emulsion Feed (250 ml bottle)
2	sept 26, 18	18- 21874- FR-9	Rich Feed (250 ml bottle)
2		18- 21874- FL-9	Lean Feed (250 ml bottle)
2		18- 21874- FE-9	Emulsion Feed (250 ml bottle)
3	sept 27, 18	18- 21874- FR-14	Rich Feed (250 ml bottle)
3		18- 21874- FL-14	Lean Feed (250 ml bottle)
3		18- 21874- FE-14	Emulsion Feed (250 ml bottle)

Custody Relinquished by: [signature] Date: oct 12, 18

Custody Received by: Date:

[signature] Linda

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= 0.2571 inches	Acceptable
Nozzle- Semi-Volatile Organics Train	for n=4 measurements high-low <0.10 mm	average= 0.2520/0.2566 inches	Acceptable
S-Type Pitot #15D (B03778) Metals Train	coefficient typically 0.84 ± 0.04	0.851	Acceptable
S-Type Pitot #S8/15A (B03769/B03775) Semi-Volatile Organics Train	coefficient typically 0.84 ± 0.04	0.840/0.847	Acceptable
Inclined Manometer # TEAM3 (COE20093) Metals Train	percentage difference within 5%	-0.9% to 0.8%	Acceptable
Inclined Manometer # TEAM1 (COE20094) Semi-Volatile Organics Train	percentage difference within 5%	-0.4% to 0.8%	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
Dry Gas Meter # TEAM3 (COE20093) Metals Train	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 1.003	Acceptable
Dry Gas Meter (M05498) Acid Gases/VOST Trains	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 0.980 (2 lpm) DGMCF: 0.994 (1 lpm)	Acceptable
Dry Gas Meter # TEAM1 (COE20094) Semi-Volatile Organics Train	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 1.006	Acceptable
Trendicator (COE20093)	±1.5% of actual value	-0.4% to 0%	Acceptable
Trendicator (COE20094)	±1.5% of actual value	-0.5% to 0.1%	Acceptable
Trendicator (M05498) (temperature readout)	±1.5% of actual value	0% to 0.7%	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%	105.3	0	0	Acceptable
2	100 ± 10%	101.1	0	0	Acceptable
3	100 ± 10%	100.3	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%	102.4	0	0	Acceptable
2	100 ± 10%	101.0	1	1.3	Acceptable
3	100 ± 10%	101.1	0	0	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	≤0.02 scfm or 4% of sampling rate, whichever is less	0.004 @ 13"Hg	0.004 @ 13"Hg	0.003 @ 15"Hg	0.003 @ 16"Hg	Acceptable
	2		0.010 @ 16"Hg	0.016 @ 17"Hg	0.013 @ 17"Hg	0.019 @ 15"Hg	Acceptable
	3		0.003 @ 16"Hg	0.002 @ 16"Hg	0.002 @ 16"Hg	0.002 @ 16"Hg	Acceptable
Semi-Volatile Organics Trains	1	≤0.02 scfm or 4% of sampling rate, whichever is less	0.004 @ 14"Hg	0.002 @ 16"Hg	0.002 @ 16"Hg	0.003 @ 21"Hg	Acceptable
	2		0.005 @ 13"Hg	0.003 @ 15"Hg	0.003 @ 15"Hg	0.001 @ 15"Hg	Acceptable
	3		0.001 @ 17"Hg	0.006 @ 16"Hg	0.004 @ 13"Hg	0.003 @ 14"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	0.47	0.27	Acceptable
	O_2	"	0.08	0.08	Acceptable
	CO_2	"	0.05	1.00	Acceptable
	CO	"	0.92	0.55	Acceptable
	NOx	"	0.06	1.68	Acceptable
	THC	"	-0.7	-1.0	Acceptable
2	SO_2	± 3% of span	0.50	0.55	Acceptable
	O_2	"	0.36	0.04	Acceptable
	CO_2	"	0.35	0.10	Acceptable
	CO	"	0.60	0.30	Acceptable
	NOx	"	0	0.18	Acceptable
	THC	"	-0.3	-0.3	Acceptable
3	SO_2	± 3% of span	0	0.02	Acceptable
	O_2	"	0.44	0.20	Acceptable
	CO_2	"	0.05	0.25	Acceptable
	CO	"	0	1.50	Acceptable
	NOx	"	0.1	0.20	Acceptable
	THC	"	0	2.1	Acceptable

TABLE 5
Clean Harbors Sarnia
ORTECH CEM Bias Check Summary

Test No.	Analyzer	Analyzer Range	Recommended Acceptable Limits	Initial System Bias		Final System Bias		QA/QC Status
				Zero %	Span %	Zero %	Span %	
1	SO_2	1000 ppm	± 5% of span	0.03	-0.38	0.50	-0.65	Acceptable
	O_2	25%	"	0.48	-0.92	0.40	-0.84	Acceptable
	CO_2	20%	"	0	-0.35	0.05	-1.35	Acceptable
	CO	100 ppm	"	0.08	-0.11	1.00	0.44	Acceptable
	NOx	500 ppm	"	0.12	0.46	0.18	-1.22	Acceptable
	THC	100 ppm	"	-1.2	-1.9	-	-	Acceptable
2	SO_2	1000 ppm	± 5% of span	0	-0.64	0.50	-1.19	Acceptable
	O_2	25%	"	0.84	-0.80	0.48	-0.76	Acceptable
	CO_2	20%	"	0	-0.90	0.35	-0.80	Acceptable
	CO	100 ppm	"	0.40	-1.40	1.00	-1.10	Acceptable
	NOx	500 ppm	"	0.16	-2.02	0.16	-1.84	Acceptable
	THC	100 ppm	"	-2.1	-2.6	-	-	Acceptable
3	SO_2	1000 ppm	± 5% of span	0	-0.93	0	-0.95	Acceptable
	O_2	25%	"	0.68	-0.64	0.24	-0.84	Acceptable
	CO_2	20%	"	0	-0.50	0.05	-0.75	Acceptable
	CO	100 ppm	"	0	-1.90	0	-0.40	Acceptable
	NOx	500 ppm	"	0	-1.44	-0.10	-1.24	Acceptable
	THC	100 ppm	"	-0.9	-1.1	-	-	Acceptable

APPENDIX 18

Equipment Calibration Data
(11 pages)

ORTECH Environmental
Pitot Tube Calibration

Date	February 21, 2018
Probe/Pitot ID	S8
Mil Number	B03769
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	7.74	0.145	0.205	0.841	0.0003
(0.25")	9.86	0.235	0.330	0.843	0.0032
	11.94	0.345	0.490	0.839	0.0016
	14.38	0.500	0.715	0.836	0.0045
	16.27	0.640	0.900	0.843	0.0026
			Mean	0.840	0.0024
Without Nozzle	7.47	0.135	0.190	0.842	0.0014
	9.43	0.215	0.300	0.846	0.0022
	11.50	0.320	0.450	0.843	0.0011
	13.94	0.470	0.660	0.843	0.0005
	15.75	0.600	0.840	0.845	0.0008
			Mean	0.844	0.0012

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 23, 2018
Probe/Pitot ID	15A
Mil Number	B03775
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	7.88	0.150	0.210	0.845	0.0026
(0.25")	10.07	0.245	0.340	0.848	0.0011
	12.29	0.365	0.510	0.846	0.0018
	14.23	0.490	0.690	0.842	0.0051
	16.33	0.645	0.880	0.856	0.0084
			Mean	0.847	0.0038
Without Nozzle	7.74	0.145	0.200	0.851	0.0032
	9.54	0.220	0.310	0.842	0.0058
	12.03	0.350	0.490	0.845	0.0031
	14.23	0.490	0.685	0.845	0.0025
	16.52	0.660	0.900	0.856	0.0081
			Mean	0.848	0.0045

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, 2018
Probe/Pitot ID	15D
Mil Number	B03778
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	0.0020
(0.25")	9.54	0.220	0.310	0.842	0.0094
	11.68	0.330	0.455	0.851	0.0002
	14.23	0.490	0.670	0.855	0.0034
	15.88	0.610	0.825	0.859	0.0081
			Mean	0.851	0.0046
Without Nozzle	7.33	0.130	0.180	0.849	0.0015
	9.54	0.220	0.310	0.842	0.0059
	11.59	0.325	0.450	0.849	0.0015
	13.94	0.470	0.650	0.850	0.0020
	16.01	0.620	0.860	0.849	0.0008
			Mean	0.848	0.0024

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	June 13, 2018
Barometric Pressure	29.30
System Leak Check	< 0.001 cfm @ 24 "Hg

MII NUMBERS	
DGM	COE 20094
Gasometer	A01463
Barometer	COE 20028

Calibrated By	Dillon Berimbau
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ ^\circ F+460}{Tstd\ ^\circ F+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

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.
81.20	18.10	63.10	2.968	23.0	848.665	851.632	2.967	74.5	0.77	73	1.001	6
81.10	17.90	63.20	2.973	23.0	851.632	854.580	2.948	74.5	0.77	73	1.009	6
81.20	17.90	63.30	2.978	23.0	854.580	857.550	2.970	73.5	0.77	73	1.001	6
81.00	16.70	64.30	3.025	23.0	859.070	862.075	3.005	73.5	1.9	73	1.002	4
80.90	16.60	64.30	3.025	23.0	862.075	865.071	2.996	73.5	1.9	73	1.005	4
81.10	16.80	64.30	3.025	23.0	865.071	868.069	2.998	73.5	1.9	73	1.004	4
81.00	16.40	64.60	3.039	23.0	869.250	872.248	2.998	73.5	3.4	73	1.005	3
81.10	16.60	64.50	3.034	23.0	872.248	875.217	2.969	73.5	3.4	73	1.013	3
81.10	16.20	64.90	3.053	23.0	875.216	878.210	2.994	74	3.4	73	1.012	3

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	1.006
BEFORE	0.995

ORTECH Environmental

Trendicator Calibration

Calibration Procedure	**03 - J005**
Trendicator Type	**Team 1**
MII	**COE 20094**
Date	**June 13, 2018**
Calibrated By	**Dillon Berimbau**
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	100		0.0
200	201		-0.5
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	799		0.1
900	900		0.0
1000	1000		0.0
1100	1100		0.0
1200	1200		0.0
1250	1250		0.0

$$\% \text{ Difference} = \frac{(\text{micromite} - \text{after adjustment reading}) \times 100}{\text{micromite}}$$

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

Manometer Calibration Data

Date	June 13, 2018	Calibrated By	Dillon Berimbau
Manometer Number	Team 1	Signature	
Manometer MII Number	COE 20094	Reviewed/Accepted By	
Calibrated Against	Omega HHP		
MII Number	B02679		
Calibration Procedure	03 - J010		

Front Leg

Manometer Scale "H_2O	Manometer Reading "H_2O		Reference Manometer Reading "H_2O	Percent Difference %
	Before Adjustment	After Adjustment		
	0.831		0.834	0.4
0-1.0	0.500		0.500	0.0
	0.240		0.241	0.4
	8.45		8.42	-0.4
1.0-10.0	5.30		5.28	-0.4
	2.45		2.47	0.8

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer} - \text{Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

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

Dry Gas Meter Calibration Data

Calibration Procedure	03 - J004
Meter Number	Team 3
Date	June 12, 2018
Barometric Pressure	29.65
System Leak Check	<0.001 cfm @ 27 "Hg

MII NUMBERS	
DGM	COE 20093
Gasometer	A01463
Barometer	COE 20028

Calibrated By	Dillon Berimbau
signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ ^\circ F+460}{Tstd\ ^\circ F+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

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.
80.80	17.80	63.00	2.963	21.5	69.465	72.436	2.971	73.5	0.84	73	1.001	6
79.40	16.30	63.10	2.968	21.5	63.575	66.515	2.940	73.5	0.84	73	1.013	6
80.60	17.70	62.90	2.959	21.5	66.515	69.465	2.950	73.5	0.84	73	1.006	6
79.80	17.00	62.80	2.954	21.5	89.825	92.766	2.941	76	2	74	1.009	4
80.20	17.60	62.60	2.945	21.5	83.926	86.871	2.945	75.5	2	74	1.004	4
79.60	16.70	62.90	2.959	21.5	86.871	89.825	2.954	76	2	74	1.007	4
81.40	18.00	63.40	2.982	21.5	93.619	96.590	2.971	75.5	3.5	74	1.004	3
79.50	16.70	62.80	2.954	21.5	96.590	99.573	2.983	75.5	3.5	74	0.991	3
80.00	17.60	62.40	2.935	21.5	99.573	102.539	2.966	75.5	3.5	74	0.990	3

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	1.003
BEFORE	0.998

ORTECH Environmental

Trendicator Calibration

Calibration Procedure	**03 - J005**
Trendicator Type	**Team 3**
MII	**COE 20093**
Date	**June 12, 2018**
Calibrated By	**Dillon Berimbau**
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	100		0.0
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	701		-0.1
800	801		-0.1
900	901		-0.1
1000	1001		-0.1
1100	1102		-0.2
1200	1201		-0.1
1250	1251		-0.1

$$\% \text{ Difference} = \frac{(\text{micromite} - \text{after adjustment reading})}{\text{micromite}} \times 100$$

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

Manometer Calibration Data

Date	June 12, 2018	Calibrated By	Dillon Berimbau
Manometer Number	Team 3	Signature	
Manometer MII Number	COE 20093	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		
	0.884		0.891	0.8
0-1.0	0.529		0.533	0.8
	0.225		0.226	0.4
	8.09		8.07	-0.2
1.0-10.0	5.29		5.25	-0.8
	2.30		2.28	-0.9

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer} - \text{Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

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

Dry Gas Meter Calibration Data

Calibration Procedure	03-J004
Meter Number	M05498
Date	September 20, 2018
Barometric Pressure	29.65
System Leak Check	NDL @ 21' Hg

MII NUMBERS	
DGM	M05498
Gasometer	A01463
Barometer	COE 20028

Calibrated By	J. Grollman
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ ^\circ F+460}{Tstd\ ^\circ F+460} \quad \frac{Pbar\ ("Hg)}{(Pbar\ "Hg+DGMPressure/13.6)}$$

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
84.20	61.90	22.30	1.049	22.0	647.47	678.08	1.081	26.0	4.5	26.0	0.973	15	2.0
61.90	38.30	23.60	1.110	22.0	678.08	710.30	1.138	27.0	4.5	27.0	0.981	16	2.0
83.80	58.90	24.90	1.171	22.0	710.74	744.65	1.198	28.0	4.5	28.0	0.987	17	2.0
82.70	69.30	13.40	0.630	22.0	744.65	762.57	0.633	25.0	2.0	25.0	1.001	18	1.0
69.30	58.40	10.90	0.513	22.0	762.57	777.35	0.522	26.0	2.0	26.0	0.991	15	1.0
70.40	59.50	10.90	0.513	22.0	792.12	806.97	0.524	27.0	2.0	27.0	0.989	15	1.0
65.20	58.70	6.50	0.306	22.0	833.47	842.14	0.306	28.0	1.2	28.0	1.016	17	0.5
78.20	71.70	6.50	0.306	22.0	815.98	824.61	0.305	28.0	1.2	28.0	1.021	17	0.5
71.70	65.20	6.50	0.306	22.0	824.61	833.47	0.313	28.0	1.2	28.0	0.994	17	0.5

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	
2Lpm	0.980
1Lpm	0.994
0.5 Lpm	1.009

Revision June 5, 2007

ORTECH Environmental

Trendicator Calibration

Calibration Procedure	**03-J005**
Trendicator Type	**Nutech**
MII	**M05498**
Date	SEPTEMBER 29/2018
Calibrated By	**J. Grollman**
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°C)	Tredicator Display Value		Percent Difference
	Before Adjustment (°C)	After Adjustment (°C)	(%)
0	0		0.0
10	10		0.0
20	20		0.0
50	50		0.0
75	75		0.0
100	100		0.0
125	125		0.0
150	150		0.0
200	200		0.0
300	298		0.7
400	398		0.5
500	498		0.4
600	598		0.3

$$\% \text{ Difference} = \frac{(\text{micromite} - \text{after adjustment reading})}{\text{micromite}} \times 100$$

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)

APPENDIX 19

Pre-Test Plan Acceptance Letter
(4 pages)

Ministry of the Environment & Climate Change
Technical Assessment and Standards Development Branch
40 St. Clair Avenue West
Toronto ON M4V 1M2
www.ene.gov.on.ca

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction des évaluations Techniques et de l'élaboration des normes
40, avenue St. Clair ouest
Toronto, ON M4V 1M2
www.ene.gov.on.ca

Via email: cbelore@ortech.ca
TSS File No.: SR:SA:109650:18

2018/06/11

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 2018/05/23, 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 # 21874).

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 2018 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 (SO2),

- Cyanide,
- Combustion gases (oxygen, CO, and CO2), 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,
- SO2: US EPA 40CFR60 Method 6C,
- O2/CO2: 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 the 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, CO2, H2O, THC, O2, SO2, 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 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.

We noted the source testing program schedule for the week of 2018/09/10, with actual testing starting on Tuesday (2018/09/11) and extending for three consecutive days. If changes in the sampling schedule occur, please notify both the MOECC's Sarnia District Office, and the MOECC's 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 MOECC's Sarnia District Office.

If you have any questions with regard to this assessment, I can be reached by phone at 416-327-6403, or by email at guillermo.azocar@ontario.ca.
Sincerely yours,

Guillermo Azocar
Source Assessment Specialist
Technology Standards Section

cc: M. Parker - Clean Harbors Canada Inc. (via email: parker.michaele@cleanharbors.com)
E. Carabott - Clean Harbors Canada Inc. (via email: carabott.erica@cleanharbors.com)
D. Baulcomb - Clean Harbors Canada Inc. (via email: baulcomb.david@cleanharbors.com)
T. Sanderson – ORTECH (via email: tsanderson@ortech.ca)
S. Mercer – MOECC EAB (via email: steve.mercer@ontario.ca)
D. Hayes – MOECC Sarnia District Office (via email: don.hayes@ontario.ca)
C. Grant – MOECC TASDB TSS (via email: cathy.grant@ontario.ca)
C. Ruddy – MOECC SDB TSS (via email: caitlyn.ruddy@ontario.ca)

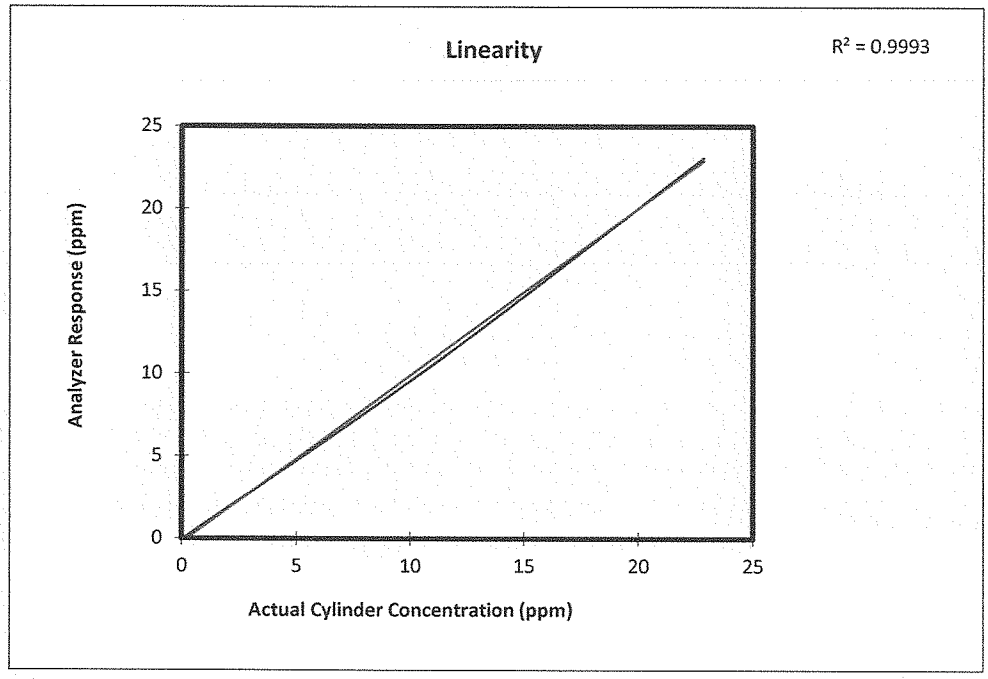
File AQ-02 (Clean Harbors Canada Inc. - Corunna)

APPENDIX 20

ORTECH CEM Linearity Check Data
(6 pages)

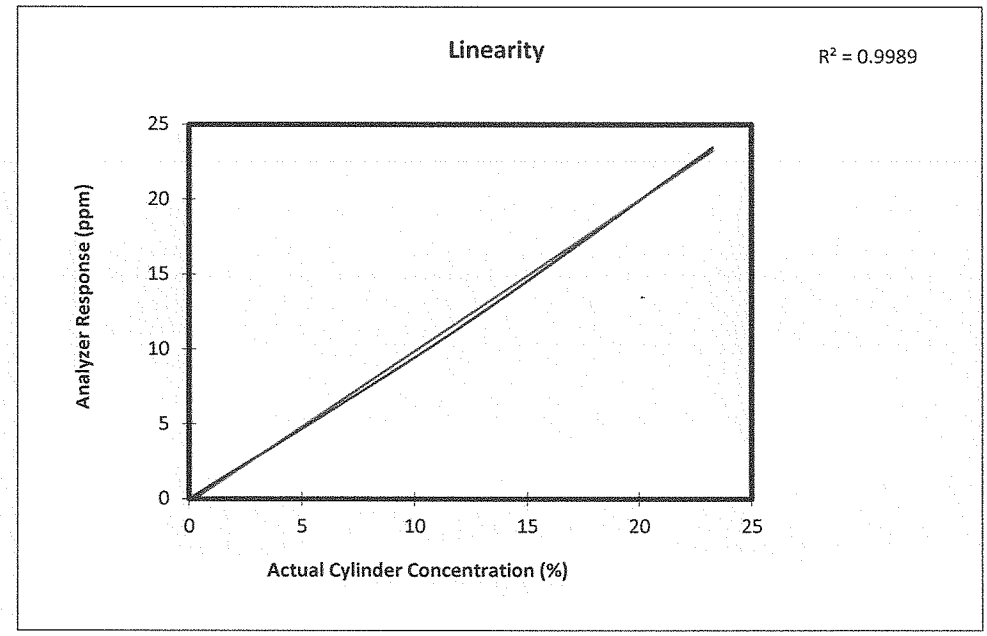
Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Oxygen Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
25	COE 20060	0.00	0.01	0.0
		12.49	12.57	0.3
		22.90	22.92	0.1



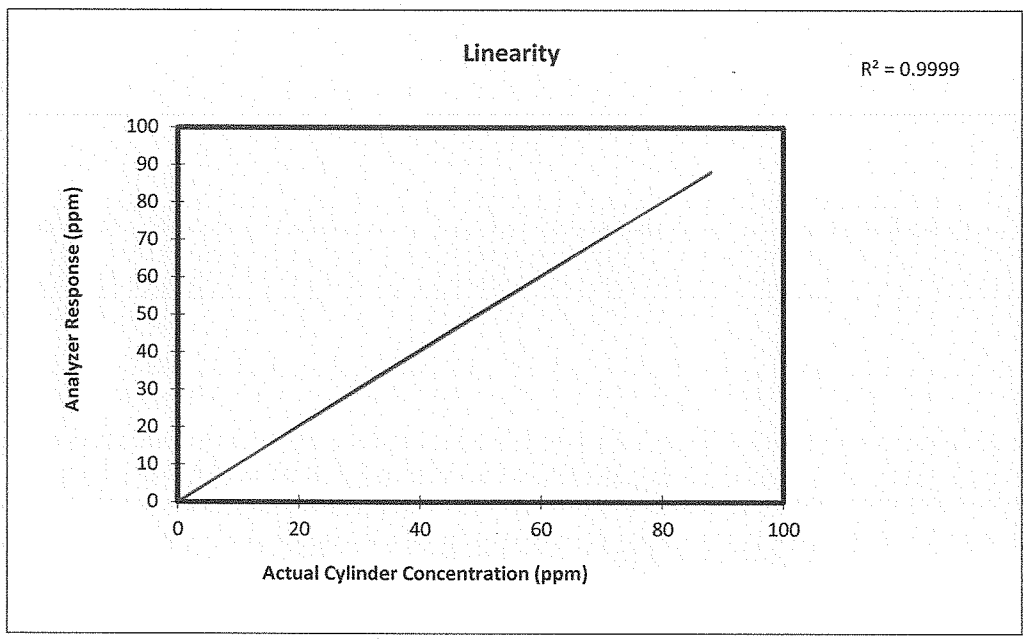
Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Carbon Dioxide Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
20	COE 20060	0.00	0.00	0.0
		12.48	12.27	-1.1
		20.00	19.98	-0.1



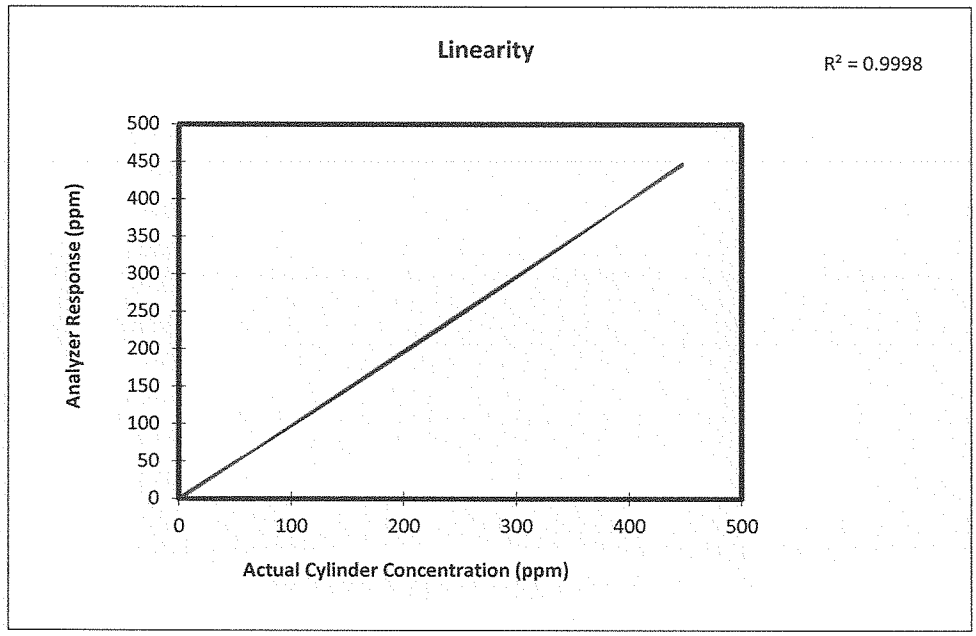
Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Sulphur Dioxide Analyzer
Teledyne API T100H

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
1000	COE 20099	0.0	0.0	0.0
		460.6	461.6	0.1
		1003.0	1002.2	-0.1



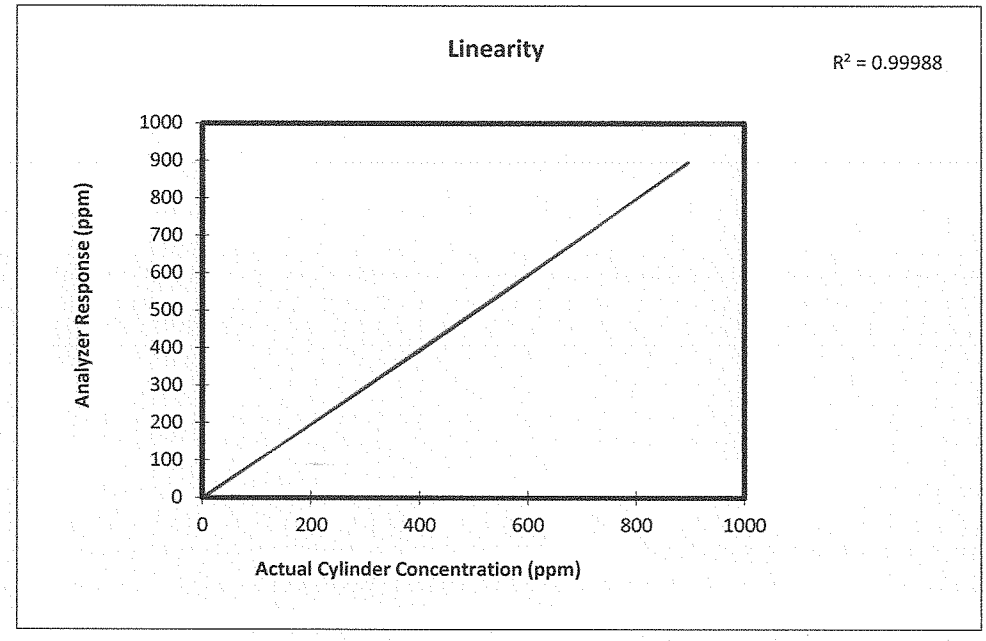
Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Carbon Monoxide Analyzer
Siemens Ultramat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
100	COE 20101	0.0	0.0	0.0
		50.1	50.2	0.1
		89.6	89.0	-0.6



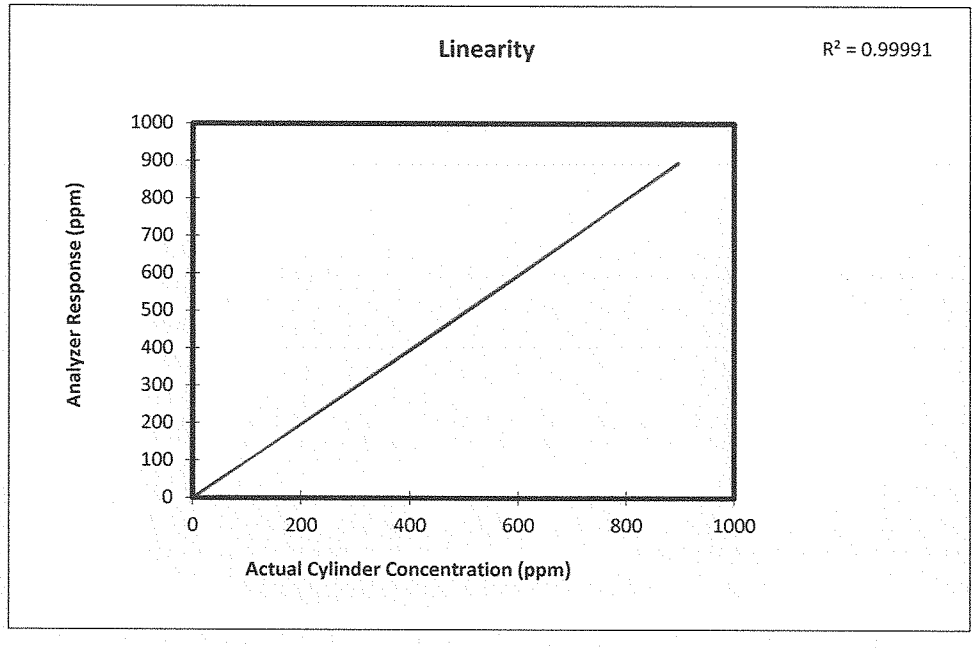
Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Nitric Oxide Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
500	COE 20061	0.0	0.0	0.0
		254.1	252.5	-0.3
		467.2	467.8	0.1



Clean Harbors
September 25, 2018
Analyzer Linearity Determination
Nitrogen Oxides Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
500	COE 20061	0.0	0.0	0.0
		254.1	252.7	-0.3
		467.2	468.8	0.3



APPENDIX 21

ORTECH CEM Calibration Data
(12 pages)

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21874
September 25, 2018
Test 1 Final Calculations

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	500	500
Actual Cylinder Value	High	22.90	20.00	1003	89.6	467.2	467.2
	Mid.	12.49	12.48	460.6	50.11	254.1	254.1
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.01	0.00	0	0.0	0.0	0.0
	Mid	12.57	12.27	461.6	50.2	252.5	252.7
	High	22.92	19.98	1002.2	89.0	467.8	468.8
System Initial Calibration	Zero	0.13	0.00	0.3	0.1	0.8	0.6
	Upscale	12.34	12.00	457.8	50.1	254.7	255.0
System Final Calibration	Zero	0.11	0.01	0.5	1.0	0.8	0.9
	Upscale	12.36	11.80	455.1	50.7	246.6	246.6

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	500	500
Calibration Error	Zero	%	0.04	0.00	0.00	0.00	0.00	0.00
	Mid	%	0.32	1.05	0.10	0.10	0.32	0.28
	High	%	0.08	0.10	0.08	0.57	0.12	0.32
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	500	500
Initial System Bias	Zero	0.48	0.00	0.03	0.08	0.16	0.12
	Upscale	-0.92	-0.35	-0.38	-0.1	0.4	0.5
Final System Bias	Zero	0.40	0.05	0.50	1.0	0.2	0.2
	Upscale	-0.84	-1.35	-0.65	0.4	-1.2	-1.2

System Zero Drift	%	0.08	0.05	0.47	0.92	0.00	0.06
System Cal Drift	%	0.08	1.00	0.27	0.55	1.62	1.68
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	500	500
Analyzer Initial	Zero	0.01	0.00	0.00	0.0	0.0	0.0
	Upscale	12.57	12.07	461.60	50.2	252.5	252.7
System Initial	Zero	0.13	0.00	0.30	0.1	0.8	0.6
	Upscale	12.34	12.00	457.80	50.1	254.7	255.0
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	0.11	0.01	0.50	1.0	0.8	0.9
	Upscale	12.36	11.80	455.10	50.7	246.6	246.6

Initial System Bias	Zero %	0.48	0.00	0.03	0.08	0.16	0.12
	Upscale %	-0.92	-0.35	-0.38	-0.11	0.44	0.46
Final System Bias	Zero %	0.40	0.05	0.50	1.00	0.16	0.18
	Upscale %	-0.84	-1.35	-0.65	0.44	-1.18	-1.22
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:	21874	Date:	September 25, 2018
Company:	Clean Harbors	Operator:	T, Timar
Location:	Corunna, 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	B1	1.002		
High	90.09	A2	90.26	B2	C		
Mid	51.6	A4	51.1	B4		51.7 D4	-1.2 E4
Low	30.3	A3	29.78	B3		30.4 D3	-1.9 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	0.7	-0.7
Mid	29.78	30.8	-1.0

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**

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21874
September 26, 2018
Test 2 Final Calculations

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	500	500
Actual Cylinder Value	High	22.90	20.00	1003	89.6	467.2	467.2
	Mid.	12.49	12.48	460.6	50.11	254.1	254.1
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.00	0.00	0	0.0	0.0	0.0
	Mid	12.56	12.08	464.2	50.6	256.4	256.9
	High	22.92	20.01	1003.5	89.2	468.7	468.9
System Initial Calibration	Zero	0.21	0.00	0	0.4	0.6	0.8
	Upscale	12.36	11.90	457.8	49.2	246.3	246.8
System Final Calibration	Zero	0.12	0.07	0.5	1.0	0.4	0.8
	Upscale	12.37	11.92	452.3	49.5	245.7	247.7

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	500	500
Calibration Error	Zero	%	0.00	0.00	0.00	0.00	0.00	0.00
	Mid	%	0.28	2.00	0.36	0.49	0.46	0.56
	High	%	0.08	0.05	0.05	0.40	0.30	0.34
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	500	500
Initial System Bias	Zero	0.84	0.00	0.00	0.40	0.12	0.16
	Upscale	-0.80	-0.90	-0.64	-1.4	-2.0	-2.0
Final System Bias	Zero	0.48	0.35	0.50	1.0	0.1	0.2
	Upscale	-0.76	-0.80	-1.19	-1.1	-2.1	-1.8

System Zero Drift	%	0.36	0.35	0.50	0.60	0.04	0.00
System Cal Drift	%	0.04	0.10	0.55	0.30	0.12	0.18
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	500	500
Analyzer Initial	Zero	0.00	0.00	0.00	0.0	0.0	0.0
	Upscale	12.56	12.08	464.20	50.6	256.4	256.9
System Initial	Zero	0.21	0.00	0.00	0.4	0.6	0.8
	Upscale	12.36	11.90	457.80	49.2	246.3	246.8
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	0.12	0.07	0.50	1.0	0.4	0.8
	Upscale	12.37	11.92	452.30	49.5	245.7	247.7

Initial System Bias	Zero %	0.84	0.00	0.00	0.40	0.12	0.16
	Upscale %	-0.80	-0.90	-0.64	-1.40	-2.02	-2.02
Final System Bias	Zero %	0.48	0.35	0.50	1.00	0.08	0.16
	Upscale %	-0.76	-0.80	-1.19	-1.10	-2.14	-1.84
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:	21874	Date:	September 26, 2018
Company:	Clean Harbors	Operator:	T, Timar
Location:	Corunna, 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	B1	0.999					
High	90.09	A2	90.01	B2		C				
Mid	51.6	A4	50.47	B4			51.6	D4	-2.1	E4
Low	30.3	A3	29.5	B3			30.3	D3	-2.6	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	0.3	-0.3
Mid	29.5	29.8	-0.3

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**

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
21874
September 27, 2018
Test 3 Final Calculations

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	500	500
Actual Cylinder Value	High	22.90	20.00	1003	89.6	467.2	467.2
	Mid.	12.49	12.48	460.6	50.11	254.1	254.1
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.01	0.00	0	0.0	0.0	0.5
	Mid	12.54	12.10	462.1	50.1	256.6	257.0
	High	22.93	20.05	1003	89.1	468.1	468.9
System Initial Calibration	Zero	0.18	0.00	0	0.0	0.0	0.5
	Upscale	12.38	12.00	452.8	48.2	246.2	249.8
System Final Calibration	Zero	0.07	0.01	0	0.0	0.0	0.0
	Upscale	12.33	11.95	452.6	49.7	247.3	250.8

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	500	500
Calibration Error	Zero	%	0.04	0.00	0.00	0.00	0.00	0.10
	Mid	%	0.20	1.90	0.15	0.01	0.50	0.58
	High	%	0.12	0.25	0.00	0.50	0.18	0.34
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	500	500
Initial System Bias	Zero	0.68	0.00	0.00	0.00	0.00	0.00
	Upscale	-0.64	-0.50	-0.93	-1.9	-2.1	-1.4
Final System Bias	Zero	0.24	0.05	0.00	0.0	0.0	-0.1
	Upscale	-0.84	-0.75	-0.95	-0.4	-1.9	-1.2

System Zero Drift	%	0.44	0.05	0.00	0.00	0.00	0.10
System Cal Drift	%	0.20	0.25	0.02	1.50	0.22	0.20
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	500	500
Analyzer Initial	Zero	0.01	0.00	0.00	0.0	0.0	0.5
	Upscale	12.54	12.10	462.10	50.1	256.6	257.0
System Initial	Zero	0.18	0.00	0.00	0.0	0.0	0.5
	Upscale	12.38	12.00	452.80	48.2	246.2	249.8
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	0.07	0.01	0.00	0.0	0.0	0.0
	Upscale	12.33	11.95	452.60	49.7	247.3	250.8

Initial System Bias	Zero %	0.68	0.00	0.00	0.00	0.00	0.00
	Upscale %	-0.64	-0.50	-0.93	-1.90	-2.08	-1.44
Final System Bias	Zero %	0.24	0.05	0.00	0.00	0.00	-0.10
	Upscale %	-0.84	-0.75	-0.95	-0.40	-1.86	-1.24
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:	21874	Date:	September 27, 2018
Company:	Clean Harbors	Operator:	T, Timar
Location:	Corunna, 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	0.999	C				
High	90.09	A2	89.97	B2						
Mid	51.6	A4	51.07	B4			51.5	D4	-0.9	E4
Low	30.3	A3	29.92	B3			30.3	D3	-1.1	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	0
Mid	29.92	27.8	2.1

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	Corunna, ON	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21874	**Analyzer Span Setting**	25

Span Gas Concentration	22.90

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	38	42
2	38	44
3	36	42

System Response Time* 44 Seconds
Average Time 38 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	22.93
2	22.93
3	22.91
4	22.92
5	22.93
Mean	22.92
Standard Deviation (SD)	0.01
% RSD Criteria <3%	**0.04**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Carbon Dioxide
Location	Corunna, ON	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21874	**Analyzer Span Setting**	20

Span Gas Concentration	20.00

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	49	51
2	48	51
3	49	51

System Response Time* 51 Seconds
Average Time 46 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	20.05
2	20.01
3	20
4	20.04
5	20
Mean	20.02
Standard Deviation (SD)	0.02
% RSD Criteria <3%	**0.12**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Sulphur Dioxide
Location	Corunna, ON	**Analyzer ID.**	Teledyne API T100H
Project No.	21874	**Analyzer Span Setting**	1000

Span Gas Concentration	1003

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	91	100
2	92	96
3	92	94

System Response Time* 100 Seconds
Average Time 83 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	1003
2	1002.8
3	1003.2
4	1002.98
5	1002.96
Mean	1003
Standard Deviation (SD)	0.14
% RSD Criteria <3%	**0.01**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Carbon Monoxide
Location	Corunna, ON	**Analyzer ID.**	Siemens Ultramat 23
Project No.	21874	**Analyzer Span Setting**	100

Span Gas Concentration	89.6

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	41	53
2	44	44
3	40	49

System Response Time* 53 Seconds
Average Time 42 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	89.1
2	89.1
3	89.3
4	89.1
5	89.2
Mean	89
Standard Deviation (SD)	0.09
% RSD Criteria <3%	**0.10**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitric Oxide
Location	Corunna, ON	**Analyzer ID.**	Teledyne 200EH
Project No.	21874	**Analyzer Span Setting**	500

Span Gas Concentration	467.2

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	77	85
2	77	85
3	77	84

System Response Time* 85 Seconds

Average Time 72 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	468.1
2	468.3
3	468.5
4	468.1
5	468.2
Mean	468
Standard Deviation (SD)	0.17
% RSD Criteria <3%	**0.04**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitrogen Oxides
Location	Corunna, ON	**Analyzer ID.**	Teledyne 200EH
Project No.	21874	**Analyzer Span Setting**	500

Span Gas Concentration	467.2

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	86	91
2	88	92
3	87	91

System Response Time* 92 Seconds
Average Time 79 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	468.9
2	468.8
3	468.7
4	468.9
5	468.8
Mean	469
Standard Deviation (SD)	0.08
% RSD Criteria <3%	**0.02**

% 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:	September 25, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.851
DGM CORRECTION FACTOR	1.003
NOZZLE DIAMETER	6.53 mm
DRY REF GAS VOLUME SAMPLED	5.255 m^3
AVGERGE ISOKINETICITY	105.3 %
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	177.4 ^oC
AVERAGE GAS MOISTURE BY VOLUME	49.7 %
AVERAGE GAS VELOCITY	31.65 m/s
BAROMETRIC PRESSURE (Station)	99.120 Kpa
STATIC PRESSURE	0.299 Kpa
ABSOLUTE GAS PRESSURE	99.418 Kpa
OXYGEN CONCENTRATION	8.91 %
CARBON DIOXIDE CONCENTRATION	8.51 %
CARBON MONOXIDE CONCENTRATION	54.4 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	57.74 m^3/s
DRY REF GAS FLOWRATE	18.86 Rm^3/s
DRY ADJ GAS FLOWRATE	22.84 Rm^3/s
WET REF GAS FLOWRATE	37.50 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	8.6 mg
	-FILTER	31.8 mg
	-TOTAL	40.4 mg
DRY REF GAS VOLUME SAMPLED		5.255 m^3
PARTICULATE CONC. - ACTUAL		2.511 mg/m^3
PARTICULATE CONC. - DRY REF		7.687 mg/m^3
PARTICULATE CONC. - DRY ADJ		6.347 mg/m^3
PARTICULATE CONC. - WET REF		3.868 mg/m^3
PARTICULATE EMISSION RATE		0.144987 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:	September 25, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	31.8		
DGMCF	1.003	**Probe (mg)**	8.6		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3775.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	40.8		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.75 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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
49.7 %

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	142.06	1.7	352	69	75	76	2	3.5		31.01	
	3	144.27	1.5	353	59	76	76	1.9	3.5		29.15	101.4
	6	146.47	1.5	352	58	76	76	1.85	3.5		29.13	107.4
	9	148.65	1.4	352	57	76	76	1.75	3.5		28.14	106.4
2	12	150.78	1.5	352	58	76	76	1.8	3.5		29.13	107.5
	15	152.92	1.55	353	58	76	76	1.9	3.5		29.63	104.4
	18	155.11	1.55	353	60	76	76	1.9	3.5		29.63	105.2
	21	157.31	1.55	349	60	76	76	1.9	3.5		29.56	105.7
3	24	159.51	1.65	349	59	76	77	2	3.8		30.50	105.4
	27	161.77	1.6	348	60	77	77	1.95	4.0		30.01	104.9
	30	164.02	1.6	349	61	77	77	1.95	4.0		30.03	105.9
	33	166.26	1.65	350	62	77	77	2	4.0		30.51	105.5
4	36	168.51	1.65	350	64	77	77	2	4.0		30.51	104.4
	39	170.77	1.65	351	63	77	77	2	4.0		30.53	104.9
	42	173.03	1.7	352	55	77	78	2.05	4.0		31.01	104.9
	45	175.33	1.7	352	54	77	78	2.05	4.0		31.01	105.2
5	48	177.63	2	351	54	77	78	2.35	4.0		33.62	105.2
	51	180.09	2	352	52	77	78	2.35	4.3		33.64	103.7
	54	182.57	1.9	352	52	77	78	2.25	4.3		32.78	104.6
	57	185.01	1.9	350	54	78	78	2.25	4.3		32.74	105.6
6	60	187.45	1.9	350	55	78	78	2.25	4.3		32.74	105.4
	63	189.89	1.9	351	58	78	78	2.25	4.3		32.76	105.4
	66	192.33	1.9	351	61	78	78	2.25	4.3		32.76	105.4
	69	194.76	2	349	63	78	78	2.35	4.3		33.57	105.0
7	72	197.22	1.9	350	65	78	78	2.25	4.3		32.74	103.5
	75	199.67	1.9	352	60	78	78	2.25	4.5		32.78	105.8
	78	202.13	1.9	349	60	78	78	2.25	4.5		32.72	106.4
	81	204.59	1.85	350	60	78	78	2.2	4.3		32.31	106.2
8	84	207.02	1.9	352	60	78	78	2.25	4.5		32.78	106.3
	87	209.45	1.9	352	61	78	78	2.25	4.5		32.78	105.1
	90	211.89	1.9	352	63	79	78	2.25	4.5		32.78	105.5
	93	214.32	1.9	353	64	79	78	2.25	4.5		32.80	105.0
9	96	216.75	1.85	354	60	79	78	2.2	4.3		32.39	105.0
	99	219.15	1.85	355	59	79	78	2.2	4.3		32.41	105.2

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 25, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	31.8		
DGMCF	1.003	**Probe (mg)**	8.6		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3775.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	40.8		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**	0.75	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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
49.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures				ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
				Stack °F	Imp. Out °F	DGM Out °F	DGM In °F					
	102	221.55	1.85	355	59	79	78	2.2	4.3		32.41	**105.2**
	105	223.94	1.85	354	59	79	79	2.2	4.3		32.39	**104.8**
10	108	226.31	1.85	353	60	79	79	2.2	4.3		32.37	**103.8**
	111	228.72	1.85	352	63	79	79	2.2	4.3		32.35	**105.5**
	114	231.13	1.9	351	66	79	79	2.25	4.5		32.76	**105.4**
	117	233.57	1.85	352	65	79	79	2.2	4.3		32.35	**105.2**
	120	235.99								0.75		**105.8**
1	0	236.74	1.9	353	73	80	80	2.25	4.5		32.80	
	3	239.15	1.85	352	62	80	80	2.2	4.5		32.35	**103.9**
	6	241.58	1.85	351	58	80	79	2.2	4.5		32.33	**106.1**
	9	244.01	1.9	352	58	80	79	2.25	4.5		32.78	**106.1**
2	12	246.45	1.9	352	60	80	79	2.25	4.5		32.78	**105.2**
	15	248.89	1.9	352	59	80	79	2.25	4.5		32.78	**105.2**
	18	251.34	1.9	352	59	80	79	2.25	4.8		32.78	**105.6**
	21	253.78	1.9	353	60	80	79	2.25	4.8		32.80	**105.2**
3	24	256.21	1.85	353	61	80	79	2.2	4.8		32.37	**104.8**
	27	258.65	1.9	352	61	80	79	2.25	4.8		32.78	**106.7**
	30	261.10	1.9	352	60	80	79	2.25	4.8		32.78	**105.6**
	33	263.53	1.9	353	59	80	79	2.25	4.8		32.80	**104.8**
4	36	265.97	1.85	351	59	80	79	2.2	4.8		32.33	**105.3**
	39	268.39	1.85	351	59	80	79	2.2	4.8		32.33	**105.7**
	42	270.82	1.9	353	60	80	79	2.25	4.8		32.80	**106.1**
	45	273.24	1.9	352	62	80	79	2.25	4.8		32.78	**104.4**
5	48	275.67	2	351	64	80	79	2.35	5.0		33.62	**104.8**
	51	278.17	1.9	354	68	80	79	2.25	5.0		32.82	**105.0**
	54	280.65	1.9	353	72	80	80	2.25	5.0		32.80	**107.1**
	57	283.11	1.9	351	70	80	80	2.25	5.0		32.76	**106.0**
6	60	285.56	1.85	352	64	80	80	2.2	5.0		32.35	**105.5**
	63	288.00	1.9	352	62	80	80	2.25	5.0		32.78	**106.5**
	66	290.42	1.9	351	62	80	80	2.25	5.0		32.76	**104.2**
	69	292.83	1.85	353	62	80	80	2.2	5.0		32.37	**103.7**
7	72	295.24	1.7	351	62	80	80	2.05	5.0		30.99	**105.3**
	75	297.59	1.7	351	62	80	80	2.05	5.0		30.99	**106.9**
	78	299.90	1.7	350	63	80	80	2.05	5.0		30.97	**105.1**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 25, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	31.8		
DGMCF	1.003	**Probe (mg)**	8.6		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3775.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	40.8		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.75 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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
49.7 %

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	302.23	1.7	350	64	80	80	2.05	5.0		30.97	**105.9**
8	84	304.56	1.6	349	67	80	80	1.95	5.0		30.03	**105.9**
	87	306.83	1.6	348	70	80	80	1.95	5.0		30.01	**106.3**
	90	309.08	1.6	348	66	80	80	1.95	5.0		30.01	**105.3**
	93	311.34	1.6	348	65	80	80	1.95	5.0		30.01	**105.7**
9	96	313.60	1.5	348	64	80	80	1.85	5.0		29.06	**105.7**
	99	315.82	1.5	348	64	80	80	1.8	5.0		29.06	**107.3**
	102	317.98	1.55	350	67	81	80	1.9	5.0		29.57	**104.3**
	105	320.19	1.55	349	68	81	80	1.9	5.0		29.56	**105.1**
10	108	322.40	1.55	349	65	81	80	1.9	5.0		29.56	**105.0**
	111	324.58	1.5	351	64	81	81	1.85	4.8		29.11	**103.6**
	114	326.78	1.7	351	69	81	81	2.05	5.0		30.99	**106.3**
	117	329.08	1.75	351	69	81	81	2.1	5.0		31.44	**104.4**
	120	331.43										**105.2**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	2 - Metals and Particulate
Date:	September 26, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.851
DGM CORRECTION FACTOR	1.003
NOZZLE DIAMETER	6.53 mm
DRY REF GAS VOLUME SAMPLED	5.286 m^3
AVGERGE ISOKINETICITY	101.1 %
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	48.4 %
AVERAGE GAS VELOCITY	32.44 m/s
BAROMETRIC PRESSURE (Station)	99.255 Kpa
STATIC PRESSURE	0.299 Kpa
ABSOLUTE GAS PRESSURE	99.554 Kpa
OXYGEN CONCENTRATION	9.18 %
CARBON DIOXIDE CONCENTRATION	8.41 %
CARBON MONOXIDE CONCENTRATION	63.3 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	59.17 m^3/s
DRY REF GAS FLOWRATE	19.76 Rm^3/s
DRY ADJ GAS FLOWRATE	23.39 Rm^3/s
WET REF GAS FLOWRATE	38.28 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	3.7 mg
	-FILTER	35.1 mg
	-TOTAL	38.8 mg
DRY REF GAS VOLUME SAMPLED		5.286 m^3
PARTICULATE CONC. - ACTUAL		2.451 mg/m^3
PARTICULATE CONC. - DRY REF		7.340 mg/m^3
PARTICULATE CONC. - DRY ADJ		6.200 mg/m^3
PARTICULATE CONC. - WET REF		3.790 mg/m^3
PARTICULATE EMISSION RATE		0.145009 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:	September 26, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	35.1		
DGMCF	1.003	**Probe (mg)**	3.7		
Barometric Pressure	29.31 "Hg	**CWTR (g)**	3596		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	44.3		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		1.99 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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
48.4 %

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	332.22	1.9	348	69	72	72	2.15	3.5		32.58	
	3	334.59	1.5	351	52	73	73	1.75	3.0		29.00	101.1
	6	336.75	1.4	351	51	73	73	1.65	3.0		28.02	103.6
	9	338.82	1.5	350	51	73	73	1.7	3.0		28.98	102.7
2	12	340.92	1.5	352	51	73	73	1.7	3.0		29.02	100.6
	15	343.01	1.5	351	51	74	73	1.7	3.0		29.00	100.3
	18	345.10	1.45	351	51	74	73	1.7	3.3		28.51	100.1
	21	347.17	1.6	351	51	74	73	1.85	3.5		29.95	100.8
3	24	349.34	1.8	352	53	74	74	2.05	3.8		31.79	100.7
	27	351.64	1.75	351	54	74	74	2.05	3.8		31.32	100.6
	30	353.95	1.7	350	56	74	74	1.95	3.8		30.85	102.4
	33	356.21	1.65	350	59	74	74	1.9	3.8		30.40	101.6
4	36	358.44	1.8	348	56	74	74	2.05	3.8		31.71	101.7
	39	360.74	1.8	347	55	74	74	2.05	3.8		31.69	100.4
	42	363.04	1.8	348	54	74	74	2.05	3.8		31.71	100.3
	45	365.33	1.8	352	54	74	74	2.05	3.8		31.79	99.9
5	48	367.64	1.8	354	56	74	74	2.05	3.8		31.83	101.1
	51	369.97	1.75	355	60	74	74	2	3.8		31.40	102.1
	54	372.28	1.85	358	59	74	74	2.1	4.0		32.34	102.7
	57	374.61	1.85	359	55	75	74	2.1	4.0		32.36	100.9
6	60	376.93	1.9	359	55	75	74	2.15	4.0		32.80	100.5
	63	379.30	2	362	54	75	74	2.2	4.0		33.71	101.3
	66	381.71	2	362	54	75	75	2.2	4.0		33.71	100.6
	69	384.14	2	363	52	75	75	2.2	4.0		33.73	101.3
7	72	386.56	2	365	51	75	75	2.2	4.0		33.77	101.0
	75	388.97	2	364	51	75	75	2.2	4.0		33.75	100.7
	78	391.39	2	364	51	75	75	2.2	4.0		33.75	101.0
	81	393.82	2	366	52	75	75	2.2	4.0		33.79	101.4
8	84	396.24	2	366	54	75	75	2.2	4.0		33.79	101.2
	87	398.65	2.05	366	53	75	75	2.25	4.0		34.21	100.7
	90	401.09	2.05	364	53	75	75	2.25	4.0		34.17	100.8
	93	403.52	2.05	363	53	75	76	2.25	4.0		34.15	100.2
9	96	405.96	2.05	363	56	75	76	2.25	4.0		34.15	100.5
	99	408.39	2	360	58	76	75	2.2	4.0		33.67	100.1

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 26, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	35.1		
DGMCF	1.003	**Probe (mg)**	3.7		
Barometric Pressure	29.31 "Hg	**CWTR (g)**	3596		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	44.3		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		1.99 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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
48.4 %

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	410.82	2	361	60	76	75	2.2	4.0		33.69	101.1
	105	413.26	2	360	61	75	75	2.2	4.0		33.67	101.6
10	108	415.70	2	359	62	75	75	2.2	4.0		33.65	101.6
	111	418.14	2	359	64	75	75	2.2	4.0		33.65	101.6
	114	420.58	2	360	62	75	75	2.2	4.0		33.67	101.6
	117	423.02	2	358	61	75	75	2.2	4.0		33.63	101.6
	120	425.45								1.99		101.1
1	0	427.44	2	355	66	76	76	2.25	4.0		33.57	
	3	429.89	2	356	58	76	76	2.25	4.0		33.59	101.5
	6	432.34	2	357	55	76	76	2.25	4.0		33.61	101.6
	9	434.77	2	356	56	77	76	2.2	4.0		33.59	100.8
2	12	437.15	2	355	55	77	76	2.25	4.0		33.57	98.6
	15	439.59	2	357	56	77	76	2.25	4.0		33.61	101.0
	18	442.06	2.05	356	58	77	76	2.3	4.3		34.01	102.4
	21	444.52	2	355	65	77	76	2.25	4.3		33.57	100.7
3	24	446.97	2.05	357	66	77	76	2.3	4.3		34.03	101.5
	27	449.43	2	356	60	77	76	2.25	4.3		33.59	100.8
	30	451.87	2.05	355	57	77	76	2.3	4.3		33.98	101.1
	33	454.32	2.05	355	57	77	76	2.3	4.3		33.98	100.2
4	36	456.76	2	355	57	77	76	2.25	4.3		33.57	99.8
	39	459.22	2	354	57	77	77	2.25	4.3		33.55	101.9
	42	461.68	2	356	54	77	77	2.25	4.3		33.59	101.7
	45	464.12	2	356	53	77	77	2.25	4.3		33.59	101.0
5	48	466.56	2	355	54	77	77	2.25	4.3		33.57	101.0
	51	468.99	2.05	356	56	78	77	2.3	4.3		34.01	100.5
	54	471.45	2	355	57	77	77	2.25	4.3		33.57	100.5
	57	473.90	2	354	58	77	77	2.25	4.3		33.55	101.4
6	60	476.33	2	355	63	77	77	2.25	4.3		33.57	100.5
	63	478.77	2	354	62	78	77	2.25	4.3		33.55	100.9
	66	481.22	2.05	355	54	77	77	2.3	4.3		33.98	101.2
	69	483.68	2	353	58	78	77	2.25	4.3		33.53	100.5
7	72	486.12	1.7	351	57	78	77	2	4.0		30.87	100.7
	75	488.42	1.8	353	56	78	77	2.05	4.0		31.81	102.8
	78	490.70	1.7	353	55	78	77	2	4.0		30.91	99.2

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 26, 2018	**Operator:**	JB

Pitot Factor	0.851		**Filter (mg)**	35.1			
DGMCF	1.003		**Probe (mg)**	3.7			
Barometric Pressure	29.31	"Hg	**CWTR (g)**	3596			
Static Pressure	1.200	"H_2O	**WCBDA (g)**	44.3			
Nozzle	0.2571	inches					
Stack Diameter	5.000	ft	**Leak Check Volume**		1.99	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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
48.4 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures				ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
				Stack °F	Imp. Out °F	DGM Out °F	DGM In °F					
	81	492.99	1.7	352	54	78	77	2	4.0		30.89	**102.5**
8	84	495.28	1.7	353	54	78	77	2	4.0		30.91	**102.4**
	87	497.57	1.7	351	55	78	77	2	4.0		30.87	**102.5**
	90	499.83	1.7	351	57	78	77	2	4.0		30.87	**101.0**
	93	502.10	1.7	352	58	78	77	2	4.0		30.89	**101.5**
9	96	504.37	1.8	352	61	78	77	2.1	4.0		31.79	**101.5**
	99	506.68	1.7	353	63	78	77	2	4.0		30.91	**100.4**
	102	508.96	1.7	354	65	78	77	2	4.0		30.93	**102.0**
	105	511.24	1.7	355	62	78	77	2	4.0		30.95	**102.1**
10	108	513.51	1.7	356	63	78	78	2	4.0		30.97	**101.7**
	111	515.77	1.8	355	64	78	78	2.1	4.0		31.84	**101.2**
	114	518.08	1.7	355	67	78	78	2	4.0		30.95	**100.5**
	117	520.36	1.7	356	65	78	78	2	4.0		30.97	**102.1**
	120	522.63										**101.7**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	3 - Metals and Particulate
Date:	September 27, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.851
DGM CORRECTION FACTOR	1.003
NOZZLE DIAMETER	6.53 mm
DRY REF GAS VOLUME SAMPLED	5.238 m^3
AVGERGE ISOKINETICITY	100.3 %
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	176.7 °C
AVERAGE GAS MOISTURE BY VOLUME	49.0 %
AVERAGE GAS VELOCITY	32.43 m/s
BAROMETRIC PRESSURE (Station)	99.729 Kpa
STATIC PRESSURE	0.324 Kpa
ABSOLUTE GAS PRESSURE	100.053 Kpa
OXYGEN CONCENTRATION	8.99 %
CARBON DIOXIDE CONCENTRATION	8.58 %
CARBON MONOXIDE CONCENTRATION	49.0 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	59.15 m^3/s
DRY REF GAS FLOWRATE	19.73 Rm^3/s
DRY ADJ GAS FLOWRATE	23.74 Rm^3/s
WET REF GAS FLOWRATE	38.72 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	8.4 mg
	-FILTER	33 mg
	-TOTAL	41.4 mg
DRY REF GAS VOLUME SAMPLED		5.238 m^3
PARTICULATE CONC. - ACTUAL		2.637 mg/m^3
PARTICULATE CONC. - DRY REF		7.904 mg/m^3
PARTICULATE CONC. - DRY ADJ		6.570 mg/m^3
PARTICULATE CONC. - WET REF		4.030 mg/m^3
PARTICULATE EMISSION RATE		0.155960 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:	September 27, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	33		
DGMCF	1.003	**Probe (mg)**	8.4		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3658.6		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	44		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.75 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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.0 %

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	523.41	1.8	340	49	58	59	2	3.5		31.52	
	3	525.71	1.7	348	43	59	59	1.8	3.5		30.78	104.3
	6	527.83	1.7	348	43	59	59	1.85	3.5		30.78	99.2
	9	529.95	1.7	348	43	59	59	1.85	3.5		30.78	99.3
2	12	532.09	1.75	349	44	59	59	1.85	3.5		31.25	100.2
	15	534.22	1.8	348	45	59	60	1.95	3.8		31.67	98.3
	18	536.39	1.75	349	45	60	61	1.9	3.8		31.25	98.7
	21	538.58	1.75	348	46	60	61	1.9	3.8		31.23	100.8
3	24	540.75	1.75	351	46	60	61	1.9	3.8		31.29	99.9
	27	542.92	1.75	351	47	60	61	1.9	3.8		31.29	100.0
	30	545.07	1.8	349	47	60	62	1.95	4.0		31.69	99.1
	33	547.26	1.8	348	47	61	62	1.95	4.0		31.67	99.3
4	36	549.61	1.8	348	48	61	62	1.95	4.0		31.67	106.4
	39	551.75	1.8	349	50	61	62	1.95	4.0		31.69	96.9
	42	553.94	1.8	349	51	64	62	1.95	4.0		31.69	99.2
	45	556.15	1.9	349	54	62	63	2.05	4.0		32.56	99.9
5	48	558.41	1.85	350	54	62	63	2	4.0		32.15	99.5
	51	560.68	1.85	350	51	62	63	2	4.0		32.15	101.4
	54	562.93	1.85	349	51	62	63	2	4.0		32.13	100.5
	57	565.17	1.85	348	51	62	63	2	4.0		32.11	100.0
6	60	567.44	2	347	50	62	63	2.1	4.5		33.37	101.2
	63	569.78	2	348	48	63	64	2.1	4.5		33.39	100.3
	66	572.13	2	350	49	64	64	2.1	4.5		33.43	100.6
	69	574.48	2	354	50	63	64	2.1	4.5		33.51	100.6
7	72	576.82	2	350	50	63	64	2.1	4.5		33.43	100.6
	75	579.14	2	351	50	63	64	2.1	4.5		33.45	99.5
	78	581.45	2	350	52	63	65	2.1	4.5		33.43	99.1
	81	583.77	1.95	348	54	64	65	2.1	4.5		32.97	99.4
8	84	586.10	1.95	348	57	64	65	2.1	4.5		32.97	100.8
	87	588.42	1.95	348	61	65	65	2.1	4.5		32.97	100.4
	90	590.75	1.95	348	64	65	65	2.1	4.5		32.97	100.7
	93	593.08	1.95	350	65	65	66	2.1	4.5		33.01	100.7
9	96	595.40	1.95	348	61	65	66	2.1	4.5		32.97	100.3
	99	597.74	1.95	347	60	67	66	2.1	4.5		32.95	101.1

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 27, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	33		
DGMCF	1.003	**Probe (mg)**	8.4		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3658.6		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	44		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**	0.75	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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.0 %

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	600.07	1.95	348	60	65	66	2.1	4.5		32.97	100.4
	105	602.40	2	348	62	66	66	2.15	4.5		33.39	100.7
10	108	604.75	1.95	348	66	66	66	2.1	4.5		32.97	100.2
	111	607.08	1.95	347	61	66	66	2.1	4.5		32.95	100.6
	114	609.44	1.95	347	59	66	66	2.1	4.5		32.95	101.8
	117	611.77	1.95	348	57	66	67	2.1	4.5		32.97	100.5
	120	614.10								0.75		100.5
1	0	614.85	1.85	351	65	68	68	2	4.3		32.17	
	3	617.10	1.85	351	54	68	69	2	4.3		32.17	99.5
	6	619.36	1.85	351	49	68	69	2	4.3		32.17	99.8
	9	621.63	1.85	351	49	68	69	2	4.3		32.17	100.3
2	12	623.91	1.85	350	51	69	69	2	4.3		32.15	100.7
	15	626.23	1.9	349	53	69	69	2.1	4.8		32.56	102.3
	18	628.55	1.85	351	56	69	69	2	4.8		32.17	100.9
	21	630.77	1.85	351	59	69	69	2	4.8		32.17	98.0
3	24	633.03	1.95	352	56	69	69	2.1	4.8		33.05	99.7
	27	635.37	1.95	354	54	69	69	2.1	4.8		33.09	100.7
	30	637.71	1.95	353	54	69	70	2.1	4.8		33.07	100.8
	33	640.06	1.95	355	54	70	70	2.1	4.8		33.11	101.1
4	36	642.40	1.95	354	54	70	70	2.1	4.8		33.09	100.7
	39	644.75	1.95	355	53	70	70	2.1	4.8		33.11	101.0
	42	647.07	1.95	354	52	70	70	2.1	4.8		33.09	99.8
	45	649.45	1.95	353	52	70	70	2.1	4.8		33.07	102.3
5	48	651.65	1.95	353	54	70	71	2.1	4.8		33.07	94.5
	51	653.97	2	353	55	70	71	2.15	5.0		33.49	99.6
	54	656.37	2	352	56	71	71	2.15	5.0		33.47	101.7
	57	658.70	2	352	56	71	71	2.15	5.0		33.47	98.6
6	60	661.07	2	352	58	71	71	2.15	5.0		33.47	100.3
	63	663.46	1.9	353	58	71	71	2.1	5.0		32.64	101.2
	66	665.79	1.9	353	55	72	71	2.1	5.0		32.64	101.2
	69	668.10	1.9	354	54	71	71	2.1	5.0		32.66	100.3
7	72	670.38	1.85	353	54	71	71	2.05	5.0		32.21	99.1
	75	672.71	1.85	352	53	71	71	2.05	5.0		32.19	102.6
	78	675.02	1.85	351	55	72	72	2.05	5.0		32.17	101.6

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	September 27, 2018	**Operator:**	JB

Pitot Factor	0.851	**Filter (mg)**	33		
DGMCF	1.003	**Probe (mg)**	8.4		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3658.6		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	44		
Nozzle	0.2571 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.75 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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.0 %

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	677.31	1.85	349	56	72	72	2.05	5.0		32.13	100.5
8	84	679.58	1.85	349	60	73	72	2.05	5.0		32.13	99.5
	87	681.84	1.85	350	63	73	72	2.05	5.0		32.15	99.0
	90	684.13	1.85	349	57	73	72	2.05	5.0		32.13	100.3
	93	686.41	1.85	350	55	72	72	2.05	5.0		32.15	99.8
9	96	688.70	1.85	351	54	72	72	2.05	5.0		32.17	100.4
	99	690.97	1.85	351	54	72	72	2.05	5.0		32.17	99.6
	102	693.27	1.8	350	55	72	72	2	5.0		31.71	100.9
	105	695.55	1.8	350	56	72	72	2	5.0		31.71	101.4
10	108	697.83	1.8	350	58	73	73	2	5.0		31.71	101.4
	111	700.10	1.8	352	56	73	73	2	5.0		31.75	100.7
	114	702.37	1.8	351	56	73	73	2	5.0		31.73	100.9
	117	704.63	1.85	353	56	73	73	2.05	5.0		32.21	100.3
	120	706.90										99.6

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:	September 25, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.84
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.40 mm
DRY REF GAS VOLUME SAMPLED	5.007 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	176.0 °C
AVERAGE GAS MOISTURE BY VOLUME	48.9 %
AVERAGE GAS VELOCITY	31.69 m/s
BAROMETRIC PRESSURE (Station)	99.120 Kpa
STATIC PRESSURE	0.299 Kpa
ABSOLUTE GAS PRESSURE	99.418 Kpa
OXYGEN CONCENTRATION	8.91 %
CARBON DIOXIDE CONCENTRATION	8.51 %
CARBON MONOXIDE CONCENTRATION	54.4 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	57.80 m^3/s
DRY REF GAS FLOWRATE	19.24 Rm^3/s
DRY ADJ GAS FLOWRATE	23.31 Rm^3/s
WET REF GAS FLOWRATE	37.66 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.007 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 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 25, 2018	**Operator:**	CB

Pitot Factor	0.84	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3507.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	11.6		
Nozzle	0.252 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.57 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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
48.9 %

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	11.02	1.9	350	68	75	74	1.9	5.6		32.26	
	3	13.29	1.9	350	62	74	74	1.9	5.6		32.26	102.8
	6	15.54	1.85	351	61	74	74	1.9	5.6		31.85	102.0
	9	17.79	1.85	351	60	74	74	1.9	5.6		31.85	103.4
2	12	20.03	1.7	349	59	74	74	1.8	55.0		30.49	103.0
	15	22.26	1.7	352	60	74	74	1.7	5.2		30.55	106.8
	18	24.45	1.75	347	62	75	75	1.7	5.2		30.90	105.0
	21	26.64	1.75	345	63	75	75	1.7	5.2		30.86	103.0
3	24	28.82	1.75	345	63	75	75	1.7	5.2		30.86	102.4
	27	31.00	1.8	347	63	75	75	1.7	5.2		31.34	102.4
	30	33.18	1.8	347	62	75	75	1.7	5.2		31.34	101.1
	33	35.38	1.8	347	61	75	75	1.7	5.2		31.34	102.0
4	36	37.56	1.75	346	61	75	75	1.7	5.2		30.88	101.1
	39	39.77	1.8	348	61	75	75	1.7	5.2		31.36	103.9
	42	41.97	1.9	350	61	75	75	1.8	5.5		32.26	102.1
	45	44.22	1.9	350	60	76	76	1.8	5.5		32.26	101.8
5	48	46.48	1.9	350	60	76	76	1.8	5.5		32.26	102.0
	51	48.74	1.9	348	59	76	76	1.8	5.5		32.22	102.0
	54	51.00	1.9	348	58	76	76	1.8	5.5		32.22	101.9
	57	53.23	1.9	349	59	76	76	1.8	5.5		32.24	100.6
6	60	55.48	1.85	348	61	76	76	1.8	5.5		31.79	101.5
	63	57.72	1.85	347	62	77	77	1.8	5.5		31.77	102.4
	66	59.98	1.85	349	64	77	77	1.8	5.5		31.81	103.0
	69	62.27	1.9	347	64	77	76	1.8	5.5		32.20	104.5
7	72	64.52	1.9	347	63	77	76	1.8	5.5		32.20	101.3
	75	66.78	2	346	63	77	77	1.8	5.5		33.01	101.8
	78	69.05	2	349	64	77	77	1.8	5.5		33.07	99.5
	81	71.28	2	349	64	77	77	1.8	5.5		33.07	97.9
8	84	73.54	2.1	349	64	77	77	2	6.0		33.89	99.2
	87	75.87	2.1	350	66	77	77	2	6.0		33.91	99.9
	90	78.22	2	350	66	77	77	2	6.0		33.09	100.8
	93	80.62	2	350	66	77	77	2	6.0		33.09	105.5
9	96	82.98	1.9	352	65	77	77	2	6.0		32.30	103.7
	99	85.32	1.9	354	65	78	77	2	6.0		32.34	105.6

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 25, 2018	**Operator:**	CB

Pitot Factor	0.84	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3507.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	11.6		
Nozzle	0.252 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.57 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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
48.9 %

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	87.67	1.9	353	65	78	77	2	6.0		32.32	106.1
	105	90.02	1.9	352	65	77	77	2	6.0		32.30	106.1
10	108	92.34	1.8	351	66	60	78	1.8	5.5		31.42	104.7
	111	94.62	1.8	350	66	78	78	1.8	5.5		31.40	107.2
	114	96.85	1.8	349	66	78	78	1.8	5.5		31.38	103.1
	117	99.10	1.8	349	66	78	78	1.8	5.5		31.38	103.9
	120	101.34								0.57		103.5
1	0	101.91	1.8	348	69	78	78	1.9	5.0		31.36	
	3	104.06	2	348	68	77	77	2	6.0		33.05	99.3
	6	106.39	2	348	69	78	78	2	6.0		33.05	102.3
	9	108.77	1.9	349	69	78	78	2	6.0		32.24	104.3
2	12	111.15	1.85	349	67	78	78	1.9	5.8		31.81	107.0
	15	113.44	1.85	351	66	78	78	1.9	5.8		31.85	104.4
	18	115.75	1.85	351	65	78	78	1.9	5.8		31.85	105.4
	21	117.98	1.85	350	63	78	78	1.9	5.8		31.83	101.7
3	24	120.34	1.8	350	64	78	78	1.9	5.8		31.40	107.6
	27	122.62	1.8	350	66	78	78	1.9	5.8		31.40	105.4
	30	124.83	1.8	349	62	78	78	1.9	5.8		31.38	102.2
	33	127.13	1.9	348	58	78	78	1.9	5.8		32.22	106.3
4	36	129.48	1.85	348	56	78	78	1.9	5.8		31.79	105.6
	39	131.68	1.85	348	57	79	79	1.9	5.8		31.79	100.2
	42	133.93	1.9	348	57	79	79	1.9	5.8		32.22	102.3
	45	136.21	1.85	349	56	79	79	1.9	5.8		31.81	102.3
5	48	138.49	1.85	349	55	79	79	1.9	5.8		31.81	103.7
	51	140.73	1.85	349	56	78	78	1.9	5.8		31.81	101.9
	54	142.94	1.8	349	57	78	78	1.9	5.8		31.38	100.7
	57	145.17	1.85	350	58	79	79	1.9	5.8		31.83	103.0
6	60	147.42	1.9	349	61	80	79	1.9	5.8		32.24	102.4
	63	149.64	1.9	349	61	79	79	1.9	5.8		32.24	99.5
	66	151.82	1.85	350	61	79	79	1.9	5.8		31.83	97.8
	69	154.03	1.9	349	63	80	80	1.9	5.8		32.24	100.6
7	72	156.22	1.75	348	63	79	79	1.9	5.8		30.92	98.1
	75	158.43	1.75	350	63	80	80	1.9	5.8		30.96	103.3
	78	160.66	1.8	350	59	80	80	1.9	5.8		31.40	104.2

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 25, 2018	**Operator:**	CB

Pitot Factor	0.84	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.27 "Hg	**CWTR (g)**	3507.6		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	11.6		
Nozzle	0.252 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.57 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%	8.91
CO2%	8.51
COppm	54.4

Measured H2O
48.9 %

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	162.88	1.75	347	59	80	80	1.9	5.8		30.90	**102.2**
8	84	165.05	1.7	348	61	81	80	1.9	5.8		30.47	**101.2**
	87	167.16	1.7	346	62	82	80	1.9	5.8		30.44	**99.8**
	90	169.31	1.7	345	57	81	79	1.9	5.8		30.42	**101.5**
	93	171.43	1.75	345	52	81	80	1.9	5.8		30.86	**100.2**
9	96	173.50	1.7	345	52	81	80	1.9	5.8		30.42	**96.3**
	99	175.58	1.7	345	52	81	80	1.9	8.8		30.42	**98.2**
	102	177.60	1.7	348	61	81	80	1.9	8.8		30.47	**95.3**
	105	179.64	1.7	348	61	82	80	1.9	9.0		30.47	**96.5**
10	108	181.82	1.7	349	62	81	80	1.9	9.0		30.49	**103.0**
	111	184.04	1.7	349	62	81	80	1.8	9.0		30.49	**105.0**
	114	186.17	1.65	352	60	81	81	1.8	9.0		30.10	**100.8**
	117	188.26	1.65	352	62	81	80	1.8	9.0		30.10	**100.5**
	120	190.46										**105.8**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	2 - SVOC
Date:	September 26, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.847
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.52 mm
DRY REF GAS VOLUME SAMPLED	5.096 m^3
AVGERGE ISOKINETICITY	101.0 %
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	178.2 °C
AVERAGE GAS MOISTURE BY VOLUME	49.0 %
AVERAGE GAS VELOCITY	31.73 m/s
BAROMETRIC PRESSURE (Station)	99.255 Kpa
STATIC PRESSURE	0.299 Kpa
ABSOLUTE GAS PRESSURE	99.554 Kpa
OXYGEN CONCENTRATION	9.18 %
CARBON DIOXIDE CONCENTRATION	8.41 %
CARBON MONOXIDE CONCENTRATION	63.3 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	57.88 m^3/s
DRY REF GAS FLOWRATE	19.15 Rm^3/s
DRY ADJ GAS FLOWRATE	22.67 Rm^3/s
WET REF GAS FLOWRATE	37.58 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.096 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:	September 26, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.31 "Hg	**CWTR (g)**	3586.2		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	17.1		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.62 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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
49.0 %

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	91.66	1.75	349	61	73	72	1.9	4.5		31.19	
	3	93.92	1.8	350	53	72	72	1.8	5.0		31.65	102.7
	6	96.10	1.5	349	52	72	72	1.7	4.8		28.87	97.8
	9	98.20	1.1	349	50	73	72	1.1	4.0		24.73	103.1
2	12	100.18	1.1	349	50	73	72	1.1	4.0		24.73	113.2
	15	101.91	1.7	349	50	73	72	1.9	5.0		30.74	98.9
	18	104.04	1.8	349	50	73	72	1.9	5.0		31.63	98.2
	21	106.25	1.75	349	49	73	72	1.9	5.0		31.19	99.0
3	24	108.42	1.8	350	49	73	72	1.9	5.0		31.65	98.6
	27	110.62	1.8	350	48	73	72	1.9	5.0		31.65	98.6
	30	112.82	1.8	348	49	73	72	1.9	5.0		31.61	98.6
	33	115.03	1.8	346	49	73	72	1.9	5.0		31.57	98.9
4	36	117.22	1.75	346	49	73	72	1.9	5.0		31.13	97.9
	39	119.42	1.75	346	48	73	73	1.9	5.0		31.13	99.7
	42	121.62	1.75	346	47	73	73	1.9	5.0		31.13	99.7
	45	123.82	1.75	350	47	73	73	1.9	5.0		31.21	99.7
5	48	126.02	1.75	351	48	73	73	1.9	5.0		31.23	99.9
	51	128.22	1.75	352	47	73	73	1.9	5.0		31.25	100.0
	54	130.44	1.75	355	47	73	73	1.9	5.0		31.30	100.9
	57	132.65	1.75	356	47	73	73	1.9	5.0		31.32	100.7
6	60	134.85	2.1	358	47	73	73	2.3	6.0		34.35	100.3
	63	137.18	2.1	358	47	73	73	2.3	6.0		34.35	97.2
	66	139.62	2.1	359	46	73	73	2.3	6.0		34.37	101.7
	69	142.02	2.1	362	46	74	73	2.3	6.0		34.44	100.1
7	72	144.41	1.9	361	46	74	73	2.1	5.5		32.74	99.8
	75	146.71	1.9	362	46	74	73	2.1	5.5		32.76	100.9
	78	149.03	1.9	363	46	74	73	2.1	5.5		32.78	101.8
	81	151.33	1.9	363	46	74	73	2.1	5.5		32.78	101.0
8	84	153.59	1.85	363	46	74	73	2	5.0		32.34	99.2
	87	155.85	1.8	363	46	74	73	2	5.0		31.90	100.5
	90	158.10	1.8	361	46	74	73	2	5.0		31.86	101.5
	93	160.34	1.8	360	45	74	73	2	5.0		31.84	100.9
9	96	162.59	1.8	361	46	74	74	2	5.0		31.86	101.3
	99	164.83	1.8	352	45	74	73	2	5.0		31.69	100.8

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 26, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.31 "Hg	**CWTR (g)**	3586.2		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	17.1		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.62 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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
49.0 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures				ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
				Stack °F	Imp. Out °F	DGM Out °F	DGM In °F					
	102	167.09	1.8	356	46	74	73	2	5.0		31.77	101.2
	105	169.37	1.85	356	46	74	73	2	5.0		32.20	102.4
10	108	171.66	1.75	357	46	73	73	2	4.8		31.34	101.4
	111	173.92	1.75	356	47	73	73	2	4.8		31.32	103.1
	114	176.16	1.75	356	47	73	74	2	4.8		31.32	102.1
	117	178.42	1.75	355	47	73	73	2	4.8		31.30	102.9
	120	180.68								0.62		103.0
1	0	181.30	1.85	351	65	74	73	2	5.0		32.11	
	3	183.63	1.85	352	52	73	73	2	5.0		32.13	102.9
	6	185.88	1.85	353	52	74	74	2	5.0		32.15	99.5
	9	188.14	1.85	352	52	75	74	2	5.0		32.13	99.8
2	12	190.40	1.85	352	54	75	74	2	5.0		32.13	99.7
	15	192.63	1.85	354	52	75	75	2	5.0		32.16	98.4
	18	194.90	1.85	352	54	74	74	2	5.0		32.13	100.2
	21	197.16	1.85	351	56	75	75	2	5.0		32.11	99.8
3	24	199.42	1.9	352	56	75	75	2	5.0		32.56	99.5
	27	201.78	1.9	353	56	74	75	2	5.0		32.58	102.6
	30	204.10	1.9	353	57	74	74	2	5.0		32.58	101.0
	33	206.25	1.9	351	51	74	74	2	5.0		32.54	93.7
4	36	208.54	1.9	351	51	74	75	2	5.0		32.54	99.7
	39	210.82	1.9	351	51	74	75	2	5.0		32.54	99.2
	42	213.15	1.9	352	51	75	74	2	5.0		32.56	101.3
	45	215.46	1.9	352	53	75	75	2	5.0		32.56	100.5
5	48	217.83	1.9	352	53	75	75	2	5.0		32.56	103.1
	51	220.10	1.9	352	52	75	75	2	5.0		32.56	98.7
	54	222.41	1.9	352	52	75	75	2	5.0		32.56	100.4
	57	224.73	1.9	353	54	75	74	2	5.0		32.58	100.9
6	60	227.07	1.9	351	56	75	75	2	5.0		32.54	101.9
	63	229.37	1.9	351	57	75	74	2	5.0		32.54	99.9
	66	231.70	1.9	350	60	75	75	2	5.0		32.52	101.3
	69	234.03	1.9	350	61	75	75	2	5.0		32.52	101.2
7	72	236.36	1.9	348	58	76	75	2	5.0		32.48	101.2
	75	238.77	1.8	351	57	76	75	2	5.0		31.67	104.4
	78	240.97	1.8	350	53	76	75	2	5.0		31.65	98.1

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 26, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.31 "Hg	**CWTR (g)**	3586.2		
Static Pressure	1.200 "H_2O	**WCBDA (g)**	17.1		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.62 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%	9.18
CO2%	8.41
COppm	63.3

Measured H2O
49.0 %

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	243.27	1.8	349	52	76	75	2	5.0		31.63	**102.5**
8	84	245.54	1.75	347	52	76	75	2	5.0		31.15	**101.1**
	87	247.86	1.75	347	52	76	76	2	4.5		31.15	**104.7**
	90	250.12	1.75	349	54	76	75	2	4.5		31.19	**101.9**
	93	252.41	1.75	349	53	76	75	2	4.5		31.19	**103.5**
9	96	254.66	1.75	349	53	76	75	2	4.5		31.19	**101.7**
	99	256.92	1.75	349	58	76	75	2	4.5		31.19	**102.1**
	102	259.17	1.75	351	59	76	75	2	4.5		31.23	**101.7**
	105	261.45	1.75	352	60	76	75	2	4.5		31.25	**103.1**
10	108	263.73	1.7	354	57	76	75	2	4.5		30.83	**103.2**
	111	266.03	1.7	353	60	76	75	2	4.5		30.81	**105.8**
	114	268.28	1.7	352	61	76	76	2	4.5		30.80	**103.4**
	117	270.55	1.7	352	61	76	75	2	4.5		30.80	**104.2**
	120	272.83										**104.7**

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	3 - SVOC
Date:	September 27, 2018

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.847
DGM CORRECTION FACTOR	1.006
NOZZLE DIAMETER	6.52 mm
DRY REF GAS VOLUME SAMPLED	5.035 m^3
AVGERGE ISOKINETICITY	101.1 %
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	175.5 °C
AVERAGE GAS MOISTURE BY VOLUME	49.6 %
AVERAGE GAS VELOCITY	31.32 m/s
BAROMETRIC PRESSURE (Station)	99.729 Kpa
STATIC PRESSURE	0.324 Kpa
ABSOLUTE GAS PRESSURE	100.053 Kpa
OXYGEN CONCENTRATION	8.99 %
CARBON DIOXIDE CONCENTRATION	8.58 %
CARBON MONOXIDE CONCENTRATION	49.0 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	57.13 m^3/s
DRY REF GAS FLOWRATE	18.89 Rm^3/s
DRY ADJ GAS FLOWRATE	22.72 Rm^3/s
WET REF GAS FLOWRATE	37.49 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.035 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:	September 27, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3625.7		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	18		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.55 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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.6 %

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	77.80	1.5	345	57	58	57	1.5	3.0		28.77	
	3	79.92	1.5	346	51	58	57	1.5	3.0		28.78	108.0
	6	81.87	1.5	347	51	58	58	1.5	3.0		28.80	99.4
	9	83.80	1.5	347	53	58	58	1.5	3.0		28.80	98.3
2	12	85.75	1.5	346	54	58	58	1.5	3.0		28.78	99.4
	15	87.66	1.65	347	48	59	58	1.6	4.0		30.21	97.3
	18	89.71	1.65	347	47	59	58	1.6	4.0		30.21	99.5
	21	91.80	1.65	346	47	59	58	1.6	4.0		30.19	101.5
3	24	93.90	1.65	348	47	59	58	1.6	4.0		30.23	101.9
	27	95.99	1.65	348	47	59	58	1.6	4.0		30.23	101.5
	30	98.05	1.7	346	50	60	59	1.8	4.5		30.64	100.1
	33	100.19	1.7	346	50	60	59	1.8	4.5		30.64	102.1
4	36	102.33	1.7	346	50	60	59	1.8	4.5		30.64	102.1
	39	104.46	1.7	347	49	60	59	1.8	4.5		30.66	101.7
	42	106.61	1.7	346	49	60	59	1.8	4.5		30.64	102.7
	45	108.75	1.7	348	51	61	60	1.8	4.5		30.68	102.1
5	48	110.88	1.7	350	52	61	60	1.8	4.5		30.72	101.6
	51	113.01	1.75	348	52	62	60	1.8	4.5		31.13	101.7
	54	115.15	1.75	346	50	62	60	1.8	4.5		31.09	100.5
	57	117.29	1.75	348	51	63	61	1.8	4.5		31.13	100.4
6	60	119.43	1.9	346	51	63	61	2	5.0		32.39	100.3
	63	121.71	1.9	345	50	62	61	2	5.0		32.37	102.5
	66	124.00	1.9	347	50	63	61	2	5.0		32.41	103.0
	69	126.27	1.9	349	51	63	61	2	5.0		32.45	102.1
7	72	128.54	1.9	348	50	63	61	2	5.0		32.43	102.2
	75	130.80	2	348	50	63	61	2.1	5.0		33.28	101.7
	78	133.14	2	347	50	63	61	2.1	5.0		33.26	102.7
	81	135.52	2	346	50	64	62	2.1	5.0		33.24	104.4
8	84	137.78	1.9	346	49	64	62	2	5.0		32.39	98.9
	87	140.08	1.9	346	49	64	62	2	5.0		32.39	103.2
	90	142.37	1.9	348	48	64	62	2	5.0		32.43	102.8
	93	144.66	1.9	346	48	64	62	2	5.0		32.39	102.9
9	96	146.95	1.9	345	48	64	63	2	5.0		32.37	102.8
	99	149.21	1.9	346	48	64	63	2	5.0		32.39	101.2

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 27, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3625.7		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	18		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.55 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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.6 %

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	151.48	1.95	345	48	65	63	2	5.0		32.80	101.8
	105	153.77	1.95	345	48	65	63	2	5.0		32.80	101.2
10	108	156.04	1.95	347	49	65	63	2	5.0		32.84	100.3
	111	158.30	2.1	345	48	65	63	2.1	5.2		34.04	100.0
	114	160.62	2	345	48	65	63	2	5.2		33.22	98.8
	117	162.95	2	345	49	65	64	2	5.2		33.22	101.6
	120	165.27								0.55		101.1
1	0	165.82	1.85	345	66	67	66	2	4.2		31.95	
	3	168.09	1.9	349	48	67	66	1.9	4.5		32.45	102.5
	6	170.32	1.9	348	47	67	67	1.9	4.5		32.43	99.6
	9	172.54	1.9	348	47	67	66	1.9	4.5		32.43	99.0
2	12	174.80	1.95	348	47	67	66	1.9	4.5		32.86	100.8
	15	177.04	1.95	347	48	68	67	1.9	4.5		32.84	98.7
	18	179.36	1.95	349	49	68	67	1.9	4.5		32.88	101.9
	21	181.62	1.95	350	49	68	67	1.9	4.5		32.90	99.4
3	24	183.87	2	351	49	69	68	2.05	5.0		33.34	99.0
	27	186.21	2	352	49	69	68	2.05	5.0		33.36	101.6
	30	188.53	2	352	50	69	68	2.05	5.0		33.36	100.8
	33	190.85	2	353	49	69	68	2.05	5.0		33.38	100.8
4	36	193.16	1.9	352	49	69	68	1.9	5.0		32.51	100.4
	39	195.45	1.9	352	49	69	68	1.9	5.0		32.51	102.0
	42	197.67	1.9	353	49	69	68	1.9	5.0		32.54	98.9
	45	199.93	1.9	353	49	69	69	1.9	5.0		32.54	100.8
5	48	202.19	1.9	351	50	71	70	1.9	5.0		32.49	100.7
	51	204.43	1.9	352	50	71	69	1.9	5.0		32.51	99.4
	54	206.71	1.9	350	50	71	69	1.9	5.0		32.47	101.3
	57	208.92	1.9	348	50	70	69	1.9	5.0		32.43	98.1
6	60	211.16	1.9	350	50	70	69	1.9	5.0		32.47	99.4
	63	213.40	1.8	351	49	70	69	1.85	5.0		31.63	99.5
	66	215.62	1.75	350	50	71	70	1.85	5.0		31.17	101.4
	69	217.80	1.75	350	49	72	71	1.85	5.0		31.17	100.7
7	72	220.05	1.65	350	49	72	71	1.8	4.8		30.26	103.7
	75	222.23	1.65	349	50	72	71	1.8	4.8		30.24	103.5
	78	224.37	1.65	350	49	72	71	1.8	4.8		30.26	101.5

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - SVOC	**Test Location:**	Incinerator Exhaust Stack
Date:	September 27, 2018	**Operator:**	CB

Pitot Factor	0.847	**Filter (mg)**	0		
DGMCF	1.006	**Probe (mg)**	0		
Barometric Pressure	29.45 "Hg	**CWTR (g)**	3625.7		
Static Pressure	1.300 "H_2O	**WCBDA (g)**	18		
Nozzle	0.2566 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.55 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%	8.99
CO2%	8.58
COppm	49.0

Measured H2O
49.6 %

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	226.54	1.65	348	49	72	71	1.8	4.8		30.23	**103.0**
8	84	228.71	1.6	348	49	71	70	1.7	4.5		29.76	**102.9**
	87	230.84	1.6	346	49	71	70	1.7	4.5		29.73	**102.7**
	90	232.92	1.6	346	49	72	70	1.7	4.5		29.73	**100.2**
	93	235.04	1.6	348	50	73	72	1.7	4.5		29.76	**102.0**
9	96	237.13	1.5	348	49	72	71	1.6	4.2		28.82	**100.4**
	99	239.17	1.5	347	50	72	71	1.6	4.2		28.80	**101.4**
	102	241.19	1.5	349	49	72	71	1.6	4.2		28.84	**100.3**
	105	243.20	1.5	347	50	72	71	1.6	4.2		28.80	**100.0**
10	108	245.24	1.4	347	52	73	72	1.5	4.0		27.82	**101.3**
	111	247.20	1.4	349	51	73	72	1.5	4.0		27.86	**100.6**
	114	249.16	1.4	349	51	73	72	1.5	4.0		27.86	**100.7**
	117	251.13	1.4	348	52	73	72	1.5	4.0		27.84	**101.2**
	120	253.13										**102.7**

APPENDIX 24

ORTECH One-Minute Average
Combustion Gas Results
(15 pages)

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:45	9.33	8.19	27.7	32.1	6.6		118.1	119.2
10:46	9.02	8.43	41.3	30.2	7.1		122.3	122.8
10:47	9.17	8.28	47.8	31.7	6.6		121.0	121.5
10:48	8.85	8.56	47.9	32.7	7.3		119.9	120.4
10:49	9.17	8.28	53.3	37.4	7.0		113.9	115.1
10:50	8.75	8.63	43.8	38.8	9.2		114.6	115.3
10:51	8.69	8.64	42.3	46.6	8.7		113.0	113.4
10:52	8.73	8.65	30.8	43.9	8.9		122.0	122.7
10:53	8.97	8.41	25.3	42.9	7.8		117.2	117.9
10:54	8.95	8.49	19.6	35.2	8.7	7.8	120.0	120.8
10:55	8.81	8.55	17.1	39.1	8.2	8.0	117.9	119.1
10:56	8.96	8.47	14.5	36.2	8.1	8.1	117.6	118.4
10:57	8.81	8.56	14.9	43.9	8.0	8.2	113.1	113.8
10:58	9.18	8.32	23.6	41.3	8.0	8.3	114.3	115.2
10:59	8.73	8.64	46.0	47.0	9.4	8.5	111.5	113.1
11:00	9.00	8.42	49.8	50.5	7.4	8.3	114.9	115.6
11:01	8.80	8.58	47.9	43.6	8.5	8.3	116.5	117.1
11:02	9.25	8.25	51.0	43.8	7.7	8.2	114.3	115.3
11:03	8.76	8.63	44.7	40.8	9.8	8.4	115.0	116.6
11:04	8.82	8.55	39.5	46.7	9.3	8.4	114.4	115.2
11:05	8.47	8.85	42.3	51.3	12.2	8.8	112.6	113.8
11:06	8.84	8.52	61.8	59.4	8.5	8.9	106.4	108.0
11:07	8.65	8.72	59.4	39.8	9.1	9.0	116.7	117.5
11:08	8.71	8.63	63.9	38.4	7.6	8.9	116.7	117.1
11:09	8.88	8.54	54.0	35.1	7.7	8.8	122.4	123.1
11:10	9.06	8.38	55.7	37.1	7.3	8.8	115.1	117.8
11:11	9.07	8.41	51.3	35.0	8.0	8.7	118.1	118.3
11:12	8.85	8.54	55.3	41.9	7.9	8.7	116.2	116.7
11:13	8.84	8.56	55.2	39.9	11.2	8.9	115.6	116.9
11:14	8.44	8.84	69.7	54.7	15.3	9.5	107.2	108.7
11:15	8.77	8.61	72.1	57.2	12.0	9.5	108.9	110.5
11:16	8.32	8.94	75.8	50.0	13.3	9.9	110.4	112.9
11:17	8.60	8.73	77.9	48.0	9.7	10.0	116.0	116.2
11:18	8.50	8.83	60.9	36.0	11.4	10.4	122.9	124.4
11:19	9.15	8.31	48.6	33.4	9.7	10.6	117.5	119.3
11:20	8.87	8.56	34.1	28.6	9.6	10.8	120.4	122.2
11:21	8.98	8.43	26.3	30.5	9.4	10.9	118.4	119.7
11:22	8.76	8.65	20.2	31.5	10.0	11.1	116.8	117.7
11:23	8.98	8.44	19.9	39.2	8.0	10.8	111.2	111.9
11:24	8.82	8.61	35.2	36.5	9.4	10.2	114.5	115.5
11:25	8.68	8.67	57.7	46.5	8.9	9.9	109.8	111.4
11:26	8.68	8.70	54.0	35.3	10.4	9.7	119.6	121.5
11:27	8.78	8.58	65.0	42.0	9.9	9.7	113.2	115.7
11:28	8.94	8.51	59.3	37.8	8.3	9.4	113.5	114.7
11:29	8.78	8.61	61.1	37.9	9.5	9.3	115.6	117.0
11:30	8.98	8.47	55.7	36.5	10.0	9.4	116.6	117.5
11:31	8.70	8.67	59.3	44.9	9.4	9.4	112.1	113.5
11:32	9.13	8.35	58.6	45.7	7.7	9.2	111.4	113.1
11:33	8.75	8.64	56.2	39.4	9.3	9.3	111.6	114.4
11:34	8.85	8.55	58.1	47.8	8.9	9.2	114.2	114.5
11:35	8.56	8.80	56.1	49.8	10.7	9.4	114.6	116.7
11:36	9.12	8.33	61.8	49.1	8.2	9.2	111.9	113.6
11:37	8.83	8.59	53.7	40.9	9.6	9.2	117.1	117.9
11:38	8.85	8.54	58.1	47.1	9.0	9.2	115.5	116.3
11:39	8.55	8.81	58.8	49.9	12.2	9.5	114.8	116.0
11:40	8.85	8.53	68.5	58.8	8.5	9.4	107.3	107.9
11:41	8.92	8.54	55.2	40.5	8.0	9.2	114.0	115.2
11:42	8.81	8.59	56.5	48.0	8.4	9.3	111.8	112.9

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:43	9.00	8.47	49.4	47.8	7.9	9.1	113.1	112.6
11:44	9.08	8.38	50.0	50.3	5.5	8.8	110.7	111.1
11:45	9.33	8.24	46.1	47.5	5.0	8.2	109.9	111.4
11:46	9.00	8.47	46.5	48.6	5.6	8.0	109.3	110.2
11:47	9.01	8.46	47.2	54.6	6.8	7.7	109.9	110.5
11:48	8.63	8.74	55.9	68.4	8.7	7.7	107.6	108.5
11:49	9.06	8.41	58.0	70.5	6.6	7.1	104.3	106.2
11:50	8.64	8.75	58.4	58.5	8.9	7.1	106.6	109.0
11:51	8.82	8.56	61.1	62.4	5.8	6.9	107.4	108.5
11:52	8.77	8.64	52.7	46.5	6.1	6.7	115.0	116.1
11:53	9.41	8.12	50.6	44.9	5.1	6.4	111.4	112.5
11:54	9.12	8.39	45.0	43.1	5.9	6.4	112.2	112.7
11:55	9.13	8.35	48.7	50.5	5.5	6.5	110.5	111.3
11:56	8.96	8.51	47.2	52.4	6.8	6.6	110.6	111.0
11:57	9.09	8.36	53.9	63.7	6.6	6.6	104.9	105.9
11:58	9.06	8.44	48.0	59.8	7.5	6.5	109.1	110.5
11:59	8.70	8.68	56.9	75.0	9.3	6.7	104.8	105.4
12:00	8.80	8.61	55.9	67.7	7.5	6.6	113.1	113.6
12:01	8.85	8.54	59.8	56.3	6.8	6.7	111.7	113.5
12:02	9.27	8.27	51.6	43.4	6.1	6.7	116.1	116.9
12:03	8.79	8.61	54.1	42.5	7.6	7.0	114.1	115.7
12:04	8.89	8.54	57.1	46.4	6.9	7.1	115.6	116.6
12:05	8.58	8.77	59.0	47.4	7.8	7.3	110.6	112.4
12:06	9.12	8.35	59.8	49.2	5.9	7.2	113.0	114.1
12:07	8.75	8.66	60.3	44.4	6.9	7.2	113.3	114.3
12:08	8.91	8.50	58.8	47.3	6.0	7.1	115.7	116.0
12:09	8.74	8.66	53.7	42.4	6.5	6.8	118.0	118.5
12:10	9.20	8.28	56.9	44.2	6.4	6.7	114.1	115.8
12:11	8.84	8.60	52.8	46.8	7.8	6.8	116.7	117.0
12:12	8.71	8.65	63.4	49.6	7.4	6.9	113.6	115.1
12:13	8.53	8.82	65.0	47.0	9.4	7.1	114.6	116.3
12:14	8.52	8.78	78.2	59.9	9.9	7.4	108.2	109.7
12:15	8.60	8.77	70.3	54.2	9.4	7.6	110.5	110.7
12:16	8.32	8.94	83.0	52.2	9.7	7.9	109.6	111.2
12:17	8.72	8.65	70.9	44.9	6.4	7.9	121.6	122.7
12:18	8.71	8.64	66.5	35.9	6.7	8.0	120.9	123.5
12:19	9.12	8.36	61.6	36.6	6.0	7.9	120.1	120.8
12:20	8.71	8.66	59.8	33.0	7.3	8.0	120.8	121.0
12:21	8.88	8.53	63.7	39.2	6.2	7.9	120.3	121.3
12:22	8.59	8.77	63.8	38.6	7.7	7.9	116.6	117.6
12:23	9.05	8.38	66.4	44.7	6.7	7.6	113.9	114.5
12:24	8.57	8.78	64.1	44.8	8.0	7.4	113.3	115.3
12:25	8.67	8.68	71.0	45.3	7.2	7.2	113.7	114.0
12:26	8.39	8.92	66.8	39.7	8.9	7.1	118.9	121.4
12:27	8.78	8.58	79.6	40.8	7.5	7.2	115.6	116.7
12:28	8.74	8.64	68.8	33.5	6.7	7.2	123.7	124.9
12:29	8.84	8.54	63.2	32.1	6.5	7.3	122.5	123.6
12:30	8.79	8.62	49.5	33.9	7.5	7.3	122.2	123.1
12:31	8.83	8.55	44.4	40.6	6.5	7.3	115.5	116.7
12:32	9.11	8.38	44.0	34.4	5.8	7.1	118.7	119.9
12:33	8.86	8.56	52.4	39.4	6.2	7.1	114.4	116.5
12:34	9.14	8.34	49.4	41.6	6.2	6.9	117.7	118.5
12:35	8.97	8.47	46.5	41.9	7.3	6.9	118.5	119.5
12:36	9.33	8.22	50.0	44.4	7.1	6.7	114.7	115.4
12:37	8.90	8.54	50.3	46.7	8.0	6.8	116.2	117.2
12:38	9.03	8.42	52.2	47.4	7.5	6.9	115.4	115.7
12:39	8.67	8.71	55.8	50.7	9.3	7.1	114.9	115.3
12:40	9.15	8.32	60.5	52.7	6.8	7.1	113.8	113.8

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
12:41	8.95	8.51	52.3	44.3	7.2	7.1	113.4	114.2
12:42	9.11	8.34	53.7	48.4	6.0	7.2	112.8	114.0
12:43	9.08	8.41	44.2	45.6	7.3	7.3	114.2	114.7
12:44	9.49	8.06	45.3	56.0	6.3	7.3	110.7	111.0
12:45	9.36	8.21	39.6	50.2	7.0	7.2	111.1	111.7
13:44	9.16	8.24	56.1	59.6	3.5		94.7	94.9
13:45	8.98	8.47	47.7	50.5	4.0		96.8	96.9
13:46	8.99	8.40	50.6	53.9	3.4		94.8	94.1
13:47	8.81	8.60	48.5	56.8	6.8		93.9	93.3
13:48	8.75	8.57	60.6	80.3	5.3		87.0	87.5
13:49	8.73	8.65	59.3	67.5	6.4		93.4	94.8
13:50	8.43	8.83	68.1	70.0	6.4		90.3	89.7
13:51	8.64	8.69	63.5	65.2	5.2		99.7	100.0
13:52	8.62	8.67	64.0	56.0	5.1		97.6	97.7
13:53	9.15	8.32	58.1	51.8	3.8	5.0	98.8	99.6
13:54	8.84	8.54	54.1	45.0	4.4	5.1	99.8	100.2
13:55	8.97	8.43	53.2	48.6	3.9	5.1	98.7	97.9
13:56	8.67	8.68	54.7	51.3	5.0	5.2	97.5	96.4
13:57	9.11	8.31	57.9	57.5	3.9	4.9	96.7	96.7
13:58	8.74	8.64	53.4	53.1	5.1	4.9	95.5	95.5
13:59	8.85	8.49	58.7	58.5	3.5	4.6	96.3	95.9
14:00	8.80	8.60	50.2	51.6	4.5	4.4	99.0	99.5
14:01	9.15	8.26	54.3	55.1	3.7	4.3	94.6	93.9
14:02	8.80	8.61	52.4	51.2	5.4	4.3	96.5	97.0
14:03	8.71	8.61	62.9	56.3	4.5	4.4	95.1	95.1
14:04	8.59	8.76	60.2	49.5	5.9	4.5	97.4	98.0
14:05	8.60	8.70	62.9	58.7	5.6	4.7	93.0	92.7
14:06	8.78	8.62	64.0	56.5	5.7	4.8	97.4	97.9
14:07	8.50	8.79	70.2	54.4	4.9	4.9	94.8	93.9
14:08	8.87	8.51	58.5	49.1	3.6	4.7	103.3	104.4
14:09	8.86	8.50	55.4	40.9	3.6	4.7	100.9	101.0
14:10	9.33	8.19	51.1	41.2	3.4	4.6	98.6	99.3
14:11	9.00	8.44	48.2	48.2	3.9	4.6	96.7	96.7
14:12	9.18	8.29	47.5	54.2	3.9	4.5	96.6	95.4
14:13	8.75	8.64	49.2	70.9	6.1	4.7	90.1	90.4
14:14	9.10	8.32	55.2	85.0	4.2	4.5	89.5	89.9
14:15	8.73	8.67	53.3	69.1	7.0	4.6	90.8	92.0
14:16	8.79	8.55	58.7	80.0	4.5	4.5	92.2	92.4
14:17	8.80	8.60	50.2	62.2	5.2	4.5	98.2	98.3
14:18	9.13	8.31	52.5	60.3	4.4	4.6	95.2	94.2
14:19	9.03	8.45	48.2	52.9	5.0	4.8	96.1	94.7
14:20	8.99	8.41	51.6	58.9	4.1	4.8	95.8	94.6
14:21	9.05	8.42	45.1	58.9	3.8	4.8	96.3	94.8
14:22	9.05	8.36	47.2	61.2	3.6	4.8	92.2	91.4
14:23	9.16	8.36	44.1	64.2	5.7	4.8	91.2	91.5
14:24	8.72	8.65	51.6	84.7	4.6	4.8	87.8	88.6
14:25	9.00	8.42	51.2	69.9	3.7	4.5	92.8	93.5
14:26	8.77	8.60	47.0	60.3	5.4	4.6	93.6	93.3
14:27	9.10	8.37	51.6	58.5	4.5	4.5	94.2	93.9
14:28	8.69	8.69	58.4	54.8	5.0	4.5	96.0	95.4
14:29	8.76	8.62	61.3	54.2	4.9	4.5	97.4	97.5
14:30	8.37	8.94	68.1	66.3	7.6	4.9	92.0	92.7
14:31	8.92	8.50	73.1	66.9	4.2	4.9	91.1	91.5
14:32	8.68	8.72	65.2	49.6	5.8	5.1	98.5	98.9
14:33	8.88	8.52	67.7	62.2	3.6	4.9	98.7	98.2
14:34	8.78	8.64	56.8	50.7	4.3	4.9	100.4	100.9
14:35	9.37	8.15	57.1	55.0	2.9	4.8	95.6	95.7
14:36	9.22	8.32	48.8	45.5	3.7	4.6	96.8	97.5

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:37	9.19	8.30	50.0	61.0	3.4	4.5	93.6	93.1
14:38	8.91	8.55	48.9	59.6	6.4	4.7	93.0	91.9
14:39	8.80	8.58	63.9	94.7	6.0	4.8	87.4	88.0
14:40	8.91	8.54	60.7	71.8	6.7	4.7	94.4	94.9
14:41	8.62	8.74	69.3	83.7	6.7	4.9	91.6	91.4
14:42	8.82	8.59	63.5	70.1	4.9	4.8	99.8	99.7
14:43	8.72	8.66	62.7	66.5	5.2	5.0	97.4	97.0
14:44	9.26	8.28	57.1	59.6	3.6	4.9	95.4	95.9
14:45	8.92	8.52	55.1	57.0	3.5	5.0	95.1	94.6
14:46	9.07	8.40	55.5	50.4	3.2	4.9	95.2	93.9
14:47	8.75	8.66	55.5	63.9	6.3	5.2	92.2	92.2
14:48	9.22	8.27	58.8	91.3	3.6	5.0	89.5	89.2
14:49	8.96	8.51	51.7	70.6	5.3	4.9	92.0	91.9
14:50	8.89	8.52	55.3	89.1	4.6	4.7	90.5	90.3
14:51	8.78	8.64	51.7	76.5	5.2	4.5	92.8	93.0
14:52	9.16	8.32	56.3	78.9	3.8	4.4	90.2	90.2
14:53	9.01	8.47	49.5	57.7	4.8	4.4	93.3	93.2
14:54	8.82	8.58	55.3	77.0	4.9	4.5	90.3	88.9
14:55	8.78	8.65	54.0	68.6	5.8	4.7	92.1	92.7
14:56	8.82	8.58	62.4	86.0	5.1	4.9	89.4	89.4
14:57	9.12	8.39	53.1	64.2	3.9	4.7	93.9	94.0
14:58	8.83	8.59	55.6	67.1	4.7	4.8	91.3	91.6
14:59	9.13	8.36	50.2	62.8	3.1	4.6	95.4	95.0
15:00	9.03	8.43	46.6	56.8	3.6	4.5	94.3	94.9
15:01	9.53	8.08	45.4	56.5	2.7	4.2	90.1	90.6
15:02	9.06	8.44	44.0	57.8	4.3	4.3	91.9	90.9
15:03	9.08	8.40	48.2	66.6	4.6	4.3	92.1	90.0
15:04	8.73	8.68	52.4	74.6	6.5	4.4	90.8	89.3
15:05	9.16	8.32	54.9	80.3	4.5	4.3	89.9	88.6
15:06	8.82	8.62	50.5	70.2	6.3	4.4	90.4	89.4
15:07	8.86	8.55	55.3	89.0	4.8	4.5	90.3	89.4
15:08	9.00	8.47	45.8	68.6	4.6	4.5	93.4	94.3
15:09	9.42	8.13	44.1	76.1	3.3	4.5	90.7	89.7
15:10	9.41	8.19	36.6	67.6	3.7	4.5	89.3	88.4
15:11	9.25	8.26	38.2	90.3	3.9	4.6	88.0	87.2
15:12	9.30	8.25	36.0	88.5	5.1	4.7	87.0	86.5
15:13	9.17	8.32	39.8	106.6	5.4	4.8	85.4	84.2
15:14	9.30	8.25	38.9	101.3	5.6	4.7	83.9	84.8
15:15	8.79	8.61	44.4	107.7	8.5	5.1	82.9	83.0
15:16	8.89	8.54	47.3	73.7	5.8	5.1	89.8	90.3
15:17	8.82	8.58	46.8	85.2	5.1	5.1	89.6	89.8
15:18	9.30	8.24	46.8	71.0	4.3	5.1	89.0	88.6
15:19	8.94	8.52	47.0	63.6	4.9	5.2	92.7	93.1
15:20	9.13	8.35	48.9	64.7	3.6	5.2	93.5	92.5
15:21	8.89	8.56	46.9	57.5	4.2	5.3	93.2	91.5
15:22	9.27	8.23	51.1	57.0	3.4	5.1	92.7	91.6
15:23	9.08	8.42	45.8	49.5	3.7	4.9	92.2	90.6
15:24	9.04	8.42	50.3	54.1	3.4	4.7	91.9	90.1
15:25	9.11	8.40	46.1	48.5	3.5	4.2	96.1	96.9
15:26	9.24	8.26	49.9	56.3	4.2	4.1	91.7	92.2
15:27	9.12	8.40	48.4	53.0	5.0	4.0	94.4	94.8
15:28	8.87	8.55	57.9	65.0	5.2	4.1	94.0	92.7
15:29	8.84	8.60	56.3	58.9	6.2	4.3	94.1	93.3
15:30	8.66	8.70	67.0	67.3	6.9	4.6	91.2	91.5
15:31	9.09	8.41	62.2	62.3	4.7	4.6	92.9	93.3
15:32	8.77	8.64	60.1	60.3	5.3	4.8	92.2	93.0
15:33	9.03	8.43	57.4	60.7	3.3	4.8	96.4	95.7
15:34	8.93	8.52	51.9	56.4	5.3	5.0	96.7	96.4

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018

	O2	CO2	SO2	CO	THC (ppm)		NO	NOx
Time	%	%	ppm	ppm	1-min	10-min	ppm	ppm
15:35	9.40	8.16	54.2	64.2	4.4	5.1	93.6	94.6
15:36	8.95	8.52	53.4	57.4	5.4	5.2	97.4	97.7
15:37	8.93	8.51	58.5	59.1	5.0	5.2	97.2	95.9
15:38	8.60	8.79	62.5	56.5	8.9	5.6	95.9	95.2
15:39	8.83	8.57	77.2	73.9	6.2	5.6	89.7	90.5
15:40	8.66	8.74	67.5	54.1	5.8	5.4	97.5	97.7
15:41	8.74	8.64	72.2	54.1	4.2	5.4	95.7	95.2
15:42	8.94	8.53	56.7	45.3	3.8	5.2	101.3	101.9
15:43	9.09	8.39	57.0	51.9	4.6	5.4	97.3	96.3
15:44	9.22	8.34	53.0	53.2	3.8	5.2	97.9	98.5
Min	8.32	8.06	14.5	28.6	2.7	4.0	82.9	83.0
Max	9.53	8.94	83.0	107.7	15.3	11.1	123.7	124.9
Avg	8.91	8.51	53.6	54.4	6.4	6.4	104.1	104.6

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:35	9.51	8.16	28.4	107.9	3.6		86.3	86.4
09:36	9.23	8.33	27.5	101.3	3.1		87.0	86.7
09:37	9.43	8.19	26.3	82.5	2.4		88.3	87.1
09:38	9.31	8.27	25.5	73.8	2.8		89.5	88.7
09:39	9.66	8.04	25.5	69.1	2.8		90.2	88.7
09:40	9.18	8.39	26.2	72.7	3.2		90.7	89.7
09:41	9.24	8.34	28.5	68.0	3.1		92.0	90.9
09:42	8.85	8.65	31.2	65.8	4.4		93.7	93.0
09:43	9.21	8.34	33.5	75.0	2.9		94.6	93.0
09:44	8.84	8.67	35.7	58.7	4.0	3.3	95.8	94.6
09:45	8.99	8.49	40.6	61.9	2.2	3.1	97.6	96.5
09:46	9.18	8.40	33.7	46.8	2.2	3.0	99.4	97.9
09:47	9.60	8.03	29.5	48.7	1.9	3.0	97.2	96.7
09:48	9.51	8.17	26.3	45.9	2.3	2.9	94.4	94.5
09:49	9.41	8.20	26.4	56.3	2.4	2.9	95.2	93.2
09:50	9.36	8.28	25.4	66.1	3.2	2.9	94.2	92.4
09:51	9.25	8.32	28.7	82.2	3.5	2.9	89.9	90.0
09:52	9.39	8.25	26.8	82.5	3.6	2.8	90.3	90.1
09:53	9.05	8.50	28.8	85.7	4.7	3.0	90.9	89.9
09:54	9.24	8.33	29.1	85.5	3.4	3.0	91.3	90.0
09:55	9.24	8.33	26.9	80.3	3.5	3.1	91.8	91.2
09:56	9.71	7.99	24.9	80.6	3.0	3.2	89.1	90.3
09:57	9.37	8.27	22.5	87.9	4.1	3.4	89.5	88.2
09:58	9.47	8.16	22.7	99.9	3.5	3.5	88.0	86.4
09:59	9.15	8.43	21.9	95.2	5.4	3.8	87.8	86.7
10:00	9.50	8.12	24.5	117.3	3.7	3.8	86.8	85.5
10:01	9.12	8.47	22.2	101.9	5.7	4.1	86.4	84.4
10:02	9.18	8.37	25.0	113.1	3.3	4.0	87.4	85.9
10:03	9.32	8.31	21.9	91.9	3.8	3.9	89.5	88.2
10:04	9.68	7.98	20.6	92.5	2.7	3.9	86.5	86.2
10:05	9.76	7.99	17.1	90.2	3.2	3.8	85.1	84.8
10:06	9.65	8.04	16.7	109.7	2.9	3.8	84.2	83.2
10:07	9.68	8.04	14.8	119.5	3.2	3.7	81.6	80.9
10:08	9.59	8.07	14.1	126.4	2.9	3.7	79.3	78.4
10:09	9.78	7.97	13.6	115.4	3.4	3.5	78.2	76.6
10:10	9.16	8.42	13.6	117.9	3.7	3.5	78.7	77.0
10:11	9.33	8.29	17.3	89.5	2.1	3.1	88.2	88.5
10:12	9.15	8.41	17.4	59.8	2.5	3.1	93.1	92.3
10:13	9.59	8.11	18.6	51.0	1.8	2.9	93.0	91.8
10:14	9.14	8.45	22.6	39.6	2.2	2.8	97.9	98.2
10:15	9.27	8.33	26.8	40.3	1.8	2.7	98.9	97.8
10:16	9.01	8.56	26.2	43.0	2.6	2.6	97.7	96.9
10:17	9.30	8.29	28.2	52.3	2.0	2.5	95.3	94.9
10:18	9.15	8.46	25.3	47.0	3.3	2.5	95.5	96.1
10:19	9.02	8.50	28.5	62.4	2.2	2.4	94.3	93.8
10:20	9.07	8.51	26.4	47.3	2.3	2.3	100.5	100.5
10:21	9.28	8.29	28.1	45.1	1.8	2.3	97.2	96.4
10:22	9.21	8.42	27.4	37.9	2.4	2.3	99.2	100.1
10:23	8.96	8.56	31.1	42.9	2.5	2.3	99.3	97.7
10:24	9.01	8.55	30.9	39.6	2.5	2.3	101.0	99.0
10:25	8.79	8.69	34.0	44.5	2.8	2.4	98.8	97.1
10:26	8.98	8.57	36.8	47.8	2.7	2.5	98.3	98.5
10:27	8.65	8.81	40.5	56.6	3.1	2.6	96.4	96.5
10:28	9.17	8.41	37.6	54.0	1.6	2.4	100.5	101.4
10:29	9.06	8.50	30.6	42.0	2.4	2.4	99.7	99.7
10:30	9.61	8.10	30.0	49.3	1.5	2.3	96.2	96.0
10:31	9.27	8.37	27.3	52.3	2.5	2.4	95.3	94.8
10:32	9.42	8.23	28.6	70.5	2.2	2.4	94.1	93.0

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:33	9.09	8.51	26.4	78.0	4.8	2.6	92.0	90.9
10:34	9.28	8.32	29.9	107.1	3.0	2.7	87.7	87.7
10:35	9.03	8.56	29.3	73.4	4.5	2.8	92.7	93.1
10:36	8.98	8.55	34.6	88.3	2.9	2.8	91.8	91.6
10:37	8.99	8.58	31.0	60.7	3.3	2.9	96.7	97.4
10:38	9.17	8.39	33.1	70.2	2.6	3.0	95.2	94.3
10:39	9.14	8.47	30.6	52.7	2.7	3.0	95.3	93.9
10:40	9.03	8.51	32.9	55.5	2.3	3.1	95.6	94.1
10:41	9.17	8.44	30.2	51.5	2.8	3.1	96.1	95.3
10:42	8.96	8.57	31.4	76.4	3.1	3.2	94.1	93.2
10:43	9.31	8.34	31.8	65.2	2.4	3.0	94.5	94.8
10:44	8.88	8.65	32.9	62.8	3.8	3.0	93.4	92.8
10:45	9.11	8.46	34.0	66.2	2.4	2.8	97.4	97.4
10:46	8.86	8.66	32.8	55.3	2.9	2.8	97.9	97.8
10:47	9.33	8.31	34.5	52.4	2.3	2.7	98.1	96.6
10:48	8.89	8.66	33.4	48.0	3.0	2.8	98.3	96.9
10:49	9.00	8.55	36.7	48.7	2.4	2.7	98.9	97.0
10:50	8.66	8.84	38.5	44.0	4.1	2.9	99.8	98.3
10:51	9.02	8.53	45.4	58.3	2.4	2.9	97.5	97.9
10:52	9.01	8.58	37.3	38.9	2.6	2.8	100.1	100.6
10:53	8.93	8.60	38.5	56.3	2.2	2.8	95.0	94.4
10:54	9.09	8.51	31.8	48.8	2.1	2.6	96.1	94.5
10:55	9.20	8.40	32.8	48.6	2.0	2.6	96.7	94.7
10:56	9.29	8.38	30.1	50.1	2.6	2.6	96.1	95.2
10:57	9.01	8.56	32.9	61.3	2.4	2.6	93.8	92.6
10:58	8.99	8.58	33.2	52.8	2.9	2.6	93.3	92.0
10:59	8.68	8.79	38.0	62.1	3.4	2.7	94.3	93.0
11:00	8.99	8.57	41.6	57.9	2.3	2.5	95.4	95.3
11:01	8.63	8.85	40.7	50.6	3.3	2.6	96.8	96.4
11:02	8.85	8.67	41.7	54.9	1.9	2.5	100.9	100.2
11:03	8.64	8.84	39.5	38.1	2.2	2.5	102.9	103.0
11:04	9.41	8.24	38.9	35.4	1.5	2.5	99.1	99.3
11:05	9.04	8.55	34.3	30.9	2.0	2.5	99.0	99.2
11:06	9.16	8.43	35.7	42.2	2.0	2.4	98.0	97.9
11:07	8.87	8.69	33.7	48.4	3.3	2.5	97.7	96.3
11:08	9.07	8.49	39.5	64.2	2.5	2.4	94.1	93.7
11:09	9.03	8.57	35.7	50.1	2.9	2.4	96.4	96.5
11:10	8.78	8.72	39.0	68.2	3.5	2.5	96.2	95.4
11:11	8.96	8.60	37.0	60.0	2.3	2.4	98.3	98.4
11:12	9.13	8.44	35.2	50.0	2.0	2.4	96.9	95.6
11:13	9.23	8.42	35.9	44.2	2.6	2.4	96.1	95.2
11:14	8.95	8.59	35.0	57.7	2.6	2.6	96.7	95.6
11:15	9.10	8.49	33.7	51.8	3.1	2.7	97.6	95.4
11:16	8.92	8.61	34.6	66.8	2.9	2.8	95.9	94.6
11:17	9.45	8.23	32.1	59.3	2.1	2.6	91.3	91.9
11:18	9.01	8.57	29.5	70.4	4.3	2.8	91.5	89.7
11:19	9.15	8.45	31.7	86.0	2.0	2.7	91.4	91.0
11:20	9.04	8.55	27.7	63.0	2.9	2.7	93.6	93.4
11:21	9.53	8.16	27.3	73.3	2.1	2.7	91.5	91.7
11:22	9.17	8.46	25.2	64.8	3.0	2.8	92.9	91.5
11:23	9.20	8.39	29.1	76.7	2.4	2.7	91.4	90.4
11:24	8.98	8.60	29.6	63.9	3.4	2.8	91.5	90.0
11:25	9.17	8.40	32.9	77.6	3.0	2.8	90.0	89.5
11:26	9.16	8.46	29.5	69.9	3.3	2.9	91.3	91.3
11:27	8.97	8.58	30.3	87.4	3.0	2.9	90.5	89.3
11:28	9.04	8.55	27.8	73.8	3.0	2.8	94.3	93.7
11:29	8.98	8.56	30.6	75.3	3.0	2.9	94.1	94.1
11:30	9.24	8.41	30.0	61.6	2.3	2.8	93.5	92.6

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:31	8.93	8.62	31.0	61.4	2.6	2.9	93.8	91.6
11:32	9.10	8.49	31.3	56.5	2.5	2.9	94.1	92.4
11:33	8.78	8.74	32.3	72.2	3.8	3.0	94.5	92.9
11:34	9.33	8.31	32.5	74.0	2.2	2.9	94.7	93.6
11:35	8.99	8.58	25.2	58.2	3.6	2.9	93.5	92.6
12:56	9.16	8.42	21.3	61.2	2.9		94.7	93.5
12:57	9.25	8.30	21.5	69.7	2.7		93.7	92.5
12:58	9.10	8.47	20.4	73.2	5.1		92.7	91.0
12:59	9.22	8.31	22.0	106.1	4.1		88.9	88.0
13:00	9.23	8.37	20.5	91.9	4.3		90.9	91.6
13:01	8.96	8.54	21.2	96.3	4.3		89.4	88.4
13:02	9.11	8.43	22.1	90.8	3.8		93.8	95.1
13:03	9.13	8.39	21.7	84.4	3.2		93.8	92.9
13:04	9.29	8.33	22.0	66.5	2.8		94.2	91.6
13:05	8.99	8.53	23.6	60.0	3.4	3.6	95.4	93.4
13:06	9.16	8.40	24.1	62.6	3.6	3.7	96.4	94.3
13:07	8.93	8.57	24.1	69.5	4.2	3.9	95.5	93.7
13:08	9.37	8.24	25.0	74.6	3.1	3.7	92.5	93.0
13:09	9.00	8.55	22.7	73.2	4.6	3.7	91.9	92.2
13:10	9.17	8.36	24.4	89.0	2.3	3.5	90.4	90.1
13:11	9.13	8.45	21.5	76.0	4.1	3.5	91.9	90.6
13:12	9.67	7.99	20.2	87.9	2.3	3.4	89.6	89.4
13:13	9.32	8.32	19.8	79.3	4.8	3.5	88.9	87.7
13:14	9.20	8.36	18.3	101.8	4.6	3.7	89.0	87.4
13:15	8.97	8.58	20.1	103.1	7.9	4.1	88.8	88.0
13:16	9.04	8.46	23.3	131.4	6.8	4.5	89.0	88.4
13:17	9.03	8.54	22.9	115.2	7.4	4.8	91.2	91.4
13:18	8.78	8.68	26.0	118.4	5.8	5.1	90.2	89.2
13:19	9.05	8.49	26.0	98.0	4.9	5.1	95.7	95.7
13:20	9.19	8.35	23.1	91.4	4.1	5.3	93.2	93.9
13:21	9.54	8.15	21.3	83.9	3.8	5.2	91.4	91.6
13:22	9.21	8.38	19.9	85.7	3.4	5.4	92.3	90.1
13:23	9.38	8.27	20.9	72.0	3.3	5.2	92.3	91.0
13:24	9.05	8.51	20.9	98.2	5.7	5.3	91.5	90.6
13:25	9.36	8.28	22.6	101.5	4.1	4.9	90.8	88.8
13:26	8.86	8.67	24.0	96.8	6.0	4.9	91.2	89.1
13:27	9.04	8.50	28.5	90.4	2.7	4.4	95.4	94.6
13:28	8.91	8.63	26.1	58.2	3.1	4.1	99.5	99.7
13:29	9.47	8.17	26.5	58.0	2.2	3.8	95.9	96.2
13:30	9.15	8.45	25.8	47.0	2.9	3.7	100.7	101.0
13:31	9.38	8.26	27.3	53.5	1.7	3.5	100.6	98.9
13:32	9.21	8.42	24.5	45.9	2.6	3.4	96.2	96.5
13:33	9.35	8.27	26.9	67.4	2.8	3.4	94.7	94.5
13:34	9.27	8.37	25.2	55.6	2.8	3.1	95.0	93.1
13:35	9.10	8.45	27.7	63.7	3.0	3.0	96.3	93.5
13:36	9.38	8.27	25.1	56.4	2.2	2.6	96.8	94.9
13:37	9.26	8.34	23.9	63.5	4.0	2.7	95.8	94.9
13:38	9.41	8.26	24.5	71.9	2.7	2.7	95.2	95.8
13:39	8.99	8.55	27.5	60.9	3.6	2.8	97.2	95.6
13:40	9.14	8.44	30.0	57.3	3.2	2.9	99.0	96.2
13:41	8.85	8.65	32.8	61.3	3.3	3.0	99.4	97.6
13:42	9.29	8.32	34.8	48.1	2.2	3.0	100.2	98.7
13:43	8.94	8.60	33.6	45.2	3.3	3.0	101.1	99.3
13:44	9.17	8.39	34.2	51.2	1.6	2.9	101.8	100.0
13:45	9.06	8.50	29.7	34.2	1.7	2.8	102.4	100.6
13:46	9.65	8.04	29.7	41.5	1.8	2.7	99.4	99.3
13:47	9.40	8.26	26.0	57.0	3.0	2.6	95.7	95.9
13:48	9.41	8.21	26.0	78.2	3.1	2.7	94.5	93.3

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:49	9.13	8.46	24.3	87.8	6.6	3.0	92.1	91.0
13:50	9.12	8.42	28.9	127.1	5.4	3.2	89.8	88.9
13:51	9.13	8.46	27.5	90.7	4.4	3.3	90.0	88.8
13:52	8.96	8.56	29.4	86.3	3.7	3.5	92.1	90.9
13:53	9.15	8.43	27.8	69.5	3.0	3.4	97.8	98.1
13:54	9.18	8.38	27.1	66.0	2.6	3.5	99.7	97.3
13:55	9.54	8.16	25.6	51.3	1.8	3.5	98.2	96.0
13:56	9.22	8.37	24.5	49.8	2.7	3.6	98.1	96.3
13:57	9.56	8.13	23.8	56.1	2.1	3.5	97.1	95.6
13:58	9.24	8.37	22.3	71.0	3.7	3.6	92.2	92.3
13:59	9.69	8.01	22.7	87.3	2.2	3.2	89.2	88.8
14:00	9.34	8.30	21.0	71.9	4.1	3.0	88.9	88.2
14:01	9.38	8.23	22.5	87.9	2.5	2.9	91.0	89.9
14:02	9.26	8.35	21.8	62.2	3.0	2.8	93.8	94.2
14:03	9.63	8.05	20.8	69.6	2.9	2.8	92.3	91.7
14:04	9.40	8.26	20.5	62.5	3.4	2.8	92.5	92.9
14:05	9.32	8.29	23.7	74.0	2.7	2.9	93.7	93.3
14:06	9.23	8.38	30.1	48.7	2.7	2.9	97.4	98.4
14:07	9.46	8.16	29.9	52.7	2.0	2.9	94.4	93.7
14:08	9.60	8.12	23.6	48.9	2.6	2.8	92.2	92.8
14:09	9.28	8.34	24.3	63.8	2.7	2.8	92.0	90.5
14:10	9.55	8.13	23.9	56.2	2.0	2.6	91.6	90.6
14:11	9.50	8.15	21.9	58.5	2.2	2.6	92.2	90.6
14:12	9.84	7.92	20.4	61.0	2.2	2.5	88.8	89.4
14:13	9.49	8.18	18.8	70.5	2.8	2.5	89.5	87.5
14:14	9.61	8.09	19.2	76.5	2.3	2.4	88.0	86.9
14:15	9.33	8.31	18.6	80.2	3.7	2.5	86.8	85.5
14:16	9.75	7.97	18.4	90.9	2.8	2.5	86.3	84.9
14:17	9.48	8.20	16.0	88.5	3.8	2.7	85.6	83.6
14:18	9.50	8.16	17.6	98.8	2.7	2.7	85.8	84.0
14:19	9.29	8.34	17.2	76.0	3.5	2.8	90.2	90.7
14:20	9.66	8.02	20.5	74.7	2.6	2.9	90.7	89.1
14:21	9.42	8.25	19.9	57.5	2.4	2.9	91.3	89.7
14:22	9.38	8.25	21.1	54.2	2.3	2.9	93.8	91.7
14:23	9.16	8.45	22.4	50.8	2.9	2.9	94.9	93.0
14:24	9.06	8.48	29.9	55.2	2.6	2.9	96.9	94.4
14:25	9.29	8.34	29.2	41.7	2.0	2.8	98.7	96.1
14:26	9.00	8.54	30.8	41.1	2.0	2.7	99.1	97.7
14:27	9.39	8.24	28.5	35.0	1.6	2.5	101.7	99.1
14:28	9.27	8.33	25.0	40.0	2.0	2.4	100.3	99.2
14:29	9.65	8.07	23.8	40.6	1.7	2.2	97.9	97.7
14:30	9.21	8.40	24.9	41.1	2.6	2.2	99.1	99.2
14:31	9.23	8.36	28.5	55.2	2.5	2.2	99.3	97.6
14:32	8.84	8.68	29.9	49.8	3.3	2.3	99.9	97.8
14:33	9.21	8.36	35.6	49.8	2.1	2.2	101.0	99.4
14:34	8.83	8.69	33.8	35.3	3.1	2.3	103.6	104.1
14:35	8.83	8.66	40.5	43.7	2.3	2.3	102.7	101.6
14:36	8.83	8.69	37.2	33.7	2.2	2.3	108.4	109.2
14:37	9.30	8.29	37.6	33.6	1.7	2.3	105.3	105.2
14:38	9.25	8.39	32.7	30.3	1.8	2.3	105.0	103.7
14:39	9.21	8.37	34.9	33.5	1.5	2.3	104.5	103.1
14:40	9.22	8.40	30.0	32.2	2.2	2.3	102.7	101.6
14:41	9.08	8.47	32.9	44.7	1.9	2.2	99.9	99.9
14:42	9.35	8.30	31.5	39.9	2.1	2.1	99.2	97.6
14:43	8.96	8.58	31.1	49.0	2.2	2.1	99.1	97.9
14:44	9.31	8.30	33.0	41.8	1.6	2.0	100.3	98.6
14:45	9.20	8.39	29.1	40.9	2.0	1.9	101.2	99.2
14:46	9.66	8.05	28.0	46.2	1.7	1.9	95.1	95.6

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:47	9.29	8.33	26.5	47.2	1.9	1.9	97.7	96.3
14:48	9.43	8.21	28.0	46.3	2.0	1.9	97.4	95.3
14:49	8.94	8.61	28.7	53.8	3.3	2.1	97.2	94.9
14:50	9.19	8.38	34.6	60.9	2.3	2.1	97.5	95.7
14:51	8.90	8.63	33.3	44.5	2.7	2.2	100.5	101.1
14:52	8.93	8.57	39.1	47.2	2.1	2.2	101.5	100.1
14:53	9.04	8.53	32.5	36.1	2.7	2.2	106.1	106.6
14:54	9.24	8.34	33.6	49.9	2.3	2.3	101.7	101.4
14:55	9.30	8.35	29.9	34.7	1.8	2.3	104.9	105.2
14:56	9.22	8.37	31.0	35.9	1.5	2.3	101.6	100.6
Min	8.63	7.92	13.6	30.3	1.5	1.9	78.2	76.6
Max	9.84	8.85	45.4	131.4	7.9	5.4	108.4	109.2
Avg	9.18	8.41	28.2	63.3	2.9	2.9	95.2	94.4

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:16	9.33	8.33	11.6	70.5	4.2		99.1	98.8
09:17	9.06	8.51	11.9	73.5	4.5		99.6	98.6
09:18	8.71	8.80	13.0	74.5	8.0		100.8	99.4
09:19	8.56	8.85	17.3	105.6	5.6		99.1	98.1
09:20	8.92	8.63	18.7	86.2	4.4		107.0	107.0
09:21	8.56	8.88	19.0	57.7	4.0		106.8	106.6
09:22	8.88	8.63	20.7	49.8	3.1		110.3	111.5
09:23	8.88	8.62	18.5	36.2	3.1		112.7	112.3
09:24	9.46	8.21	17.5	36.4	3.1		107.7	108.3
09:25	9.09	8.51	15.4	43.9	3.6	4.4	105.9	106.0
09:26	9.14	8.45	14.6	53.0	3.4	4.3	105.5	105.2
09:27	8.67	8.83	13.4	49.0	5.1	4.4	105.7	105.1
09:28	9.01	8.52	15.6	59.6	3.9	3.9	105.4	104.9
09:29	8.72	8.80	16.7	39.4	5.1	3.9	109.7	110.4
09:30	8.75	8.73	17.8	42.9	3.7	3.8	109.4	108.7
09:31	8.79	8.74	17.8	37.1	3.6	3.8	115.4	114.7
09:32	9.13	8.43	17.2	29.6	3.2	3.8	112.0	111.8
09:33	9.18	8.47	16.5	29.3	3.6	3.8	112.6	111.5
09:34	9.04	8.53	15.2	31.6	3.5	3.9	111.7	110.4
09:35	8.96	8.62	15.1	35.4	4.2	3.9	110.1	109.3
09:36	8.78	8.71	15.4	45.1	4.7	4.1	107.1	107.0
09:37	9.05	8.55	16.6	47.0	4.7	4.0	108.3	108.9
09:38	8.65	8.84	16.9	43.7	5.1	4.1	108.2	108.2
09:39	8.83	8.68	17.9	42.0	3.6	4.0	113.2	113.4
09:40	8.76	8.76	18.2	31.2	4.0	4.0	114.5	114.4
09:41	9.07	8.55	20.8	28.8	3.7	4.0	112.8	113.2
09:42	8.54	8.93	21.5	28.4	4.2	4.1	112.9	113.3
09:43	8.62	8.87	25.0	27.5	4.0	4.2	114.6	114.4
09:44	8.22	9.18	28.2	28.3	4.4	4.3	113.1	113.9
09:45	8.85	8.67	33.6	36.8	3.3	4.2	110.5	111.3
09:46	8.77	8.76	28.4	34.9	3.7	4.1	114.1	114.7
09:47	9.18	8.42	24.6	53.6	3.2	3.9	110.7	110.6
09:48	9.13	8.50	18.7	50.1	3.1	3.7	108.5	108.6
09:49	9.42	8.26	15.3	50.5	3.1	3.7	105.3	105.1
09:50	9.12	8.51	15.1	45.2	3.2	3.6	107.1	107.7
09:51	9.02	8.55	15.6	43.5	3.7	3.6	108.8	107.7
09:52	8.87	8.70	15.7	38.4	4.3	3.6	109.1	107.8
09:53	8.83	8.69	17.8	57.4	4.4	3.6	107.1	106.2
09:54	8.96	8.63	18.7	50.6	3.7	3.6	109.3	110.1
09:55	8.58	8.90	19.1	44.6	5.5	3.8	109.8	109.4
09:56	8.91	8.65	21.3	41.8	3.7	3.8	114.7	114.6
09:57	8.89	8.63	18.8	35.1	3.5	3.8	114.5	114.4
09:58	9.34	8.33	18.5	30.2	2.9	3.8	111.1	111.4
09:59	8.93	8.64	16.6	31.2	3.2	3.8	113.1	112.7
10:00	9.14	8.47	17.8	29.8	2.9	3.8	112.2	111.3
10:01	8.79	8.75	17.1	38.0	3.9	3.8	111.1	109.9
10:02	9.26	8.37	18.5	48.6	2.9	3.7	106.2	106.2
10:03	8.94	8.65	18.1	33.1	4.2	3.6	108.2	108.8
10:04	8.97	8.59	18.4	47.0	3.7	3.6	106.6	105.4
10:05	8.93	8.65	16.8	41.3	3.8	3.5	109.0	106.4
10:06	9.22	8.39	16.6	48.8	3.2	3.4	106.9	106.1
10:07	9.13	8.50	16.0	45.8	3.4	3.4	106.8	107.4
10:08	9.00	8.57	14.9	50.8	3.3	3.5	106.7	105.1
10:09	8.92	8.65	15.7	49.4	4.0	3.5	106.6	105.7
10:10	8.81	8.70	16.4	63.4	4.0	3.6	105.6	104.8
10:11	9.17	8.46	17.6	50.8	3.3	3.6	105.7	103.7
10:12	8.86	8.69	16.0	53.5	3.6	3.7	105.7	104.2
10:13	9.13	8.47	15.9	48.2	3.0	3.5	106.7	105.7

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:14	9.01	8.56	13.5	44.7	3.3	3.5	107.8	106.0
10:15	9.47	8.24	12.6	45.9	3.4	3.5	104.6	105.6
10:16	8.82	8.73	11.1	48.3	3.9	3.5	108.4	106.4
10:17	8.91	8.64	15.1	46.2	3.2	3.5	108.0	106.3
10:18	8.45	9.00	16.6	44.3	4.7	3.6	108.9	107.5
10:19	8.85	8.66	21.5	45.3	3.0	3.5	108.2	108.3
10:20	8.73	8.79	22.8	27.3	2.9	3.4	115.3	115.2
10:21	8.87	8.65	23.2	31.6	2.5	3.3	113.1	111.9
10:22	8.96	8.63	20.8	31.5	2.7	3.3	112.5	111.6
10:23	9.27	8.34	16.9	33.4	2.7	3.2	110.2	110.4
10:24	9.14	8.49	16.0	34.1	3.0	3.2	111.7	112.1
10:25	8.96	8.60	15.0	34.8	3.4	3.2	111.5	110.6
10:26	8.92	8.66	16.9	27.5	4.0	3.2	112.0	110.6
10:27	8.71	8.78	17.8	38.8	4.0	3.3	113.2	111.2
10:28	9.14	8.48	20.8	35.3	2.8	3.1	112.7	111.2
10:29	8.72	8.78	19.6	40.3	3.9	3.2	110.2	108.9
10:30	8.82	8.71	20.2	48.5	2.7	3.2	112.4	112.0
10:31	8.69	8.81	18.8	36.3	2.9	3.2	115.2	114.9
10:32	9.33	8.33	19.3	31.3	2.5	3.2	108.6	109.4
10:33	8.83	8.72	18.1	33.8	3.2	3.3	111.5	112.0
10:34	9.01	8.55	18.2	32.5	2.9	3.2	111.6	110.1
10:35	8.74	8.78	17.5	33.9	3.7	3.3	111.6	110.3
10:36	9.13	8.46	18.3	46.2	3.9	3.3	106.0	106.0
10:37	8.98	8.62	17.3	41.5	3.7	3.2	107.7	107.2
10:38	8.88	8.66	17.1	44.0	3.5	3.3	108.1	106.5
10:39	8.81	8.73	17.7	36.2	4.0	3.3	113.4	113.8
10:40	8.98	8.57	17.8	34.2	3.7	3.4	110.9	110.1
10:41	9.00	8.60	19.2	24.7	3.5	3.5	113.0	113.8
10:42	8.80	8.73	19.5	27.3	3.5	3.6	114.1	113.2
10:43	8.83	8.72	20.6	25.1	3.8	3.6	114.0	112.6
10:44	8.63	8.85	22.1	37.0	3.9	3.7	113.3	111.3
10:45	9.17	8.46	24.3	31.6	2.9	3.6	112.6	113.5
10:46	8.87	8.68	21.4	38.2	3.7	3.6	110.4	110.0
10:47	9.03	8.56	20.1	40.5	3.2	3.6	109.6	108.7
10:48	8.81	8.73	17.8	34.1	3.9	3.6	111.7	109.8
10:49	9.32	8.32	17.9	33.9	3.5	3.6	109.4	109.6
10:50	8.89	8.68	17.4	30.6	3.4	3.5	112.2	112.5
10:51	9.04	8.53	17.5	33.2	3.1	3.5	112.3	110.3
10:52	8.73	8.80	17.7	28.5	3.8	3.5	113.2	111.5
10:53	9.07	8.50	20.5	34.1	3.1	3.5	109.9	109.7
10:54	8.98	8.61	20.7	30.2	3.3	3.4	112.9	113.2
10:55	8.90	8.65	19.5	34.6	3.1	3.4	111.1	109.8
10:56	9.07	8.54	16.0	28.3	3.8	3.4	112.5	111.2
10:57	9.25	8.37	13.7	31.4	4.1	3.5	111.5	110.9
10:58	9.30	8.37	11.9	28.9	3.6	3.5	110.5	109.8
10:59	9.03	8.55	11.3	38.5	4.9	3.6	111.2	109.1
11:00	9.18	8.46	12.1	40.7	5.8	3.9	110.0	108.3
11:01	8.81	8.72	13.0	56.0	8.1	4.4	108.2	106.7
11:02	9.20	8.43	14.1	49.7	6.6	4.6	107.1	106.9
11:03	8.63	8.86	14.6	36.4	7.9	5.1	109.5	108.6
11:04	8.84	8.69	18.3	38.6	7.6	5.5	111.1	111.3
11:05	8.67	8.83	17.5	29.5	7.3	6.0	116.5	115.9
11:06	9.30	8.33	17.5	28.2	5.5	6.1	112.3	112.0
11:07	8.84	8.72	16.8	25.5	5.8	6.3	114.8	114.4
11:08	9.01	8.56	17.3	31.3	6.6	6.6	114.3	112.3
11:09	8.85	8.70	17.3	33.0	6.4	6.8	113.6	111.3
11:10	9.12	8.47	17.4	42.4	5.8	6.8	108.9	108.4
11:11	9.03	8.58	17.1	37.1	6.9	6.6	109.1	109.5

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:12	8.81	8.72	16.3	47.2	8.3	6.8	109.0	108.0
11:13	8.92	8.65	17.6	37.3	6.1	6.6	114.0	114.5
11:14	9.00	8.57	16.1	40.0	5.3	6.4	112.3	111.7
11:15	9.23	8.43	16.1	33.9	5.2	6.2	111.0	111.5
11:16	8.86	8.69	16.3	31.9	6.3	6.3	113.7	112.9
12:13	9.16	8.44	10.1	76.5	3.9		102.4	101.4
12:14	9.37	8.24	8.8	80.8	3.7		100.1	98.5
12:15	9.44	8.26	8.3	73.6	4.4		98.6	98.3
12:16	9.24	8.36	7.1	91.6	3.7		99.4	97.2
12:17	9.30	8.35	6.9	96.5	6.5		98.3	96.5
12:18	8.93	8.59	6.5	146.0	7.6		96.7	95.5
12:19	9.14	8.45	7.3	144.4	6.1		96.2	95.3
12:20	8.70	8.78	6.6	110.6	5.3		101.0	101.2
12:21	8.97	8.56	8.0	84.4	2.6		103.5	104.0
12:22	8.82	8.70	8.6	60.1	3.2	4.7	107.0	107.0
12:23	9.34	8.28	8.9	61.9	2.6	4.6	103.4	103.8
12:24	8.92	8.64	9.8	56.9	3.6	4.6	106.3	106.1
12:25	9.00	8.54	9.7	58.2	4.0	4.5	107.0	105.1
12:26	8.74	8.78	11.2	57.1	5.0	4.7	106.8	105.8
12:27	8.97	8.54	11.9	67.3	3.7	4.4	106.4	104.8
12:28	8.84	8.70	12.7	51.6	4.3	4.0	106.6	105.1
12:29	8.73	8.72	13.3	55.3	3.4	3.8	108.0	105.9
12:30	9.00	8.56	14.6	48.1	3.3	3.6	109.6	107.5
12:31	9.14	8.41	14.4	44.8	2.9	3.6	108.3	107.6
12:32	9.34	8.32	13.2	41.5	3.7	3.6	107.5	107.7
12:33	9.06	8.50	12.8	53.4	3.2	3.7	107.2	105.9
12:34	9.13	8.45	12.1	54.5	3.9	3.7	106.3	105.2
12:35	8.87	8.63	12.5	60.6	4.1	3.7	105.0	104.2
12:36	9.21	8.38	12.2	55.6	3.8	3.6	104.7	103.3
12:37	8.80	8.71	12.0	52.2	4.0	3.7	105.7	103.8
12:38	8.97	8.55	13.8	54.5	2.7	3.5	108.4	108.4
12:39	8.77	8.74	13.6	46.6	2.7	3.4	112.2	112.1
12:40	9.36	8.24	13.9	44.0	2.0	3.3	108.8	108.7
12:41	8.94	8.61	13.6	38.2	3.1	3.3	109.3	109.2
12:42	8.89	8.61	13.5	44.3	3.3	3.3	109.3	107.5
12:43	8.57	8.89	15.6	41.3	4.9	3.5	109.4	108.8
12:44	8.71	8.73	17.8	47.5	3.5	3.4	109.7	108.9
12:45	8.68	8.82	20.6	36.7	4.0	3.4	112.9	113.4
12:46	8.44	8.95	22.0	44.5	3.6	3.4	110.1	109.2
12:47	8.66	8.79	24.3	40.6	2.4	3.2	117.6	117.6
12:48	8.88	8.59	23.4	32.7	2.1	3.2	114.8	115.3
12:49	9.13	8.47	21.3	28.3	2.0	3.1	115.8	115.6
12:50	8.85	8.66	20.8	29.4	2.2	3.1	115.8	113.5
12:51	9.12	8.45	19.7	31.2	2.1	3.0	114.5	112.8
12:52	8.88	8.63	17.8	39.1	2.6	2.9	108.3	108.5
12:53	9.29	8.32	17.4	44.3	2.4	2.7	103.0	102.7
12:54	8.76	8.74	15.9	48.4	3.9	2.7	104.8	103.8
12:55	8.81	8.68	16.4	57.1	2.7	2.6	107.6	107.1
12:56	8.68	8.81	16.6	43.2	3.6	2.6	112.0	111.1
12:57	9.20	8.37	16.9	42.8	3.4	2.7	108.5	108.9
12:58	8.92	8.63	16.4	38.2	4.3	2.9	110.8	110.2
12:59	8.90	8.60	16.8	44.8	2.7	3.0	109.9	109.4
13:00	8.90	8.65	17.7	45.9	3.4	3.1	109.5	108.5
13:01	9.08	8.45	17.4	55.3	3.9	3.3	106.8	106.6
13:02	9.19	8.44	16.9	51.7	3.3	3.4	105.7	106.0
13:03	8.94	8.60	15.3	53.3	3.2	3.4	105.0	104.3
13:04	9.13	8.45	14.9	46.0	2.5	3.3	105.9	104.3
13:05	9.15	8.42	13.4	47.3	3.0	3.3	106.1	104.9

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018

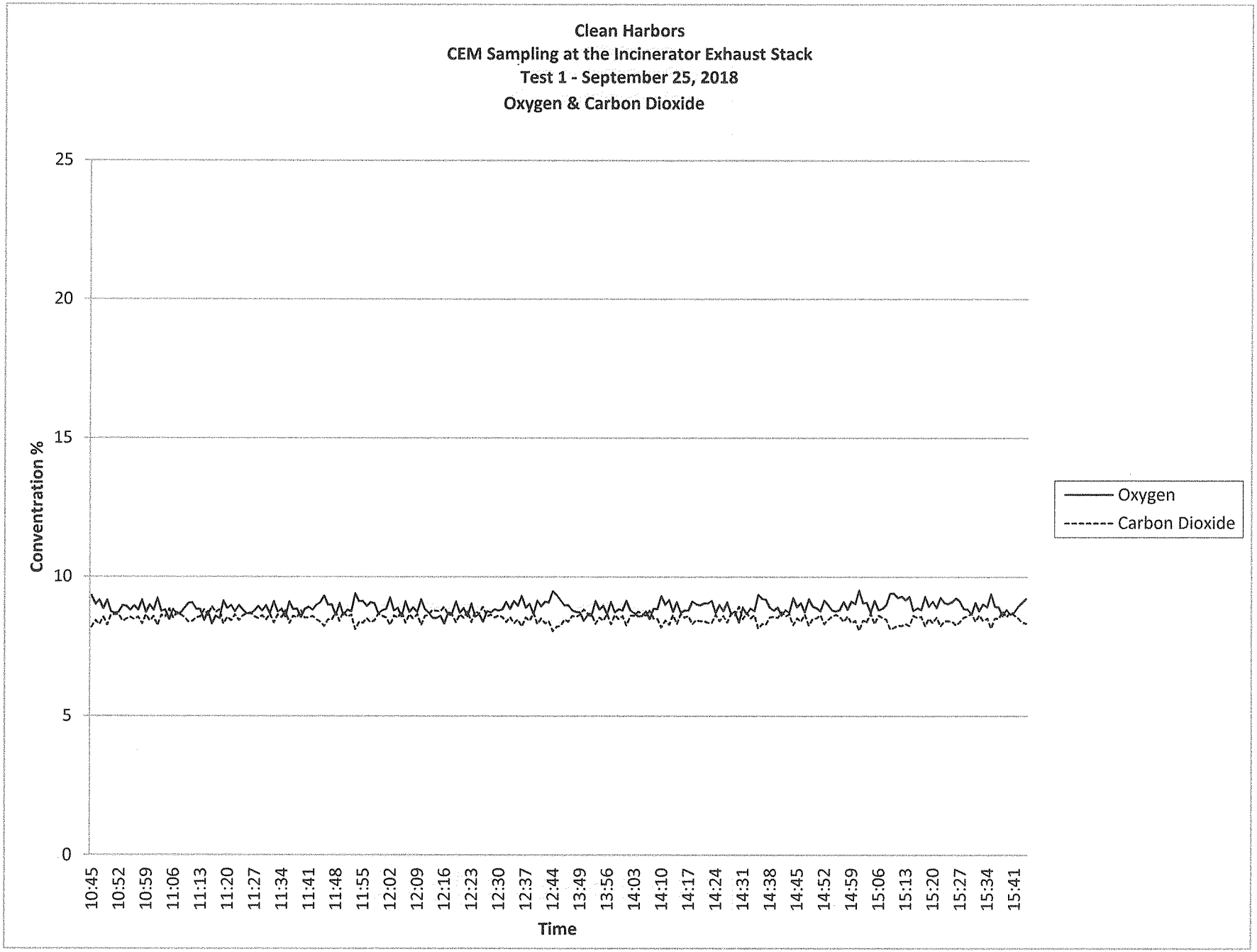
Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:06	9.34	8.32	11.8	56.2	2.9	3.3	102.2	102.4
13:07	8.92	8.62	11.3	65.1	3.9	3.3	102.7	102.0
13:08	9.01	8.55	12.1	59.7	4.3	3.3	103.7	102.5
13:09	8.64	8.84	12.6	59.7	4.3	3.5	104.6	102.9
13:10	9.09	8.47	14.3	54.2	3.4	3.5	104.4	103.2
13:11	8.74	8.77	14.6	46.4	3.9	3.5	105.7	103.9
13:12	9.01	8.52	15.3	48.2	2.2	3.4	106.3	104.7
13:13	8.94	8.62	14.8	44.7	3.6	3.4	106.6	105.5
13:14	9.34	8.26	13.1	48.1	2.8	3.4	107.1	105.4
13:15	9.04	8.56	12.5	39.8	3.6	3.5	106.4	105.0
13:16	8.99	8.55	13.0	44.3	3.7	3.6	106.4	104.9
13:17	8.86	8.69	12.7	46.5	3.9	3.6	107.3	105.7
13:18	8.77	8.71	13.3	57.1	4.2	3.5	104.7	103.8
13:19	8.78	8.75	15.2	53.8	3.7	3.5	108.3	109.1
13:20	8.52	8.91	15.9	46.3	3.0	3.5	107.6	106.2
13:21	8.83	8.69	18.1	38.6	3.9	3.4	114.6	115.0
13:22	8.70	8.78	18.2	35.6	4.5	3.7	113.0	113.2
13:23	9.20	8.43	19.8	37.9	3.7	3.7	111.1	112.3
13:24	8.97	8.59	19.9	31.8	2.5	3.7	112.7	111.8
13:25	9.19	8.42	18.2	32.1	3.0	3.6	112.2	111.1
13:26	8.92	8.65	16.8	46.0	4.1	3.7	109.3	108.4
13:27	9.35	8.28	15.7	49.5	3.2	3.6	102.9	102.9
13:28	9.06	8.55	14.0	52.0	4.4	3.6	104.4	103.9
13:29	9.14	8.44	12.7	70.3	3.5	3.6	102.7	101.5
13:30	9.03	8.58	12.1	59.5	3.8	3.7	102.5	101.1
13:31	9.38	8.25	10.5	63.9	2.7	3.5	102.6	100.7
13:32	9.20	8.45	10.3	60.2	3.3	3.4	102.1	100.1
13:33	9.11	8.47	8.9	63.8	3.1	3.4	102.4	100.8
13:34	9.01	8.59	9.4	62.0	4.2	3.5	102.8	101.2
13:35	8.94	8.59	9.7	65.8	3.9	3.6	102.0	100.1
13:36	9.29	8.37	10.7	62.9	3.9	3.6	101.8	100.3
13:37	9.10	8.49	10.3	78.5	3.2	3.6	100.9	99.8
13:38	9.32	8.33	9.0	75.2	2.9	3.5	101.1	99.8
13:39	9.27	8.34	7.3	72.0	3.1	3.4	100.8	98.4
13:40	9.71	8.05	7.0	73.3	3.2	3.3	94.5	94.7
13:41	9.30	8.36	5.5	97.6	3.6	3.4	95.2	94.0
13:42	9.36	8.29	5.4	102.8	4.3	3.5	93.5	93.2
13:43	8.77	8.78	4.3	120.4	5.7	3.8	93.5	91.7
13:44	9.09	8.46	4.4	106.3	3.2	3.7	96.0	95.1
13:45	8.71	8.82	4.6	74.0	6.1	3.9	100.4	99.7
13:46	8.71	8.76	5.3	74.4	4.2	4.0	102.5	101.2
13:47	8.72	8.79	7.0	61.4	3.3	4.0	108.4	109.2
13:48	9.23	8.36	8.2	52.0	2.9	4.0	103.9	104.7
13:49	9.20	8.46	7.5	51.5	3.8	4.0	105.3	103.9
13:50	9.10	8.48	7.7	51.3	4.0	4.1	104.6	103.3
13:51	9.11	8.52	5.3	55.5	3.8	4.1	103.7	101.8
13:52	8.96	8.58	1.5	68.9	3.7	4.1	100.4	99.3
13:53	9.24	8.42	1.1	76.4	3.9	3.9	99.5	99.1
13:54	8.77	8.75	0.5	77.0	3.7	4.0	100.6	97.5
13:55	8.94	8.61	0.3	66.3	3.1	3.7	105.7	105.0
13:56	8.78	8.73	0.3	59.9	3.3	3.6	106.4	106.4
13:57	9.27	8.38	0.5	52.8	2.8	3.5	105.6	105.6
13:58	8.83	8.72	1.0	45.1	3.6	3.6	109.0	107.5
13:59	8.97	8.59	1.7	43.3	3.1	3.5	108.6	106.9
14:00	8.76	8.78	1.8	39.4	3.9	3.5	109.3	107.1
14:01	9.15	8.43	2.8	42.7	2.9	3.4	108.0	108.1
14:02	8.99	8.61	3.0	40.2	3.0	3.3	110.0	109.3
14:03	8.92	8.62	3.8	42.5	2.9	3.2	108.8	106.9

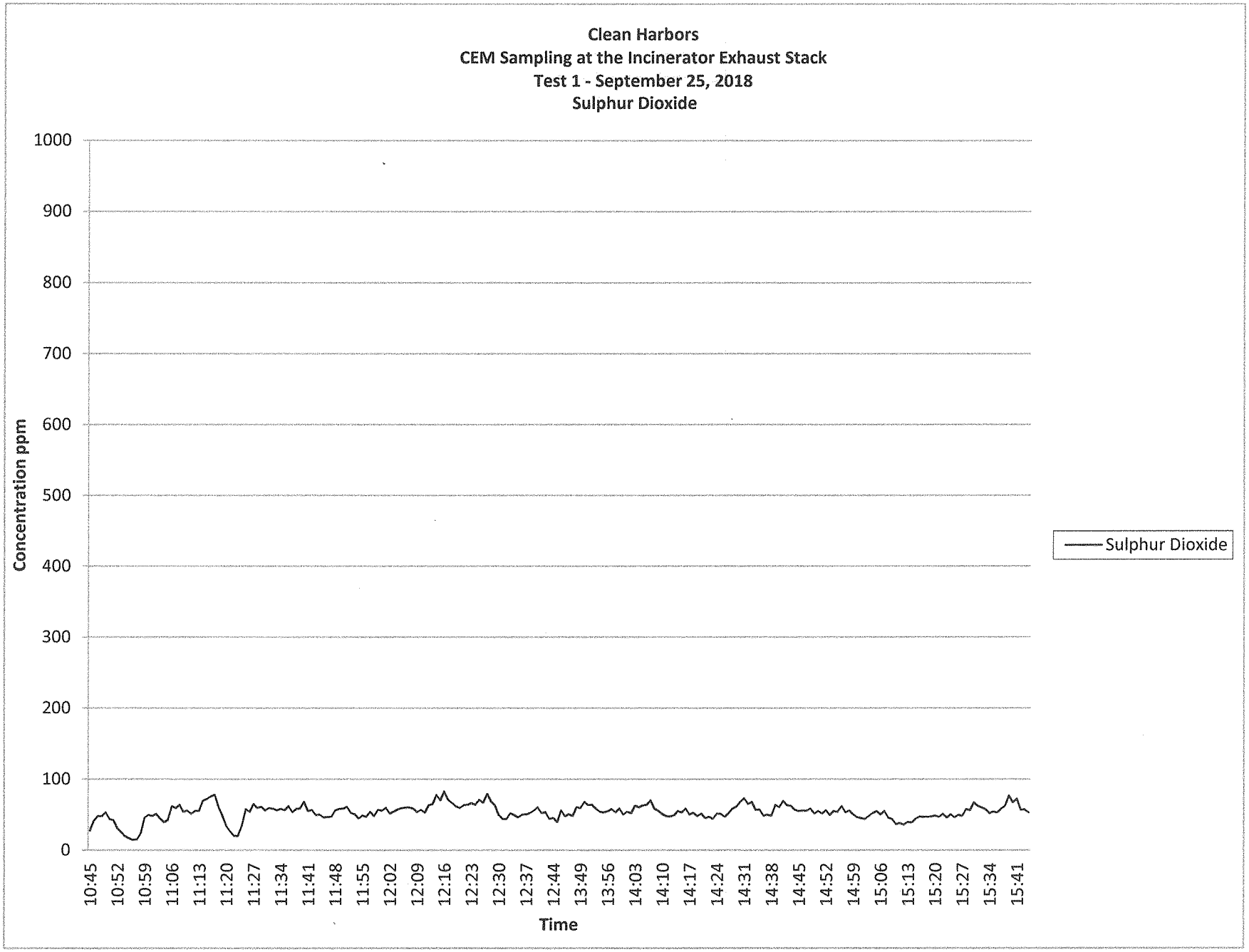
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018

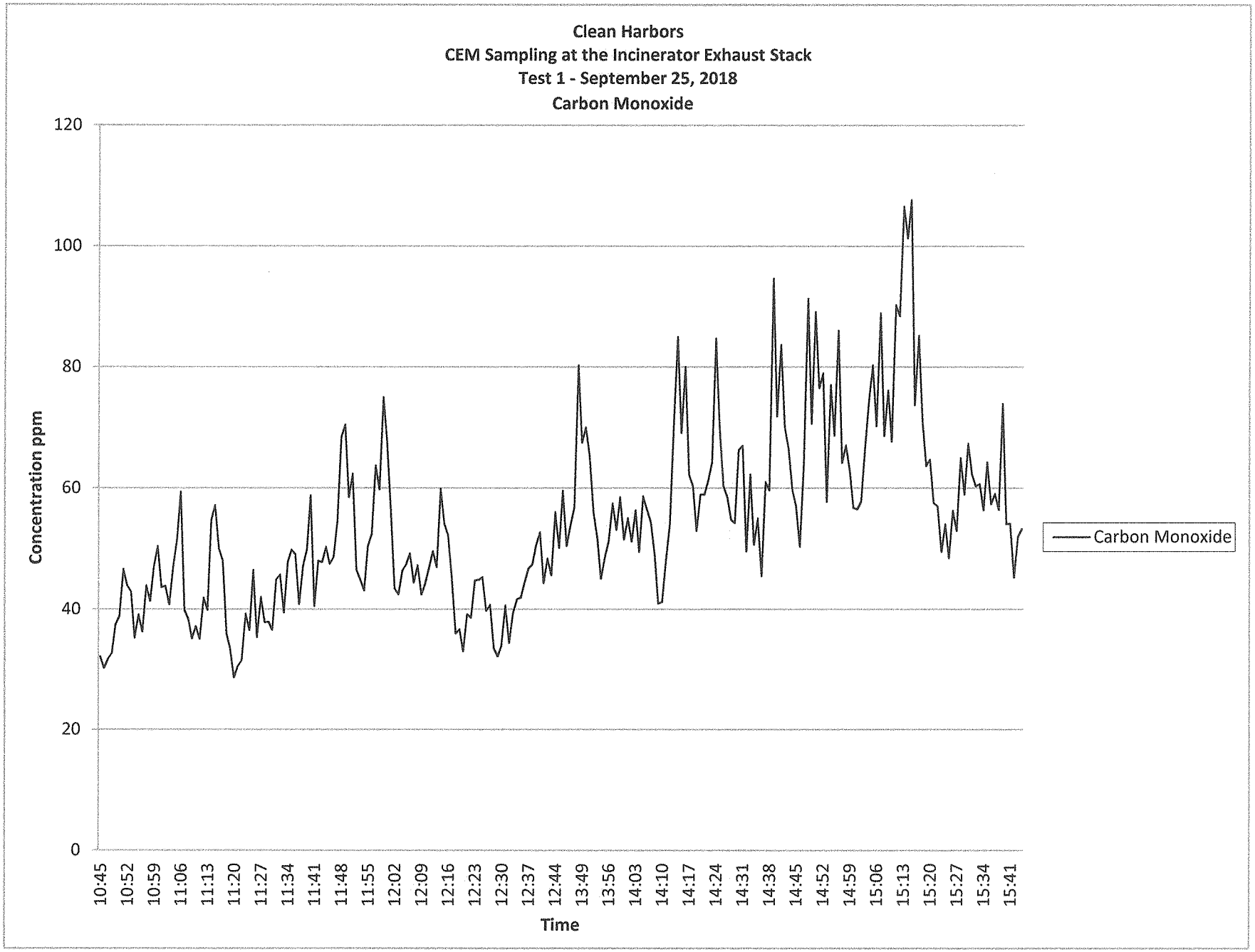
Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:04	9.01	8.59	4.8	41.7	2.8	3.2	109.0	107.0
14:05	9.28	8.34	4.8	42.5	2.5	3.1	108.3	107.7
14:06	9.17	8.49	4.9	42.4	3.8	3.1	108.5	108.8
14:07	8.93	8.61	5.0	53.8	2.8	3.1	108.8	107.0
14:08	8.91	8.66	6.3	47.3	3.2	3.1	109.4	107.5
14:09	8.72	8.76	6.8	50.4	3.4	3.1	110.0	108.3
14:10	9.01	8.57	8.6	44.2	3.4	3.1	110.1	108.6
14:11	8.61	8.86	9.0	36.3	3.7	3.2	111.3	110.2
14:12	8.95	8.59	11.6	38.0	2.9	3.1	112.4	111.3
14:13	8.85	8.68	10.8	37.2	3.4	3.2	113.2	111.5
Min	8.44	8.05	0.3	24.7	2.0	2.6	93.5	91.7
Max	9.71	9.00	24.3	146.0	8.3	6.8	117.6	117.6
Avg	8.99	8.58	13.9	49.0	3.8	3.7	107.9	107.1

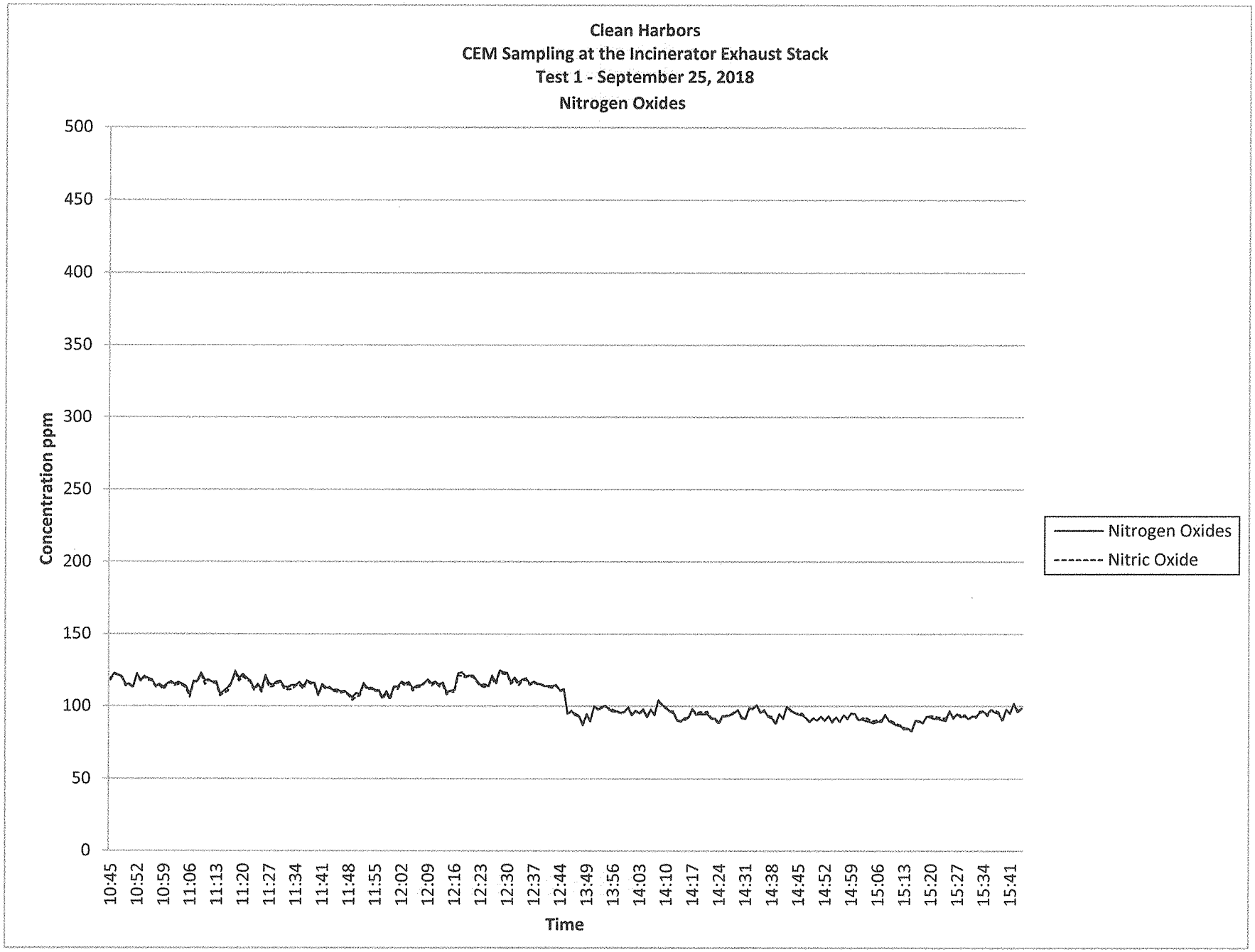
APPENDIX 25

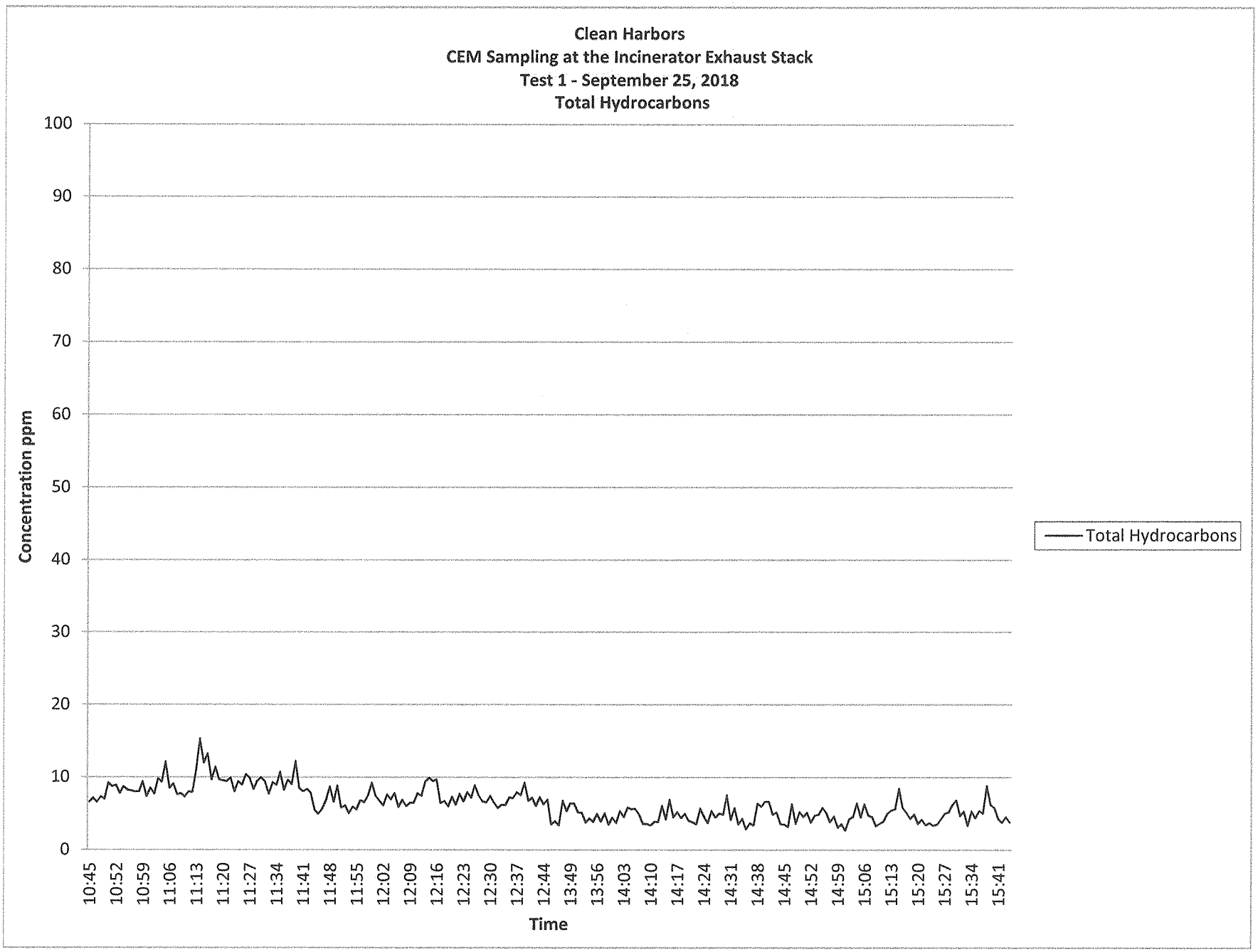
Gas Analysis Graphs
(15 pages)


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018
Oxygen & Carbon Dioxide
Conventration %
25
20
15
10
5
0
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
11:41
11:48
11:55
12:02
12:09
12:16
12:23
12:30
12:37
12:44
13:49
13:56
14:03
14:10
14:17
14:24
14:31
14:38
14:45
14:52
14:59
15:06
15:13
15:20
15:27
15:34
15:41
Time
Oxygen
Carbon Dioxide

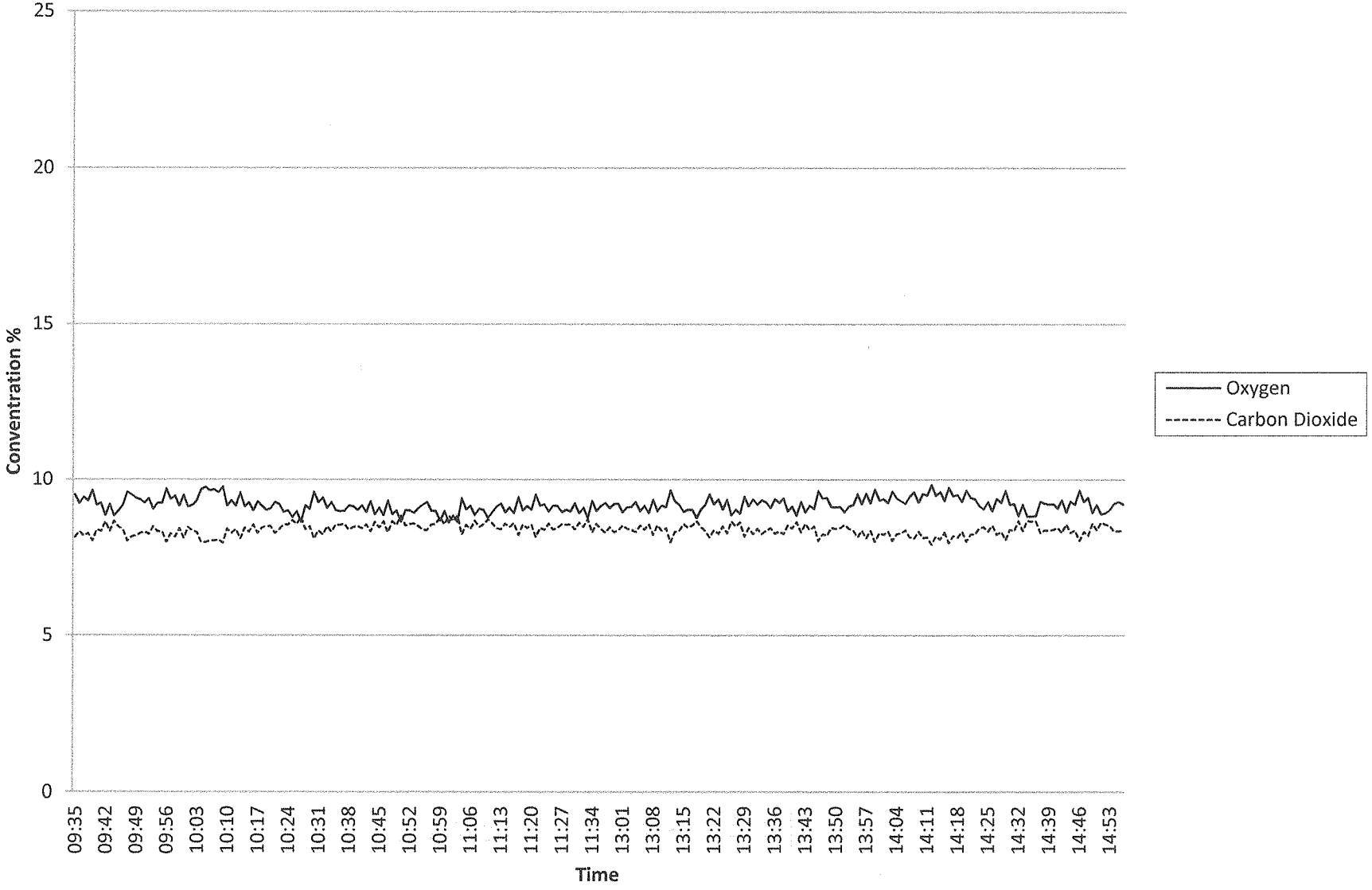

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
11:41
11:48
11:55
12:02
12:09
12:16
12:23
12:30
12:37
12:44
13:49
13:56
14:03
14:10
14:17
14:24
14:31
14:38
14:45
14:52
14:59
15:06
15:13
15:20
15:27
15:34
15:41
Time
Sulphur Dioxide

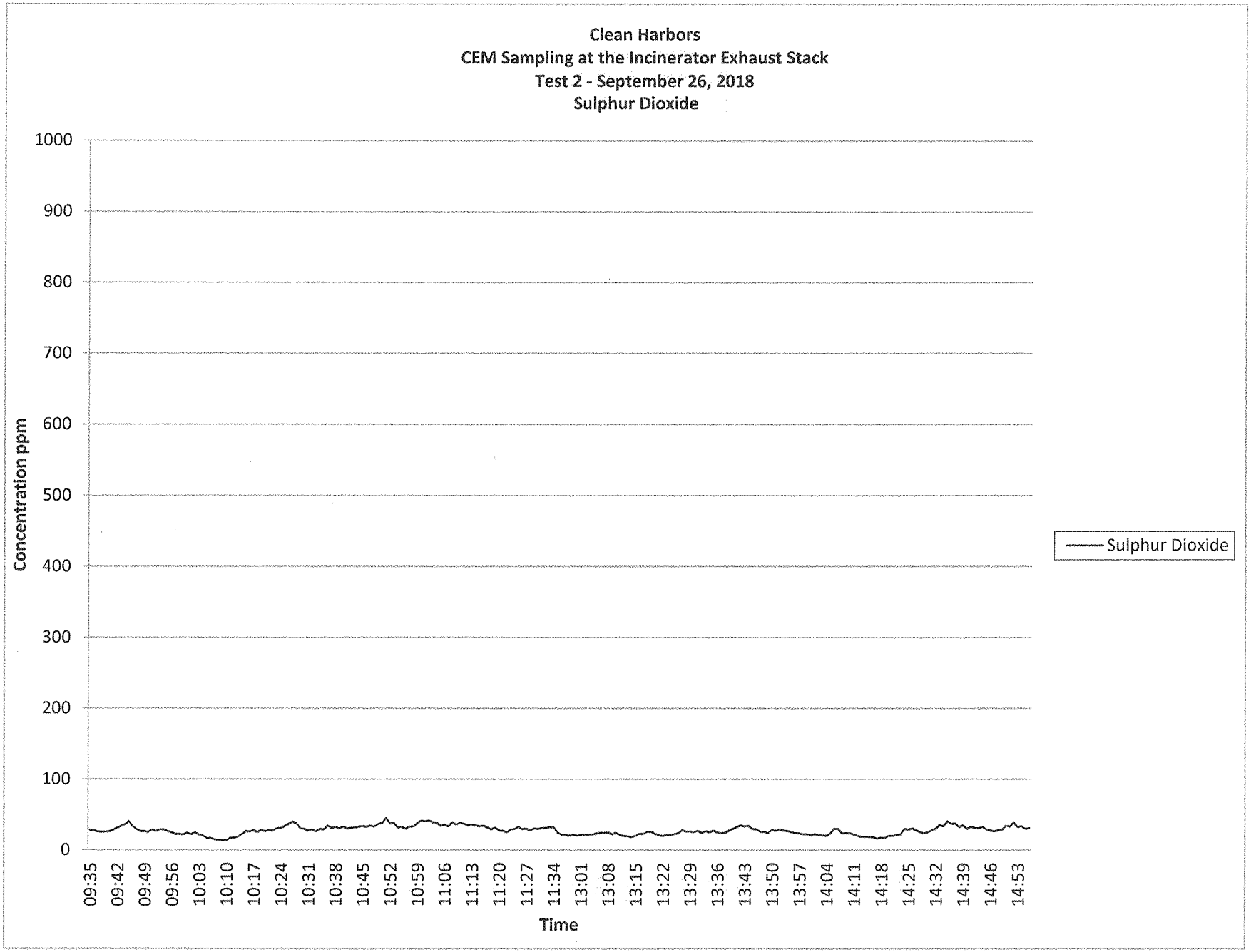

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018
Carbon Monoxide
120
100
80
60
40
20
0
Concentration ppm
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
11:41
11:48
11:55
12:02
12:09
12:16
12:23
12:30
12:37
12:44
13:49
13:56
14:03
14:10
14:17
14:24
14:31
14:38
14:45
14:52
14:59
15:06
15:13
15:20
15:27
15:34
15:41
Time
Carbon Monoxide

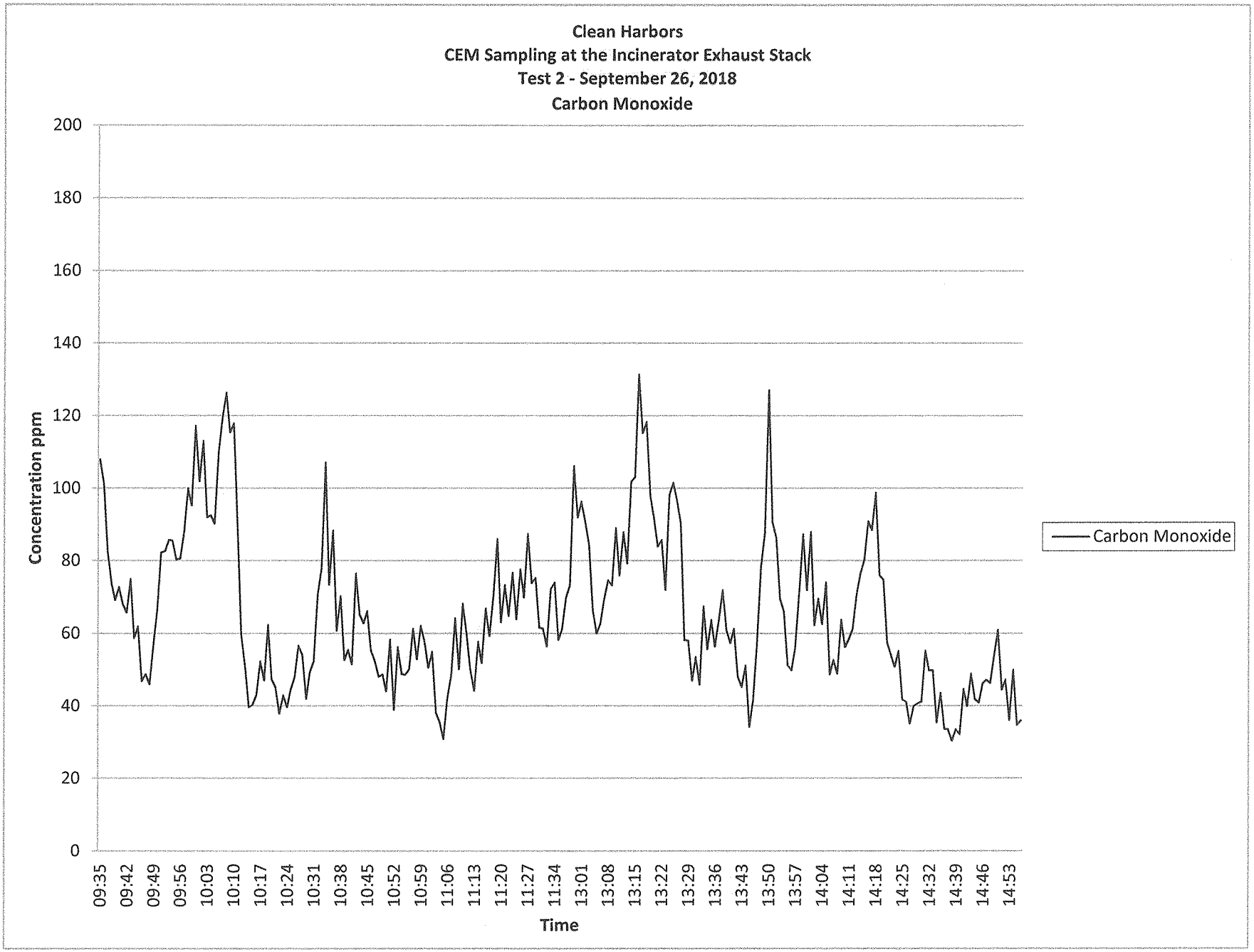

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018
Nitrogen Oxides
Concentration ppm
500
450
400
350
300
250
200
150
100
50
0
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
11:41
11:48
11:55
12:02
12:09
12:16
12:23
12:30
12:37
12:44
13:49
13:56
14:03
14:10
14:17
14:24
14:31
14:38
14:45
14:52
14:59
15:06
15:13
15:20
15:27
15:34
15:41
Time
Nitrogen Oxides
Nitric Oxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - September 25, 2018
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
11:41
11:48
11:55
12:02
12:09
12:16
12:23
12:30
12:37
12:44
13:49
13:56
14:03
14:10
14:17
14:24
14:31
14:38
14:45
14:52
14:59
15:06
15:13
15:20
15:27
15:34
15:41
Time
Total Hydrocarbons

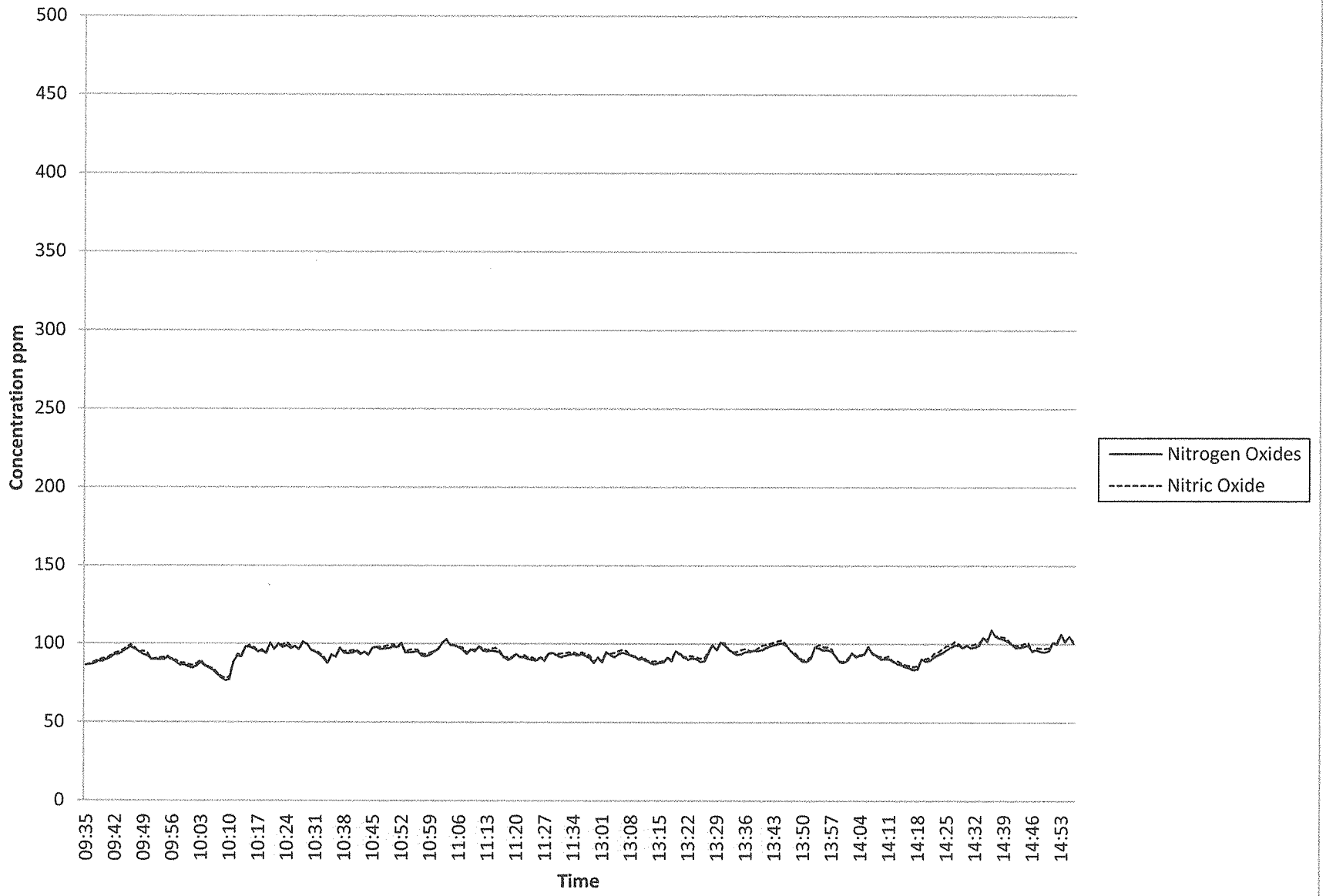
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018
Oxygen & Carbon Dioxide

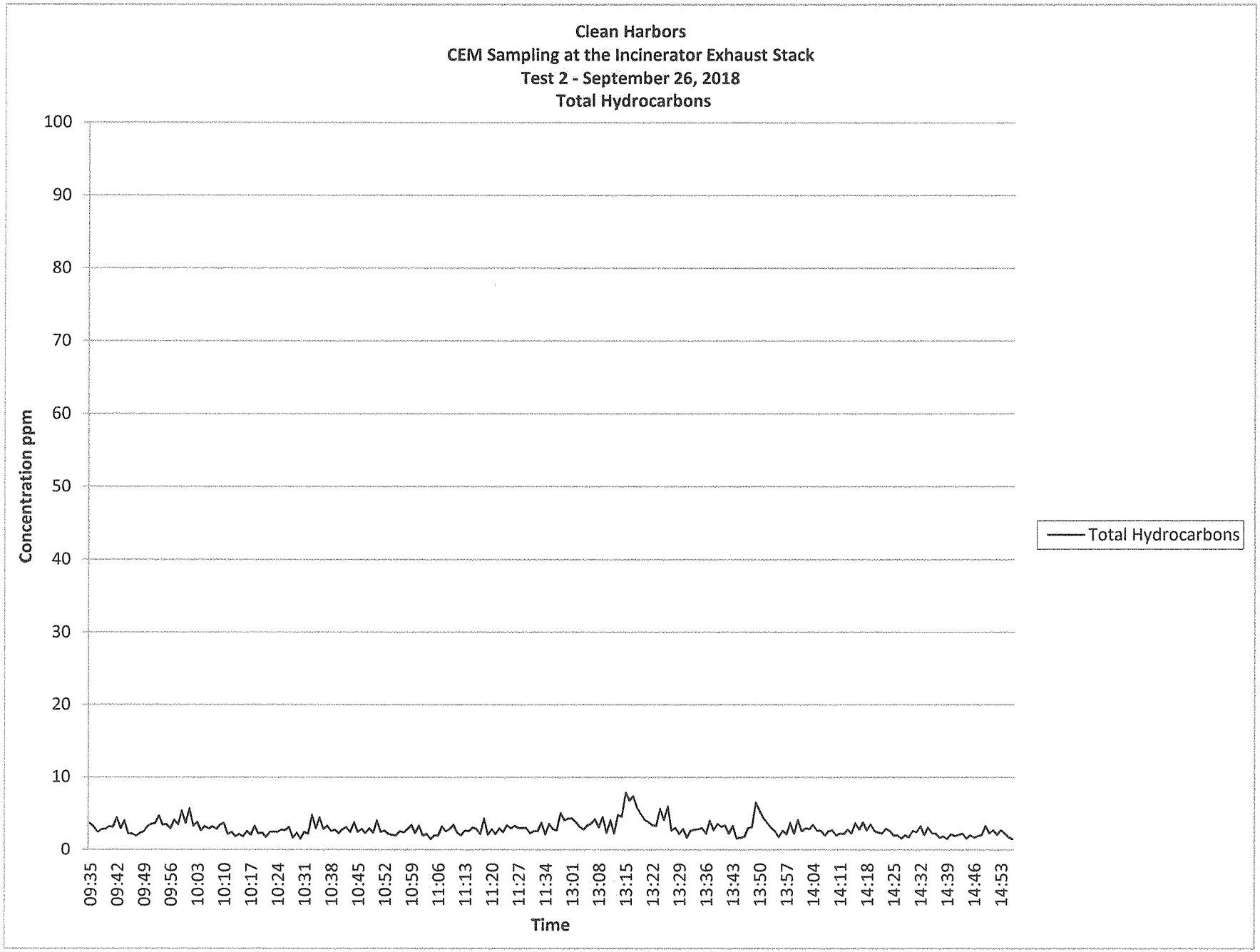



Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
09:35
09:42
09:49
09:56
10:03
10:10
10:17
10:24
10:31
10:38
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
Time
Sulphur Dioxide

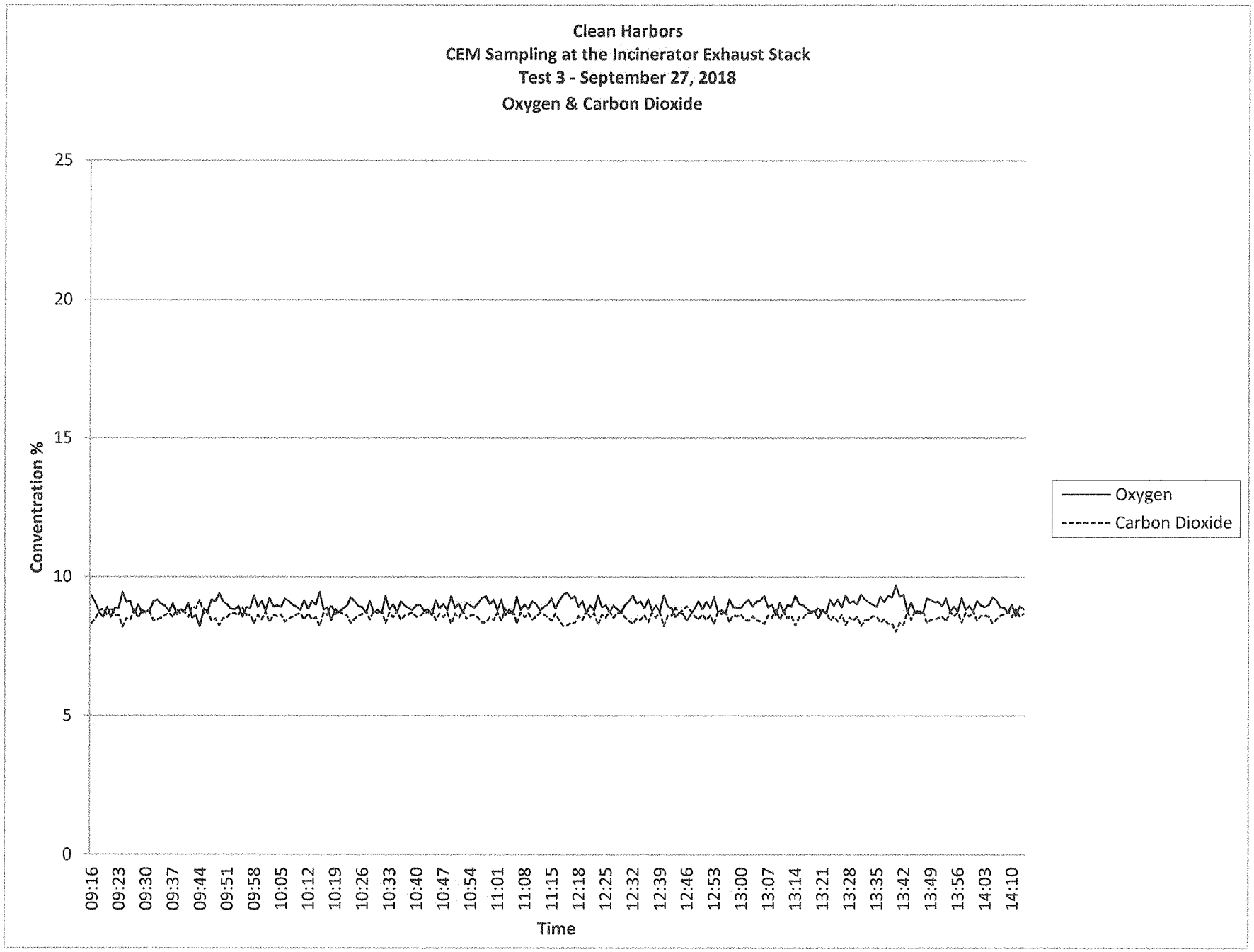

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018
Carbon Monoxide
Concentration ppm
200
180
160
140
120
100
80
60
40
20
0
09:35
09:42
09:49
09:56
10:03
10:10
10:17
10:24
10:31
10:38
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
Time
Carbon Monoxide

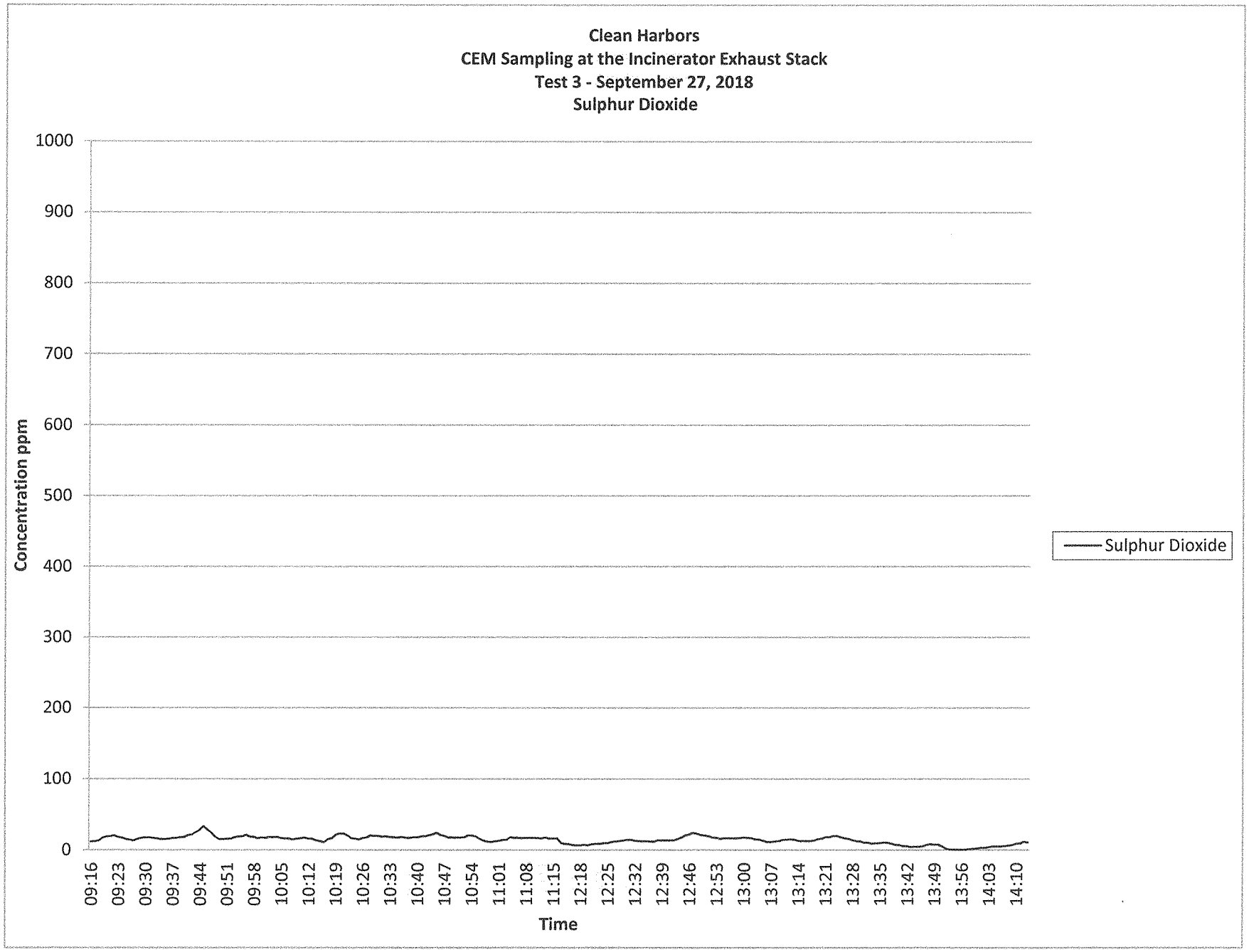
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018
Nitrogen Oxides

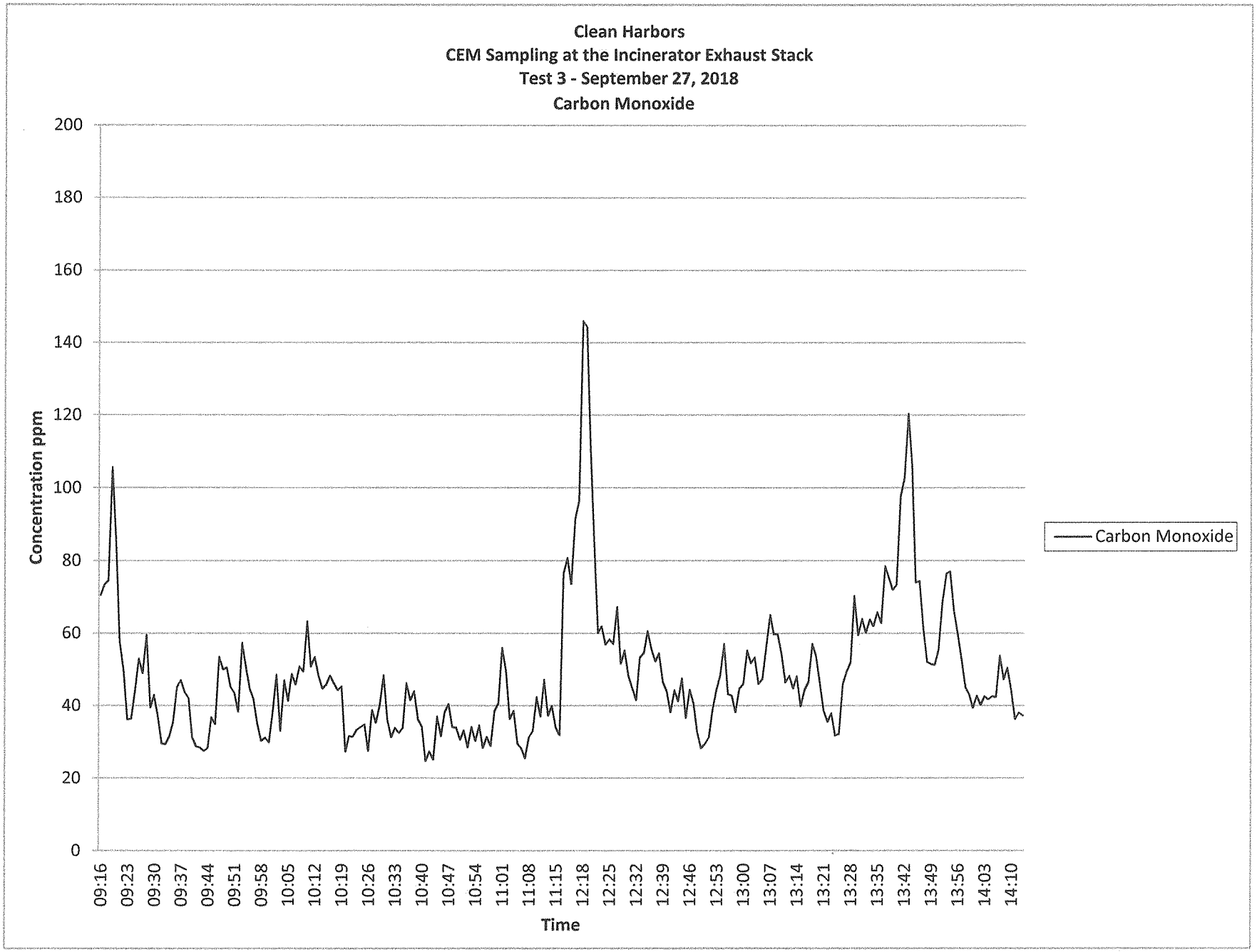


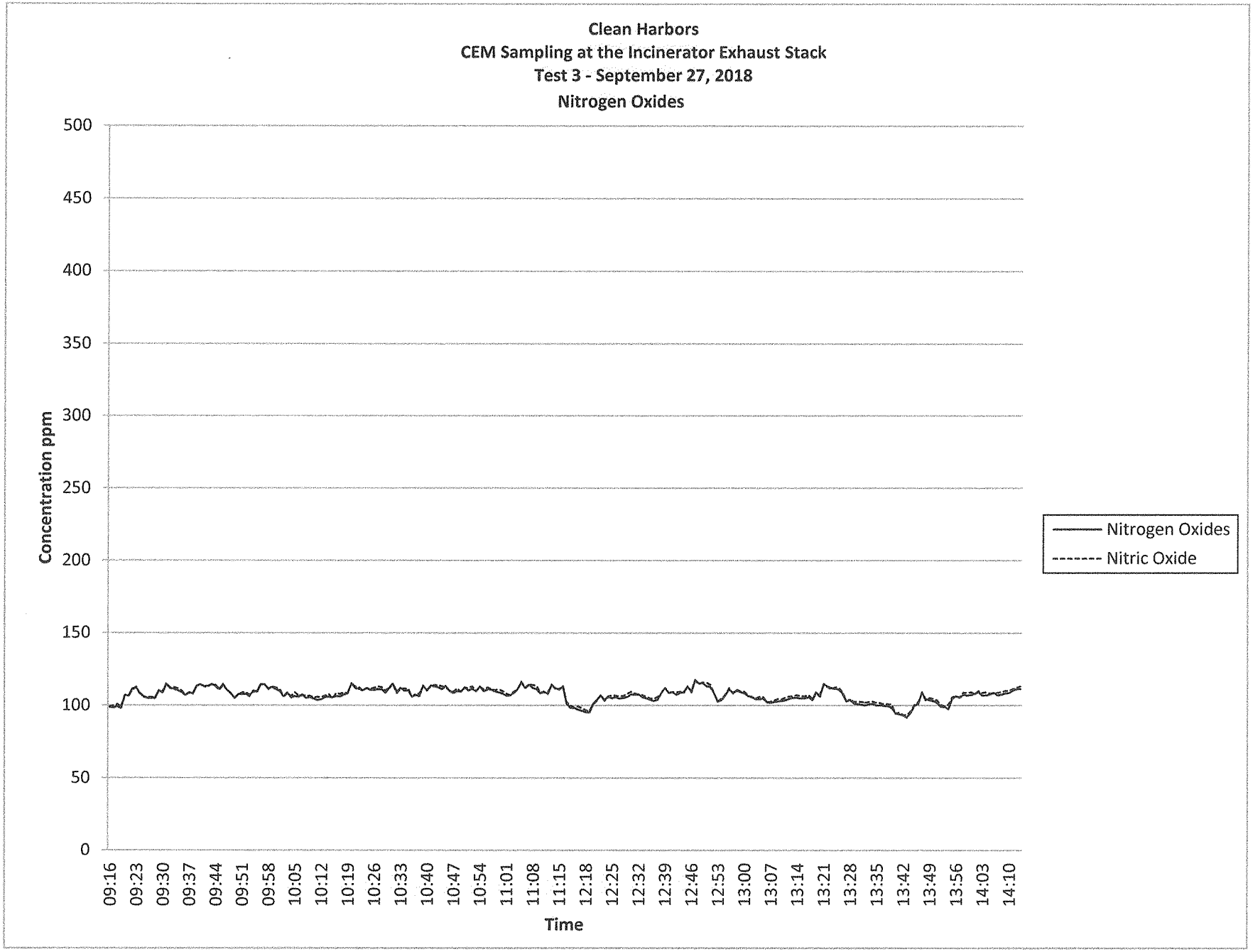

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - September 26, 2018
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:35
09:42
09:49
09:56
10:03
10:10
10:17
10:24
10:31
10:38
10:45
10:52
10:59
11:06
11:13
11:20
11:27
11:34
13:01
13:08
13:15
13:22
13:29
13:36
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
Time
Total Hydrocarbons

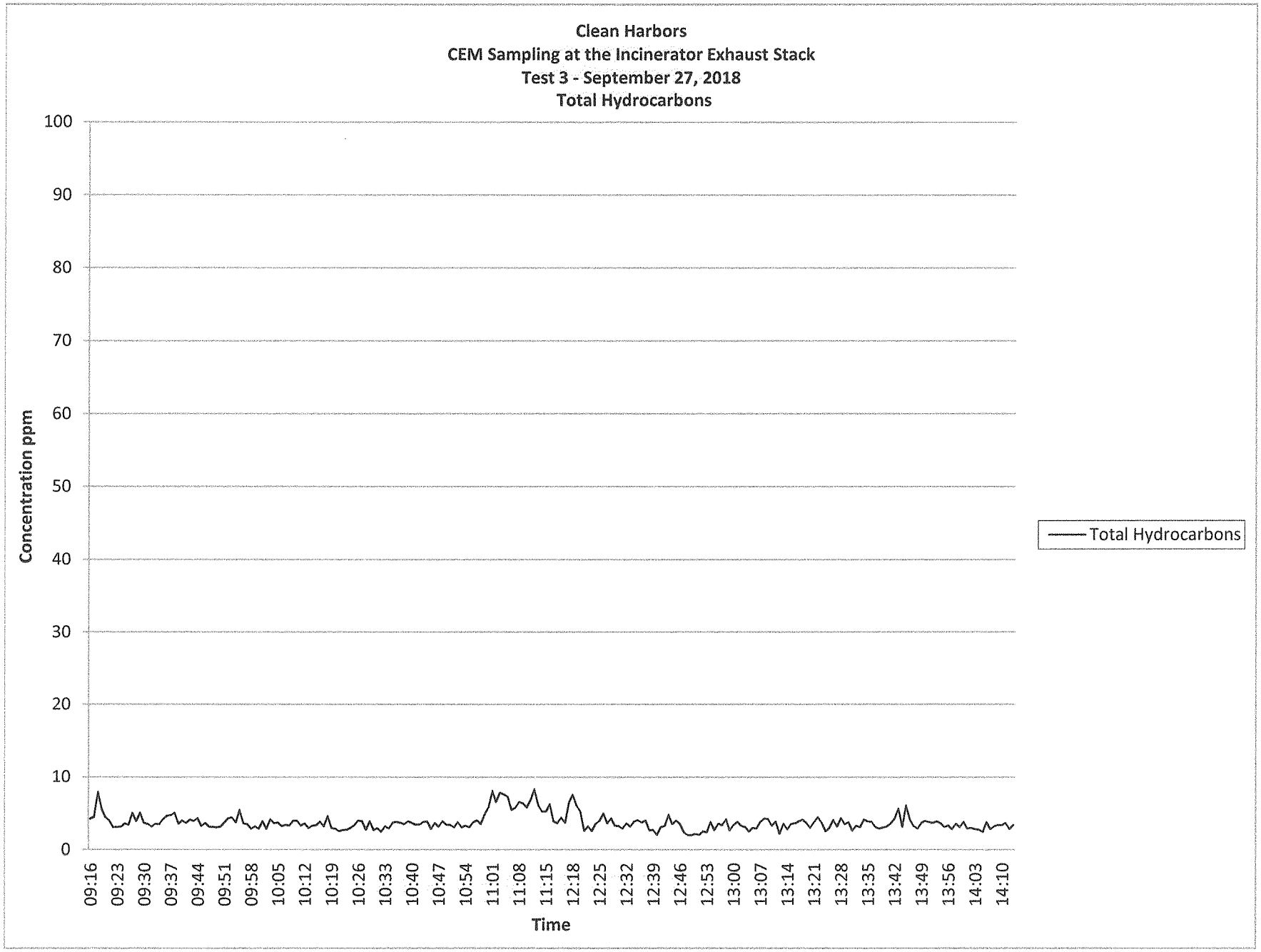
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018
Oxygen & Carbon Dioxide




Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
09:16
09:23
09:30
09:37
09:44
09:51
09:58
10:05
10:12
10:19
10:26
10:33
10:40
10:47
10:54
11:01
11:08
11:15
12:18
12:25
12:32
12:39
12:46
12:53
13:00
13:07
13:14
13:21
13:28
13:35
13:42
13:49
13:56
14:03
14:10
Time
Sulphur Dioxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018
Carbon Monoxide
Concentration ppm
200
180
160
140
120
100
80
60
40
20
0
09:16
09:23
09:30
09:37
09:44
09:51
09:58
10:05
10:12
10:19
10:26
10:33
10:40
10:47
10:54
11:01
11:08
11:15
12:18
12:25
12:32
12:39
12:46
12:53
13:00
13:07
13:14
13:21
13:28
13:35
13:42
13:49
13:56
14:03
14:10
Time
Carbon Monoxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018
Nitrogen Oxides
Concentration ppm
500
450
400
350
300
250
200
150
100
50
0
09:16
09:23
09:30
09:37
09:44
09:51
09:58
10:05
10:12
10:19
10:26
10:33
10:40
10:47
10:54
11:01
11:08
11:15
12:18
12:25
12:32
12:39
12:46
12:53
13:00
13:07
13:14
13:21
13:28
13:35
13:42
13:49
13:56
14:03
14:10
Time
Nitrogen Oxides
Nitric Oxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - September 27, 2018
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:16
09:23
09:30
09:37
09:44
09:51
09:58
10:05
10:12
10:19
10:26
10:33
10:40
10:47
10:54
11:01
11:08
11:15
12:18
12:25
12:32
12:39
12:46
12:53
13:00
13:07
13:14
13:21
13:28
13:35
13:42
13:49
13:56
14:03
14:10
Time
Total Hydrocarbons

APPENDIX 26

AERMOD Modelling Files
(1 CD)

APPENDIX 27

Clean Harbors Feed Data Summaries
(3 pages)

Clean Harbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: _____ Analysis Date: SEPT 25/18

Storage Location: I6 Lab No.: C18-2093

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					SEPT 25/18	SEPT 25/18	SEPT25/18		SEPT25/18		SEPT25/18			SEPT25/18
Time Received at LAB					7:00	7:00	7:00		7:00		7:00			7:00
pH		AM047	pH				10.5		7		7			9.77
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										0.554
Specific Gravity		AM045	g/ml				1.05		0.98		0.91			1
Heat Value		AM005	MJ/kg	0.3	2.5	7.3	4.14		21		35.1			
Ash @ 750 C		AM129	% mass	0.03			5.1		4.25		2.56			
Fluoride	Total	AM005	% mass F	0.05										
	Soluble	AM036	% mass F	0.05										
	Organic	AM005	% mass F	0.05										
Chloride	Total	AM005	% mass Cl	0.05			0.41		0.73		0.31			
	Soluble	AM036	% mass Cl	0.05										ND
	Organic	AM005	% mass Cl	0.05										
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02										
	Soluble	AM036	% mass S	0.02										
	Non Sulphate	AM005	% mass S	0.02										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30			14400							
	Normality	AM046	N	0.01										0.028
Phase Composition	Organic	AM045	% volume	0.5			2		44		92			
	Emulsion	"	% volume	0.5					46					
	Aqueous	"	% volume	0.5			90							
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5			8		10		8			1
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<50			
Solids @ 110 C		AM003	% mass	0.03										0.12
Total Organic Carbon		AM142	ppm	1										31
Water Content by KF :		AM074	% H2O						37.28		11.23			

Additional Analysis: LEACHATE TOC= 5383 PPM

Comments: _____

ANALYST: MS

Clean Harbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: _____ Analysis Date: SEPT 26/18

Storage Location: I6 Lab No.: C18-2103

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					SEPT26/18	SEPT 26/18	SEPT 26/18		SEPT 26/18		SEPT 26/18			SEPT 26/18
Time Received at LAB					7:00	7:00	7:00		7:00		7:00			7:00
pH		AM047	pH				10.62		7		7			8.14
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										
Specific Gravity		AM045	g/ml				1.06		0.98		0.91			1
Heat Value		AM005	MJ/kg	0.3	2.82	15.54	5.04		20.5		33.5			
Ash @ 750 C		AM129	% mass	0.03			7.47		4.99		2.61			
Fluoride	Total	AM005	% mass F	0.05										
	Soluble	AM036	% mass F	0.05										
	Organic	AM005	% mass F	0.05										
Chloride	Total	AM005	% mass Cl	0.05			0.49		0.69		0.34			
	Soluble	AM036	% mass Cl	0.05										ND
	Organic	AM005	% mass Cl	0.05										
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02										
	Soluble	AM036	% mass S	0.02										
	Non Sulphate	AM005	% mass S	0.02										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30			13680							
	Normality	AM046	N	0.01										0.004
Phase Composition	Organic	AM045	% volume	0.5			2		34		92			
	Emulsion	"	% volume	0.5			88		52					
	Aqueous	"	% volume	0.5										
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5			10		14		8			<1
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<50			
Solids @ 110 C		AM003	% mass	0.03										0.15
Total Organic Carbon		AM142	ppm	1										35
Water Content by KF :		AM074	% H2O						41.8		12.37			

Additional Analysis: _____

Comments: _____

ANALYST: MS

Clean Harbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: _____ Analysis Date: SEPT 27/2018

Storage Location: I1 Lab No.: C18-2114

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					SEPT27/18	SEPT27/18	SEPT27/18		SEPT27/18		SEPT27/18			SEPT27/18
Time Received at LAB					7:00	7:00	7:00		7:00		7:00			7:00
pH		AM047	pH				10.82		8		7			7.34
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										0.501
Specific Gravity		AM045	g/ml				1.05		0.98		0.86			1
Heat Value		AM005	MJ/kg	0.3	2.83	7.06	5.09		18.93		43.81			
Ash @ 750 C		AM129	% mass	0.03			6.65		4.28		4.28			
Fluoride	Total	AM005	% mass F	0.05										
	Soluble	AM036	% mass F	0.05										
	Organic	AM005	% mass F	0.05										
Chloride	Total	AM005	% mass Cl	0.05			0.39		0.65		0.13			
	Soluble	AM036	% mass Cl	0.05										0.01
	Organic	AM005	% mass Cl	0.05										
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02										
	Soluble	AM036	% mass S	0.02										
	Non Sulphate	AM005	% mass S	0.02										
Alkalinity	as Carbonate	AM001	ppm CaCO3	30			14280							
	Normality	AM046	N	0.01										0.004
Phase Composition	Organic	AM045	% volume	0.5			3		30		98			
	Emulsion	"	% volume	0.5					10					
	Aqueous	"	% volume	0.5			87		50					
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5			10		10		2			0
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100		<50			
Solids @ 110 C		AM003	% mass	0.03										<0.03
Total Organic Carbon		AM142	ppm	1										26
Water Content by KF :		AM074	% H2O						50.05		13.62			

Additional Analysis: _____

Comments: _____

ANALYST: MS

APPENDIX 28

Clean Harbors One-Minute Average
Combustion Gas Results
(12 pages)

Test No. 1 - September 25, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
10:45:00	32.5	14.9	7.0	47.2	5.7	9.9	0.4	12.2
10:46:00	30.2	15.0	6.7	46.7	6.5	9.3	0.4	12.2
10:47:00	33.5	14.7	7.3	47.0	6.4	9.3	0.4	14.8
10:48:00	32.4	14.5	7.7	47.3	7.1	8.9	0.5	16.8
10:49:00	35.5	15.2	7.8	47.6	5.5	9.3	0.0	22.3
10:50:00	34.4	15.5	7.8	47.4	7.2	9.1	0.2	22.3
10:51:00	34.9	15.3	7.8	47.7	4.7	8.7	0.4	26.9
10:52:00	29.6	14.9	7.9	47.7	5.5	9.2	0.5	25.4
10:53:00	26.7	15.0	7.8	47.6	4.5	8.9	0.4	21.3
10:54:00	27.3	14.9	7.3	47.1	5.2	9.6	0.4	16.3
10:55:00	25.9	14.7	7.3	46.8	4.3	9.2	0.4	14.8
10:56:00	27.3	15.1	7.6	47.1	5.2	9.4	0.5	14.8
10:57:00	28.1	15.5	7.6	47.1	5.1	9.0	0.0	14.8
10:58:00	30.6	15.1	7.6	47.2	6.6	9.5	0.0	15.9
10:59:00	32.4	14.9	7.7	47.4	7.1	8.9	0.4	18.7
11:00:00	36.3	15.1	7.8	47.6	5.8	9.1	0.3	21.2
11:01:00	35.2	15.1	7.9	47.8	5.9	9.1	0.4	20.1
11:02:00	35.4	15.0	7.8	47.7	6.0	9.6	0.4	20.1
11:03:00	29.4	14.4	7.7	47.3	6.5	9.1	0.4	18.7
11:04:00	30.3	14.5	7.7	47.5	5.4	9.1	0.5	17.7
11:05:00	30.3	14.5	7.7	47.4	6.2	9.2	0.4	17.7
11:06:00	35.3	14.5	7.7	47.6	4.9	9.4	0.0	17.7
11:07:00	34.6	14.2	7.7	47.5	7.5	9.4	0.1	17.7
11:08:00	37.4	14.4	7.6	47.3	4.9	9.0	0.4	16.2
11:09:00	39.2	13.9	7.7	47.4	6.3	9.4	0.4	16.2
11:10:00	35.8	13.7	7.7	47.4	5.4	9.0	0.4	15.1
11:11:00	35.2	13.7	7.6	47.1	6.8	9.5	0.7	15.1
11:12:00	33.3	13.7	7.6	47.1	5.8	8.9	0.6	15.1
11:13:00	37.2	13.8	7.8	47.5	8.5	9.1	0.7	18.7
11:14:00	41.7	14.1	7.9	48.0	6.4	8.7	0.9	23.7
11:15:00	43.7	14.3	7.9	48.0	6.6	9.4	0.2	25.3
11:16:00	33.1	13.6	7.8	47.8	6.2	8.9	0.7	24.1
11:17:00	32.5	13.3	7.9	47.9	5.6	9.2	0.5	24.1
11:18:00	29.7	13.0	7.8	47.7	5.7	9.2	0.4	17.5
11:19:00	31.2	12.7	7.7	47.6	5.9	9.7	0.6	16.0
11:20:00	29.4	12.5	7.6	47.1	6.4	9.3	0.6	16.0
11:21:00	32.1	12.9	7.7	47.3	6.2	9.1	0.7	17.2
11:22:00	32.6	12.7	7.8	47.5	12.7	9.1	0.6	18.4
11:23:00	41.9	12.5	7.9	47.8	7.9	8.9	0.0	27.3
11:24:00	43.6	12.4	8.0	47.9	9.9	9.0	0.1	29.2
11:25:00	39.6	12.4	8.0	48.2	6.7	8.6	0.4	33.2
11:26:00	36.0	12.2	8.0	48.3	8.1	8.8	0.4	32.3
11:27:00	31.3	12.2	8.0	48.2	6.7	8.8	0.4	28.2
11:28:00	28.4	11.5	7.8	47.8	7.0	9.5	0.4	23.6
11:29:00	24.9	11.4	7.7	47.5	6.6	9.1	0.6	19.9
11:30:00	25.2	11.9	7.7	47.6	7.7	9.3	0.5	18.4
11:31:00	27.3	11.5	7.8	47.7	5.9	9.1	0.2	18.4
11:32:00	29.5	11.1	7.8	47.6	7.3	9.5	0.0	19.4
11:33:00	30.3	11.4	7.7	47.5	7.0	8.9	1.1	19.4
11:34:00	33.8	11.5	7.9	47.7	6.3	8.9	0.4	20.7
11:35:00	29.7	11.2	7.9	47.9	8.4	8.9	0.4	21.9
11:36:00	33.0	11.3	7.8	47.8	5.9	9.4	0.5	23.2
11:37:00	31.9	11.1	7.8	47.6	6.7	9.2	0.4	22.2
11:38:00	31.4	11.2	7.8	47.6	6.7	9.0	0.5	20.8
11:39:00	31.1	11.0	7.8	47.7	7.2	9.2	0.5	19.6
11:40:00	35.8	11.1	7.8	47.9	5.2	9.0	0.0	19.6
11:41:00	37.1	11.3	7.7	47.8	6.4	9.4	0.1	19.6
11:42:00	33.4	11.1	7.7	47.6	5.6	9.0	0.5	18.6
11:43:00	39.4	10.7	7.8	47.9	7.5	9.2	0.4	18.6
11:44:00	40.3	10.7	7.9	48.2	5.4	8.8	0.5	18.6
11:45:00	40.1	11.0	7.8	47.8	6.8	9.5	0.5	19.9
11:46:00	35.2	11.1	7.7	47.5	6.4	9.1	0.5	18.2
11:47:00	37.6	11.0	7.8	47.8	8.7	9.3	0.6	18.2
11:48:00	41.0	11.1	7.9	48.2	7.3	8.9	0.3	22.5
11:49:00	45.2	10.8	7.9	48.2	5.4	9.4	0.1	23.6
11:50:00	35.6	10.4	7.7	47.7	6.7	9.2	1.3	18.8
11:51:00	36.9	10.5	7.7	47.7	5.5	9.2	0.5	18.8
11:52:00	40.4	10.2	7.7	47.7	6.1	9.2	0.5	14.2
11:53:00	42.7	10.4	7.7	47.6	5.4	9.8	0.5	13.0
11:54:00	40.4	10.3	7.6	47.1	6.1	9.6	0.5	13.0
11:55:00	41.1	10.3	7.6	47.2	6.8	9.2	0.5	11.8
11:56:00	44.0	10.9	7.7	47.5	8.3	9.2	0.5	13.4
11:57:00	52.4	11.0	7.7	47.8	6.2	8.8	0.0	17.7
11:58:00	55.5	10.8	7.7	47.8	8.6	9.2	0.1	17.7

Test No. 1 - September 25, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
11:59:00	49.5	10.3	7.8	47.8	5.3	8.8	0.4	20.1
12:00:00	46.8	10.2	7.9	48.0	6.1	9.3	0.4	19.9
12:01:00	40.7	10.4	7.8	48.0	4.9	9.0	0.4	17.2
12:02:00	38.7	9.9	7.4	47.4	5.6	9.9	0.4	13.3
12:03:00	37.1	10.0	7.3	47.2	5.9	9.5	0.5	11.8
12:04:00	41.7	9.9	7.6	47.4	6.7	9.5	0.4	11.8
12:05:00	44.3	10.1	7.7	47.6	7.3	9.3	0.4	13.1
12:06:00	52.9	10.3	7.7	47.6	6.4	9.6	0.0	13.1
12:07:00	51.5	10.0	7.6	47.3	9.9	9.2	1.2	13.1
12:08:00	53.6	10.1	7.7	47.5	6.7	8.9	0.5	16.0
12:09:00	54.6	10.6	7.8	48.0	7.7	8.9	0.5	17.5
12:10:00	45.8	10.6	7.8	47.7	5.7	9.6	0.6	17.5
12:11:00	38.9	10.2	7.7	47.4	7.9	9.4	0.6	15.9
12:12:00	35.2	10.8	7.7	47.4	6.1	9.0	0.5	15.9
12:13:00	36.4	10.9	7.8	47.6	7.5	9.0	0.6	18.5
12:14:00	38.7	10.4	7.9	47.9	5.0	8.8	0.0	21.8
12:15:00	40.7	10.3	7.9	47.7	6.6	9.5	0.2	21.8
12:16:00	36.9	10.0	7.7	47.4	5.5	9.1	0.5	19.9
12:17:00	38.7	10.2	7.8	47.7	6.1	9.3	0.5	19.9
12:18:00	35.9	10.2	7.9	47.7	5.9	9.1	0.5	18.0
12:19:00	37.7	10.0	7.7	47.4	7.5	9.7	0.6	16.2
12:20:00	36.9	10.1	7.7	47.3	7.6	9.1	0.6	16.2
12:21:00	40.1	10.7	7.9	47.7	7.9	9.1	0.6	21.0
12:22:00	39.4	11.0	8.0	48.0	9.8	8.7	0.6	27.8
12:23:00	45.2	11.1	8.1	48.1	7.7	9.1	0.1	31.9
12:24:00	42.7	10.7	8.0	48.0	10.5	8.7	0.6	31.9
12:25:00	42.5	10.6	8.0	48.1	5.5	8.7	0.5	34.4
12:26:00	37.4	11.0	8.1	48.2	6.4	8.9	0.5	29.4
12:27:00	33.7	11.0	8.0	48.0	5.3	9.3	0.6	23.5
12:28:00	30.2	10.6	7.9	47.5	6.3	9.3	0.6	20.7
12:29:00	28.8	11.2	7.8	47.6	5.1	8.9	0.5	20.3
12:30:00	30.4	11.5	7.8	47.6	7.4	9.1	0.6	20.3
12:31:00	33.1	11.4	7.9	47.9	5.4	8.9	0.0	21.4
12:32:00	35.4	11.4	7.9	47.8	7.6	9.3	0.1	21.4
12:33:00	34.6	11.4	7.8	47.6	6.4	8.9	0.5	21.4
12:34:00	36.4	11.8	8.0	48.0	7.9	9.1	0.5	23.8
12:35:00	34.0	11.5	8.1	48.1	7.3	8.6	0.5	25.2
12:36:00	34.3	11.0	8.0	47.9	6.2	9.4	0.5	30.6
12:37:00	31.1	11.4	7.9	47.8	6.7	9.0	0.5	29.3
12:38:00	28.5	11.4	7.9	47.9	6.9	9.2	0.5	22.3
12:39:00	29.2	11.4	7.8	48.1	7.0	9.0	0.5	19.9
12:40:00	32.4	11.5	7.8	48.2	5.4	9.4	0.1	19.9
12:41:00	30.2	11.2	7.7	47.7	5.9	9.2	1.0	16.7
12:42:00	30.2	11.4	7.7	47.7	5.1	9.2	0.4	15.6
12:43:00	33.7	11.3	7.7	47.9	7.0	9.4	0.5	12.9
12:44:00	36.8	11.4	7.7	47.7	6.3	9.6	0.5	12.9
12:45:00	36.7	11.6	7.6	47.4	7.7	9.4	0.5	12.9
13:44:00	78.2	10.8	6.6	46.4	7.3	9.8	0.5	9.8
13:45:00	73.6	10.8	6.5	46.4	9.6	9.6	0.6	9.8
13:46:00	71.5	10.8	6.6	46.6	9.2	9.4	0.5	9.8
13:47:00	71.5	10.8	7.0	47.2	16.1	8.9	0.6	17.5
13:48:00	77.3	10.8	7.4	47.5	8.5	8.8	0.0	24.4
13:49:00	69.1	10.8	7.7	47.5	12.2	9.0	0.1	29.6
13:50:00	58.1	10.8	7.6	47.4	7.7	8.6	0.5	29.6
13:51:00	55.9	10.8	7.7	47.5	10.4	9.0	0.5	28.4
13:52:00	46.0	11.0	7.7	47.6	6.5	8.8	0.5	23.1
13:53:00	46.5	10.8	7.4	47.3	7.7	9.6	0.5	21.6
13:54:00	40.7	10.3	7.0	47.0	6.4	9.2	0.5	17.2
13:55:00	43.6	10.3	7.3	47.1	9.8	9.4	0.6	17.2
13:56:00	47.8	10.1	7.6	47.4	11.0	8.9	0.3	18.7
13:57:00	57.6	9.8	7.7	47.6	10.5	9.4	0.1	22.9
13:58:00	52.9	9.6	7.7	47.6	12.1	8.9	1.1	26.5
13:59:00	53.0	9.7	7.9	48.1	8.5	8.7	0.5	30.5
14:00:00	50.4	9.8	8.0	48.2	10.5	9.0	0.5	30.5
14:01:00	47.7	10.0	7.9	48.0	7.1	9.4	0.5	25.8
14:02:00	43.6	9.9	7.8	47.7	8.6	9.4	0.5	23.4
14:03:00	38.6	9.6	7.7	47.6	6.9	9.2	0.5	19.3
14:04:00	40.2	10.0	7.8	47.7	9.3	9.2	0.6	19.3
14:05:00	41.6	10.1	7.8	47.8	6.7	8.8	0.1	20.8
14:06:00	45.6	10.1	7.8	47.7	8.1	9.5	0.2	20.8
14:07:00	43.6	10.0	7.8	47.7	6.3	8.9	0.5	19.3
14:08:00	46.0	10.2	7.9	48.0	8.1	9.3	0.6	20.9
14:09:00	41.9	10.2	7.9	47.9	7.1	8.9	0.6	16.5
14:10:00	44.9	10.2	7.8	47.6	9.6	9.5	0.6	16.5

Test No. 1 - September 25, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
14:11:00	42.9	10.4	7.8	47.8	8.6	8.9	0.5	19.7
14:12:00	44.1	10.5	8.0	48.1	9.9	9.1	0.6	22.1
14:13:00	40.9	10.7	8.1	48.4	11.1	8.7	0.5	25.0
14:14:00	47.9	10.7	8.1	48.5	9.5	9.2	0.1	29.3
14:15:00	43.9	11.0	8.0	48.3	9.9	8.9	1.2	29.3
14:16:00	40.9	11.0	8.1	48.3	6.7	8.7	0.5	27.9
14:17:00	38.9	10.6	8.1	48.3	7.6	9.1	0.5	23.9
14:18:00	35.7	10.9	8.0	48.2	6.7	9.7	0.5	16.5
14:19:00	34.7	11.0	7.8	47.9	7.5	9.5	0.6	15.1
14:20:00	40.8	10.4	7.7	47.7	6.8	9.3	0.6	13.1
14:21:00	48.0	10.3	7.8	48.0	10.5	9.3	0.6	13.1
14:22:00	53.9	10.6	7.9	48.0	6.8	8.9	0.1	13.1
14:23:00	60.9	10.2	7.9	48.0	11.2	9.3	0.1	15.5
14:24:00	57.9	10.1	7.9	48.1	7.1	8.9	0.4	17.3
14:25:00	59.9	10.9	8.0	48.4	8.9	9.3	0.5	18.7
14:26:00	47.4	10.4	8.0	48.3	8.4	9.1	0.5	15.1
14:27:00	48.6	10.0	7.9	48.1	8.7	9.6	0.5	15.1
14:28:00	43.9	10.5	7.8	47.8	8.3	9.2	0.5	13.9
14:29:00	48.5	10.9	7.8	47.9	7.4	9.5	0.5	13.9
14:30:00	48.9	10.6	7.8	48.0	7.7	9.3	0.4	12.1
14:31:00	52.8	10.4	7.8	48.0	8.1	9.7	0.0	12.1
14:32:00	54.2	10.0	7.7	47.7	9.0	9.2	0.4	12.1
14:33:00	62.0	10.6	7.9	48.2	5.7	9.0	0.4	16.3
14:34:00	56.8	10.6	8.0	48.3	9.9	9.2	0.5	16.3
14:35:00	50.4	9.8	7.9	48.2	7.7	9.5	0.5	14.5
14:36:00	47.0	9.8	7.9	48.0	9.1	9.3	0.6	15.9
14:37:00	42.6	9.7	7.9	47.9	7.9	8.9	0.5	18.4
14:38:00	44.6	9.9	8.0	48.3	12.3	9.1	0.5	22.1
14:39:00	47.5	10.3	8.1	48.5	6.8	8.7	0.1	24.7
14:40:00	51.0	10.2	8.1	48.6	9.3	9.3	0.2	26.2
14:41:00	45.5	10.0	8.0	48.4	6.8	8.9	0.5	23.9
14:42:00	46.8	10.2	8.0	48.3	8.1	9.4	0.5	20.1
14:43:00	42.7	9.9	7.9	48.2	6.8	9.0	0.5	15.5
14:44:00	46.2	9.6	7.8	47.9	7.2	9.9	0.6	15.5
14:45:00	41.2	9.2	7.6	47.5	7.4	9.5	0.9	12.0
14:46:00	44.7	9.4	7.6	47.6	9.0	9.5	0.5	12.0
14:47:00	50.1	9.9	7.7	47.9	11.4	9.1	0.5	13.2
14:48:00	64.6	10.0	7.8	47.9	11.3	9.4	0.1	19.5
14:49:00	60.2	9.9	7.7	47.9	11.4	9.2	1.2	20.7
14:50:00	61.4	10.1	7.9	48.1	7.4	8.9	0.6	23.9
14:51:00	57.9	10.3	7.9	48.3	10.1	9.2	0.5	23.9
14:52:00	51.8	10.0	7.9	48.1	6.4	9.3	0.6	20.6
14:53:00	50.9	9.8	7.8	47.7	3.0	9.3	0.5	19.5
14:54:00								
14:55:00								
14:56:00								
14:57:00	49.6	9.8	5.6	41.4	8.8	9.5	0.0	10.5
14:58:00	54.1	9.8	6.1	44.5	8.5	9.1	0.5	13.2
14:59:00	63.0	9.8	7.3	47.4	8.7	9.1	0.5	15.1
15:00:00	62.7	13.9	7.8	47.8	8.0	8.9	0.5	17.3
15:01:00	64.4	13.0	7.8	47.8	8.1	9.7	0.6	17.3
15:02:00	50.9	11.7	7.7	47.5	9.9	9.2	0.5	16.1
15:03:00	54.9	11.8	7.7	47.7	8.7	9.0	0.5	17.4
15:04:00	58.0	12.1	7.8	48.0	10.1	9.0	0.6	20.5
15:05:00	64.6	11.6	7.9	48.3	6.4	9.5	0.1	21.9
15:06:00	57.4	11.3	7.8	47.8	8.7	9.3	0.2	18.9
15:07:00	54.2	11.9	7.8	48.0	5.5	9.1	0.5	17.2
15:08:00	53.7	11.7	7.8	48.0	7.3	9.3	0.6	15.4
15:09:00	47.7	11.6	7.7	47.9	5.5	9.3	0.5	13.6
15:10:00	48.0	11.5	7.3	47.6	7.3	9.7	0.6	10.9
15:11:00	47.5	11.5	7.3	47.3	6.8	9.2	0.5	10.9
15:12:00	54.1	11.7	7.7	47.9	11.3	9.4	0.6	14.3
15:13:00	56.9	12.0	7.8	48.1	7.7	9.0	0.0	16.2
15:14:00	64.4	11.5	7.7	48.1	9.9	9.5	0.1	17.6
15:15:00	59.4	11.3	7.7	48.1	10.6	9.0	0.6	17.6
15:16:00	65.9	11.9	7.8	48.3	7.9	9.3	0.5	17.6
15:17:00	59.7	11.5	7.8	48.3	6.8	9.3	0.5	13.0
15:18:00	62.4	11.1	7.4	48.1	6.6	9.9	0.5	11.0
15:19:00	60.6	11.1	7.0	47.3	8.0	9.5	0.5	8.4
15:20:00	67.5	11.4	7.3	47.4	8.1	9.5	0.6	8.4
15:21:00	74.8	11.3	7.5	47.6	10.6	9.5	0.6	8.4
15:22:00	90.2	10.7	7.6	47.8	8.2	9.5	0.0	10.3
15:23:00	88.1	10.4	7.6	47.8	14.7	9.3	0.2	10.3
15:24:00	91.9	10.9	7.8	48.2	8.4	8.9	0.4	14.6

Test No. 1 - September 25, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
15:25:00	87.6	11.2	7.9	48.3	8.7	9.1	0.5	16.4
15:26:00	65.8	10.4	7.8	48.1	7.3	9.1	0.5	16.4
15:27:00	64.1	10.4	7.8	48.0	8.4	9.6	0.5	16.4
15:28:00	55.5	10.8	7.7	47.8	6.1	9.2	0.6	16.4
15:29:00	52.3	10.5	7.8	47.9	7.0	9.4	0.5	16.4
15:30:00	47.4	10.5	7.8	48.0	7.1	9.2	0.1	16.4
15:31:00	47.2	11.1	7.8	47.8	7.4	9.7	0.1	16.4
15:32:00	43.4	10.8	7.7	47.5	7.8	9.4	0.7	15.1
15:33:00	44.2	10.8	7.7	47.8	6.1	9.4	0.5	15.1
15:34:00	41.9	11.0	7.7	47.9	8.0	9.4	0.4	13.7
15:35:00	45.9	11.0	7.7	47.8	7.3	9.7	0.6	13.7
15:36:00	45.8	10.2	7.7	47.6	10.2	9.3	0.5	15.4
15:37:00	48.8	10.3	7.8	47.8	9.1	9.1	0.6	17.7
15:38:00	49.5	11.1	7.9	48.1	11.3	9.1	0.6	20.6
15:39:00	52.5	11.4	7.9	48.4	7.4	9.1	0.1	24.6
15:40:00	51.2	11.4	7.9	48.3	9.1	9.3	0.2	23.6
15:41:00	49.0	11.2	7.9	48.1	5.5	9.1	0.5	21.2
15:42:00	49.2	11.1	7.8	48.0	8.5	9.3	0.5	19.3
15:43:00	47.0	11.1	7.8	48.0	6.4	9.1	0.5	15.4
15:44:00	50.8	10.7	7.8	47.7	8.4	9.6	0.6	15.4
15:45:00	46.8	11.1	7.7	47.5	8.5	9.2	0.5	15.4
15:46:00	46.9	11.6	7.9	48.0	13.3	9.2	0.5	18.6
15:47:00	46.6	11.3	8.0	48.3	10.9	8.8	0.2	21.5
15:48:00	52.9	11.3	8.1	48.4	9.5	9.3	0.2	27.2
15:49:00	48.0	11.5	8.1	48.3	8.5	8.9	1.1	27.2
15:50:00	44.1	11.5	8.1	48.5	6.4	9.1	0.4	26.0
15:51:00	39.5	11.5	8.0	48.4	8.4	9.1	0.5	17.4
15:52:00	43.4	11.0	7.8	48.0	6.7	9.8	0.6	16.1
15:53:00	44.0	10.8	7.7	47.6	9.3	9.3	0.5	14.4
15:54:00	42.8	11.1	7.8	47.7	6.7	9.1	0.6	15.8
15:55:00	41.1	11.2	7.9	47.9	10.2	9.2	0.6	18.2
15:56:00	47.2	11.0	7.9	48.0	7.0	8.9	0.0	20.5
15:57:00	48.6	11.4	7.9	48.1	16.8	9.0	0.2	25.9
15:58:00	53.9	11.7	8.0	48.4	8.4	8.6	0.5	32.5
15:59:00	57.5	11.9	8.1	48.7	8.4	8.8	0.5	34.6
16:00:00	45.7	11.7	8.2	48.5	6.6	8.8	0.5	30.3
Max	91.9	15.5	8.2	48.7	16.8	9.9	1.3	34.6
Min	24.9	9.2	5.6	41.4	3.0	8.6	0.0	8.4
Average	44.8	11.3	7.7	47.7	7.6	9.2	0.4	19.0

Test No. 2 - September 26, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
9:35:00	35.7	10.3	6.0	44.2	4.1	11.4	0.0	2.1
9:36:00	18.7	10.1	5.9	43.8	3.3	9.7	0.3	2.1
9:37:00	21.9	10.5	6.4	45.2	3.9	9.7	0.4	5.1
9:38:00	32.3	11.0	6.6	45.6	3.4	9.7	0.5	5.1
9:39:00	40.8	10.9	6.5	45.5	4.0	10.3	0.4	5.1
9:40:00	51.0	10.9	6.5	45.2	4.4	9.9	0.4	3.6
9:41:00	59.2	11.0	6.6	45.6	5.7	9.9	0.4	3.6
9:42:00	73.6	11.6	6.9	46.1	6.6	9.5	0.4	3.6
9:43:00	92.3	11.6	7.2	46.3	5.5	9.9	0.0	3.6
9:44:00	95.0	11.2	6.9	46.0	5.0	9.7	0.9	3.6
9:45:00	82.7	11.2	6.9	46.2	3.7	9.5	0.4	3.6
9:46:00	72.9	11.2	6.9	46.3	4.7	9.7	0.6	3.6
9:47:00	67.3	11.1	6.6	46.1	3.7	10.0	0.4	3.6
9:48:00	61.5	11.1	6.6	45.8	5.3	9.7	0.5	3.6
9:49:00	61.0	11.4	6.9	45.7	3.9	9.5	0.5	3.6
9:50:00	55.9	11.4	7.2	46.3	6.7	9.5	0.5	5.6
9:51:00	56.2	11.6	7.3	46.6	3.6	9.1	0.0	6.6
9:52:00	57.7	11.2	7.6	46.5	6.6	9.5	0.1	7.6
9:53:00	51.9	11.2	7.6	46.5	3.7	9.1	0.4	7.6
9:54:00	51.7	11.6	7.7	46.8	3.5	9.5	0.8	8.9
9:55:00	41.2	11.9	7.3	46.4	3.5	9.5	0.8	5.0
9:56:00	44.5	12.2	6.9	46.0	3.9	10.3	0.8	5.0
9:57:00	43.4	11.7	6.6	45.5	4.4	9.8	0.8	3.6
9:58:00	48.6	11.8	6.6	45.7	5.2	9.8	0.8	3.6
9:59:00	60.2	12.2	6.9	46.1	6.5	9.6	0.8	3.6
10:00:00	73.4	11.9	7.2	46.2	6.2	9.8	0.8	3.6
10:01:00	71.5	11.7	6.9	46.1	7.7	9.6	0.7	3.6
10:02:00	74.2	11.7	7.2	46.5	4.5	9.4	0.4	4.7
10:03:00	73.3	11.9	7.5	46.6	5.0	9.6	0.4	4.7
10:04:00	72.8	12.3	7.2	46.3	3.8	9.8	0.4	4.7
10:05:00	72.0	11.9	6.9	45.9	5.6	10.0	0.4	3.2
10:06:00	78.4	11.4	6.6	45.8	4.3	9.6	0.4	3.2
10:07:00	84.5	12.2	6.6	46.0	6.8	9.8	0.4	3.2
10:08:00	84.1	12.2	6.9	46.1	4.3	9.4	0.0	3.2
10:09:00	96.4	11.8	6.9	46.1	7.1	10.0	0.0	3.2
10:10:00	89.1	11.7	6.9	46.2	4.9	9.4	0.4	3.2
10:11:00	92.1	11.8	7.2	46.6	5.6	9.8	0.3	4.5
10:12:00	80.3	11.7	6.7	46.6	4.2	9.6	0.4	3.1
10:13:00	84.2	11.6	6.6	46.0	4.4	10.5	0.3	3.1
10:14:00	85.1	12.1	6.5	45.6	4.9	10.1	0.4	1.9
10:15:00	97.3	11.9	6.5	45.8	4.6	10.1	0.4	1.9
10:16:00	107.5	11.4	6.5	45.9	4.9	9.9	0.4	1.9
10:17:00	111.8	11.2	6.5	45.7	3.8	10.3	0.0	1.9
10:18:00	103.5	10.8	6.5	45.7	6.3	9.9	0.2	1.9
10:19:00	94.1	10.8	6.9	46.4	3.0	9.4	0.3	1.9
10:20:00	78.4	10.8	7.2	46.5	3.8	9.6	0.4	3.0
10:21:00	51.1	10.9	7.5	46.4	2.9	9.4	0.3	3.0
10:22:00	40.3	10.7	7.2	46.0	3.3	9.8	0.4	4.3
10:23:00	36.2	10.9	6.9	45.9	2.5	9.4	0.5	4.3
10:24:00	36.7	11.1	7.5	46.4	3.2	9.6	0.5	4.3
10:25:00	37.1	11.1	7.5	46.5	2.8	9.1	0.0	4.3
10:26:00	42.7	11.3	7.5	46.3	4.3	9.8	0.0	5.7
10:27:00	42.4	11.1	7.5	46.1	4.2	9.4	0.4	5.7
10:28:00	50.7	11.2	7.6	46.4	3.1	9.4	0.5	5.7
10:29:00	40.1	11.4	7.7	46.4	3.1	9.4	0.4	5.7
10:30:00	39.7	11.3	7.3	46.1	3.7	9.9	0.5	5.7
10:31:00	34.7	11.2	7.3	46.1	4.0	9.4	0.5	5.7
10:32:00	36.4	11.5	7.7	46.4	3.0	9.2	0.5	5.7
10:33:00	35.5	12.0	7.7	46.7	4.4	9.2	0.5	7.0
10:34:00	41.4	12.1	7.7	46.8	3.4	9.1	0.0	8.2
10:35:00	42.2	12.1	7.8	46.8	4.8	9.2	0.1	8.2
10:36:00	46.9	11.7	7.8	46.9	2.6	9.0	0.4	8.2
10:37:00	46.8	11.5	7.7	46.6	3.4	9.6	0.5	8.2
10:38:00	38.3	11.7	7.6	46.1	2.5	9.4	0.4	4.5
10:39:00	41.6	12.2	7.2	45.8	3.9	9.8	0.5	4.5
10:40:00	46.3	12.3	7.2	45.7	3.3	9.6	0.5	4.5
10:41:00	60.7	11.7	7.5	46.1	6.6	9.8	0.5	4.5
10:42:00	67.2	11.6	7.5	46.2	5.3	9.4	0.1	4.5
10:43:00	82.3	12.4	7.6	46.4	5.7	9.8	0.1	4.5
10:44:00	72.7	12.6	7.6	46.2	5.1	9.2	0.7	4.5
10:45:00	68.6	12.4	7.6	46.4	4.3	9.4	0.4	5.8
10:46:00	56.0	12.3	7.6	46.6	4.4	9.2	0.4	5.8
10:47:00	58.3	12.2	7.6	46.6	4.0	9.8	0.5	5.8
10:48:00	49.0	12.1	7.5	46.1	3.7	9.4	0.5	5.8

Test No. 2 - September 26, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
10:49:00	47.1	12.4	7.6	46.3	3.5	9.4	0.5	5.8
10:50:00	47.9	12.5	7.6	46.1	5.4	9.4	0.5	4.7
10:51:00	61.4	12.9	7.6	46.2	3.0	9.4	0.1	4.7
10:52:00	57.5	12.5	7.6	46.1	4.9	9.4	0.1	4.7
10:53:00	54.9	12.0	7.6	46.2	2.8	9.2	0.4	4.7
10:54:00	54.5	12.4	7.6	46.4	4.5	9.5	0.5	4.7
10:55:00	46.2	12.8	7.7	46.3	3.0	9.0	0.5	4.7
10:56:00	44.6	12.4	7.6	46.1	4.7	9.6	0.5	5.7
10:57:00	42.7	12.4	7.6	46.2	3.4	9.2	0.5	5.7
10:58:00	41.3	12.7	7.7	46.6	4.9	9.4	0.5	6.9
10:59:00	38.9	12.7	7.7	46.6	4.5	8.9	0.2	6.9
11:00:00	45.3	12.9	7.7	46.6	3.8	9.6	0.1	8.7
11:01:00	40.7	13.1	7.7	46.4	4.1	9.4	0.9	7.2
11:02:00	45.5	13.1	7.7	46.5	3.3	9.4	0.5	5.9
11:03:00	42.6	12.9	7.7	46.2	3.0	9.4	0.5	4.5
11:04:00	43.6	12.8	7.6	46.1	3.2	9.8	0.5	4.5
11:05:00	45.8	12.2	7.5	45.7	3.7	9.5	0.6	4.5
11:06:00	49.3	12.6	7.5	45.8	3.5	9.3	0.5	4.5
11:07:00	46.5	13.5	7.7	46.3	4.6	9.1	0.6	4.5
11:08:00	50.9	13.4	7.8	46.6	2.7	8.9	0.1	6.3
11:09:00	49.5	13.5	7.7	46.7	4.8	9.3	0.2	7.6
11:10:00	44.3	13.7	7.8	46.9	2.7	8.9	0.5	8.7
11:11:00	43.9	13.4	7.8	46.9	3.8	9.2	0.5	8.7
11:12:00	34.4	13.2	7.8	47.0	2.3	8.9	0.5	8.7
11:13:00	30.6	12.8	7.1	46.5	3.1	9.7	0.5	6.3
11:14:00	28.8	12.8	7.0	46.2	2.9	9.3	0.5	5.3
11:15:00	36.9	13.1	7.6	46.5	4.1	9.5	0.6	5.3
11:16:00	40.3	13.2	7.6	46.6	4.4	9.1	0.3	5.3
11:17:00	51.9	13.3	7.6	46.6	3.6	9.5	0.1	6.9
11:18:00	47.4	13.1	7.6	46.6	6.1	9.3	1.3	6.9
11:19:00	52.8	13.4	7.7	46.8	3.0	9.1	0.5	6.9
11:20:00	50.3	13.5	7.7	47.0	3.3	9.3	0.5	6.9
11:21:00	46.3	13.3	7.7	46.7	3.3	9.7	0.5	5.6
11:22:00	41.2	13.2	7.2	46.2	4.3	9.5	0.5	5.6
11:23:00	44.2	13.4	7.3	46.5	3.7	9.3	0.5	5.6
11:24:00	47.8	13.2	7.6	46.8	4.7	9.5	0.5	5.6
11:25:00	53.8	12.8	7.6	46.9	2.5	9.3	0.0	5.6
11:26:00	55.5	12.8	7.3	46.7	6.0	9.7	0.2	4.5
11:27:00	61.6	13.0	7.3	46.6	3.3	9.3	0.5	4.5
11:28:00	67.3	13.0	7.6	46.7	4.6	9.5	0.5	4.5
11:29:00	58.6	12.6	7.6	46.5	2.9	9.3	0.4	4.5
11:30:00	59.2	12.6	7.2	46.1	4.5	9.9	0.5	4.5
11:31:00	57.2	12.5	7.2	45.8	4.3	9.5	0.5	4.5
11:32:00	62.6	12.7	7.5	46.3	3.9	9.5	0.5	4.5
11:33:00	57.6	12.9	7.6	46.5	5.1	9.3	0.3	4.5
11:34:00	64.8	12.9	7.6	46.6	4.4	9.7	0.1	5.7
11:35:00	63.6	12.4	7.6	46.4	4.8	9.3	0.8	5.7
12:56:00	65.6	9.4	6.9	45.7	5.8	9.6	0.5	3.7
12:57:00	73.0	9.0	7.2	46.1	8.0	9.6	0.5	3.7
12:58:00	79.2	9.1	7.5	46.4	11.0	9.2	0.5	3.7
12:59:00	98.4	9.8	7.6	46.8	4.1	9.2	0.1	6.2
13:00:00	88.8	9.3	7.6	46.6	8.0	9.4	0.1	6.2
13:01:00	72.6	8.6	7.7	46.7	3.7	9.0	0.4	7.2
13:02:00	70.5	8.6	7.7	46.9	6.6	9.4	0.4	7.2
13:03:00	66.1	8.9	7.7	46.9	2.7	9.2	0.4	7.2
13:04:00	60.4	9.1	7.3	46.4	4.5	9.7	0.5	5.8
13:05:00	56.2	8.6	7.3	46.3	3.8	9.5	0.5	4.4
13:06:00	60.9	8.6	7.6	46.4	6.7	9.7	0.5	4.4
13:07:00	72.9	9.0	7.5	46.6	7.4	9.3	0.2	4.4
13:08:00	86.1	9.1	7.3	46.4	5.4	9.7	0.0	4.4
13:09:00	78.7	8.6	7.0	46.2	7.6	9.3	0.8	4.4
13:10:00	80.4	8.9	7.3	46.6	5.0	9.3	0.4	5.5
13:11:00	76.5	8.7	7.6	46.8	5.5	9.3	0.4	5.5
13:12:00	69.2	9.0	7.3	46.4	4.2	9.8	0.5	5.5
13:13:00	57.6	9.2	7.2	46.2	6.1	9.4	0.5	5.5
13:14:00	54.4	9.1	7.6	46.7	4.8	9.4	0.5	5.5
13:15:00	54.1	8.8	7.6	46.7	6.8	9.4	0.5	5.5
13:16:00	62.3	8.6	7.7	46.7	3.2	9.4	0.0	5.5
13:17:00	63.7	8.5	7.3	46.6	6.0	9.6	0.1	5.5
13:18:00	64.0	8.6	7.3	46.4	3.3	9.2	0.4	5.5
13:19:00	72.1	9.0	7.6	46.6	5.4	9.6	0.4	5.5
13:20:00	69.8	8.8	7.6	46.6	3.4	9.4	0.4	4.4
13:21:00	73.8	8.7	6.9	46.2	5.9	10.1	0.4	3.1
13:22:00	70.0	8.3	6.6	46.0	5.8	9.5	0.5	3.1

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
13:23:00	85.8	8.3	7.2	46.4	8.8	9.5	0.4	3.1
13:24:00	94.7	8.6	7.6	46.7	11.8	9.3	0.3	5.9
13:25:00	108.4	8.5	7.6	46.8	8.8	9.7	0.1	5.9
13:26:00	96.5	8.4	7.6	46.6	9.2	9.1	1.0	5.9
13:27:00	96.3	8.3	7.7	46.9	5.6	9.1	0.4	8.1
13:28:00	81.0	8.4	7.7	47.0	7.3	9.3	0.5	8.1
13:29:00	79.7	8.1	7.3	46.3	5.4	10.0	0.6	6.1
13:30:00	73.3	8.0	6.9	46.0	6.2	9.6	0.5	4.6
13:31:00	72.8	7.9	7.2	46.2	3.4	9.6	0.5	4.6
13:32:00	68.3	7.6	7.2	46.3	9.1	9.6	0.5	4.6
13:33:00	77.0	7.4	7.3	46.5	4.6	9.4	0.0	4.6
13:34:00	85.0	7.7	7.5	46.5	9.2	9.6	0.3	4.6
13:35:00	78.7	7.8	7.6	46.6	4.2	9.2	0.4	6.2
13:36:00	71.4	7.6	7.7	46.8	3.9	9.4	0.4	6.2
13:37:00	56.7	7.3	7.7	46.8	3.6	9.2	0.4	6.2
13:38:00	49.8	7.4	7.3	46.4	4.1	9.9	0.7	6.2
13:39:00	44.3	7.9	7.2	46.2	3.3	9.5	0.5	5.0
13:40:00	45.0	8.0	7.2	46.4	3.9	9.9	0.5	5.0
13:41:00	44.6	7.8	7.2	46.3	5.4	9.5	0.4	5.0
13:42:00	54.3	7.8	7.5	46.2	4.1	9.7	0.1	5.0
13:43:00	51.5	8.1	7.2	46.2	5.9	9.5	1.2	5.0
13:44:00	52.3	8.1	7.3	46.4	2.8	9.3	0.5	5.0
13:45:00	52.3	7.9	7.3	46.4	7.0	9.7	0.4	5.0
13:46:00	60.2	7.5	7.2	46.3	4.2	9.8	0.4	3.5
13:47:00	60.9	7.6	6.9	46.1	5.9	9.6	0.4	3.5
13:48:00	55.3	8.2	7.3	46.5	3.7	9.2	0.5	5.1
13:49:00	51.1	8.3	7.6	46.5	5.5	9.4	0.5	5.1
13:50:00	49.1	8.2	7.7	46.7	3.1	9.2	0.0	6.3
13:51:00	42.4	8.3	7.6	46.7	5.1	9.6	0.1	7.4
13:52:00	39.5	8.6	7.6	46.5	2.7	9.2	0.3	7.4
13:53:00	40.3	8.6	7.6	46.6	3.0	9.6	0.4	6.4
13:54:00	34.4	8.4	7.6	46.5	3.0	9.4	0.4	5.0
13:55:00	40.3	8.5	7.2	45.9	4.4	10.1	0.4	5.0
13:56:00	45.6	8.6	6.9	45.8	5.2	9.7	0.4	3.5
13:57:00	64.3	8.7	6.9	46.2	6.3	9.9	0.4	3.5
13:58:00	82.0	8.8	7.5	46.5	9.4	9.3	0.4	3.5
13:59:00	97.6	8.7	7.5	46.7	5.8	9.7	0.1	5.2
14:00:00	82.6	8.6	7.6	46.5	6.7	9.3	1.0	5.2
14:01:00	73.9	8.6	7.6	46.7	4.4	9.3	0.4	5.2
14:02:00	63.5	8.5	7.6	46.9	5.0	9.5	0.4	5.2
14:03:00	56.2	8.9	7.3	46.4	3.1	10.0	0.4	5.2
14:04:00	49.7	8.6	6.9	46.2	4.6	9.8	0.5	5.2
14:05:00	46.2	8.5	7.2	46.1	3.2	9.5	0.4	3.9
14:06:00	48.7	8.3	7.2	46.1	5.2	9.9	0.5	3.9
14:07:00	60.7	7.8	6.9	46.3	3.3	9.5	0.0	3.9
14:08:00	70.7	8.3	6.9	46.0	5.3	10.1	0.1	2.8
14:09:00	66.7	8.1	6.8	45.9	4.0	9.5	0.7	2.8
14:10:00	69.7	8.1	7.2	46.4	4.0	9.7	0.4	2.8
14:11:00	61.6	8.2	7.2	46.4	5.2	9.5	0.4	2.8
14:12:00	61.8	8.1	6.9	46.1	4.3	10.1	0.4	2.8
14:13:00	60.0	8.4	6.8	46.0	4.9	9.7	0.4	2.8
14:14:00	57.6	8.5	7.2	46.2	4.5	9.7	0.4	4.5
14:15:00	44.8	8.3	7.5	46.4	3.7	9.5	0.4	5.9
14:16:00	46.1	8.2	7.5	46.4	3.8	10.1	0.0	5.9
14:17:00	46.4	7.9	6.8	45.9	4.7	9.7	0.9	4.5
14:18:00	50.4	7.9	6.8	46.0	3.2	9.5	0.4	3.4
14:19:00	51.7	8.0	6.9	46.2	3.9	9.9	0.5	3.4
14:20:00	54.3	7.5	6.8	45.9	3.7	10.2	0.4	3.4
14:21:00	56.3	7.6	6.8	45.5	3.9	10.0	0.5	3.4
14:22:00	62.1	7.7	6.6	45.6	3.5	9.8	0.5	2.4
14:23:00	65.5	7.8	6.6	45.6	5.2	10.0	0.5	2.4
14:24:00	70.9	7.7	6.6	45.8	3.7	9.6	0.0	2.4
14:25:00	80.5	7.6	6.6	46.1	5.5	10.2	0.1	2.4
14:26:00	80.1	7.7	6.6	45.9	5.1	9.8	0.5	2.4
14:27:00	81.7	7.4	6.6	45.9	5.0	9.8	0.5	2.4
14:28:00	71.9	7.3	6.6	46.0	4.6	9.6	0.5	2.4
14:29:00	66.0	7.0	6.9	45.8	3.9	10.3	0.5	2.4
14:30:00	51.0	7.3	6.6	45.5	3.9	9.8	0.4	2.4
14:31:00	49.5	7.2	6.6	45.8	4.4	9.6	0.4	3.6
14:32:00	45.1	6.9	7.2	46.2	5.0	9.4	0.4	4.8
14:33:00	47.3	7.2	7.6	46.4	3.3	9.7	0.1	6.1
14:34:00	38.3	7.2	7.3	46.3	3.5	9.4	0.3	6.1
14:35:00	34.0	6.7	7.6	46.3	2.6	9.2	0.4	6.1
14:36:00	33.2	6.8	7.5	46.4	3.8	9.7	0.5	5.0

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
14:37:00	36.4	7.2	7.2	46.1	3.0	9.7	0.4	3.9
14:38:00	36.9	7.3	6.9	45.8	3.6	9.9	0.4	3.9
14:39:00	37.8	7.6	7.2	45.8	3.6	9.5	0.4	3.9
14:40:00	42.6	7.9	7.5	46.1	4.6	9.5	0.5	3.9
14:41:00	44.4	8.0	7.6	46.6	3.3	9.1	0.0	5.3
14:42:00	40.2	7.8	7.6	46.6	4.5	9.5	0.0	6.9
14:43:00	34.1	7.8	7.6	46.5	3.8	9.1	0.4	6.9
14:44:00	35.5	8.2	7.7	46.9	3.3	9.3	0.4	8.5
14:45:00	32.5	8.4	7.7	47.0	3.0	9.1	0.4	8.5
14:46:00	31.0	7.8	7.4	46.5	3.1	9.9	0.4	6.7
14:47:00	29.2	7.6	7.0	46.1	3.1	9.4	0.4	5.4
14:48:00	30.2	7.8	7.2	46.1	3.2	9.7	0.4	5.4
14:49:00	32.8	7.9	7.3	46.3	3.2	9.4	0.4	5.4
14:50:00	37.6	7.7	7.4	46.6	3.0	9.7	0.0	5.4
14:51:00	38.9	7.7	7.3	46.2	3.9	9.7	0.1	5.4
14:52:00	40.1	8.1	7.2	46.2	2.5	9.2	0.5	5.4
14:53:00	39.5	8.0	7.5	46.5	3.2	9.7	0.4	5.4
14:54:00	37.6	7.5	7.2	46.2	2.5	9.5	0.4	4.2
14:55:00	41.4	7.7	6.9	45.9	3.3	10.0	0.5	4.2
14:56:00	41.9	7.9	6.9	45.8	2.8	9.6	0.5	4.2
Max	111.8	13.7	7.8	47.0	11.8	11.4	1.3	8.9
Min	18.7	6.7	5.9	43.8	2.3	8.9	0.0	1.9
Average	57.9	10.1	7.3	46.3	4.5	9.5	0.4	4.9

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
9:16:00	26.3	8.8	7.3	46.6	3.5	9.3	0.4	1.5
9:17:00	27.6	8.8	6.7	45.6	2.9	11.3	0.4	1.5
9:18:00	20.9	8.8	6.1	44.8	3.8	10.1	0.5	0.4
9:19:00	29.1	8.8	6.3	45.3	3.5	9.4	0.0	0.4
9:20:00	41.4	8.8	6.5	45.8	6.9	9.8	0.1	0.4
9:21:00	67.2	8.8	6.9	46.2	3.2	9.2	0.3	0.4
9:22:00	79.2	8.8	7.0	46.6	3.7	9.7	0.4	0.4
9:23:00	68.8	8.8	7.0	46.5	3.7	9.5	0.5	0.4
9:24:00	68.3	8.8	6.9	46.1	3.8	10.0	0.5	0.4
9:25:00	61.4	8.8	6.6	46.0	4.7	9.4	0.5	0.4
9:26:00	62.6	8.8	7.3	46.6	5.7	9.4	0.6	0.4
9:27:00	69.6	8.8	7.9	46.9	6.0	8.6	0.4	2.3
9:28:00	79.4	8.8	7.9	47.2	3.9	9.3	0.0	2.3
9:29:00	56.8	8.8	7.7	47.0	4.3	8.9	0.8	2.3
9:30:00	47.6	8.8	7.8	47.2	2.8	9.0	0.4	2.3
9:31:00	36.5	8.8	7.8	47.3	3.3	9.1	0.4	2.3
9:32:00	32.7	8.8	7.8	47.2	2.8	9.7	0.5	2.3
9:33:00	33.0	8.8	7.0	46.5	3.7	9.5	0.4	1.2
9:34:00	41.8	8.8	7.3	46.6	3.1	9.3	0.5	1.2
9:35:00	43.2	8.8	7.6	46.6	4.8	9.3	0.5	1.2
9:36:00	43.8	8.8	7.7	47.1	3.9	8.8	0.0	1.2
9:37:00	46.0	8.8	7.8	47.1	5.6	9.3	0.0	2.3
9:38:00	34.2	8.8	7.7	47.1	4.6	8.8	0.5	2.3
9:39:00	35.2	8.8	7.8	47.4	3.5	9.3	0.5	2.3
9:40:00	30.9	8.8	7.8	47.4	3.3	8.9	0.5	2.3
9:41:00	28.0	8.8	7.3	46.8	3.7	9.9	0.5	2.3
9:42:00	26.7	8.8	7.3	46.5	3.9	9.3	0.5	1.2
9:43:00	29.4	8.8	7.6	46.8	3.8	9.4	0.6	1.2
9:44:00	34.0	8.8	7.7	47.1	5.6	8.9	0.6	1.2
9:45:00	39.3	8.8	7.7	47.1	4.3	9.5	0.1	1.2
9:46:00	37.9	8.8	7.7	46.9	6.4	9.1	0.4	1.2
9:47:00	36.9	8.8	7.8	47.1	3.7	9.0	0.4	1.2
9:48:00	31.5	8.8	7.8	47.3	4.4	9.0	0.5	2.3
9:49:00	27.1	8.8	7.8	47.3	4.2	9.1	0.5	2.3
9:50:00	25.8	8.8	7.7	46.9	4.8	9.2	0.6	2.3
9:51:00	23.8	8.8	7.8	47.0	4.3	8.7	0.5	2.3
9:52:00	23.5	8.8	7.9	47.3	4.7	8.8	0.5	3.7
9:53:00	23.9	8.8	8.0	47.8	3.8	8.4	0.5	5.6
9:54:00	29.3	8.8	8.0	47.7	4.8	9.3	0.5	5.6
9:55:00	31.5	8.8	7.7	47.5	3.9	9.0	0.5	3.1
9:56:00	44.9	8.8	7.4	47.6	3.6	9.7	0.5	1.4
9:57:00	43.9	8.8	7.3	47.4	4.1	9.2	0.5	1.4
9:58:00	44.7	8.8	7.2	46.7	3.8	10.0	0.5	0.3
9:59:00	40.6	8.8	6.9	46.4	4.6	9.3	0.5	0.3
10:00:00	37.6	8.8	7.3	46.7	4.3	9.4	0.5	0.3
10:01:00	34.4	8.8	7.6	46.9	5.1	9.0	0.5	0.3
10:02:00	43.5	8.8	7.7	47.3	3.7	9.3	0.1	1.5
10:03:00	41.5	8.8	7.6	47.0	6.6	9.1	0.1	1.5
10:04:00	38.1	8.8	7.7	47.1	3.7	8.9	0.6	1.5
10:05:00	35.7	8.8	7.8	47.4	4.8	9.2	0.5	1.5
10:06:00	31.1	8.8	7.8	47.3	3.3	9.0	0.5	1.5
10:07:00	28.7	8.8	7.0	46.7	4.0	9.5	0.6	1.5
10:08:00	26.6	8.8	7.3	46.6	3.1	9.1	0.5	1.5
10:09:00	26.6	8.8	7.6	46.6	4.6	9.4	0.6	1.5
10:10:00	31.9	8.8	7.6	46.9	3.7	9.0	0.1	1.5
10:11:00	38.1	8.8	7.6	47.0	4.5	9.7	0.1	1.5
10:12:00	33.6	8.8	7.5	46.7	4.6	9.1	0.6	1.5
10:13:00	36.7	8.8	7.6	47.0	4.6	9.4	0.5	1.5
10:14:00	36.6	8.8	7.7	47.1	4.1	9.1	0.5	1.5
10:15:00	41.6	8.8	7.4	46.9	4.6	9.9	0.5	1.5
10:16:00	39.4	8.8	7.0	46.6	4.5	9.3	0.6	1.5
10:17:00	41.5	8.8	7.3	46.9	3.9	9.3	0.5	1.5
10:18:00	44.6	8.8	7.7	47.3	5.3	9.0	0.6	1.5
10:19:00	48.3	8.8	7.7	47.3	3.6	9.3	0.1	1.5
10:20:00	43.8	8.8	7.4	46.9	4.6	9.3	0.1	1.5
10:21:00	42.3	8.8	7.3	47.0	3.3	9.1	0.5	1.5
10:22:00	42.1	8.8	7.6	47.1	3.8	9.4	0.5	1.5
10:23:00	37.7	8.8	7.6	46.9	3.6	9.1	0.5	1.5
10:24:00	39.9	8.8	7.0	46.5	4.7	9.6	0.6	1.5
10:25:00	40.2	8.8	7.3	46.8	3.5	9.0	0.5	1.5
10:26:00	40.1	8.8	7.7	47.0	5.3	9.2	0.5	1.5
10:27:00	35.8	8.8	7.8	47.3	4.1	8.6	0.2	1.5
10:28:00	38.2	8.8	7.8	47.4	3.0	9.4	0.2	3.3
10:29:00	28.2	8.8	7.8	47.1	3.4	8.9	0.8	3.3

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Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
10:30:00	27.8	8.8	7.7	47.2	3.2	9.3	0.5	2.1
10:31:00	28.6	8.8	7.7	47.1	3.6	9.1	0.5	2.1
10:32:00	31.6	8.8	7.3	46.8	3.8	9.9	0.6	2.1
10:33:00	30.2	8.8	7.3	46.6	4.4	9.3	0.5	0.9
10:34:00	30.2	8.8	7.6	46.7	3.5	9.3	0.6	0.9
10:35:00	28.3	8.8	7.7	46.9	5.0	9.0	0.6	0.9
10:36:00	29.6	8.8	7.7	47.1	3.4	9.0	0.1	2.3
10:37:00	31.5	8.8	7.7	47.0	4.4	9.3	0.2	2.3
10:38:00	31.9	8.8	7.7	47.0	3.0	8.9	0.5	2.3
10:39:00	38.0	8.8	7.8	47.4	3.8	9.1	0.5	2.3
10:40:00	30.8	8.8	7.7	47.3	2.5	8.9	0.5	2.3
10:41:00	31.0	8.8	7.6	47.0	3.7	9.5	0.6	2.3
10:42:00	29.2	8.8	7.6	46.9	3.1	9.0	0.5	2.3
10:43:00	29.6	8.8	7.6	47.0	4.5	9.4	0.6	2.3
10:44:00	29.4	8.8	7.7	47.2	4.6	9.0	0.3	2.3
10:45:00	39.9	8.8	7.7	47.2	4.6	9.7	0.2	2.3
10:46:00	38.0	8.8	7.6	46.7	4.4	9.2	1.2	2.3
10:47:00	35.9	8.8	7.7	47.1	4.0	9.2	0.5	2.3
10:48:00	33.5	8.8	7.7	47.2	4.7	9.0	0.5	2.3
10:49:00	29.7	8.8	7.7	47.1	3.6	9.6	0.5	2.3
10:50:00	25.9	8.8	7.6	46.9	4.2	9.2	0.5	2.3
10:51:00	23.0	8.8	7.7	46.9	3.7	9.2	0.5	2.3
10:52:00	25.0	8.8	7.8	47.2	4.4	8.9	0.5	2.3
10:53:00	26.9	8.8	7.8	47.4	3.2	8.9	0.0	2.3
10:54:00	28.7	8.8	7.7	47.1	4.2	9.4	0.1	2.3
10:55:00	30.3	8.8	7.7	47.0	3.3	9.1	0.5	2.3
10:56:00	34.3	8.8	7.7	47.1	4.8	9.4	0.5	2.3
10:57:00	30.4	8.8	7.7	47.1	3.9	9.0	0.5	1.2
10:58:00	29.7	8.8	7.3	46.9	4.1	9.6	0.6	1.2
10:59:00	27.0	8.8	7.3	46.8	3.7	9.1	0.5	1.2
11:00:00	28.3	8.8	7.6	47.0	4.0	9.5	0.5	1.2
11:01:00	27.4	8.8	7.7	47.1	3.9	8.9	0.4	1.2
11:02:00	29.7	8.8	7.7	47.2	3.7	9.6	0.2	1.2
11:03:00	28.5	8.8	7.6	46.9	3.6	9.1	0.9	1.2
11:04:00	28.8	8.8	7.7	47.1	3.6	9.2	0.4	1.2
11:05:00	26.5	8.8	7.6	47.0	4.6	9.3	0.5	1.2
11:06:00	27.1	8.8	7.3	46.6	4.2	10.0	0.5	1.2
11:07:00	27.2	8.8	7.0	46.4	4.8	9.4	0.4	1.2
11:08:00	31.8	8.8	7.3	46.6	6.2	9.4	0.4	1.2
11:09:00	38.0	8.8	7.6	46.7	9.0	9.4	0.5	1.2
11:10:00	41.9	8.8	7.6	46.8	6.2	9.0	0.0	1.2
11:11:00	41.1	8.8	7.6	46.8	8.3	9.4	0.1	1.2
11:12:00	33.7	8.8	7.7	46.8	7.5	8.8	0.5	1.2
11:13:00	31.7	8.8	7.8	47.3	7.4	9.2	0.5	1.2
11:14:00	27.2	8.8	7.8	47.5	6.3	8.9	0.5	1.2
11:15:00	27.8	8.8	7.7	47.2	6.1	9.6	0.4	1.2
11:16:00	24.3	8.8	7.6	46.8	5.9	9.0	0.4	1.2
12:13:00	55.0	0.2	7.7	47.2	5.5	9.2	0.5	1.8
12:14:00	45.3	0.2	7.7	46.9	4.1	9.1	0.5	1.8
12:15:00	43.1	0.2	7.4	46.6	5.3	9.6	0.5	1.8
12:16:00	38.6	0.9	7.2	46.2	4.8	9.3	0.5	1.8
12:17:00	47.5	0.6	7.5	46.5	7.8	9.6	0.5	1.8
12:18:00	53.9	0.6	7.6	46.6	5.7	9.1	0.0	1.8
12:19:00	65.5	0.4	7.3	46.6	6.9	9.8	0.0	1.8
12:20:00	59.0	0.4	7.3	46.5	7.1	9.2	0.6	1.8
12:21:00	64.2	0.5	7.6	46.7	5.9	9.6	0.4	1.8
12:22:00	64.5	0.1	7.6	46.7	6.0	9.3	0.4	0.7
12:23:00	68.6	0.1	7.3	46.5	6.4	10.2	0.5	0.7
12:24:00	67.1	0.5	6.6	46.0	6.8	9.5	0.5	0.7
12:25:00	73.3	0.8	6.7	46.2	7.9	9.7	0.6	0.7
12:26:00	89.3	0.5	7.0	46.7	11.6	9.3	0.5	0.7
12:27:00	120.6	0.0	7.6	46.8	7.8	9.4	0.0	0.7
12:28:00	113.3	0.0	7.6	46.7	8.4	9.2	0.0	0.7
12:29:00	82.5	0.0	7.8	47.1	4.5	8.9	0.4	2.0
12:30:00	69.3	0.0	7.8	47.2	5.5	9.3	0.5	2.0
12:31:00	49.5	0.1	7.7	47.0	4.1	8.9	0.4	2.0
12:32:00	50.1	0.1	7.3	46.8	5.6	9.5	0.5	2.0
12:33:00	46.1	0.1	7.3	46.7	5.9	9.1	0.5	2.0
12:34:00	48.3	0.1	7.7	47.1	7.3	9.4	0.5	2.0
12:35:00	48.2	0.1	7.8	47.3	6.6	8.9	0.2	2.0
12:36:00	52.5	0.1	7.8	47.1	6.2	9.5	0.0	2.0
12:37:00	46.0	0.1	7.7	47.0	5.9	8.9	0.7	2.0
12:38:00	45.1	0.1	7.8	47.3	6.1	9.3	0.4	2.0
12:39:00	39.0	0.1	7.7	46.9	5.0	9.2	0.5	2.0

Test No. 3 - September 27, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
12:40:00	39.6	0.1	7.3	46.6	6.5	10.0	0.4	2.0
12:41:00	39.5	0.1	6.9	46.0	5.9	9.5	0.4	2.0
12:42:00	43.5	0.1	7.3	46.2	5.8	9.4	0.4	2.0
12:43:00	47.4	0.0	7.6	46.7	6.6	9.2	0.4	2.0
12:44:00	49.8	0.0	7.7	46.9	5.9	9.2	0.0	2.0
12:45:00	47.1	0.2	7.7	46.7	6.7	9.3	0.2	2.0
12:46:00	44.3	0.1	7.7	46.9	4.5	9.0	0.4	2.0
12:47:00	44.6	0.4	7.7	46.9	5.2	9.3	0.5	2.0
12:48:00	38.6	0.0	7.7	46.9	4.0	8.9	0.4	2.0
12:49:00	38.6	0.0	7.6	46.6	5.3	9.6	0.5	2.0
12:50:00	33.9	0.3	7.6	46.2	5.4	9.1	0.4	2.0
12:51:00	36.4	0.2	7.8	46.8	6.5	9.3	0.5	2.0
12:52:00	34.6	0.4	7.9	47.2	6.8	8.7	0.2	2.0
12:53:00	38.3	0.8	7.9	47.4	5.8	9.4	0.0	3.6
12:54:00	34.0	0.3	7.8	47.2	7.2	8.8	1.0	3.6
12:55:00	36.2	0.3	8.0	47.4	4.3	8.8	0.4	4.9
12:56:00	31.8	0.2	8.0	47.5	4.1	8.9	0.5	3.9
12:57:00	29.2	0.4	7.9	47.3	4.0	9.7	0.8	3.9
12:58:00	25.8	0.2	7.6	46.6	4.6	9.2	0.4	2.4
12:59:00	26.7	0.2	7.7	46.7	3.6	9.3	0.4	2.4
13:00:00	29.8	0.3	7.7	46.8	4.7	9.3	0.5	2.4
13:01:00	35.9	0.3	7.6	46.8	3.7	9.1	0.0	1.4
13:02:00	38.0	0.3	7.5	46.7	5.2	9.4	0.0	1.4
13:03:00	41.9	0.5	7.6	46.9	4.2	8.9	0.4	1.4
13:04:00	43.9	0.7	7.7	47.1	5.4	9.2	0.6	1.4
13:05:00	36.1	0.5	7.8	47.2	5.3	8.9	0.5	1.4
13:06:00	36.1	0.2	7.6	47.0	5.7	9.6	0.5	1.4
13:07:00	34.4	0.3	7.6	46.6	5.3	9.1	0.5	1.4
13:08:00	39.0	0.4	7.7	47.0	5.4	9.5	0.5	1.4
13:09:00	40.0	0.3	7.7	47.1	7.3	9.1	0.3	1.4
13:10:00	47.1	0.5	7.4	46.7	6.2	9.8	0.0	1.4
13:11:00	45.0	0.5	7.3	46.5	5.9	9.3	0.7	1.4
13:12:00	44.7	0.3	7.6	46.8	4.5	9.2	0.4	1.4
13:13:00	39.9	0.2	7.6	46.9	6.0	9.3	0.4	1.4
13:14:00	42.9	0.1	7.6	46.7	5.7	9.9	0.4	1.4
13:15:00	50.8	0.3	7.2	46.4	6.3	9.4	0.4	1.4
13:16:00	53.8	0.0	7.3	46.5	5.9	9.3	0.4	1.4
13:17:00	50.7	0.0	7.7	46.8	7.5	9.1	0.4	1.4
13:18:00	47.3	0.0	7.7	47.1	5.3	8.8	0.0	1.4
13:19:00	45.0	0.0	7.8	47.3	7.0	9.3	0.1	1.4
13:20:00	39.8	0.0	7.7	47.2	4.5	9.0	0.4	1.4
13:21:00	41.5	0.0	7.7	47.1	6.6	9.5	0.6	1.4
13:22:00	39.1	0.4	7.7	46.9	5.4	9.1	0.4	1.4
13:23:00	39.6	0.0	7.0	46.4	6.2	9.8	0.5	1.4
13:24:00	35.3	0.0	7.0	46.3	7.1	9.1	0.4	1.4
13:25:00	40.1	0.0	7.7	46.6	5.6	9.5	0.5	1.4
13:26:00	40.0	0.0	7.7	46.8	7.7	8.9	0.5	1.4
13:27:00	48.1	0.0	7.8	47.2	6.6	9.4	0.0	2.5
13:28:00	41.3	0.2	7.8	47.2	6.5	8.9	0.8	2.5
13:29:00	38.6	0.2	7.9	47.4	5.2	8.9	0.5	2.5
13:30:00	31.3	0.0	7.9	47.3	9.2	9.1	0.5	2.5
13:31:00	32.0	0.0	7.8	47.2	6.0	9.5	0.4	2.5
13:32:00	31.0	0.0	7.6	46.7	5.5	9.3	0.4	2.5
13:33:00	27.6	0.0	7.6	46.5	4.3	9.3	0.4	2.5
13:34:00	31.3	0.0	7.6	46.6	6.9	9.4	0.4	1.4
13:35:00	39.7	0.0	7.6	46.9	4.7	9.1	0.0	1.4
13:36:00	41.6	0.0	7.3	46.7	7.0	9.6	0.0	1.4
13:37:00	48.4	0.0	7.3	46.7	6.3	9.3	0.5	1.4
13:38:00	55.1	0.0	7.3	46.8	7.0	9.6	0.4	1.4
13:39:00	50.8	0.0	7.3	46.8	5.1	9.2	0.4	1.4
13:40:00	54.2	0.1	7.3	46.6	6.2	10.0	0.4	1.4
13:41:00	50.6	0.1	6.9	46.2	5.8	9.3	0.4	1.4
13:42:00	54.5	0.1	7.5	46.8	6.7	9.6	0.4	1.4
13:43:00	52.8	0.1	7.6	47.0	6.7	9.1	0.4	1.4
13:44:00	56.5	0.1	7.7	47.1	6.3	9.7	0.0	1.4
13:45:00	55.6	0.1	7.3	46.9	5.9	9.4	0.5	1.4
13:46:00	63.9	0.1	7.3	46.8	5.0	9.5	0.3	1.4
13:47:00	63.1	0.1	7.3	46.7	5.7	9.5	0.4	0.3
13:48:00	63.9	0.1	7.0	46.6	5.1	9.9	0.4	0.3
13:49:00	68.8	0.1	6.6	45.9	6.2	9.8	0.4	0.3
13:50:00	75.5	0.1	6.6	45.8	5.8	9.5	0.4	0.3
13:51:00	88.5	0.1	6.7	46.4	9.9	9.5	0.5	0.3
13:52:00	91.4	0.1	7.4	46.8	4.5	8.8	0.0	0.3
13:53:00	84.3	0.1	7.7	46.8	8.7	9.4	0.1	0.3

Test No. 3 - September 27, 2018
CEM Analyzers

Time	CO ppm	HCl ppm	CO2 %	H2O %	THC ppm	O2 %	Opacity %	SO2 ppm
13:54:00	57.4	0.1	7.7	46.9	7.1	8.8	0.4	1.7
13:55:00	60.3	0.1	7.8	47.2	5.6	9.3	0.5	1.7
13:56:00	48.5	0.1	7.8	47.1	5.3	9.0	0.5	1.7
13:57:00	46.5	0.1	7.4	46.6	6.1	10.0	0.5	1.7
13:58:00	44.5	0.1	7.2	46.4	6.3	9.3	0.4	1.7
13:59:00	45.6	0.1	7.6	46.5	6.5	9.6	0.5	0.7
14:00:00	46.4	0.1	7.6	46.5	7.1	9.2	0.5	0.7
14:01:00	59.7	0.1	7.6	46.6	5.7	9.6	0.0	0.7
14:02:00	60.9	0.1	7.6	46.5	6.7	9.3	0.3	0.7
14:03:00	60.6	0.1	7.7	46.7	4.5	9.2	0.5	0.7
14:04:00	52.4	0.1	7.8	47.0	5.7	9.1	0.5	0.7
14:05:00	49.1	0.1	7.7	47.1	4.5	9.3	0.5	0.7
14:06:00	43.2	0.1	7.7	46.7	5.5	9.4	0.5	0.7
14:07:00	38.4	0.1	7.6	46.7	5.1	9.0	0.5	0.7
14:08:00	36.6	0.1	7.7	47.1	5.8	9.3	0.5	0.7
14:09:00	34.7	0.1	7.7	47.0	5.1	8.9	0.0	0.7
14:10:00	37.3	0.1	7.7	46.8	4.9	9.6	0.0	0.7
14:11:00	34.6	0.1	7.6	46.6	5.5	9.1	0.5	0.7
14:12:00	36.0	0.1	7.7	46.9	5.0	9.5	0.5	0.7
14:13:00	36.4	0.1	7.7	46.8	4.4	9.2	0.5	0.7
14:14:00	38.7	0.1	7.6	46.6	6.4	10.0	0.5	0.7
14:15:00	38.9	0.1	7.2	46.2	5.2	9.2	0.5	0.7
14:16:00	42.7	0.1	7.6	46.8	5.2	9.4	0.5	0.7
Max	120.6	8.8	8.0	47.8	11.6	11.3	1.2	5.6
Min	20.9	0.0	6.1	44.8	2.5	8.4	0.0	0.3
Average	42.4	4.4	7.5	46.8	5.1	9.3	0.4	1.6

APPENDIX 29

Clean Harbors One-Minute Average
Process Data
(15 pages)

Test No. 1 - September 25, 2018

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
10:45:00	29.6	12.1	180.1	193.3	16.6	292.7	24.9	21972	13506	96500	1381.1	489.2	484.7	183.0	173.6	-27.5	-55.5	-101.6	258.1
10:46:00	30.0	12.9	179.8	193.3	15.9	292.8	25.6	22235	13663	94102	1390.0	496.1	485.0	183.0	173.6	-28.4	-54.8	-111.3	278.1
10:47:00	30.2	12.7	180.2	197.8	16.7	289.4	25.7	21709	13556	94818	1395.5	508.0	485.3	183.0	173.6	-20.5	-43.1	-93.6	283.5
10:48:00	29.8	12.1	179.6	194.0	16.7	294.7	25.0	21875	13579	100561	1402.8	525.8	485.5	183.0	174.7	-45.5	-78.7	-120.1	238.3
10:49:00	30.1	13.1	180.4	195.7	16.4	287.7	24.7	21702	13483	95480	1401.6	530.3	485.5	183.0	174.7	-22.6	-50.1	-93.6	282.0
10:50:00	30.5	12.7	179.9	193.2	16.5	295.1	24.6	21709	13360	99665	1405.4	534.4	485.9	183.0	174.7	-38.6	-69.5	-104.6	235.9
10:51:00	29.7	13.0	180.2	191.7	15.5	293.5	24.9	21875	13506	94698	1400.0	534.0	486.0	183.5	174.7	-27.2	-53.1	-97.2	274.3
10:52:00	29.6	12.5	179.5	189.6	16.2	290.8	25.7	21882	13517	94898	1401.8	525.0	486.3	184.0	174.7	-24.2	-49.9	-93.8	280.3
10:53:00	29.7	12.3	175.1	191.6	15.1	285.0	25.6	22062	13489	96245	1395.4	511.0	486.6	184.5	174.7	-33.8	-58.2	-104.2	262.4
10:54:00	29.7	12.1	178.0	190.6	16.0	295.1	24.5	21882	13494	95356	1397.6	500.6	486.6	184.5	174.7	-25.5	-49.7	-95.7	265.9
10:55:00	29.0	11.7	179.0	189.2	16.2	297.2	24.5	21972	13382	94487	1393.8	495.5	486.8	185.0	174.7	-24.6	-52.2	-93.6	284.3
10:56:00	29.1	12.1	178.5	191.3	16.1	295.5	25.7	21792	13466	93817	1396.0	498.5	486.7	185.0	174.7	-20.3	-45.5	-88.7	288.6
10:57:00	29.5	12.8	180.0	191.8	16.1	287.6	25.1	21972	13500	95002	1395.4	501.5	486.8	185.0	175.7	-26.7	-52.6	-95.9	282.8
10:58:00	29.8	12.7	179.9	193.7	16.2	290.0	24.7	21792	13500	92539	1401.6	497.6	486.6	184.5	175.7	-19.8	-43.2	-87.7	286.6
10:59:00	30.2	12.0	179.8	193.0	16.2	291.3	25.5	22145	13787	95495	1401.5	505.6	486.7	184.0	175.7	-30.7	-58.2	-104.3	274.0
11:00:00	30.0	12.7	179.9	195.0	16.2	289.0	24.8	21972	13427	93771	1401.8	500.0	486.6	184.5	175.7	-22.7	-49.0	-98.7	276.1
11:01:00	29.7	12.4	178.8	194.4	16.0	290.5	25.8	22325	13803	95869	1401.6	505.4	486.9	184.5	175.7	-33.6	-62.1	-117.5	259.4
11:02:00	29.7	13.4	180.3	194.9	16.0	284.3	24.8	22145	13534	94381	1401.8	498.6	486.7	184.5	175.7	-23.6	-49.7	-102.7	258.9
11:03:00	29.3	12.0	179.4	190.3	16.0	281.9	25.4	22497	13545	97688	1404.0	500.7	487.0	184.5	175.7	-43.3	-72.9	-127.0	259.8
11:04:00	29.0	12.1	179.5	191.4	16.1	284.4	25.1	21972	13449	94367	1401.3	491.0	486.8	184.5	175.7	-20.8	-44.8	-97.8	284.7
11:05:00	29.2	12.0	181.0	191.4	16.1	277.4	24.5	22152	13562	98081	1403.8	494.7	486.8	184.0	175.7	-42.0	-72.7	-120.1	238.6
11:06:00	29.6	12.6	180.1	191.8	15.9	267.5	24.5	21792	13596	93809	1399.6	486.1	486.8	184.5	175.7	-23.0	-47.5	-99.2	282.8
11:07:00	29.5	12.4	179.9	189.6	15.9	277.4	26.0	21613	13449	94028	1404.9	488.3	486.6	184.5	175.7	-18.8	-45.7	-94.5	279.1
11:08:00	29.6	11.7	179.9	189.2	15.3	271.5	25.3	21979	13573	94332	1398.9	483.8	486.8	185.0	175.7	-27.6	-52.1	-106.3	272.1
11:09:00	29.8	12.6	180.8	192.9	15.9	281.8	25.3	21702	13545	94726	1398.4	478.5	486.8	185.5	175.7	-21.6	-48.0	-100.2	276.9
11:10:00	29.6	12.1	180.8	193.2	15.9	284.8	25.8	21972	13562	96836	1396.3	480.3	486.8	185.5	175.7	-29.6	-56.8	-108.6	255.1
11:11:00	30.4	12.6	181.1	196.2	17.1	286.5	24.5	22504	13562	95494	1402.0	481.1	487.0	185.5	175.7	-23.6	-50.0	-108.0	259.9
11:12:00	30.1	12.7	180.2	193.3	16.5	284.6	25.2	22504	13567	96422	1403.1	489.0	486.9	185.5	175.7	-23.4	-50.0	-106.6	278.3
11:13:00	30.1	12.5	180.5	195.7	16.5	279.4	24.7	22767	13332	92967	1411.1	497.2	487.1	185.0	175.7	-19.4	-45.7	-96.8	285.3
11:14:00	30.1	13.3	179.9	194.4	16.5	272.0	25.7	22587	13730	95702	1410.1	506.7	487.1	184.5	174.6	-26.0	-54.1	-109.0	279.8
11:15:00	30.3	12.2	180.0	193.9	16.2	266.3	24.8	21702	13438	95267	1411.5	507.0	486.9	184.5	174.6	-20.0	-45.5	-103.5	285.8
11:16:00	29.7	12.4	179.9	189.9	16.6	277.1	25.8	22145	13584	95893	1410.9	510.3	487.1	184.0	173.6	-33.9	-62.7	-119.8	272.9
11:17:00	29.8	12.5	179.3	191.7	16.2	270.8	24.5	21965	13579	94853	1403.5	491.1	486.9	184.5	173.6	-26.8	-51.8	-111.5	276.5
11:18:00	30.3	13.4	179.4	189.1	15.2	282.1	25.6	22152	13584	95637	1403.6	483.7	486.8	184.5	173.6	-42.4	-67.5	-134.4	252.4
11:19:00	30.4	12.9	179.8	192.2	16.2	283.1	24.8	21972	13455	95054	1402.0	473.2	487.1	185.0	173.6	-26.3	-53.7	-105.7	256.8
11:20:00	30.1	12.8	179.2	186.6	15.2	288.4	25.7	21972	13539	98026	1406.0	475.7	487.1	185.0	173.6	-47.1	-76.9	-140.2	243.0
11:21:00	30.6	12.5	180.8	193.0	16.0	292.3	25.8	21792	13416	94983	1408.3	476.1	487.4	185.5	173.6	-19.4	-47.3	-109.7	280.4
11:22:00	30.8	12.3	180.3	195.4	16.0	293.9	25.8	21709	13399	99651	1419.4	489.8	487.5	185.0	173.6	-35.3	-68.3	-126.5	235.4
11:23:00	30.9	12.4	180.9	194.6	16.2	292.7	25.4	21875	13410	96342	1419.0	494.9	487.8	185.0	173.6	-19.9	-44.8	-117.2	279.8
11:24:00	30.7	12.4	180.3	193.1	16.2	300.2	25.8	21799	13399	95288	1425.0	501.8	488.0	185.0	173.6	-18.8	-44.8	-108.0	288.6
11:25:00	30.1	12.1	180.8	193.2	16.2	291.6	25.0	22062	13332	93953	1417.8	506.3	488.3	185.0	173.6	-25.0	-52.1	-118.3	270.4
11:26:00	30.8	13.3	180.1	196.0	16.4	243.5	25.7	22145	13332	94049	1416.8	501.0	488.7	185.0	174.7	-25.0	-52.6	-117.7	279.4
11:27:00	29.8	12.4	179.8	191.5	16.3	279.8	24.9	22145	13354	95492	1413.1	495.0	488.9	185.0	174.7	-27.5	-55.2	-127.4	255.8
11:28:00	30.0	12.2	179.6	192.6	17.3	277.2	25.3	21792	13466	95179	1410.5	482.7	488.8	185.0	174.7	-24.3	-50.2	-123.0	262.7
11:29:00	29.7	11.5	179.6	188.2	15.0	284.4	25.8	22062	13376	94797	1404.1	473.1	489.1	185.0	174.7	-23.3	-48.3	-118.5	282.1
11:30:00	29.6	12.2	180.3	192.6	16.0	283.6	25.9	21875	13371	95374	1406.5	465.6	489.1	185.5	174.7	-20.6	-47.3	-113.2	288.6
11:31:00	29.7	11.9	180.0	189.0	16.0	287.6	25.8	22325	13511	96616	1403.6	468.4	489.1	185.5	174.7	-27.3	-53.8	-127.0	283.8
11:32:00	30.3	12.6	180.5	189.6	15.8	291.4	25.4	21792	13376	94751	1406.3	460.4	489.3	185.5	174.7	-19.9	-46.9	-117.0	286.6
11:33:00	30.2	12.2	179.9	192.3	15.8	283.1	25.5	22235	13500	94020	1407.5	467.0	489.1	185.5	174.7	-31.6	-59.3	-134.5	273.1
11:34:00	30.6	12.6	180.8	193.5	16.6	291.2	25.8	21530	13382	95020	1406.3	463.7	489.5	186.0	174.7	-24.2	-51.6	-119.6	274.6
11:35:00	30.4	13.0	179.5	193.8	16.6	283.3	25.0	22152	13494	97908	1413.0	466.4	489.6	186.0	175.7	-43.7	-73.9	-128.1	236.8
11:36:00	30.0	12.3	179.8	193.6	16.7	273.7	25.4	23914	13354	95262	1409.6	462.9	489.9	186.5	175.7	-23.4	-50.8	-103.5	258.3

Test No. 1 - September 25, 2018

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
11:37:00	29.8	11.8	179.4	189.5	15.4	276.0	25.8	22242	13410	98850	1410.9	463.4	490.1	186.5	175.7	-40.6	-71.2	-122.9	242.1
11:38:00	29.7	12.7	180.5	189.4	15.7	264.6	25.9	21709	13376	94698	1407.1	455.3	490.1	186.5	175.7	-18.6	-44.5	-99.8	284.8
11:39:00	29.9	11.9	179.4	189.8	15.6	270.8	25.0	21530	13376	94687	1408.6	455.8	490.0	186.5	175.7	-18.9	-44.2	-98.1	272.9
11:40:00	29.6	12.2	180.4	190.4	15.6	267.5	25.7	21882	13399	94099	1404.0	452.7	490.2	186.5	175.7	-23.1	-47.4	-101.1	282.8
11:41:00	29.6	12.9	181.5	190.4	16.0	271.7	24.6	21882	13410	94789	1405.3	452.1	490.0	186.5	175.7	-18.7	-46.7	-95.3	289.9
11:42:00	30.1	12.5	180.8	193.5	16.7	264.6	25.7	22062	13641	95020	1402.9	446.7	490.1	186.5	175.7	-26.0	-52.1	-105.4	272.1
11:43:00	30.2	12.6	180.5	195.1	16.7	271.4	25.8	22055	13376	92376	1406.3	443.5	490.1	186.5	175.7	-22.6	-49.9	-96.7	277.0
11:44:00	29.6	13.0	180.5	193.8	16.4	269.4	25.8	21972	13601	95567	1406.3	450.5	490.0	186.5	175.7	-28.6	-54.5	-106.0	255.3
11:45:00	29.9	12.8	180.4	195.8	16.4	272.7	25.9	21620	13421	96853	1406.8	445.6	490.1	186.0	175.7	-23.0	-50.3	-97.1	261.4
11:46:00	30.0	12.9	180.9	195.3	16.4	275.4	25.4	21709	13421	93854	1402.8	448.3	490.2	186.0	175.7	-22.0	-50.0	-97.6	279.9
11:47:00	30.1	13.1	180.3	195.9	17.1	282.0	25.8	21882	13455	93929	1409.1	450.2	490.3	185.5	175.7	-17.8	-42.9	-88.9	282.6
11:48:00	29.5	12.6	180.0	191.8	15.9	285.5	24.9	22235	13545	96086	1408.6	462.4	490.1	184.5	175.7	-24.7	-52.6	-101.4	282.5
11:49:00	29.5	11.8	180.1	192.1	15.8	284.5	24.7	21882	13343	94628	1403.9	455.0	489.9	184.5	174.6	-20.7	-43.4	-96.6	288.8
11:50:00	29.4	11.7	179.0	188.2	15.8	288.8	25.9	22152	13579	96032	1403.5	453.8	489.8	184.5	174.6	-36.3	-61.6	-116.9	273.8
11:51:00	29.7	12.9	179.4	193.1	16.3	285.9	25.8	21882	13461	94874	1398.4	441.6	489.8	185.0	174.6	-25.2	-51.1	-95.8	276.8
11:52:00	29.4	12.6	181.3	190.1	16.2	296.2	24.5	22332	13416	101394	1401.6	437.4	489.8	185.0	174.6	-46.3	-76.2	-115.8	237.8
11:53:00	29.6	12.2	180.7	193.5	16.0	292.0	24.5	21972	13416	98419	1394.6	429.4	489.5	185.5	174.6	-25.1	-50.8	-90.5	257.9
11:54:00	29.2	12.9	179.9	191.6	15.8	299.6	24.6	21979	13438	99502	1395.5	429.0	489.3	185.5	174.6	-39.0	-68.9	-101.5	240.1
11:55:00	29.6	13.1	181.5	195.5	15.8	294.2	25.0	21709	13320	94519	1395.9	426.5	489.4	185.5	174.6	-20.1	-44.8	-84.1	282.7
11:56:00	29.8	13.2	179.6	194.7	16.9	294.2	24.5	21537	13494	93477	1403.4	441.1	489.2	185.0	174.6	-18.0	-41.9	-80.1	289.4
11:57:00	30.0	13.1	180.3	194.0	16.2	291.8	24.5	22055	13562	94628	1401.3	449.9	488.8	184.5	174.6	-22.2	-46.2	-87.2	281.9
11:58:00	30.0	11.8	180.1	194.3	16.2	297.1	24.6	21702	13326	94444	1405.5	457.5	488.8	184.0	174.6	-20.4	-46.7	-80.0	288.5
11:59:00	29.7	12.0	179.6	194.9	16.2	291.3	25.8	22062	13332	96097	1402.8	465.8	488.6	183.5	174.6	-29.0	-56.6	-91.4	274.9
12:00:00	29.8	12.5	179.6	192.2	16.4	293.9	25.0	21882	13332	94564	1402.0	460.3	488.4	183.5	174.6	-24.0	-50.5	-86.5	280.8
12:01:00	29.3	12.7	179.9	190.7	14.6	294.8	24.8	22242	13405	95886	1397.8	456.5	488.4	183.5	174.6	-29.6	-54.7	-95.5	256.9
12:02:00	29.6	12.1	180.0	193.1	15.8	291.9	24.5	21882	13393	95480	1394.4	444.5	487.9	184.0	174.6	-22.6	-48.9	-88.7	260.7
12:03:00	29.2	11.4	178.6	190.2	15.8	288.7	25.0	21972	13612	95180	1393.3	442.4	487.7	184.0	173.6	-24.4	-50.7	-92.1	284.5
12:04:00	29.4	12.4	180.0	192.2	16.1	287.6	25.5	21799	13511	96215	1394.4	439.1	487.7	184.0	173.6	-21.4	-48.2	-85.0	288.3
12:05:00	29.1	11.2	179.3	188.7	16.1	280.1	25.4	22152	13466	94526	1394.8	446.8	487.6	184.0	173.6	-31.0	-56.1	-102.8	283.5
12:06:00	30.0	11.9	180.5	193.1	16.1	280.1	25.0	21792	13427	92107	1395.6	443.4	487.4	184.0	173.6	-21.4	-45.3	-91.1	288.9
12:07:00	30.0	13.1	179.9	187.7	16.1	290.7	24.6	22152	13449	97085	1401.4	453.0	487.3	184.0	173.6	-47.0	-77.6	-121.7	245.9
12:08:00	30.5	12.3	180.8	194.9	16.1	290.9	24.9	21979	13343	95759	1402.1	454.4	487.4	184.0	173.6	-25.6	-51.8	-98.4	277.8
12:09:00	30.4	12.4	176.3	189.6	16.4	292.3	24.6	22152	13472	99853	1406.1	458.4	487.4	184.0	174.7	-44.1	-70.0	-120.1	236.9
12:10:00	30.3	12.1	179.5	194.4	16.2	287.9	25.6	21972	13455	96237	1401.1	456.5	487.4	184.0	174.7	-28.2	-54.8	-102.9	259.5
12:11:00	30.6	12.0	178.7	195.2	16.2	284.6	25.6	21875	13292	94965	1405.8	461.3	487.2	184.0	174.7	-26.4	-58.2	-99.0	250.3
12:12:00	30.7	12.9	178.5	190.6	15.6	295.7	24.7	21709	13225	94681	1407.1	465.4	487.3	184.0	174.7	-22.7	-48.4	-94.5	287.1
12:13:00	30.4	11.9	178.1	192.3	16.8	291.2	25.5	21709	13405	93970	1416.5	475.6	487.2	184.0	174.7	-19.8	-43.3	-90.0	293.1
12:14:00	30.6	12.8	179.3	191.4	15.8	288.3	24.8	21792	13332	94860	1413.6	475.2	487.3	184.0	174.7	-22.7	-48.9	-95.0	283.8
12:15:00	30.4	12.0	179.2	190.3	15.5	294.9	25.0	21792	13399	92552	1415.8	470.1	487.2	184.5	174.7	-20.4	-45.8	-91.7	291.6
12:16:00	30.4	11.7	179.5	189.9	15.5	294.3	24.5	21972	13298	94027	1409.5	466.7	487.4	185.0	174.7	-30.4	-57.7	-104.6	276.7
12:17:00	30.8	12.1	179.4	192.6	16.5	297.2	25.7	21875	13225	93257	1413.1	454.6	487.3	185.5	174.7	-23.9	-48.7	-99.8	281.3
12:18:00	30.4	11.5	178.6	190.8	15.7	291.5	25.8	22152	13303	95981	1411.4	452.6	487.4	186.0	174.7	-29.6	-54.6	-106.5	257.0
12:19:00	31.4	12.1	180.3	194.2	16.8	294.9	24.5	21979	13410	94859	1413.4	445.3	487.6	186.5	174.7	-24.4	-51.4	-100.4	262.4
12:20:00	31.0	12.3	178.5	192.2	15.8	297.3	24.9	22152	13292	94402	1419.9	454.4	487.4	186.5	174.7	-25.5	-52.2	-101.9	284.3
12:21:00	31.1	12.4	180.5	194.9	16.3	288.7	25.8	21620	13152	93340	1423.0	460.4	487.8	186.5	174.7	-16.3	-41.2	-92.9	285.9
12:22:00	31.1	12.5	179.8	194.6	16.3	289.3	25.7	22145	13500	96468	1429.6	474.3	487.8	186.0	174.7	-31.5	-56.0	-115.1	282.6
12:23:00	31.2	12.1	179.9	196.2	16.2	292.2	25.9	21620	13298	93375	1430.0	475.2	488.1	186.0	174.7	-17.0	-41.0	-92.3	286.4
12:24:00	30.8	12.3	176.9	191.7	16.6	293.8	25.0	21882	13444	96245	1436.1	483.2	488.0	185.5	174.7	-42.5	-71.2	-123.5	242.9
12:25:00	30.7	12.0	179.3	191.3	16.2	278.3	24.8	22152	13236	93696	1429.8	476.9	488.4	186.0	175.7	-24.0	-47.8	-101.0	280.2
12:26:00	30.4	11.3	181.4	193.2	16.1	282.2	24.5	21792	13236	97646	1428.5	469.8	488.4	186.5	175.7	-36.3	-69.4	-110.0	239.8
12:27:00	30.6	12.3	178.6	191.2	16.3	280.0	24.6	21972	13365	94845	1423.8	456.1	488.8	187.0	175.7	-24.7	-50.4	-103.7	262.4
12:28:00	30.4	12.2	178.9	189.0	15.8	282.1	24.8	21709	13360	93958	1425.9	450.2	488.9	187.5	175.7	-21.7	-46.1	-95.7	267.4

Test No. 1 - September 25, 2018

	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
12:29:00	29.8	11.6	180.8	188.3	15.5	284.3	24.9	21709	13483	93814	1422.6	446.2	488.9	187.5	175.7	-19.9	-45.0	-94.1	287.7
12:30:00	30.1	11.4	179.4	190.3	15.5	281.3	24.8	21709	13242	93846	1424.1	443.9	489.1	187.5	175.7	-17.2	-43.8	-87.6	292.9
12:31:00	30.4	11.7	180.0	188.9	15.4	287.5	25.9	21972	13225	93619	1419.1	442.6	489.0	187.5	176.7	-21.2	-46.1	-95.1	283.3
12:32:00	30.6	12.0	179.8	192.6	15.5	281.9	24.7	21620	13303	95051	1425.8	437.9	488.9	187.5	176.7	-18.5	-43.3	-88.1	290.1
12:33:00	31.1	12.2	180.3	191.0	15.6	284.7	24.7	21979	13292	93737	1425.1	442.8	489.0	187.5	176.7	-24.4	-50.7	-99.1	273.4
12:34:00	31.4	12.9	181.4	194.0	14.8	285.2	24.6	21792	13292	94851	1426.3	443.8	488.9	188.0	176.7	-20.5	-47.4	-91.9	280.2
12:35:00	30.9	12.2	179.6	193.9	16.2	289.3	25.2	22152	13365	95771	1429.1	451.5	489.2	188.0	176.7	-27.3	-53.6	-101.2	258.6
12:36:00	29.6	12.6	179.2	194.8	16.3	287.1	25.4	21799	13371	92960	1426.8	449.1	489.3	188.0	176.7	-22.7	-46.5	-95.1	263.7
12:37:00	29.3	11.8	178.9	192.6	16.5	282.8	25.8	21972	13455	92445	1422.3	442.2	489.4	187.5	176.7	-26.5	-51.3	-99.7	286.5
12:38:00	29.3	13.1	180.7	195.6	16.5	284.3	24.6	21440	13247	92541	1420.5	431.9	489.2	187.0	176.7	-19.6	-45.2	-89.1	289.8
12:39:00	29.0	11.5	179.2	190.5	16.4	287.9	25.9	22242	13365	97200	1418.9	434.5	488.9	186.0	176.7	-43.1	-71.2	-120.0	252.6
12:40:00	29.0	12.2	178.5	190.7	16.4	287.9	25.9	21709	13393	92878	1413.9	426.4	488.6	185.5	176.7	-19.0	-42.1	-92.7	288.2
12:41:00	28.5	12.4	179.4	189.2	16.3	287.6	24.8	22062	13393	98676	1410.8	419.5	488.2	185.0	176.7	-43.6	-74.4	-117.8	240.7
12:42:00	28.9	12.6	181.1	193.3	16.2	281.9	25.0	22062	13444	93516	1399.9	404.5	487.9	185.0	175.6	-27.5	-52.2	-102.5	280.2
12:43:00	29.2	12.8	179.5	193.9	16.2	290.3	24.6	21702	13421	93352	1402.4	396.7	487.7	185.0	175.6	-24.3	-50.7	-96.8	273.9
12:44:00	29.4	11.6	180.1	195.0	16.5	284.4	25.5	22062	13315	93551	1399.1	392.2	487.5	185.0	175.6	-25.6	-50.3	-100.8	258.2
12:45:00	29.5	12.4	180.0	193.2	16.5	289.1	25.3	21709	13315	92986	1399.6	392.5	487.1	184.5	175.6	-22.4	-47.2	-96.2	264.8
13:44:00	29.4	11.3	181.1	192.2	15.9	282.8	24.8	21972	13461	94340	1376.4	412.4	488.5	186.0	176.9	-27.9	-54.9	-107.5	258.9
13:45:00	29.6	12.0	180.5	190.7	16.4	287.3	25.7	22152	13506	97850	1383.4	415.1	487.9	185.5	175.7	-43.0	-72.8	-124.8	242.1
13:46:00	30.1	13.9	181.7	194.8	16.2	287.4	25.8	21702	13393	92978	1388.5	424.0	487.4	185.5	175.7	-20.8	-46.3	-100.1	284.6
13:47:00	29.8	13.6	180.8	194.2	16.3	272.9	25.6	21530	13236	93686	1396.9	446.4	486.9	185.0	175.7	-18.9	-43.4	-99.4	275.9
13:48:00	29.6	13.2	181.6	195.1	16.3	288.3	24.9	21626	13376	93827	1399.0	456.8	486.9	184.5	175.7	-18.7	-42.7	-101.0	281.9
13:49:00	29.6	14.0	180.8	194.2	16.4	288.5	25.8	21620	13275	94018	1402.3	464.7	486.5	184.0	175.7	-17.1	-43.4	-97.7	289.3
13:50:00	29.6	12.5	180.8	194.6	16.5	285.5	24.6	21709	13326	92886	1398.9	466.3	486.2	184.0	175.7	-26.3	-52.2	-111.9	275.7
13:51:00	29.3	13.6	181.3	195.4	16.4	284.6	25.8	21709	13332	93436	1400.0	458.7	486.2	184.0	175.7	-21.6	-43.8	-107.3	279.4
13:52:00	29.4	12.9	179.2	190.7	16.4	284.1	24.8	22062	13556	92990	1395.3	451.5	486.2	184.0	175.7	-29.5	-55.2	-116.6	259.3
13:53:00	29.4	12.9	180.5	192.6	16.4	288.5	25.6	21799	13388	94585	1396.0	433.8	485.8	184.5	175.7	-21.4	-47.9	-108.4	262.5
13:54:00	29.1	12.4	180.9	190.7	16.4	288.4	24.7	21792	13399	95294	1392.4	426.7	485.8	184.5	175.7	-25.5	-52.0	-114.4	287.1
13:55:00	29.8	13.2	181.9	194.6	16.4	287.2	25.7	21620	13303	93975	1395.8	419.0	485.7	184.5	175.7	-17.0	-39.3	-104.7	286.4
13:56:00	29.6	13.4	180.8	194.7	16.8	295.0	25.8	22152	13528	92913	1399.4	426.6	485.4	184.0	175.7	-24.4	-49.1	-116.1	282.2
13:57:00	30.0	13.3	180.6	196.7	15.3	291.8	25.1	21620	13298	95021	1403.4	427.5	485.0	184.0	174.6	-20.7	-45.1	-108.1	290.0
13:58:00	29.9	13.2	181.2	193.6	16.3	293.8	25.1	22221	13584	95339	1405.4	433.5	485.1	183.5	174.6	-34.2	-60.0	-131.9	273.2
13:59:00	29.9	13.7	181.2	196.3	16.3	298.7	24.7	21709	13449	93805	1407.0	426.6	485.2	184.0	174.6	-23.5	-48.3	-113.4	277.2
14:00:00	29.2	13.6	179.7	189.9	16.0	300.8	24.5	22062	13511	97008	1409.3	425.6	484.9	184.0	174.6	-43.0	-69.1	-136.8	239.1
14:01:00	29.3	12.8	180.2	193.1	16.0	298.4	25.8	21979	13337	96048	1400.3	415.7	485.0	184.5	174.6	-27.0	-51.9	-116.8	263.1
14:02:00	29.3	13.0	180.3	191.3	16.0	294.7	25.5	21792	13320	98006	1402.9	409.6	485.0	184.5	174.6	-39.8	-69.5	-124.9	246.6
14:03:00	29.5	12.7	181.0	190.8	16.0	297.3	25.9	21799	13309	93307	1399.5	400.7	484.5	185.0	174.6	-23.0	-47.6	-111.0	287.3
14:04:00	29.2	11.9	180.8	189.8	15.9	287.9	24.7	21620	13208	94751	1405.1	403.6	484.7	185.0	174.6	-18.7	-42.6	-104.7	292.6
14:05:00	29.3	12.9	181.3	189.0	15.9	296.8	25.7	21792	13332	93203	1397.0	401.5	484.4	185.0	174.6	-23.2	-45.2	-110.0	287.8
14:06:00	29.4	13.4	180.2	192.1	16.0	299.8	24.5	21709	13337	92888	1400.1	400.0	484.2	185.0	174.6	-19.0	-42.4	-105.2	293.7
14:07:00	29.0	12.9	180.2	191.3	15.8	284.9	25.7	21979	13230	94042	1396.4	402.0	484.4	185.0	174.6	-28.7	-55.6	-118.8	276.5
14:08:00	29.8	13.2	181.1	192.8	16.2	279.2	25.8	21620	13343	94814	1397.6	393.5	484.1	185.5	175.7	-25.2	-51.0	-113.9	284.0
14:09:00	30.0	12.1	181.9	192.6	16.2	287.3	25.6	21792	13343	94385	1396.0	393.9	484.2	185.5	175.7	-29.5	-55.4	-121.4	261.4
14:10:00	29.9	13.4	180.9	194.9	16.2	285.2	25.7	21799	13242	93806	1400.9	393.6	484.2	186.0	175.7	-23.9	-50.9	-111.0	265.2
14:11:00	29.4	13.0	179.9	192.6	16.1	291.5	25.8	21972	13449	94184	1403.3	403.6	484.1	186.0	175.7	-25.8	-52.5	-113.1	287.4
14:12:00	29.7	14.6	181.7	196.0	16.2	293.9	24.8	21620	13348	92814	1407.4	409.8	483.9	186.0	175.7	-18.9	-42.5	-104.3	291.1
14:13:00	29.3	12.9	179.9	193.8	16.2	294.5	25.0	22062	13438	93891	1409.4	418.6	484.2	185.5	175.7	-27.2	-52.7	-118.6	283.6
14:14:00	29.7	12.8	181.7	195.0	16.3	288.0	25.8	21709	13410	94388	1411.1	413.4	484.0	185.0	175.7	-17.5	-41.9	-108.0	287.8
14:15:00	29.1	12.7	179.6	191.7	16.3	296.1	25.6	22332	13517	96671	1411.4	415.1	483.9	184.5	175.7	-45.8	-75.1	-140.3	250.1
14:16:00	29.3	13.1	180.5	191.7	16.1	295.1	25.9	21972	13438	94346	1401.4	402.5	484.0	184.5	175.7	-25.6	-53.9	-115.7	280.7
14:17:00	28.1	13.2	179.8	193.3	16.1	299.8	25.7	21972	13388	98098	1401.9	393.9	483.8	184.5	175.7	-41.8	-69.3	-131.4	237.5
14:18:00	28.7	12.9	180.3	191.1	16.1	307.6	24.7	21792	13354	96258	1394.3	378.7	483.8	185.0	175.7	-28.2	-49.1	-118.7	264.9

Test No. 1 - September 25, 2018

Time	Waste Flows						PAC Flow	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU 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
14:19:00	28.2	12.6	180.3	189.5	16.1	285.2	24.6	21620	13354	93670	1390.3	369.2	483.8	185.0	175.7	-25.3	-50.4	-110.6	252.4
14:20:00	28.9	12.5	181.2	191.9	16.1	292.3	25.0	21626	13225	95443	1386.9	360.8	483.4	185.5	175.7	-19.8	-40.9	-107.4	288.6
14:21:00	29.0	13.1	181.7	191.9	16.1	298.4	24.4	21626	13230	93585	1394.0	358.5	483.1	185.0	175.7	-20.6	-46.2	-103.4	294.2
14:22:00	28.9	12.6	181.2	193.1	16.1	294.8	25.8	21799	13332	93873	1389.3	365.1	483.2	185.0	175.7	-21.6	-45.6	-107.3	283.3
14:23:00	28.9	13.0	182.0	194.0	16.5	294.6	24.7	21620	13332	94215	1395.4	369.2	483.0	184.5	175.7	-20.0	-44.5	-104.8	293.5
14:24:00	29.0	13.2	181.1	193.5	15.1	291.8	25.7	21979	13382	95269	1388.4	376.7	482.5	184.0	175.7	-29.3	-53.8	-117.7	277.4
14:25:00	28.9	13.4	181.6	195.7	16.2	301.4	25.4	21709	13287	95164	1389.9	372.6	482.4	184.0	175.7	-24.2	-49.9	-110.3	280.8
14:26:00	28.7	13.6	180.2	194.6	16.2	300.7	25.3	22062	13382	95087	1386.8	373.0	482.5	183.5	175.7	-30.2	-54.3	-119.6	260.5
14:27:00	29.2	13.3	179.0	194.6	16.6	305.9	24.6	21792	13354	95646	1387.1	367.9	482.1	183.5	174.6	-24.9	-48.6	-109.2	262.7
14:28:00	28.3	13.2	180.6	188.4	16.2	288.6	25.9	21979	13343	94702	1387.1	366.0	482.1	183.0	174.6	-24.7	-46.7	-110.8	284.6
14:29:00	28.3	12.4	181.9	191.3	16.0	299.0	24.9	21620	13343	94437	1384.5	359.2	481.6	183.0	174.6	-20.5	-42.1	-99.8	290.1
14:30:00	28.7	12.6	180.8	191.2	16.0	292.5	25.5	22242	13433	95699	1384.5	364.7	481.3	183.0	174.6	-32.8	-55.7	-124.5	282.4
14:31:00	29.3	12.6	182.4	189.9	16.0	300.2	24.5	21620	13281	95561	1386.6	363.6	481.4	183.0	174.6	-20.0	-43.1	-101.3	285.1
14:32:00	28.8	13.0	180.7	189.9	16.0	283.4	24.9	22062	13539	99547	1390.6	375.0	481.0	183.0	174.6	-44.2	-71.6	-129.8	240.9
14:33:00	29.4	13.7	181.1	192.9	16.1	296.0	24.7	22242	13472	94561	1386.0	371.7	481.2	183.5	174.6	-24.8	-52.1	-109.0	277.4
14:34:00	29.6	12.9	180.2	193.8	16.1	294.6	24.7	22062	13478	97423	1389.9	373.4	481.2	184.0	174.6	-33.0	-63.4	-112.8	235.8
14:35:00	29.7	12.5	180.2	195.2	17.0	288.0	24.5	21889	13225	95388	1388.5	376.5	481.2	184.0	174.6	-26.1	-51.8	-107.4	259.8
14:36:00	29.9	13.0	180.5	195.3	17.0	287.5	25.1	21882	13455	94279	1396.4	384.8	481.3	184.0	174.6	-19.2	-44.0	-98.7	264.3
14:37:00	29.8	13.1	181.8	194.9	16.6	294.6	24.7	21972	13410	92248	1397.4	391.9	481.6	184.5	174.6	-18.1	-42.2	-95.3	280.9
14:38:00	30.0	13.5	179.0	198.3	16.8	287.1	25.8	21620	13287	92334	1402.1	400.6	481.7	184.0	174.6	-16.8	-43.2	-92.1	288.9
14:39:00	28.9	12.9	180.0	191.1	16.3	297.4	24.9	21972	13371	95095	1401.8	408.6	481.6	183.5	174.6	-18.6	-44.9	-96.4	284.3
14:40:00	28.9	12.9	180.7	193.5	16.1	285.6	24.6	21792	13371	93124	1401.3	406.8	481.9	183.5	174.6	-17.9	-43.2	-91.8	294.1
14:41:00	28.9	12.5	180.5	189.0	16.1	292.6	25.5	22152	13388	93886	1394.1	405.4	481.8	184.0	174.6	-25.4	-51.4	-103.7	277.6
14:42:00	29.0	13.2	181.0	192.9	16.8	289.3	25.9	21620	13410	93436	1390.3	390.0	482.2	184.5	174.6	-24.1	-48.0	-98.7	282.6
14:43:00	28.2	12.9	180.5	189.9	15.6	293.7	25.8	21979	13590	95596	1383.8	381.1	482.4	184.5	174.6	-30.1	-57.6	-108.1	261.8
14:44:00	28.4	12.8	180.4	191.2	16.7	280.7	24.6	21882	13388	93894	1380.1	365.3	482.3	184.5	174.6	-25.9	-50.4	-100.1	266.9
14:45:00	28.7	12.7	180.1	190.8	15.7	288.5	24.7	22062	13635	93313	1376.5	355.7	482.2	184.5	174.6	-29.9	-55.8	-109.3	291.6
14:46:00	29.4	13.5	180.5	194.1	16.8	291.5	24.8	21530	13281	93382	1379.9	350.9	482.1	184.5	174.6	-17.8	-37.6	-97.5	288.2
14:47:00	29.4	13.4	181.2	194.5	16.8	286.9	25.0	22152	13590	99259	1387.6	365.9	482.1	184.0	174.6	-42.8	-70.6	-129.0	250.1
14:48:00	29.5	13.5	183.1	193.1	16.7	284.9	25.8	21709	13466	94063	1387.3	375.9	481.8	183.5	174.6	-18.8	-39.0	-102.8	287.5
14:49:00	29.6	13.2	180.9	193.5	16.7	281.0	24.6	21799	13376	99607	1392.8	385.3	481.8	183.5	174.6	-40.6	-67.2	-125.6	240.1
14:50:00	29.3	13.4	181.1	193.7	16.4	280.5	24.8	21799	13444	94638	1387.8	386.3	481.9	183.5	174.6	-24.4	-48.7	-109.8	276.8
14:51:00	29.0	12.5	179.9	192.9	16.4	284.8	25.9	21620	13320	92827	1392.5	383.3	482.0	183.5	174.6	-22.5	-47.8	-107.3	275.1
14:52:00	29.1	12.2	182.0	191.1	16.5	286.0	25.9	21792	13455	96350	1388.5	374.9	481.9	183.5	174.6	-26.5	-51.3	-112.7	261.8
14:53:00	29.3	12.8	179.3	190.0	16.6	280.8	25.2	21799	13348	94536	1388.6	370.5	482.0	183.5	174.6	-24.6	-50.3	-109.4	267.9
14:54:00	29.1	12.8	180.8	189.6	15.6	291.4	25.5	21792	13214	94751	1385.0	367.8	481.6	184.0	174.6	-22.6	-46.2	-112.2	287.4
14:55:00	29.3	12.4	179.7	191.8	16.6	289.9	24.6	21447	13197	93238	1388.6	365.3	481.5	184.0	174.6	-20.8	-46.1	-107.9	294.1
14:56:00	28.2	12.5	180.7	190.3	16.5	272.3	24.7	21799	13287	93627	1386.1	368.1	481.8	184.0	174.6	-25.9	-50.6	-115.4	284.9
14:57:00	28.9	12.9	181.3	193.9	16.1	288.5	24.5	21620	13416	94800	1382.9	361.2	481.6	184.0	174.6	-19.8	-45.1	-110.3	291.4
14:58:00	29.0	12.7	181.2	192.3	16.1	291.8	24.5	21979	13461	97347	1383.8	361.5	481.5	183.5	174.6	-29.4	-52.9	-128.9	275.4
14:59:00	29.3	13.6	180.3	194.7	17.3	287.3	25.7	21709	13360	95822	1386.9	354.2	481.4	184.0	174.6	-24.7	-50.5	-121.1	279.9
15:00:00	29.2	13.0	179.5	191.9	15.9	286.7	24.7	22152	13489	96621	1387.8	358.7	481.3	183.5	174.6	-33.7	-59.9	-133.2	261.3
15:01:00	29.6	13.6	180.7	196.8	15.8	297.2	25.6	21799	13287	94416	1386.0	353.9	481.4	183.5	174.6	-26.1	-50.2	-122.6	262.1
15:02:00	29.4	12.8	179.8	190.9	16.6	297.2	24.7	22055	13601	95203	1392.4	359.6	481.1	183.0	174.6	-28.9	-51.4	-134.4	281.8
15:03:00	29.3	13.1	180.4	194.9	16.6	297.8	25.5	21620	13258	94332	1392.8	365.5	481.0	183.0	174.6	-19.4	-41.3	-115.6	285.3
15:04:00	28.9	12.7	179.4	191.8	15.4	294.0	24.7	22152	13360	100201	1397.1	377.0	480.8	182.5	174.6	-44.1	-72.1	-144.0	244.3
15:05:00	28.8	12.8	180.5	192.2	16.4	288.5	25.8	21730	13264	93330	1391.4	371.6	480.6	183.0	174.6	-23.5	-48.5	-117.5	287.2
15:06:00	28.7	12.9	180.2	192.4	15.9	294.3	24.6	21882	13253	98426	1393.0	369.9	480.8	182.5	174.6	-40.0	-69.9	-127.9	239.6
15:07:00	29.0	12.3	179.3	191.5	15.9	289.8	24.8	21979	13371	95577	1386.5	360.6	480.7	183.0	174.6	-26.5	-53.7	-125.6	277.3
15:08:00	28.6	12.7	178.6	190.8	15.0	286.1	25.3	21882	13258	94821	1384.6	353.5	480.3	183.0	174.6	-26.1	-50.8	-120.8	283.9
15:09:00	28.6	13.3	182.6	191.4	16.0	288.9	24.6	22235	13315	96043	1378.3	349.4	480.3	183.0	174.6	-26.9	-51.8	-126.3	258.5
15:10:00	29.0	13.0	181.2	193.4	16.0	284.0	25.8	22062	13214	95414	1379.1	344.5	480.3	183.0	174.6	-22.2	-48.6	-120.5	264.0

Test No. 1 - September 25, 2018

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
15:11:00	29.1	12.9	180.1	194.5	16.4	282.8	25.7	21882	13298	94818	1379.9	351.5	480.0	183.0	174.6	-22.8	-46.0	-121.0	282.8
15:12:00	28.9	13.5	179.8	196.5	16.2	280.1	25.9	21523	13141	92516	1383.3	360.2	480.0	182.5	174.6	-19.9	-43.7	-116.4	289.5
15:13:00	28.4	13.0	182.0	192.6	16.2	282.5	25.8	21972	13343	94909	1384.9	369.9	479.9	181.5	174.6	-22.6	-46.3	-122.3	284.1
15:14:00	28.9	13.4	181.4	195.4	16.4	285.9	24.9	21620	13343	91793	1384.8	370.9	479.5	181.5	173.6	-17.7	-40.0	-116.0	289.4
15:15:00	28.4	13.0	179.9	193.7	16.4	282.5	24.8	22242	13500	95587	1385.5	377.7	479.2	180.5	173.6	-29.9	-56.2	-130.3	277.6
15:16:00	28.4	12.9	181.5	193.2	16.4	280.4	24.8	21882	13393	94398	1380.3	366.9	479.4	180.5	173.6	-23.9	-45.5	-122.5	279.8
15:17:00	27.6	12.9	180.2	190.7	15.1	284.7	25.4	22235	13376	97070	1377.0	362.1	479.0	180.5	173.6	-36.9	-63.5	-139.0	263.1
15:18:00	28.2	12.7	182.3	192.9	16.6	295.2	25.8	22055	13270	93741	1369.0	348.0	478.8	181.0	173.6	-25.0	-50.8	-122.8	262.6
15:19:00	27.6	12.6	178.6	189.6	15.5	289.1	24.6	22332	13523	97794	1367.8	344.6	478.7	180.5	172.6	-46.5	-75.8	-145.7	265.8
15:20:00	28.1	12.7	181.9	192.2	15.5	287.9	24.6	21882	13399	93816	1366.3	338.8	478.5	181.0	172.6	-21.5	-45.8	-115.4	288.6
15:21:00	28.1	12.9	179.6	192.7	15.5	297.9	25.7	21979	13354	99900	1369.1	347.2	478.4	180.5	172.6	-45.7	-76.0	-143.9	243.4
15:22:00	28.8	13.1	182.4	193.6	16.6	297.8	25.6	21882	13388	93929	1367.3	350.8	477.9	180.5	172.6	-23.4	-47.8	-123.0	287.5
15:23:00	29.6	13.3	177.2	196.1	16.7	294.1	25.5	21709	13287	94107	1376.8	361.2	477.8	180.0	172.6	-21.4	-51.0	-87.9	278.7
15:24:00	29.7	13.0	181.1	193.1	16.7	297.3	25.8	21972	13433	95773	1380.0	372.8	477.6	180.0	172.6	-28.4	-54.8	-100.3	278.4
15:25:00	29.6	13.3	179.4	195.0	16.8	291.3	25.3	21792	13354	95142	1384.6	378.5	477.8	180.5	172.6	-24.9	-49.5	-97.1	282.2
15:26:00	29.7	13.5	177.8	195.3	16.4	291.4	24.6	22062	13326	95863	1385.8	382.6	477.6	180.5	172.6	-27.5	-52.3	-100.2	260.2
15:27:00	29.6	13.1	177.3	196.3	16.4	291.4	25.3	22062	13337	95683	1390.0	384.2	477.7	180.5	172.6	-23.0	-50.6	-94.9	265.3
15:28:00	29.4	12.7	177.2	189.6	16.2	294.2	24.4	22062	13461	95280	1389.4	390.2	477.8	180.5	172.6	-24.5	-50.0	-93.7	286.4
15:29:00	29.7	13.0	176.6	191.2	16.2	280.3	24.9	21709	13416	93764	1390.4	393.4	477.9	180.5	172.6	-19.8	-45.2	-87.8	289.9
15:30:00	28.9	12.2	180.6	188.7	15.3	288.2	24.5	22062	13303	95094	1387.9	400.0	477.9	180.5	172.6	-26.5	-52.6	-96.8	285.6
15:31:00	29.1	12.7	178.6	192.7	16.4	282.0	25.5	21702	13376	93196	1387.4	390.8	477.9	181.0	172.6	-19.1	-43.5	-90.6	288.3
15:32:00	29.2	11.9	178.5	189.8	15.7	289.2	25.7	22152	13500	97360	1387.4	390.9	477.9	181.0	172.6	-35.7	-61.0	-111.3	277.6
15:33:00	29.6	12.9	176.8	192.7	15.7	287.9	25.5	21972	13315	94100	1383.9	380.0	478.0	181.5	172.6	-27.6	-54.1	-99.6	279.3
15:34:00	29.7	13.5	178.9	192.9	16.1	292.5	24.6	22332	13567	98443	1388.3	376.9	477.9	182.0	173.7	-35.9	-59.9	-115.4	253.3
15:35:00	29.9	13.4	179.8	197.1	16.2	282.8	25.9	21792	13449	95022	1387.3	375.9	477.9	182.0	173.7	-25.5	-52.0	-94.8	260.0
15:36:00	29.7	13.3	179.6	193.7	16.2	287.3	24.5	21972	13590	98822	1393.3	384.9	478.2	182.0	173.7	-42.9	-73.0	-117.9	241.3
15:37:00	29.7	13.3	181.0	196.9	16.3	282.8	24.7	21792	13287	95443	1395.8	387.6	478.2	182.5	173.7	-19.6	-44.5	-90.2	283.1
15:38:00	29.6	13.2	177.2	195.3	16.3	283.6	25.3	21792	13287	99200	1403.9	395.3	478.5	182.0	173.7	-38.8	-68.7	-103.6	241.0
15:39:00	29.4	12.6	179.0	193.8	16.3	284.8	25.7	21709	13298	95356	1399.8	389.5	478.5	182.0	173.7	-22.4	-47.4	-91.2	287.3
15:40:00	29.3	12.4	180.2	191.4	16.3	275.5	25.7	21537	13433	95950	1402.0	389.4	478.9	182.0	173.7	-20.6	-46.4	-85.2	292.9
15:41:00	29.5	12.7	178.3	190.1	16.2	284.0	24.6	21979	13416	95478	1394.1	385.2	479.0	182.0	173.7	-29.3	-57.1	-100.7	279.9
15:42:00	29.7	12.8	178.4	192.8	16.2	286.4	25.8	21882	13410	95029	1394.3	374.8	479.4	182.5	173.7	-24.8	-49.6	-94.5	282.8
15:43:00	29.9	12.8	180.6	194.1	16.2	282.8	24.6	21972	13416	96385	1392.6	370.4	479.4	183.0	173.7	-25.2	-45.7	-99.4	255.9
15:44:00	29.9	13.3	178.1	194.4	16.3	282.0	24.7	21620	13275	95046	1394.8	368.5	479.3	183.0	173.7	-24.0	-51.1	-94.4	261.6
15:45:00	29.8	12.8	178.6	193.0	16.3	289.9	25.5	22062	13214	93703	1397.3	374.2	479.4	183.0	173.7	-21.6	-45.1	-94.8	281.0
15:46:00	30.6	13.1	180.9	195.9	16.3	276.6	25.3	21709	13157	93242	1403.6	378.7	479.5	183.0	173.7	-16.1	-41.6	-85.1	284.7
15:47:00	30.0	13.0	179.0	195.6	16.7	290.5	25.2	21792	13399	95655	1409.6	389.2	479.8	182.5	173.7	-21.4	-45.5	-95.9	281.9
15:48:00	29.8	12.7	179.9	195.0	16.7	290.3	25.8	21620	13242	93171	1412.1	388.9	479.9	182.5	173.7	-16.5	-40.0	-87.6	287.1
15:49:00	29.4	12.7	179.0	190.2	15.6	288.6	25.4	22152	13517	95611	1408.6	390.0	479.8	182.0	173.7	-34.4	-61.5	-108.9	279.8
15:50:00	29.6	12.7	177.4	191.1	15.9	288.4	25.8	21882	13309	93817	1401.9	372.2	480.1	182.5	173.7	-28.1	-55.3	-97.1	282.1
15:51:00	29.6	12.4	177.4	191.6	16.2	282.2	24.8	22235	13444	97558	1403.3	362.9	480.1	183.0	173.7	-47.0	-75.7	-121.4	243.4
15:52:00	29.9	12.6	178.2	191.6	16.3	288.4	25.4	21792	13399	95406	1397.6	347.7	480.3	183.5	173.7	-26.4	-51.6	-96.9	263.3
15:53:00	29.7	12.7	178.1	191.2	16.3	285.0	25.0	22145	13500	98235	1401.9	351.4	480.5	183.5	173.7	-43.7	-69.4	-116.7	248.8
15:54:00	30.1	12.7	178.6	191.5	16.3	282.9	25.1	21620	13354	92718	1400.9	352.7	480.7	184.0	173.7	-22.3	-45.1	-92.0	290.1
15:55:00	30.1	13.2	178.9	194.0	16.2	285.2	24.6	21523	13230	95217	1407.9	359.0	481.0	184.0	174.7	-16.8	-42.9	-84.7	276.7
15:56:00	30.7	12.8	181.5	195.1	16.2	291.8	25.8	21620	13163	95924	1407.5	363.0	481.0	184.0	174.7	-20.6	-42.3	-91.6	286.4
15:57:00	30.6	12.7	178.7	193.6	16.2	284.4	25.7	21440	13332	94702	1415.6	369.3	481.1	184.0	174.7	-17.6	-42.6	-85.8	293.1
15:58:00	30.4	13.3	180.8	194.5	16.2	297.8	24.9	21882	13287	95098	1410.8	378.3	481.3	184.0	174.7	-24.1	-49.6	-97.2	277.3
15:59:00	30.5	13.3	178.0	195.1	16.2	271.4	24.6	21620	13421	95954	1413.9	372.4	481.7	184.5	174.7	-22.0	-47.7	-91.7	282.3
16:00:00	30.4	12.8	177.1	192.5	16.4	291.5	25.1	21792	13315	96213	1411.5	367.7	481.9	184.5	174.7	-27.2	-54.3	-96.8	260.8
Max	31.4	14.6	183.1	198.3	17.3	307.6	26.0	23914	13803	101394	1436.1	534.4	490.3	188.0	176.9	-16.1	-37.6	-80.0	294.2
Min	27.6	11.2	175.1	186.6	14.6	243.5	24.4	21440	13141	91793	1366.3	338.8	477.6	180.0	172.6	-47.1	-78.7	-145.7	235.4
Average	29.6	12.7	180.0	192.7	16.2	287.5	25.2	21910	13399	95132	1399.8	423.1	484.7	184.2	174.7	-26.4	-52.2	-106.9	273.0

Test No. 2 - September 26, 2018

	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
9:35:00	31.0	12.5	176.3	197.5	15.2	289.9	24.5	22580	13832	93466	1370.9	76.7	493.0	178.0	172.7	-9.6	-39.0	-87.2	285.9
9:36:00	30.7	12.2	174.7	194.9	14.1	282.2	25.6	22663	13888	94713	1367.0	97.1	492.7	177.5	172.7	-17.8	-46.7	-98.5	273.3
9:37:00	30.1	12.7	175.9	195.1	14.5	282.2	25.7	22490	14023	93939	1363.3	103.5	493.3	178.5	172.7	-13.2	-45.1	-92.0	279.6
9:38:00	29.6	11.6	176.0	193.2	13.3	287.6	25.4	22843	13944	96827	1355.6	103.5	493.7	179.5	172.7	-19.5	-53.8	-98.0	255.6
9:39:00	30.0	11.9	176.2	193.5	14.6	290.8	24.5	22490	13787	95186	1353.0	93.4	494.3	180.5	172.7	-12.8	-42.5	-91.7	260.3
9:40:00	29.9	12.3	176.6	193.3	13.6	285.9	25.0	22670	13876	95806	1349.5	92.7	494.5	181.0	172.7	-17.6	-49.9	-96.9	285.6
9:41:00	30.2	12.5	177.3	194.4	15.1	284.0	25.9	22311	13848	94956	1352.3	90.4	494.8	182.0	172.7	-8.9	-39.5	-84.4	282.9
9:42:00	30.0	11.0	177.4	192.0	14.3	279.3	24.6	22836	13921	95727	1353.1	100.8	495.2	182.0	172.7	-21.7	-48.1	-109.0	280.8
9:43:00	30.5	11.7	177.3	195.3	14.3	287.0	25.1	22484	13781	95058	1353.9	99.4	495.5	183.0	172.7	-11.4	-41.9	-87.3	287.1
9:44:00	30.5	10.9	175.4	193.3	14.3	288.7	25.8	22663	13854	99704	1358.8	102.1	495.6	183.0	172.7	-31.5	-68.2	-115.8	237.8
9:45:00	31.2	11.9	175.5	193.3	14.2	280.1	25.3	22484	13955	96611	1354.4	101.5	495.7	183.0	173.7	-16.8	-50.1	-95.7	276.2
9:46:00	31.0	11.4	175.4	194.4	14.2	279.8	25.7	22311	13860	99792	1359.8	101.9	496.0	183.5	173.7	-24.7	-60.5	-102.7	234.5
9:47:00	31.0	11.8	176.5	197.8	14.3	280.6	25.8	22408	13966	95759	1357.8	104.6	496.0	183.5	173.7	-16.5	-49.8	-94.0	260.1
9:48:00	31.5	11.3	174.8	196.5	14.3	277.1	25.8	22318	13860	95134	1363.0	110.4	496.1	183.5	173.7	-12.6	-41.3	-90.4	265.8
9:49:00	32.2	12.1	176.3	196.6	14.3	281.8	24.6	22311	13753	93945	1366.8	118.6	496.4	183.5	173.7	-10.4	-40.1	-86.2	285.1
9:50:00	32.1	11.1	175.0	195.8	15.2	287.6	24.5	22318	13854	93963	1380.1	134.0	496.6	183.5	173.7	-8.6	-39.6	-83.8	289.6
9:51:00	32.0	11.4	175.4	198.7	15.0	289.3	25.8	22490	13820	94850	1379.3	147.7	496.6	183.5	173.7	-12.8	-45.0	-88.7	286.5
9:52:00	31.8	11.8	175.5	199.7	15.0	288.0	25.7	22318	13820	93236	1388.5	152.6	496.9	183.5	173.7	-5.1	-34.2	-80.8	288.8
9:53:00	30.7	11.6	175.1	193.5	14.0	291.9	25.6	22484	13983	95721	1384.5	157.9	497.3	183.0	173.7	-14.8	-47.4	-95.0	274.8
9:54:00	30.9	11.7	175.0	194.2	14.0	290.5	24.7	22401	13865	94976	1379.0	139.7	497.5	183.5	173.7	-12.8	-44.3	-89.3	282.0
9:55:00	30.7	10.7	174.4	191.8	14.5	289.3	25.8	22484	13843	95619	1371.8	124.2	497.5	183.5	174.7	-17.9	-46.9	-99.3	261.3
9:56:00	30.7	11.1	175.4	193.1	14.6	296.7	24.7	22311	13966	95249	1365.9	104.4	497.6	184.0	174.7	-15.5	-46.9	-92.8	267.1
9:57:00	30.7	10.6	176.5	191.7	14.4	289.1	24.8	22484	13843	94783	1365.0	97.6	497.8	184.0	174.7	-15.2	-43.6	-94.8	284.9
9:58:00	30.7	11.0	176.9	194.0	14.4	287.1	24.7	22138	13742	95021	1367.8	90.0	497.5	184.5	174.7	-8.8	-37.9	-86.3	287.8
9:59:00	30.4	10.9	176.7	194.0	14.4	287.6	25.7	22753	13893	98880	1368.5	92.7	497.3	184.5	174.7	-31.9	-64.8	-114.9	247.6
10:00:00	30.9	11.2	177.0	199.8	15.4	285.4	25.8	22221	13888	94420	1367.9	92.9	497.5	184.5	174.7	-10.2	-39.7	-86.4	286.9
10:01:00	30.8	12.0	177.0	199.4	14.9	290.5	25.2	22221	13843	99560	1372.5	98.9	497.3	184.0	174.7	-29.5	-63.2	-109.1	237.6
10:02:00	30.5	10.9	177.8	196.4	14.6	282.7	25.6	22401	13843	94751	1367.3	100.9	497.1	183.5	174.7	-15.5	-43.7	-94.4	280.8
10:03:00	30.8	10.8	176.2	194.7	14.6	286.9	25.6	22408	13832	96447	1367.9	96.3	496.7	183.5	174.7	-13.3	-44.7	-89.9	279.9
10:04:00	30.6	10.2	176.9	193.0	14.6	291.2	25.8	22401	13978	95350	1364.0	92.2	496.9	184.0	174.7	-16.8	-47.4	-94.0	263.8
10:05:00	30.4	10.8	176.4	193.4	14.8	290.6	25.3	22221	13792	93430	1366.3	85.0	496.6	184.0	174.7	-13.1	-46.5	-89.5	268.9
10:06:00	30.5	10.8	177.4	193.8	14.4	292.4	25.8	22311	13916	94497	1363.9	85.2	496.7	184.0	174.7	-10.1	-40.3	-87.9	288.9
10:07:00	30.6	11.2	177.1	195.4	13.0	293.9	24.7	22221	13860	94020	1367.6	88.7	496.4	184.0	174.7	-7.7	-36.4	-81.6	293.4
10:08:00	30.7	11.0	177.3	194.8	14.5	297.8	25.7	22490	13949	95284	1366.3	96.7	496.3	184.0	174.7	-12.9	-44.7	-89.8	284.9
10:09:00	31.1	11.5	177.2	196.9	14.5	298.4	25.3	22221	13809	94261	1368.9	98.4	496.4	184.0	174.7	-7.7	-37.0	-84.4	287.7
10:10:00	30.2	11.1	176.3	197.9	14.7	299.0	24.8	22490	14051	97489	1367.6	108.8	496.1	183.5	174.7	-16.1	-52.2	-96.3	273.5
10:11:00	30.0	11.1	175.4	194.9	14.9	301.4	24.6	22490	13933	93619	1363.0	102.6	495.7	183.0	174.7	-14.3	-46.5	-91.4	277.3
10:12:00	29.5	10.0	175.0	189.9	15.1	301.9	24.9	22843	13938	96744	1355.6	98.4	495.4	182.5	174.7	-18.7	-50.8	-100.8	257.6
10:13:00	29.6	11.5	175.2	195.2	14.7	296.1	25.8	22573	13944	96010	1350.1	86.3	495.0	182.5	174.7	-14.3	-44.6	-92.9	263.2
10:14:00	29.5	11.2	174.0	191.5	14.4	295.9	25.8	22933	14067	96398	1347.3	81.3	494.4	182.0	173.6	-15.7	-47.7	-102.8	281.3
10:15:00	29.6	10.7	170.2	193.2	14.3	298.9	24.8	22484	13843	94987	1346.0	78.3	493.9	182.0	173.6	-14.0	-46.4	-88.4	289.3
10:16:00	29.4	10.9	171.5	191.6	14.5	294.4	25.8	22670	13860	97776	1350.3	85.5	493.2	181.0	173.6	-30.0	-66.0	-112.9	237.0
10:17:00	31.4	10.5	171.7	197.4	14.5	293.5	24.7	22048	13832	94104	1347.4	89.9	492.3	180.5	173.6	-9.8	-39.7	-86.0	280.4
10:18:00	31.1	11.5	170.0	199.3	14.5	290.5	24.6	22228	13815	100088	1358.8	106.3	491.7	179.5	172.6	-26.1	-62.2	-101.2	237.3
10:19:00	31.8	11.7	171.8	198.5	14.6	285.4	25.6	22401	13989	96684	1362.6	130.4	491.4	179.0	172.6	-13.2	-43.1	-90.3	271.2
10:20:00	32.3	11.2	169.6	197.7	14.6	284.1	24.7	22401	13888	95746	1371.0	149.0	491.2	179.0	172.6	-13.1	-43.4	-89.7	279.8
10:21:00	32.4	11.5	171.1	201.6	14.6	273.7	24.5	22401	13916	95224	1373.8	159.7	491.3	179.0	172.6	-15.7	-46.0	-93.8	256.1
10:22:00	32.0	12.4	171.0	197.1	14.6	278.4	25.4	22318	13809	93782	1381.3	164.8	491.4	179.5	171.6	-12.0	-42.6	-90.2	263.8
10:23:00	31.7	11.2	170.5	195.0	13.7	279.3	25.8	22490	13966	95415	1379.8	173.5	491.8	179.5	171.6	-8.2	-39.6	-87.4	283.1
10:24:00	31.6	11.4	173.4	195.1	15.0	284.3	25.1	22055	13792	95182	1386.8	167.7	491.8	179.5	171.6	-6.7	-35.5	-81.7	286.3
10:25:00	31.3	10.5	174.2	193.9	14.4	275.2	25.6	22580	13758	95530	1381.5	172.2	492.2	180.0	171.6	-12.1	-44.8	-90.1	281.9
10:26:00	31.9	10.6	174.4	196.3	14.4	274.7	25.9	22048	13815	94060	1383.1	164.2	493.2	181.0	171.6	-5.1	-36.0	-81.9	284.6

Test No. 2 - September 26, 2018

	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
10:27:00	31.6	10.5	174.5	193.5	14.3	270.8	25.6	22580	13910	96994	1386.1	162.7	494.3	182.0	171.6	-16.3	-46.4	-96.5	271.1
10:28:00	31.9	11.4	174.3	195.2	14.3	273.5	25.0	22401	13910	95219	1386.8	152.5	495.5	184.0	172.7	-9.8	-39.0	-87.4	271.9
10:29:00	31.7	10.9	174.5	192.1	14.1	268.0	25.6	22670	14045	95493	1386.6	147.3	496.7	185.0	173.7	-16.2	-48.9	-99.8	252.7
10:30:00	32.2	11.9	175.9	198.7	14.6	264.3	25.4	22138	13955	94797	1385.1	139.2	497.9	186.0	173.7	-11.3	-44.9	-86.9	257.1
10:31:00	31.9	11.7	173.9	196.2	14.6	261.4	24.6	22573	14067	96758	1391.3	140.3	498.8	186.5	174.7	-25.2	-58.5	-108.4	252.3
10:32:00	32.1	11.9	175.2	197.5	15.7	259.5	25.8	22228	13989	95408	1392.3	137.8	499.6	187.0	174.7	-5.2	-35.2	-80.7	281.8
10:33:00	31.9	11.3	175.5	197.4	14.7	263.4	25.6	22228	13792	97034	1400.4	138.9	500.3	187.0	174.7	-23.7	-59.9	-103.1	236.0
10:34:00	31.9	11.8	177.1	199.0	14.7	271.1	24.6	22221	13809	94389	1395.5	137.1	501.0	187.0	175.7	-5.2	-35.9	-79.8	281.3
10:35:00	31.5	11.2	174.6	197.2	14.7	285.5	24.5	22048	13809	94441	1402.6	133.7	501.8	187.0	175.7	-8.9	-40.4	-88.2	268.4
10:36:00	31.7	11.4	176.0	194.0	14.7	299.9	25.7	22408	13837	95802	1387.8	123.2	502.4	187.5	175.7	-13.1	-45.6	-93.1	285.8
10:37:00	31.8	10.3	175.4	194.4	14.6	303.0	24.5	22221	13702	95193	1387.4	102.0	502.7	188.5	176.7	-11.6	-43.1	-90.0	291.8
10:38:00	31.2	10.7	175.6	195.5	14.5	298.4	24.6	22401	13843	95913	1379.6	89.5	503.4	189.0	176.7	-14.6	-45.0	-94.7	268.0
10:39:00	31.4	11.0	176.2	194.4	14.5	295.5	24.5	22221	13882	95383	1379.5	77.1	503.5	190.0	176.7	-11.1	-43.1	-89.6	272.8
10:40:00	31.0	10.5	176.4	192.9	14.1	293.1	25.3	22401	14000	94130	1374.6	67.8	503.9	190.5	177.7	-10.6	-43.5	-91.2	293.9
10:41:00	31.9	11.9	177.0	198.7	14.4	289.1	25.8	22048	13775	93986	1377.8	64.6	504.4	191.0	177.7	-5.6	-35.9	-81.5	295.8
10:42:00	31.6	10.4	176.0	198.5	14.1	282.6	25.1	22401	13798	96277	1378.0	70.8	504.9	191.0	177.7	-11.9	-45.6	-90.5	286.5
10:43:00	32.0	11.7	176.7	198.8	15.5	280.0	25.4	22055	13798	95530	1386.1	74.7	505.1	191.0	178.7	-7.3	-38.0	-83.1	292.5
10:44:00	31.7	11.5	174.9	195.6	13.7	278.8	25.9	22580	13899	94634	1384.1	85.2	505.4	190.5	178.7	-17.2	-49.9	-97.6	280.1
10:45:00	32.1	11.8	176.3	198.7	14.7	275.9	24.9	22228	13865	94327	1382.3	83.9	505.5	191.0	178.7	-9.8	-41.7	-89.1	283.4
10:46:00	31.7	11.5	176.1	197.3	14.7	275.3	25.8	22580	14023	93387	1386.0	87.3	505.8	190.5	179.7	-19.5	-50.3	-105.6	262.1
10:47:00	32.1	11.0	176.1	195.6	14.7	283.7	24.5	22401	13927	94662	1388.1	87.2	506.1	191.0	179.7	-10.7	-37.4	-89.8	270.8
10:48:00	31.9	10.7	175.1	195.0	14.9	287.9	24.8	22580	13899	98878	1389.5	88.8	507.1	191.0	179.7	-29.7	-69.6	-112.8	256.5
10:49:00	31.8	10.7	177.0	193.1	14.8	284.0	24.6	22048	13697	94794	1388.6	83.5	508.7	192.0	179.7	-6.3	-38.1	-85.0	295.8
10:50:00	31.6	10.9	175.4	194.9	13.7	293.0	25.5	22228	13803	97651	1392.3	86.0	510.5	192.0	179.7	-22.5	-57.7	-100.2	251.6
10:51:00	32.1	10.3	176.6	194.4	13.9	292.5	25.6	22318	13832	96278	1386.6	84.7	512.2	192.5	179.7	-11.1	-42.7	-86.9	297.6
10:52:00	31.8	10.7	174.8	196.1	13.9	295.0	25.6	22214	13641	92938	1393.4	85.8	513.6	193.0	179.7	-5.0	-32.9	-81.6	300.2
10:53:00	32.1	10.9	176.7	195.8	14.2	276.2	24.6	22221	13888	94129	1384.5	85.8	515.0	193.0	180.7	-13.2	-45.7	-92.8	283.8
10:54:00	32.0	11.3	175.8	196.2	15.3	279.0	25.6	22318	13876	96110	1388.6	86.9	516.3	193.5	180.7	-7.7	-38.6	-86.7	288.3
10:55:00	32.0	10.9	176.4	198.1	14.7	280.7	24.7	22318	13770	96458	1387.4	87.2	517.5	193.5	180.7	-12.4	-45.1	-90.9	263.8
10:56:00	32.6	12.0	177.0	199.1	14.9	273.8	25.8	22318	13899	92944	1393.5	87.3	518.9	193.5	180.7	-8.9	-39.5	-87.5	270.1
10:57:00	32.4	11.1	175.5	197.1	14.9	278.2	24.5	22221	13826	94304	1393.9	91.2	520.0	193.0	180.7	-7.2	-37.8	-86.1	288.6
10:58:00	32.4	11.2	176.5	199.0	15.0	272.1	25.6	22048	13820	93384	1402.1	94.1	520.9	193.0	180.7	-5.9	-34.8	-79.4	295.6
10:59:00	31.6	11.3	175.2	192.6	14.2	275.9	25.6	22318	13966	93384	1401.5	99.8	522.1	192.5	180.7	-12.1	-43.6	-90.4	290.4
11:00:00	31.8	11.5	176.6	195.9	14.2	274.0	25.2	22131	13865	94824	1399.1	91.6	522.6	193.0	180.7	-6.2	-36.0	-81.8	295.6
11:01:00	31.3	10.9	173.8	193.5	14.2	280.6	25.4	22670	14011	93053	1397.3	86.0	523.2	192.5	180.7	-18.0	-52.7	-100.5	282.7
11:02:00	31.7	11.3	175.1	195.2	14.2	274.0	25.3	22311	13899	93097	1391.5	72.3	523.8	193.0	181.7	-10.1	-41.5	-87.5	284.8
11:03:00	31.4	11.0	176.1	195.8	14.2	282.3	25.0	22663	13899	97438	1390.5	66.9	524.7	193.5	181.7	-27.6	-65.0	-111.9	242.4
11:04:00	31.6	10.5	176.4	194.4	14.2	286.4	25.1	22311	13753	93652	1389.1	59.8	525.3	194.0	181.7	-10.7	-39.5	-90.4	267.1
11:05:00	31.8	11.0	176.2	195.1	14.2	284.9	25.7	22401	13972	98317	1394.3	56.6	525.9	194.0	181.7	-24.5	-59.7	-107.2	250.7
11:06:00	32.0	11.3	175.4	198.2	15.3	280.5	25.6	22048	13871	95203	1394.1	58.5	526.6	194.5	181.7	-7.4	-38.6	-82.7	290.3
11:07:00	32.1	10.8	175.9	197.4	13.8	284.0	24.8	22048	13758	93653	1404.4	66.9	526.6	194.0	181.7	-3.8	-33.7	-78.8	282.7
11:08:00	31.8	11.3	176.4	196.5	15.0	288.3	25.9	22048	13641	93660	1400.8	75.3	527.1	193.5	181.7	-7.4	-36.4	-83.2	293.4
11:09:00	32.0	11.8	176.5	199.7	15.1	285.8	24.7	21958	13770	92104	1407.4	76.6	527.6	193.5	181.7	-3.8	-32.7	-81.3	300.1
11:10:00	31.7	11.9	176.8	195.8	15.0	282.5	25.7	22048	13854	93331	1401.4	79.0	527.7	193.0	181.7	-10.6	-41.7	-90.9	286.0
11:11:00	31.6	11.1	174.9	198.6	15.0	285.8	25.7	22228	13742	93639	1403.8	76.9	526.8	192.5	181.7	-8.3	-39.4	-82.6	290.3
11:12:00	31.3	10.6	175.8	191.7	14.0	289.2	25.1	22318	13978	94779	1397.5	75.6	525.6	192.0	181.7	-10.4	-42.0	-91.5	266.4
11:13:00	31.7	11.2	176.4	196.5	14.0	292.0	25.8	22318	13876	94005	1396.9	63.7	524.5	191.5	181.7	-9.7	-41.1	-86.7	273.9
11:14:00	31.3	10.6	176.6	191.0	14.0	268.9	24.6	22221	13758	95765	1391.6	59.3	524.0	191.0	181.7	-10.9	-40.9	-85.8	291.3
11:15:00	31.9	11.2	177.0	194.1	14.1	288.0	25.9	22048	13972	94077	1397.0	55.4	523.0	191.0	181.7	-4.3	-36.2	-80.6	293.9
11:16:00	31.3	10.4	175.9	190.3	14.1	273.4	25.7	22408	13927	95879	1396.1	61.9	522.4	190.5	181.7	-13.2	-45.8	-93.9	287.9
11:17:00	31.9	11.7	177.4	197.6	15.3	287.0	25.8	22048	13910	95646	1396.4	58.5	521.8	190.5	180.6	-6.4	-38.8	-83.2	288.9
11:18:00	31.7	10.5	175.8	196.1	14.3	272.3	24.5	22753	13994	94846	1402.4	63.5	521.1	189.5	180.6	-19.7	-51.0	-106.8	273.9

Test No. 2 - September 26, 2018

Time	Waste Flows						PAC Flow	Air Flows			Temperatures					Pressures			
	Rich	Emulsion	Lean	Alkaline	Leachate	TDU 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
11:19:00	32.0	11.9	177.3	198.4	14.7	274.3	25.7	22318	13893	95236	1396.6	59.2	520.2	189.5	180.6	-11.3	-45.5	-89.8	279.4
11:20:00	31.7	11.5	177.2	197.0	14.7	273.2	25.8	22490	13876	98280	1397.4	54.9	519.7	189.0	180.6	-27.0	-63.3	-109.5	236.2
11:21:00	31.8	11.7	177.3	198.1	14.7	271.0	24.7	22221	13747	94981	1391.4	49.1	519.2	188.5	180.6	-11.0	-43.9	-90.3	262.6
11:22:00	31.7	10.6	175.4	196.4	14.7	267.3	24.5	22138	13629	100602	1396.8	48.2	518.4	188.0	179.6	-21.4	-57.8	-101.8	241.9
11:23:00	31.4	10.7	176.8	194.0	14.6	272.7	25.5	22048	13854	93372	1394.9	46.6	517.8	187.5	179.6	-7.6	-36.3	-84.4	287.2
11:24:00	31.2	10.6	176.7	196.0	14.6	275.9	24.9	22048	13702	93280	1394.9	47.3	517.3	187.0	179.6	-6.9	-38.1	-82.2	294.0
11:25:00	31.5	10.5	176.9	192.8	14.4	276.6	25.6	22221	13837	95858	1388.9	46.3	516.8	187.0	178.6	-9.0	-38.0	-86.5	288.0
11:26:00	32.0	10.1	177.1	194.9	14.4	284.4	25.2	22048	13843	94641	1393.0	42.4	516.2	187.0	178.6	-6.9	-36.6	-84.4	293.1
11:27:00	31.8	9.9	177.1	194.0	14.3	281.2	24.8	22318	13933	95986	1389.0	45.4	516.1	187.0	178.6	-13.6	-47.2	-97.0	277.5
11:28:00	31.9	10.0	176.9	195.4	14.3	287.8	25.7	22318	13949	95108	1390.8	37.9	515.9	187.0	178.6	-11.5	-44.0	-91.0	281.6
11:29:00	31.8	10.0	177.3	193.4	14.3	280.1	24.5	22490	13972	94292	1388.1	37.8	515.8	187.5	178.6	-14.7	-47.7	-97.8	260.0
11:30:00	32.0	10.3	177.9	195.2	14.7	282.0	24.6	22311	13955	95471	1387.8	33.7	515.8	188.0	178.6	-9.0	-43.7	-89.4	262.1
11:31:00	31.6	9.8	175.6	191.5	14.9	273.5	25.5	22573	13983	92965	1387.0	40.4	515.5	188.0	178.6	-9.2	-40.4	-89.4	282.8
11:32:00	31.9	11.0	177.5	194.9	13.8	266.5	24.8	22048	13742	93786	1390.6	44.7	515.6	188.0	178.6	-9.0	-38.8	-85.2	288.9
11:33:00	31.7	9.8	176.2	191.3	13.6	280.7	25.3	22318	13848	95229	1394.8	57.5	515.4	187.5	178.6	-16.7	-50.2	-99.2	282.0
11:34:00	31.7	11.0	178.4	194.7	14.0	278.9	25.6	22048	13860	93273	1393.3	56.5	515.0	188.0	178.6	-7.2	-40.2	-84.0	285.6
11:35:00	31.8	10.1	177.2	195.8	14.6	279.2	24.5	22573	13966	98239	1394.0	60.1	515.0	187.5	178.6	-28.9	-64.6	-114.0	241.8
12:56:00	31.6	11.4	177.7	195.6	14.7	291.8	25.7	22670	13848	98902	1382.8	53.0	508.1	185.0	175.6	-26.3	-63.4	-111.3	237.3
12:57:00	32.0	10.6	177.2	197.6	14.9	287.7	24.8	22138	13747	96269	1385.3	57.5	508.1	185.0	175.6	-9.1	-38.7	-83.3	279.6
12:58:00	31.9	10.9	177.2	197.6	14.9	291.2	25.8	22138	13798	99216	1394.8	70.8	508.2	185.0	175.6	-22.6	-57.9	-101.9	233.1
12:59:00	32.0	11.1	178.3	197.1	14.9	299.9	25.8	22221	13792	96339	1391.9	81.5	508.0	184.5	175.6	-7.7	-39.5	-86.8	280.4
13:00:00	32.0	10.4	176.3	199.0	14.9	303.2	25.8	21958	13792	93323	1401.1	87.2	508.3	184.5	175.6	-6.9	-34.6	-84.2	288.6
13:01:00	32.3	11.0	177.2	197.8	14.8	297.9	24.5	22318	13775	95532	1395.4	91.0	508.2	184.5	175.6	-15.0	-46.8	-94.1	274.3
13:02:00	32.2	10.4	176.2	196.7	14.8	300.2	25.8	22318	13899	92808	1398.5	88.7	508.1	184.5	175.6	-9.5	-42.2	-88.3	281.8
13:03:00	31.8	10.4	177.1	194.8	14.8	293.9	25.9	22490	13865	92903	1392.0	85.7	508.1	184.5	175.6	-15.3	-49.9	-97.1	259.9
13:04:00	31.7	10.8	176.8	197.1	14.7	287.4	24.5	22318	13747	93721	1392.8	76.5	508.1	184.5	175.6	-9.8	-43.9	-90.8	266.2
13:05:00	31.2	11.2	177.0	192.3	14.7	297.1	24.5	22311	13854	94378	1388.0	72.1	508.1	185.0	175.6	-8.8	-39.4	-91.5	287.8
13:06:00	31.8	11.0	177.5	195.6	14.8	289.4	25.5	22138	13635	94353	1387.8	64.3	507.9	185.0	175.6	-6.7	-37.4	-84.2	291.7
13:07:00	31.2	9.9	176.7	193.5	14.6	294.8	24.9	22408	13865	95291	1386.9	68.9	507.9	185.0	175.6	-13.8	-47.0	-97.2	290.7
13:08:00	31.6	11.2	177.2	196.4	14.6	294.4	24.7	22221	13747	94540	1388.9	66.6	507.8	185.0	175.6	-7.8	-39.6	-86.6	294.4
13:09:00	31.3	11.0	177.3	196.7	14.7	291.1	25.5	22670	13854	94550	1389.1	72.0	507.9	185.0	175.6	-19.7	-54.6	-103.5	278.3
13:10:00	31.9	10.8	177.1	199.1	15.0	296.9	24.5	22490	13848	94750	1388.6	66.9	508.0	185.0	175.6	-13.1	-45.2	-95.2	282.6
13:11:00	31.8	11.3	177.2	196.2	14.7	287.3	25.8	22490	13899	97354	1389.5	67.2	508.0	185.0	176.7	-28.5	-65.5	-117.2	243.9
13:12:00	32.2	11.1	177.1	199.0	14.3	284.4	24.9	22214	13725	92446	1390.1	68.4	507.8	185.0	176.7	-14.5	-47.7	-95.3	263.0
13:13:00	31.5	11.3	175.7	200.3	15.2	291.8	24.7	22408	13994	98677	1393.6	75.8	507.9	185.0	176.7	-29.2	-63.4	-115.3	247.1
13:14:00	31.6	10.6	177.0	197.3	15.2	293.9	24.9	22048	13697	94995	1395.6	78.1	508.1	185.0	176.7	-9.0	-40.3	-88.3	287.0
13:15:00	31.3	10.2	176.4	194.8	14.4	299.4	25.6	22048	13680	92196	1397.6	81.1	507.9	184.5	176.7	-7.4	-41.8	-85.4	276.6
13:16:00	31.3	10.3	177.1	195.5	14.4	300.3	25.4	22325	13663	95737	1393.4	79.6	508.2	184.5	176.7	-10.8	-43.1	-88.6	286.5
13:17:00	31.4	10.5	176.2	195.3	14.6	300.0	25.7	22048	13663	94103	1395.3	74.9	507.9	185.0	176.7	-8.5	-40.8	-83.4	293.1
13:18:00	31.0	10.9	176.0	193.6	14.6	293.8	24.5	22497	13893	94301	1388.8	72.5	508.1	185.0	175.6	-15.8	-48.7	-97.3	278.6
13:19:00	31.2	10.7	177.0	196.0	14.6	296.3	25.3	22138	13803	95468	1386.0	61.2	508.1	185.5	176.7	-10.9	-43.1	-91.0	282.8
13:20:00	31.1	10.5	177.5	193.7	14.6	288.5	25.1	22408	13714	94333	1378.1	56.3	508.1	185.5	176.7	-15.8	-49.3	-100.0	261.4
13:21:00	31.6	11.6	178.1	199.2	16.0	288.5	25.5	22318	13826	95159	1382.4	48.0	507.8	185.5	176.7	-13.6	-45.9	-92.0	267.0
13:22:00	31.4	10.8	177.6	197.8	15.0	291.7	25.8	22228	13775	94670	1383.1	52.8	507.8	185.5	176.7	-9.5	-37.9	-91.3	282.4
13:23:00	32.0	10.6	177.3	198.8	15.0	291.2	25.6	21861	13674	94322	1390.0	61.2	507.8	185.0	176.7	-6.8	-39.0	-86.7	287.3
13:24:00	31.6	11.4	177.2	195.3	15.2	290.6	25.5	22401	13820	96729	1393.1	74.1	507.8	184.0	176.7	-12.8	-45.4	-91.8	282.6
13:25:00	32.5	11.2	177.1	198.6	15.2	299.9	24.6	21868	13719	93717	1397.6	79.6	507.6	184.0	175.6	-7.8	-38.5	-88.1	291.7
13:26:00	31.9	11.2	175.8	196.4	15.2	296.4	25.4	22490	13826	95739	1402.4	89.5	507.6	184.0	175.6	-19.7	-51.7	-105.5	276.3
13:27:00	31.7	11.4	176.3	195.6	15.2	293.8	25.3	22318	13618	94431	1397.6	87.7	507.5	184.0	175.6	-14.2	-45.1	-94.2	282.3
13:28:00	31.1	10.5	176.9	192.1	15.2	294.8	25.5	22311	13708	99789	1394.3	80.6	507.8	184.0	175.6	-32.9	-70.9	-117.3	242.3
13:29:00	31.4	10.8	176.9	196.3	15.0	292.8	24.6	22490	13916	96240	1389.3	67.8	507.8	184.5	175.6	-12.8	-43.0	-94.0	260.6
13:30:00	31.1	11.0	174.5	194.3	15.1	294.6	25.7	22318	13865	99286	1389.9	59.9	507.6	184.5	175.6	-27.2	-64.3	-105.0	245.6

Test No. 2 - September 26, 2018

	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
13:31:00	31.5	10.2	176.7	193.5	14.9	302.5	25.6	22131	13629	95599	1384.3	53.2	507.8	185.0	175.6	-8.1	-35.4	-87.8	288.7
13:32:00	31.7	10.8	175.5	196.0	14.9	297.7	25.9	21965	13691	93742	1391.5	54.9	507.4	184.5	175.6	-7.8	-38.2	-85.0	295.9
13:33:00	32.2	11.1	176.1	199.0	15.0	303.5	25.7	22131	13837	94757	1390.8	59.5	507.3	184.5	175.6	-11.0	-40.8	-91.2	288.3
13:34:00	32.3	10.7	175.4	200.5	15.0	302.6	24.5	22318	13848	93806	1398.9	66.6	507.4	184.5	175.6	-8.6	-40.8	-85.1	296.7
13:35:00	32.2	11.4	175.2	197.3	15.9	303.1	24.6	22401	13921	94891	1395.6	76.7	507.1	184.0	175.6	-15.9	-47.3	-100.4	283.3
13:36:00	32.2	11.1	175.0	200.8	15.6	300.8	25.8	22138	13714	96462	1397.9	74.5	507.3	184.5	175.6	-10.9	-45.0	-92.4	285.8
13:37:00	32.1	10.9	175.2	201.6	15.5	304.5	24.9	22318	13832	96103	1395.5	75.2	507.3	184.0	175.6	-15.0	-48.5	-97.2	263.8
13:38:00	31.9	10.9	175.2	196.9	15.4	296.3	25.8	22318	13826	96360	1398.1	71.3	507.3	184.0	175.6	-13.5	-44.1	-92.8	271.1
13:39:00	31.4	10.8	174.2	192.3	15.0	299.8	24.9	22580	13815	96430	1394.0	67.4	507.3	184.0	175.6	-16.4	-47.4	-95.6	293.4
13:40:00	32.1	11.2	175.3	196.3	15.0	288.6	25.2	22318	13775	93165	1392.6	60.2	507.2	184.0	175.6	-10.2	-40.9	-87.6	295.8
13:41:00	31.5	11.2	174.7	194.9	14.9	289.1	25.8	22490	14034	94789	1395.0	61.3	507.0	184.0	175.6	-16.8	-50.9	-100.3	289.3
13:42:00	32.3	9.8	175.1	195.0	14.7	289.0	25.0	22138	13803	92332	1395.0	57.2	507.1	184.5	175.6	-10.1	-41.7	-88.3	292.9
13:43:00	31.3	10.4	174.5	194.8	14.3	299.0	25.8	22843	14051	97712	1396.5	60.7	506.8	184.5	175.6	-29.7	-67.6	-115.5	245.9
13:44:00	31.5	10.7	175.3	197.9	15.3	295.1	25.3	22408	13848	96205	1386.5	54.7	506.9	185.0	175.6	-13.9	-46.3	-94.8	279.1
13:45:00	32.0	10.9	174.5	195.0	14.9	295.9	25.5	22318	14062	101178	1389.1	49.8	506.6	185.0	175.6	-28.1	-64.1	-110.5	235.3
13:46:00	32.7	11.3	174.7	201.0	14.9	296.7	25.8	22318	13933	94607	1387.1	50.3	506.7	185.0	175.6	-16.6	-49.3	-95.0	263.0
13:47:00	32.1	11.3	175.7	196.6	14.9	292.8	25.2	22408	13949	93686	1396.5	57.2	506.7	185.0	175.6	-12.9	-51.0	-91.0	252.3
13:48:00	32.2	11.6	175.0	198.7	14.9	293.6	25.6	22228	13815	94659	1399.9	65.1	507.0	185.0	175.6	-11.5	-44.1	-91.9	293.3
13:49:00	32.3	10.9	175.4	198.5	15.1	288.8	24.9	22048	13787	93597	1405.5	74.0	506.9	184.5	175.6	-7.4	-37.5	-86.4	296.6
13:50:00	32.1	11.0	174.4	198.4	15.0	294.1	25.1	22318	13916	95166	1403.1	78.3	507.0	184.5	175.6	-11.0	-41.1	-89.4	291.6
13:51:00	32.3	10.8	174.9	197.1	15.0	291.3	24.6	22131	13702	94004	1407.9	78.4	507.0	184.5	175.6	-7.4	-36.0	-83.5	295.4
13:52:00	32.0	10.3	174.8	193.7	14.8	298.9	25.6	22408	13955	96022	1400.5	77.7	507.1	184.5	175.6	-16.2	-50.1	-99.9	282.0
13:53:00	32.5	10.7	175.1	195.1	14.8	293.9	25.8	22325	13843	93694	1402.1	66.1	507.0	185.0	175.6	-12.2	-45.9	-94.3	283.9
13:54:00	30.6	10.3	177.0	192.7	14.7	297.2	25.8	22670	13865	96887	1393.8	59.4	507.2	185.0	175.6	-16.6	-49.6	-103.7	261.4
13:55:00	31.4	10.1	177.1	196.6	14.6	296.7	25.8	22318	13860	95874	1390.1	43.7	506.8	185.5	175.6	-13.8	-48.0	-94.9	264.8
13:56:00	31.2	10.1	176.9	194.4	14.6	286.7	25.9	22670	13927	94371	1386.1	37.1	506.8	185.5	175.6	-13.4	-45.9	-97.3	284.8
13:57:00	31.8	11.1	178.0	199.7	15.6	294.4	25.1	22138	13843	95337	1390.9	32.9	506.6	185.5	175.6	-8.5	-38.9	-87.4	286.9
13:58:00	31.6	10.5	175.9	196.8	15.5	292.5	24.8	22670	13938	96427	1393.5	42.5	506.2	184.5	175.6	-16.9	-47.5	-109.3	278.9
13:59:00	32.1	10.9	176.0	199.2	15.5	282.4	24.5	22138	13646	96132	1396.1	48.3	506.1	184.5	175.6	-10.5	-43.7	-87.7	286.6
14:00:00	31.5	10.4	174.5	197.6	15.5	288.4	25.7	22580	13871	98779	1398.9	56.1	506.0	184.0	175.6	-29.1	-66.9	-117.6	239.7
14:01:00	31.8	10.8	176.0	199.3	15.5	294.2	25.4	22318	13753	95707	1395.9	59.3	505.9	184.0	175.6	-13.3	-44.6	-91.5	276.4
14:02:00	32.0	10.8	174.2	198.0	13.9	290.6	25.7	22318	13860	99450	1396.8	61.8	505.7	184.0	175.6	-25.4	-64.8	-100.2	237.0
14:03:00	32.1	10.7	175.7	194.6	14.7	295.7	24.5	22408	13893	95512	1389.8	58.3	505.7	184.0	175.6	-13.0	-44.5	-98.9	259.9
14:04:00	31.5	10.4	175.1	193.7	14.7	295.1	25.1	22318	13787	93575	1391.5	57.3	505.8	184.0	175.6	-12.3	-44.5	-93.4	267.6
14:05:00	30.6	9.8	174.8	194.1	14.6	286.7	24.6	22228	13893	95188	1382.1	51.2	505.8	184.5	175.6	-13.7	-45.2	-92.1	288.8
14:06:00	30.9	10.2	174.2	196.4	14.6	288.8	24.5	22145	13854	95034	1381.8	43.2	505.7	184.0	175.6	-9.0	-39.7	-84.4	291.9
14:07:00	30.8	10.0	174.5	193.2	14.6	291.5	24.6	22048	13815	94578	1376.0	41.0	505.5	183.5	175.6	-16.8	-49.0	-95.9	288.0
14:08:00	31.5	10.4	175.8	196.0	15.0	291.5	24.7	22228	13916	93848	1379.4	36.6	505.3	183.5	175.6	-10.1	-41.8	-90.2	290.3
14:09:00	31.2	10.1	174.0	195.9	15.0	289.7	25.8	22580	13815	95846	1376.9	40.3	504.9	183.5	175.6	-16.3	-49.1	-98.3	275.8
14:10:00	31.6	11.1	175.5	199.5	15.0	290.4	24.5	22401	13921	95384	1376.3	40.5	504.8	183.0	175.6	-16.2	-49.8	-98.4	284.3
14:11:00	31.2	10.5	174.9	196.8	15.0	288.8	25.8	22484	13927	95801	1379.6	45.1	504.6	183.0	175.6	-19.8	-52.8	-101.4	261.7
14:12:00	31.6	10.3	176.8	198.7	16.1	278.9	24.6	22318	13826	95719	1378.4	46.6	504.4	183.0	175.6	-15.8	-48.8	-97.0	268.8
14:13:00	31.2	10.2	160.5	198.5	15.0	285.8	24.9	22580	13826	95157	1381.5	50.9	504.2	182.5	174.6	-16.3	-48.0	-103.6	289.3
14:14:00	31.3	10.2	174.9	198.7	15.0	284.3	25.8	22228	13837	94176	1381.9	59.1	503.8	182.0	174.6	-12.2	-43.1	-90.8	290.9
14:15:00	31.2	10.1	173.3	196.2	15.0	279.9	25.6	22587	13955	98545	1384.5	62.4	503.8	181.5	174.6	-37.1	-72.5	-123.9	258.5
14:16:00	31.2	10.1	176.1	193.8	15.0	280.2	25.9	22408	13916	94797	1377.5	56.9	503.4	181.5	174.6	-12.0	-40.6	-94.4	292.4
14:17:00	31.0	10.1	173.5	192.3	14.9	287.5	25.8	22318	13747	98127	1382.1	57.9	503.2	181.5	174.6	-33.9	-70.3	-118.2	242.8
14:18:00	31.2	9.8	175.3	193.4	14.9	291.8	24.5	22587	13742	95718	1372.8	55.7	503.2	182.0	173.6	-17.4	-49.6	-99.7	277.9
14:19:00	31.2	9.7	175.7	194.4	14.9	296.3	25.8	22318	13848	94821	1374.3	51.9	503.0	182.0	173.6	-13.3	-45.0	-96.7	273.9
14:20:00	30.9	10.3	174.6	192.6	14.9	299.6	24.8	22145	13888	95905	1370.3	48.9	503.0	182.5	174.7	-19.0	-46.2	-102.9	263.9
14:21:00	31.1	10.2	175.0	195.5	14.9	296.5	25.8	22318	13865	94289	1372.5	47.1	502.8	182.5	174.7	-13.8	-43.9	-95.7	265.8
14:22:00	31.2	10.2	175.5	195.2	14.7	299.4	24.9	22221	13820	95431	1369.1	48.9	502.5	182.5	174.7	-15.4	-43.4	-96.4	289.3

Test No. 2 - September 26, 2018

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
14:23:00	31.4	9.7	175.2	193.6	14.7	293.5	25.8	22048	13933	96476	1373.8	53.3	502.2	182.5	174.7	-8.9	-37.1	-89.5	292.1
14:24:00	30.6	9.9	174.7	194.4	14.7	302.8	25.8	22131	13848	94628	1367.6	58.7	502.1	182.0	174.7	-15.3	-48.0	-95.0	284.5
14:25:00	30.9	10.1	175.7	196.8	14.9	293.9	24.8	22138	13843	96097	1371.1	58.8	501.7	182.0	174.7	-16.3	-46.0	-91.8	292.5
14:26:00	32.3	10.2	175.3	192.8	14.9	293.8	24.6	22490	14045	96310	1370.1	63.6	501.5	182.0	173.6	-24.3	-55.1	-104.8	276.5
14:27:00	32.5	10.2	175.4	198.9	14.9	299.5	25.5	22221	14062	96121	1372.9	68.7	501.2	182.0	173.6	-18.1	-48.1	-97.9	278.3
14:28:00	32.3	9.7	175.2	196.2	14.9	293.8	25.3	22670	14056	96910	1380.0	83.4	501.4	182.0	173.6	-19.9	-53.9	-103.1	252.8
14:29:00	32.5	10.3	175.4	196.7	14.9	279.8	24.6	22497	13910	96102	1381.0	87.9	501.1	182.0	173.6	-17.5	-49.8	-96.2	260.1
14:30:00	32.4	10.4	177.3	196.9	14.9	283.2	25.4	22573	13966	96587	1384.8	93.0	501.1	181.5	173.6	-20.4	-50.2	-106.8	277.4
14:31:00	33.1	11.4	175.6	197.8	15.5	287.8	24.8	22221	13753	95513	1391.0	101.9	501.3	181.5	173.6	-10.0	-41.5	-85.8	279.4
14:32:00	32.5	10.6	173.5	197.3	15.5	293.1	25.7	22497	14011	100348	1401.8	117.4	501.3	181.0	173.6	-32.0	-68.4	-115.5	238.3
14:33:00	32.7	10.3	174.9	196.2	14.4	286.4	25.7	22318	13882	93894	1399.5	122.9	501.4	181.5	173.6	-9.7	-38.2	-85.2	283.8
14:34:00	32.4	10.3	173.4	194.8	14.1	288.8	25.6	22145	13758	99656	1404.5	126.0	501.9	181.5	173.6	-30.7	-66.9	-106.5	243.3
14:35:00	32.2	10.0	175.3	195.3	15.1	291.2	24.5	22677	13848	97524	1394.9	119.1	502.0	182.0	173.6	-15.1	-48.5	-98.1	279.8
14:36:00	32.3	8.3	174.6	194.0	15.1	288.0	25.7	22318	13747	93536	1395.3	105.3	502.2	182.5	173.6	-12.5	-43.6	-96.0	283.7
14:37:00	32.7	9.5	174.9	195.4	14.9	287.3	25.4	22497	13714	95278	1390.5	97.6	502.4	182.5	173.6	-17.8	-49.2	-101.4	262.6
14:38:00	32.6	10.7	178.3	198.0	14.7	283.1	24.6	22138	13826	95389	1395.4	91.3	502.8	183.0	173.6	-9.9	-41.4	-91.8	264.5
14:39:00	32.7	11.0	176.3	195.9	14.7	286.7	25.3	22408	13854	94765	1398.0	93.6	503.1	183.0	173.6	-12.3	-44.0	-90.8	289.7
14:40:00	32.9	11.0	177.4	200.7	15.9	287.6	24.8	22131	13753	94705	1403.3	100.0	503.4	183.5	173.6	-7.5	-36.8	-84.2	291.3
14:41:00	32.6	10.4	177.2	196.7	14.9	279.5	24.5	22408	13899	94776	1407.0	107.6	503.5	183.0	173.6	-12.4	-44.2	-90.2	284.4
14:42:00	32.9	10.9	176.7	198.7	16.0	291.9	24.7	22228	13747	93100	1408.6	108.3	503.9	183.5	173.6	-7.8	-40.4	-84.2	291.3
14:43:00	32.9	10.3	176.9	195.8	14.9	293.7	25.0	22318	13876	96635	1411.9	112.4	504.1	183.0	173.6	-19.2	-55.0	-99.9	281.9
14:44:00	32.9	10.8	176.0	195.7	15.2	292.1	25.5	22318	13758	94070	1411.9	107.5	504.6	184.0	174.7	-14.5	-47.9	-92.1	284.9
14:45:00	32.2	10.6	176.7	195.3	15.2	287.9	25.8	22670	13899	96013	1410.1	102.1	504.9	184.0	174.7	-18.2	-51.9	-101.4	263.4
14:46:00	32.4	10.6	178.0	195.7	14.9	275.0	24.6	22228	13758	94230	1406.9	88.4	505.1	184.5	174.7	-12.0	-44.1	-92.3	266.7
14:47:00	31.8	10.4	176.0	195.1	14.9	283.7	25.0	22670	13826	96939	1404.4	79.5	505.6	185.0	174.7	-28.3	-62.0	-115.8	265.9
14:48:00	32.1	10.3	177.9	194.1	14.8	287.9	24.5	22048	13781	93232	1400.9	68.2	505.7	185.5	174.7	-10.6	-40.3	-89.4	291.6
14:49:00	31.7	10.6	176.4	194.0	14.8	277.3	24.6	22580	13730	97332	1403.3	65.1	506.1	185.0	174.7	-29.1	-66.0	-112.8	243.3
14:50:00	32.3	10.0	177.5	195.5	14.8	275.0	24.4	22228	13820	95911	1400.1	61.4	506.1	185.5	174.7	-10.8	-41.7	-91.7	291.0
14:51:00	32.1	10.6	177.0	192.3	14.9	284.6	24.8	22055	13792	93005	1403.4	60.7	506.4	185.5	175.7	-7.8	-40.2	-87.7	282.2
14:52:00	32.0	10.2	176.3	196.7	14.6	280.0	24.6	22490	13910	94894	1393.9	60.0	506.4	185.5	175.7	-18.7	-51.6	-101.7	283.5
14:53:00	31.9	10.2	176.9	193.0	14.8	281.6	25.3	22490	13798	94118	1397.0	49.8	506.1	186.0	175.7	-13.6	-45.4	-96.6	285.0
14:54:00	31.5	10.5	176.2	194.6	14.4	281.9	24.9	22228	13792	95643	1390.0	42.1	506.4	186.0	176.7	-16.4	-48.7	-99.2	262.3
14:55:00	32.0	10.9	178.3	192.8	14.6	273.7	25.6	22394	13652	94883	1392.0	32.5	506.1	186.0	176.7	-11.5	-42.6	-90.6	266.5
14:56:00	32.2	10.5	178.6	195.3	14.6	283.2	25.3	22318	13787	94862	1391.1	30.6	506.3	186.0	176.7	-11.7	-41.1	-93.2	286.7
Max	33.1	12.7	178.6	201.6	16.1	304.5	25.9	22933	14067	101178	1411.9	173.5	527.7	194.5	181.7	-3.8	-32.7	-78.8	300.2
Min	29.4	8.3	160.5	189.9	13.0	259.5	24.4	21861	13618	92104	1346.0	30.6	491.2	177.5	171.6	-37.1	-72.5	-123.9	233.1
Average	31.6	10.9	175.8	195.8	14.7	287.5	25.2	22338	13850	95371	1385.8	80.7	505.9	185.3	176.0	-14.2	-46.2	-94.0	275.4

Test No. 3 - September 27, 2018

	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 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
9:16:00	30.8	0.0	129.2	204.3	13.0	280.9	25.8	23279	14421	95249	1341.6	24.6	496.0	184.0	174.3	-35.4	-60.0	-113.4	287.9
9:17:00	30.6	11.0	180.1	200.7	13.2	276.0	24.5	22567	14242	97256	1328.8	-52.0	495.1	181.0	174.3	-10.4	-36.6	-94.7	294.7
9:18:00	30.5	10.1	180.4	201.7	12.5	280.9	24.6	22573	14118	94977	1332.4	-33.1	494.7	179.5	173.3	-9.1	-38.9	-91.2	302.9
9:19:00	30.2	10.7	173.2	199.9	12.5	278.6	24.5	23016	14303	94720	1326.5	-33.3	494.2	179.5	172.3	-22.1	-37.0	-105.7	298.9
9:20:00	30.2	11.2	184.2	203.3	12.8	282.5	25.3	22663	14208	95957	1329.5	-7.1	493.8	179.5	172.3	-8.3	-37.6	-92.4	302.6
9:21:00	30.7	9.9	183.2	201.7	12.6	271.6	25.8	22836	14450	97640	1324.8	-16.6	493.4	180.0	172.3	-14.2	-41.5	-102.0	285.0
9:22:00	31.5	11.8	181.6	201.3	12.5	281.2	25.7	22484	14219	97703	1322.5	-0.3	493.3	180.5	172.3	-13.7	-41.5	-98.6	292.0
9:23:00	31.0	11.2	180.8	201.9	12.3	271.7	25.0	23016	14242	97646	1323.0	-11.6	493.1	181.0	172.3	-19.1	-47.2	-108.3	269.9
9:24:00	31.6	11.6	181.5	203.1	12.3	276.8	25.8	22663	14112	96814	1326.8	15.5	493.1	181.5	172.3	-10.9	-38.6	-96.9	272.1
9:25:00	31.5	12.1	181.3	201.4	12.3	285.3	24.7	22836	14230	94918	1333.0	4.7	493.0	182.0	172.3	-8.7	-36.6	-93.8	288.9
9:26:00	32.0	11.7	182.6	206.4	13.7	281.3	25.5	22484	14124	95574	1346.4	50.7	492.9	182.0	172.3	-2.9	-27.5	-84.7	291.5
9:27:00	30.8	28.1	180.2	206.9	12.6	284.5	24.9	23099	14365	100972	1354.4	80.7	492.6	181.5	172.3	-28.2	-54.6	-121.7	274.3
9:28:00	32.0	12.4	181.2	208.3	12.8	283.1	25.7	22573	14197	95115	1355.6	94.4	492.7	182.0	172.3	-6.5	-34.1	-90.2	299.0
9:29:00	31.7	11.1	181.5	206.4	13.2	258.7	25.6	22746	14225	101896	1361.6	106.6	492.8	181.5	172.3	-24.4	-55.0	-117.2	249.4
9:30:00	31.8	11.2	181.7	204.1	13.2	271.7	24.6	22836	14191	95920	1354.4	108.9	492.7	182.0	172.3	-11.3	-39.0	-97.5	291.6
9:31:00	31.0	10.7	180.2	200.8	13.2	273.8	25.4	22663	14191	98486	1352.9	109.3	492.7	182.0	172.3	-10.5	-38.7	-98.7	274.4
9:32:00	30.8	11.6	180.8	202.7	13.2	268.4	25.5	22567	14157	96845	1345.0	93.2	492.9	182.0	172.3	-11.8	-38.5	-96.1	270.5
9:33:00	31.4	11.1	181.4	202.8	12.2	273.9	25.3	22573	14242	96603	1345.0	87.1	492.8	182.5	172.3	-8.3	-36.5	-92.7	276.9
9:34:00	31.8	11.4	181.3	203.9	12.2	273.0	25.1	22573	14135	97347	1344.3	79.5	492.7	182.5	172.3	-6.3	-32.5	-92.2	298.1
9:35:00	31.8	11.8	181.2	206.0	13.2	270.0	25.8	22221	14034	93862	1351.6	89.0	492.8	182.0	172.3	-5.1	-30.3	-87.3	300.6
9:36:00	31.6	11.5	181.2	205.2	13.3	273.1	25.3	22573	14191	95798	1353.0	93.4	492.8	182.0	172.3	-8.9	-35.6	-93.7	294.8
9:37:00	32.2	11.8	180.2	207.1	12.7	271.3	24.6	22401	14056	97192	1359.4	101.6	492.6	181.5	172.3	-5.8	-31.7	-87.9	301.3
9:38:00	31.8	10.5	180.1	206.4	13.0	282.1	24.5	22746	14287	97478	1358.0	96.4	492.6	181.0	172.3	-14.0	-42.2	-102.1	284.2
9:39:00	32.1	11.9	180.5	205.7	13.0	277.7	25.7	22573	14163	97266	1356.8	99.9	492.6	181.0	172.3	-10.0	-36.4	-95.5	287.8
9:40:00	31.4	9.9	180.2	200.1	13.1	274.9	25.9	22926	14163	96867	1353.8	77.8	492.3	181.0	172.3	-18.2	-48.0	-104.8	265.9
9:41:00	31.6	11.0	180.4	201.3	12.6	277.7	24.5	22670	14163	95808	1351.3	89.0	492.5	181.5	172.3	-9.3	-34.6	-94.7	268.8
9:42:00	31.6	10.0	179.9	201.2	12.2	280.1	25.5	22926	14287	94808	1351.4	77.5	492.4	182.0	172.3	-13.4	-41.6	-100.3	287.4
9:43:00	31.9	11.7	181.0	203.1	12.8	276.1	25.8	22394	14067	93718	1357.3	91.5	492.4	182.0	172.3	-5.8	-33.7	-87.8	291.7
9:44:00	31.6	10.3	180.5	199.6	12.8	264.5	25.9	22836	14309	100857	1362.3	98.0	492.4	182.0	172.3	-27.2	-57.7	-119.7	246.5
9:45:00	31.7	9.9	181.9	204.1	12.6	275.9	25.0	22311	14090	94107	1361.6	100.2	492.4	182.5	172.3	-5.7	-32.5	-86.6	287.3
9:46:00	31.9	12.1	181.0	199.3	12.1	280.3	24.8	22484	14090	100972	1364.9	100.6	492.5	182.0	172.3	-23.6	-56.2	-112.7	241.7
9:47:00	32.1	11.6	181.1	201.1	13.2	279.8	24.7	22663	14157	96601	1361.1	101.0	492.6	182.5	172.3	-11.1	-40.6	-97.1	282.9
9:48:00	32.3	10.7	180.4	200.8	13.4	276.2	25.9	22311	14146	96369	1363.0	98.2	492.6	183.0	173.5	-10.0	-38.9	-93.0	287.8
9:49:00	32.6	11.7	181.5	205.2	13.2	280.7	25.6	22484	14242	94941	1363.5	82.7	492.7	183.5	173.5	-9.2	-38.3	-95.1	261.6
9:50:00	32.9	10.6	180.7	207.2	13.7	284.6	25.4	22484	14118	96175	1369.0	76.0	493.0	184.0	173.5	-5.1	-32.5	-90.0	268.3
9:51:00	32.5	11.2	181.5	203.4	13.0	285.6	25.4	22567	14118	96102	1373.6	43.4	493.1	184.0	173.5	-4.5	-31.5	-87.5	286.0
9:52:00	33.2	11.4	180.9	207.5	13.1	277.6	25.6	22131	14006	95422	1383.1	36.0	493.4	184.0	173.5	-2.5	-27.3	-83.7	293.2
9:53:00	30.8	11.4	180.9	204.3	12.8	273.9	25.9	22573	14135	96514	1377.9	38.6	493.4	183.5	173.5	-8.3	-35.5	-92.6	289.4
9:54:00	29.6	11.1	180.7	208.7	13.6	278.1	25.8	22311	14135	94603	1371.9	17.0	493.2	183.0	173.5	-3.7	-28.6	-84.0	292.1
9:55:00	29.1	10.5	181.0	200.7	12.4	279.7	25.6	22926	14270	96568	1353.3	28.6	493.3	181.5	173.5	-17.1	-45.6	-106.0	287.6
9:56:00	30.9	11.8	181.0	204.8	12.3	270.6	24.5	22573	14146	95360	1342.9	-4.6	493.0	181.5	173.5	-13.3	-41.0	-99.3	292.7
9:57:00	31.1	11.6	180.9	203.6	12.3	272.0	24.5	23009	14219	95926	1342.6	2.3	493.1	181.0	173.5	-22.3	-53.5	-113.6	273.1
9:58:00	31.2	11.5	181.0	205.8	14.0	277.7	24.8	22573	14219	96055	1341.4	14.0	492.8	182.0	173.5	-10.6	-37.0	-98.8	272.3
9:59:00	31.5	11.7	179.7	207.5	13.5	280.7	24.5	23016	14298	100123	1347.0	26.4	492.8	182.0	172.4	-26.6	-56.4	-119.0	268.8
10:00:00	31.4	11.2	180.8	205.7	13.5	282.3	25.8	22221	14079	95023	1348.8	34.9	492.8	181.5	172.4	-6.8	-35.6	-90.0	298.4
10:01:00	31.6	10.7	180.5	204.5	12.7	277.1	25.5	22753	14180	101181	1356.1	43.5	492.6	181.0	172.4	-29.5	-62.9	-123.2	252.3
10:02:00	32.0	12.0	181.8	207.9	13.6	278.0	25.5	22663	14062	95645	1354.6	46.2	492.4	181.0	172.4	-7.5	-34.0	-92.3	296.8
10:03:00	31.7	10.7	180.0	206.8	13.1	286.1	25.6	22311	14056	95361	1363.3	55.9	492.2	181.0	172.4	-7.3	-36.2	-94.4	291.0
10:04:00	31.5	10.5	181.7	205.2	13.1	275.0	24.8	22573	14157	96607	1357.1	57.0	492.3	181.0	172.4	-13.2	-42.3	-101.7	288.5
10:05:00	31.6	10.1	179.6	201.7	13.1	282.6	24.5	22484	14124	97154	1358.1	67.6	492.4	181.5	172.4	-10.3	-41.2	-96.3	293.4
10:06:00	31.6	11.0	181.8	201.6	12.2	279.6	25.2	22663	14107	98125	1353.5	60.4	492.6	182.0	172.4	-13.3	-41.2	-102.3	268.8
10:07:00	31.7	10.7	180.7	204.1	13.6	280.3	24.6	22573	14107	96199	1355.0	62.6	492.4	182.5	172.4	-10.4	-37.9	-97.1	273.3

Test No. 3 - September 27, 2018

	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 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
10:08:00	31.1	9.8	181.0	201.4	12.6	275.4	25.7	22490	14112	97312	1352.8	60.7	492.6	183.0	172.4	-10.8	-39.9	-95.7	295.3
10:09:00	31.5	11.2	181.3	201.5	13.5	285.8	25.8	22304	14242	96904	1355.5	64.7	492.6	183.0	172.4	-7.0	-34.7	-89.7	299.6
10:10:00	31.0	10.5	180.8	200.7	12.8	282.8	24.5	22753	14174	95993	1352.9	61.1	492.4	183.0	172.4	-11.3	-39.1	-99.4	291.9
10:11:00	31.5	11.0	182.0	204.8	12.8	284.4	25.7	22221	14073	95090	1351.3	67.7	492.6	183.5	172.4	-6.9	-32.5	-90.6	296.3
10:12:00	30.9	10.8	181.2	200.7	12.6	278.2	24.8	22836	14303	97474	1351.9	62.1	492.6	183.0	172.4	-18.2	-47.9	-108.2	283.1
10:13:00	31.5	11.3	181.8	205.9	13.2	284.8	25.1	22394	14191	97297	1347.8	61.5	492.6	183.5	173.4	-12.9	-40.8	-99.2	286.3
10:14:00	30.6	10.8	180.9	203.5	13.2	282.7	24.8	22926	14185	96215	1350.4	53.2	492.5	183.0	173.4	-22.8	-52.0	-114.7	262.9
10:15:00	31.0	10.6	181.5	205.0	13.7	285.6	24.8	22401	14079	98184	1344.9	46.8	492.5	183.0	173.4	-10.7	-38.7	-97.2	268.3
10:16:00	30.9	11.2	181.4	204.3	13.7	276.3	25.5	22843	14185	99470	1346.3	45.4	492.3	182.5	173.4	-31.7	-65.3	-126.6	256.8
10:17:00	31.2	11.7	181.6	206.6	13.7	287.7	25.5	22221	14079	97183	1348.6	50.7	492.2	182.0	173.4	-7.8	-35.1	-92.4	296.5
10:18:00	30.8	11.3	180.2	204.3	13.7	285.2	24.5	22573	14079	100869	1354.8	59.5	492.0	181.0	173.4	-25.0	-58.5	-116.5	248.1
10:19:00	30.7	10.5	180.2	203.2	13.8	285.5	24.8	22573	14185	96924	1350.3	65.3	492.0	181.0	172.3	-10.1	-40.0	-95.4	299.2
10:20:00	31.0	9.4	180.3	203.2	13.4	286.1	24.6	22401	14073	95851	1353.3	75.4	491.8	180.5	172.3	-9.3	-37.8	-93.0	305.9
10:21:00	30.8	11.5	181.9	202.5	13.2	283.0	24.8	22663	14174	96447	1345.8	70.6	491.6	181.0	172.3	-14.6	-44.8	-104.0	286.7
10:22:00	30.9	11.1	181.5	206.0	13.2	279.2	25.1	22490	14051	95830	1342.9	69.5	491.5	181.0	172.3	-13.1	-42.9	-100.3	293.1
10:23:00	31.0	11.0	181.5	205.3	13.2	284.7	24.4	22670	14191	96134	1340.9	60.4	491.5	181.0	172.3	-17.4	-48.8	-106.3	267.6
10:24:00	32.4	11.6	181.2	207.0	12.9	275.9	25.8	22484	14107	95249	1349.8	67.5	491.4	181.0	172.3	-12.0	-40.9	-101.0	273.3
10:25:00	32.4	10.9	181.3	204.2	12.9	284.1	25.3	22573	14112	94925	1353.3	76.8	491.3	181.0	172.3	-11.0	-41.1	-98.7	291.2
10:26:00	32.6	11.5	181.3	208.1	14.2	284.6	24.4	22221	14028	95470	1364.9	92.8	491.3	181.0	172.3	-7.1	-31.9	-92.2	295.7
10:27:00	31.9	10.5	180.6	203.4	13.3	283.4	24.5	22580	14163	96545	1369.5	99.7	491.3	181.0	172.3	-14.7	-45.2	-102.8	294.6
10:28:00	31.7	11.6	181.6	205.6	13.3	278.3	24.6	22221	14051	94876	1367.0	104.8	491.5	181.0	172.3	-7.7	-37.0	-93.8	297.0
10:29:00	31.0	11.1	180.7	200.9	12.9	278.8	25.1	22663	14258	96493	1364.5	87.2	491.4	181.0	172.3	-21.9	-53.9	-115.0	288.4
10:30:00	31.6	11.4	181.2	203.0	12.9	274.7	24.9	22490	14135	96399	1357.6	91.3	491.5	181.5	172.3	-12.0	-40.2	-100.9	289.6
10:31:00	31.2	10.9	180.2	203.4	13.0	277.1	24.9	22843	14174	99372	1354.8	79.3	491.5	182.0	172.3	-30.3	-62.4	-126.0	248.9
10:32:00	31.7	10.7	179.9	200.3	13.0	274.3	25.2	22311	14169	96658	1353.3	79.1	491.5	182.5	172.3	-11.9	-40.7	-100.7	270.4
10:33:00	31.4	11.1	180.5	199.5	12.8	280.4	25.2	22753	14303	100122	1356.6	84.5	491.7	183.0	172.3	-29.2	-61.0	-125.2	256.5
10:34:00	31.9	11.1	182.1	200.4	13.1	274.5	25.8	22221	14051	95308	1355.5	87.0	491.8	183.5	172.3	-10.1	-39.5	-96.0	299.3
10:35:00	31.7	10.8	180.7	202.2	13.1	283.8	25.3	22318	13966	94998	1366.0	89.9	491.7	183.5	172.3	-7.8	-41.3	-94.1	273.1
10:36:00	30.9	11.6	181.7	205.1	13.1	276.6	24.8	22221	14045	94342	1359.6	83.1	491.8	184.0	173.4	-10.4	-38.5	-99.7	295.9
10:37:00	31.7	12.1	181.0	207.7	14.0	284.7	25.6	22048	14169	95747	1360.3	88.9	491.9	184.0	173.4	-6.1	-33.2	-93.1	302.1
10:38:00	31.3	11.2	181.2	206.7	13.1	283.4	25.7	22401	14062	96732	1358.9	81.0	492.0	183.5	173.4	-12.9	-43.0	-105.6	287.1
10:39:00	31.2	11.6	180.2	205.6	13.6	285.6	24.8	22408	14185	97469	1361.1	88.9	491.9	183.5	173.4	-10.5	-38.6	-98.4	291.3
10:40:00	31.3	11.0	181.7	203.7	13.6	289.3	24.5	22753	14292	96347	1357.4	78.1	492.0	183.0	173.4	-15.4	-44.4	-107.2	269.9
10:41:00	31.7	11.0	180.9	207.2	13.8	288.4	25.8	22318	14051	95907	1359.5	83.3	492.0	183.0	173.4	-11.0	-39.4	-99.5	274.9
10:42:00	30.9	10.4	180.9	205.6	13.8	295.1	24.9	22490	14067	95079	1359.0	79.4	491.9	182.0	173.4	-11.9	-40.9	-100.2	296.9
10:43:00	30.9	11.0	180.7	205.6	13.4	291.5	24.8	22131	13949	95104	1360.6	87.9	491.9	182.0	173.4	-7.3	-36.8	-92.5	301.1
10:44:00	30.5	10.5	181.0	201.9	12.4	294.2	24.5	22926	14101	96977	1359.0	84.9	491.8	181.5	173.4	-13.5	-42.8	-104.0	293.0
10:45:00	30.8	10.2	181.6	203.6	13.2	291.5	25.8	22401	14129	96028	1355.3	85.3	491.7	181.5	173.4	-9.0	-38.8	-95.6	299.7
10:46:00	31.1	10.7	180.9	203.7	13.1	292.1	24.5	22760	14253	97130	1356.1	86.3	491.7	181.5	172.3	-23.3	-52.9	-120.9	284.4
10:47:00	31.4	11.8	181.6	208.8	14.3	288.1	24.5	22580	14034	96042	1354.4	90.7	491.6	181.5	172.3	-13.1	-41.0	-103.1	286.6
10:48:00	31.9	11.6	180.5	204.1	14.2	284.6	24.5	22663	14141	98369	1362.0	98.6	491.5	181.5	172.3	-29.4	-62.1	-126.6	243.5
10:49:00	31.9	10.4	180.8	206.5	13.2	277.2	24.5	22580	14023	96431	1362.8	95.4	491.4	181.5	172.3	-11.7	-41.7	-102.0	267.7
10:50:00	31.5	12.0	180.2	206.8	13.7	275.9	25.6	22580	14135	101123	1365.0	100.0	491.3	181.5	172.3	-27.0	-60.7	-120.3	251.5
10:51:00	31.7	12.3	181.4	207.0	13.7	288.2	24.9	22401	13933	96112	1368.1	87.1	491.6	181.5	172.3	-7.2	-36.6	-95.3	292.2
10:52:00	31.1	11.1	180.4	205.0	13.7	287.6	24.6	22221	14051	94313	1374.5	84.5	491.4	181.5	172.3	-6.3	-35.8	-91.6	298.1
10:53:00	30.4	11.1	180.9	203.4	13.8	281.6	24.8	22573	14112	95016	1365.0	53.2	491.6	181.5	172.3	-11.3	-39.2	-100.5	293.3
10:54:00	30.5	10.7	181.0	203.2	13.6	289.0	25.7	22228	13994	94511	1363.6	73.7	491.4	181.5	172.3	-9.4	-38.3	-94.7	298.0
10:55:00	30.5	11.5	181.4	204.5	13.6	291.6	25.6	22490	14219	96690	1355.8	68.0	491.5	181.5	172.3	-17.2	-48.3	-107.8	282.4
10:56:00	30.9	12.0	181.0	208.4	13.6	288.8	25.6	22490	14011	96361	1355.0	78.4	491.3	181.5	172.3	-13.5	-43.8	-101.9	287.6
10:57:00	30.8	11.4	181.6	205.0	13.5	281.6	25.7	22753	14135	99006	1353.8	70.7	491.4	181.5	172.3	-16.6	-46.8	-107.3	263.7
10:58:00	31.2	11.8	181.7	208.4	13.5	282.4	25.8	22318	14028	94114	1357.6	80.0	491.2	181.5	172.3	-11.4	-41.8	-100.1	267.8
10:59:00	30.9	12.2	181.1	204.3	13.1	285.2	24.4	22490	14247	95326	1358.1	81.8	491.3	181.0	172.3	-13.8	-44.2	-102.8	289.8

Test No. 3 - September 27, 2018

	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 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
11:00:00	31.1	11.5	181.0	207.4	14.1	286.2	25.6	22221	14017	95631	1361.5	97.2	491.1	181.0	172.3	-9.3	-38.5	-94.1	291.8
11:01:00	30.5	11.1	180.3	202.5	12.9	287.9	25.3	22670	14056	97024	1363.1	85.1	491.1	180.5	172.3	-15.9	-44.4	-108.6	290.6
11:02:00	30.7	11.2	180.6	204.2	14.0	284.9	25.0	22401	14056	95748	1361.6	99.0	490.8	180.5	172.3	-10.6	-38.8	-96.7	295.3
11:03:00	30.4	11.6	181.2	200.5	13.3	289.2	25.8	22753	14169	101342	1361.8	106.3	490.7	180.5	172.3	-32.3	-67.8	-130.8	261.4
11:04:00	30.5	10.9	181.0	203.7	13.3	287.6	24.6	22490	14073	96639	1355.8	100.4	490.7	181.0	172.3	-14.3	-45.7	-104.6	285.1
11:05:00	30.3	10.8	180.8	201.5	13.3	279.5	25.1	22670	14062	101296	1356.5	96.6	490.6	181.0	172.3	-29.1	-61.7	-125.8	242.4
11:06:00	30.5	11.2	181.8	201.2	13.4	283.2	25.0	22490	14062	96763	1349.3	82.1	490.3	181.5	172.3	-12.9	-43.6	-104.0	266.8
11:07:00	30.9	10.7	180.7	201.1	13.3	277.0	25.6	22325	14062	95555	1351.6	84.2	490.3	181.5	172.3	-18.5	-55.7	-106.0	255.8
11:08:00	30.3	11.3	181.5	202.7	13.5	282.2	24.7	22408	14039	96399	1348.4	83.8	490.3	182.0	172.3	-8.2	-36.9	-96.0	292.5
11:09:00	30.7	11.1	181.2	202.4	13.7	273.9	25.0	22138	13938	95824	1356.0	90.1	490.1	181.5	172.3	-6.0	-34.8	-92.9	298.3
11:10:00	31.3	11.5	181.7	205.1	14.9	276.8	25.8	22408	14062	97305	1356.0	89.6	490.1	181.5	172.3	-10.2	-38.9	-101.0	291.4
11:11:00	31.3	11.9	182.1	207.4	13.6	283.1	25.6	22228	13893	95694	1363.0	103.4	490.1	181.5	172.3	-7.7	-40.7	-93.9	296.6
11:12:00	30.9	11.4	181.5	206.6	13.6	279.5	25.8	22580	14023	98468	1362.8	102.9	490.2	181.5	172.3	-12.6	-45.5	-104.4	283.1
11:13:00	31.0	11.9	181.5	206.5	13.6	282.3	24.5	22318	14023	94142	1363.3	117.1	490.3	181.5	172.3	-9.0	-38.7	-99.7	286.2
11:14:00	31.0	11.6	181.2	205.0	14.0	282.8	25.5	22490	14045	96620	1363.1	106.2	490.0	181.0	172.3	-15.5	-47.7	-108.3	266.2
11:15:00	31.5	11.3	181.0	205.3	13.8	276.2	24.7	22490	14039	95590	1363.6	121.0	490.1	181.0	172.3	-12.4	-41.7	-101.7	268.9
11:16:00	30.4	11.6	180.2	202.1	13.5	282.7	24.7	22580	14023	94851	1360.0	109.8	489.9	180.5	172.3	-14.1	-42.1	-106.7	292.9
12:13:00	30.3	11.1	179.9	195.6	14.3	280.3	25.8	22318	14101	94688	1354.4	121.7	514.5	182.5	173.2	-13.7	-45.3	-101.9	292.4
12:14:00	30.2	11.0	180.9	192.0	14.3	276.7	24.4	22497	14107	95692	1346.9	117.7	514.2	183.0	173.2	-15.7	-47.2	-108.2	268.9
12:15:00	30.3	11.4	180.4	193.7	13.7	285.5	24.5	22228	14067	95349	1345.0	119.9	513.9	183.5	173.2	-14.2	-45.1	-100.8	273.9
12:16:00	29.8	10.5	181.3	191.9	13.4	283.1	25.3	22318	14090	96026	1341.3	110.1	513.7	184.0	173.2	-11.3	-38.2	-101.9	294.8
12:17:00	30.1	11.1	180.9	194.4	14.2	297.1	24.6	22048	13978	96248	1347.5	110.0	513.1	184.5	173.2	-8.3	-37.4	-92.7	300.1
12:18:00	29.9	11.0	180.7	192.5	14.0	288.7	25.9	22760	13961	95081	1344.5	102.1	513.0	184.5	173.2	-11.9	-43.0	-102.4	291.2
12:19:00	30.0	11.0	181.3	193.0	13.5	291.3	25.3	22318	13966	93006	1343.4	112.5	512.3	184.5	173.2	-7.8	-37.2	-96.5	298.6
12:20:00	29.7	10.9	180.8	190.1	13.4	288.7	25.8	22677	14101	96729	1340.1	105.9	512.0	184.5	174.2	-20.8	-52.3	-115.2	285.6
12:21:00	29.8	10.5	181.5	194.7	13.4	294.7	25.0	22228	13994	96202	1335.9	106.2	511.5	185.0	174.2	-12.6	-41.4	-102.3	286.4
12:22:00	29.6	11.2	180.6	191.6	13.5	290.4	25.8	22677	14124	98327	1335.3	95.1	511.1	185.0	174.2	-26.5	-54.9	-124.5	264.3
12:23:00	29.6	10.7	180.6	191.7	13.4	287.0	24.6	22318	14011	97349	1331.6	91.9	510.8	185.0	174.2	-12.9	-42.5	-104.0	269.6
12:24:00	29.3	11.0	180.5	191.8	13.5	281.9	25.6	22670	14141	99490	1328.0	80.8	510.4	185.0	174.2	-30.0	-63.4	-127.6	253.9
12:25:00	29.8	10.8	181.1	195.6	14.6	284.9	25.6	22138	13938	95357	1329.0	80.7	509.9	185.0	174.2	-11.8	-41.1	-97.1	295.6
12:26:00	30.7	10.2	181.1	195.6	14.6	283.0	25.6	22318	14045	100003	1339.4	96.0	509.3	184.0	174.2	-25.6	-62.5	-113.2	250.1
12:27:00	30.9	11.1	181.6	197.8	14.3	276.7	24.5	22228	14028	95183	1341.5	88.5	509.2	184.0	174.2	-11.5	-43.0	-98.4	297.0
12:28:00	31.2	11.5	178.3	197.1	14.3	285.7	25.8	22228	13893	95753	1350.5	104.1	509.0	183.0	174.2	-7.0	-33.9	-95.2	302.9
12:29:00	30.6	11.2	178.5	197.2	14.3	285.7	25.6	22580	14011	97264	1348.6	103.1	509.0	183.0	174.2	-14.2	-44.0	-107.6	285.5
12:30:00	31.0	11.5	179.7	198.3	14.3	276.1	25.8	22221	13893	95637	1351.4	122.0	508.6	183.0	174.2	-15.1	-47.0	-101.3	292.2
12:31:00	30.7	11.0	180.0	196.0	14.3	287.3	25.8	22497	14006	95431	1349.6	118.9	508.8	183.0	174.2	-15.0	-44.1	-108.3	268.7
12:32:00	31.1	11.9	179.6	198.1	14.3	283.7	25.0	22318	14011	95354	1355.4	132.6	508.5	183.0	174.2	-13.9	-45.0	-100.1	274.8
12:33:00	30.8	11.5	179.9	195.1	13.9	287.0	24.7	22497	13905	94730	1354.4	129.7	508.5	183.0	174.2	-12.0	-39.5	-101.7	295.8
12:34:00	31.1	11.5	179.7	196.9	14.8	279.5	25.8	22055	13899	92784	1358.0	144.2	508.5	183.0	174.2	-7.1	-34.7	-92.9	299.8
12:35:00	31.1	11.3	179.0	196.4	14.6	278.5	24.6	22408	14028	95408	1359.1	138.6	508.4	182.5	174.2	-15.1	-46.2	-104.0	292.9
12:36:00	31.3	11.0	180.4	199.1	14.6	275.5	25.6	22228	13927	93353	1361.6	150.0	508.5	182.5	174.2	-7.0	-34.8	-93.5	296.3
12:37:00	30.5	11.0	178.9	193.9	14.2	279.9	25.4	22760	14157	98277	1361.6	148.9	508.1	182.0	174.2	-19.8	-50.9	-115.1	286.3
12:38:00	31.0	10.5	179.1	195.5	14.2	278.8	24.4	22408	14039	96382	1355.9	149.8	508.3	182.5	173.1	-11.5	-41.5	-102.6	287.5
12:39:00	30.4	10.5	179.0	190.4	14.0	279.1	24.5	22760	14141	97808	1359.3	147.5	508.5	183.0	174.2	-31.6	-66.1	-128.6	247.8
12:40:00	30.5	11.0	178.8	192.5	14.0	281.0	25.5	22580	14028	96129	1353.3	134.0	508.5	184.0	174.2	-14.5	-45.5	-105.8	270.8
12:41:00	30.3	10.6	179.9	190.6	14.0	280.6	24.9	22580	14028	98884	1355.0	128.2	508.5	184.5	174.2	-28.4	-62.9	-124.2	252.2
12:42:00	30.6	10.9	180.1	194.0	14.0	289.1	25.2	22228	13899	94300	1352.6	122.7	508.6	185.0	174.2	-9.4	-40.3	-97.1	293.2
12:43:00	30.7	11.4	179.1	192.9	14.2	285.9	24.6	22228	13899	97127	1361.4	129.7	508.4	185.0	174.2	-9.6	-42.1	-94.2	281.5
12:44:00	30.9	10.8	179.6	191.5	13.4	283.2	24.5	22228	13893	96275	1357.9	126.7	508.7	185.0	174.2	-7.5	-36.1	-97.8	292.3
12:45:00	30.9	10.1	180.0	192.3	13.4	291.6	25.9	22048	14028	95751	1362.5	134.4	508.7	185.5	174.2	-4.7	-32.9	-92.6	297.6
12:46:00	30.9	10.4	180.6	192.9	13.4	293.6	25.4	22580	14028	96516	1358.4	130.1	508.9	185.5	174.2	-15.0	-45.8	-108.4	285.0
12:47:00	30.8	10.8	180.3	193.3	13.7	291.1	25.6	22318	13893	95254	1361.6	141.0	508.9	186.0	175.2	-10.1	-39.7	-99.7	290.2

Test No. 3 - September 27, 2018

	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 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
12:48:00	30.9	11.1	180.2	191.7	13.7	294.7	24.5	22580	14051	95911	1358.4	135.7	509.4	186.5	175.2	-15.5	-47.7	-109.4	267.1
12:49:00	31.3	10.7	180.9	193.2	14.3	292.6	25.4	22235	14034	96054	1362.6	148.4	509.3	187.0	175.2	-8.3	-39.2	-97.6	270.5
12:50:00	31.1	11.5	180.1	194.9	14.3	281.9	25.1	22408	14028	95230	1363.3	145.8	509.4	187.0	175.2	-10.9	-41.0	-100.1	294.8
12:51:00	31.6	11.8	180.3	197.7	14.4	290.6	25.8	22145	13994	95174	1373.5	153.5	509.6	187.0	175.2	-5.0	-34.0	-92.5	297.2
12:52:00	31.1	11.3	179.5	194.4	14.4	293.9	24.8	22490	14101	95672	1374.1	157.1	509.4	186.0	175.2	-11.9	-42.9	-103.4	288.2
12:53:00	31.3	11.1	181.3	196.8	14.7	292.8	24.6	22228	13899	95157	1378.0	171.7	509.5	186.0	175.2	-6.1	-34.7	-94.0	295.9
12:54:00	31.1	10.9	180.0	195.6	14.5	291.2	24.9	22677	14006	95809	1382.0	174.5	509.4	185.5	175.2	-22.0	-51.6	-119.6	283.4
12:55:00	31.3	10.9	180.2	194.5	14.4	295.3	25.6	22325	13910	93742	1377.5	169.9	509.7	185.5	175.2	-10.9	-43.2	-101.2	286.1
12:56:00	30.7	10.6	179.7	195.0	14.4	291.5	25.4	22490	14017	100462	1378.8	165.6	509.8	185.5	176.2	-28.5	-64.3	-126.0	248.9
12:57:00	30.9	10.9	178.6	192.7	14.5	290.8	25.1	22318	14023	96256	1369.0	157.9	510.0	186.0	176.2	-13.6	-43.5	-103.1	271.9
12:58:00	30.9	11.2	179.6	193.1	14.5	290.7	24.5	22138	14023	100785	1370.4	158.0	510.0	186.5	176.2	-25.5	-61.2	-118.5	254.9
12:59:00	29.7	11.2	180.9	192.0	13.7	283.2	25.1	22325	13910	96304	1363.0	150.9	510.1	187.0	176.2	-8.7	-38.9	-95.7	296.9
13:00:00	29.8	10.3	179.9	192.4	13.7	290.8	25.8	22048	13910	95931	1366.9	138.5	509.5	187.0	176.2	-5.8	-33.8	-92.0	301.4
13:01:00	30.3	11.0	180.3	194.9	13.7	286.0	25.1	21965	13955	94452	1358.8	120.3	509.4	186.5	176.2	-8.5	-34.4	-97.0	293.3
13:02:00	30.8	11.6	179.6	197.3	14.0	289.1	24.6	21972	13848	95834	1363.8	121.4	509.0	186.0	176.2	-6.0	-33.9	-91.9	299.8
13:03:00	30.8	10.9	180.8	194.4	14.1	288.8	24.5	22394	13961	97273	1361.3	122.2	509.0	185.5	176.2	-13.9	-42.3	-105.7	284.8
13:04:00	30.7	11.8	180.2	198.5	14.8	294.3	25.9	22228	13820	95264	1364.9	133.6	508.9	185.5	176.2	-11.9	-41.9	-99.2	290.4
13:05:00	30.5	10.9	180.8	196.7	15.1	288.7	25.8	22408	13955	97672	1361.1	130.9	508.9	185.5	176.2	-14.2	-44.8	-106.1	267.0
13:06:00	30.6	11.3	179.1	196.8	14.9	293.0	25.8	22318	13955	95553	1362.6	140.4	508.6	185.5	176.2	-6.4	-35.7	-96.9	268.1
13:07:00	29.9	10.4	179.5	192.6	13.8	282.2	25.6	22408	14062	96444	1364.9	141.3	508.5	185.0	176.2	-11.3	-42.5	-100.5	294.9
13:08:00	29.9	11.0	180.1	193.2	13.8	286.7	24.9	22055	13961	94849	1366.4	147.3	508.3	185.0	176.2	-7.9	-38.3	-94.4	298.1
13:09:00	29.8	11.0	179.2	191.6	13.9	279.6	25.7	22760	14079	95790	1363.1	137.0	507.7	184.5	176.2	-17.2	-49.2	-109.4	293.1
13:10:00	29.7	10.5	179.9	194.2	13.9	287.0	25.4	22048	13961	95077	1357.9	131.1	507.5	184.5	175.1	-8.3	-37.8	-96.3	297.5
13:11:00	29.8	10.8	178.8	192.6	13.9	281.2	25.2	22760	14135	100806	1357.5	117.6	507.1	184.5	175.1	-31.1	-69.7	-130.8	254.8
13:12:00	30.3	11.0	179.3	195.4	13.9	282.0	25.5	22497	14011	96586	1348.1	111.7	507.0	184.5	175.1	-16.7	-50.1	-104.3	286.6
13:13:00	30.2	10.8	180.0	193.9	13.9	287.9	25.6	22497	13893	100403	1353.1	108.9	506.9	185.0	175.1	-29.6	-66.0	-122.7	243.3
13:14:00	30.6	10.2	180.0	196.4	14.6	291.2	25.1	22325	14129	98234	1347.0	88.5	506.7	185.0	175.1	-14.8	-46.1	-106.4	268.6
13:15:00	30.5	10.6	179.8	196.7	14.6	287.0	25.6	22145	13888	95733	1355.4	100.4	506.7	184.5	175.1	-11.7	-44.6	-101.9	258.0
13:16:00	30.6	10.7	180.7	197.9	14.6	296.3	24.7	22055	13916	94842	1354.3	107.2	506.6	184.5	175.1	-8.6	-39.1	-97.0	290.9
13:17:00	30.8	11.0	179.0	197.4	14.6	300.2	25.7	22048	13876	93836	1361.1	125.8	506.3	184.0	175.1	-6.6	-37.7	-91.7	295.3
13:18:00	30.5	11.1	179.9	197.6	14.7	303.5	25.7	22228	13949	94874	1359.3	126.6	506.1	183.5	175.1	-10.1	-40.5	-99.5	293.2
13:19:00	30.4	11.2	179.1	195.6	13.7	291.5	25.4	21965	13832	92984	1360.5	140.6	506.0	183.0	175.1	-9.4	-40.5	-95.8	300.9
13:20:00	30.0	10.7	179.6	192.2	13.8	285.6	25.8	22497	13944	96608	1354.1	133.4	505.7	183.0	174.1	-14.1	-43.0	-106.4	283.9
13:21:00	30.7	11.0	180.3	193.7	13.9	293.7	25.5	22325	13944	94328	1353.4	136.7	505.7	183.5	174.1	-13.9	-45.3	-102.3	290.1
13:22:00	30.6	10.7	179.1	191.0	14.9	291.9	25.4	22760	13961	99070	1352.3	124.5	505.9	184.0	174.1	-17.1	-50.2	-111.5	268.1
13:23:00	31.2	10.7	179.8	193.5	13.6	285.5	24.7	22408	13876	98726	1355.1	132.0	506.1	184.5	174.1	-11.0	-42.2	-99.9	270.6
13:24:00	30.5	10.9	179.3	190.9	13.7	289.3	25.8	22408	13983	95385	1354.9	131.7	506.3	185.0	174.1	-13.9	-46.3	-104.2	294.9
13:25:00	31.6	10.9	179.7	196.7	15.0	285.2	25.6	22055	13882	95781	1359.4	144.8	506.4	185.5	174.1	-5.8	-35.0	-92.9	298.9
13:26:00	31.3	10.8	181.4	195.7	14.7	286.7	24.5	22580	13994	97208	1365.8	143.5	506.5	185.0	175.2	-17.4	-48.4	-114.6	285.8
13:27:00	31.4	11.6	180.0	196.7	14.7	289.4	24.6	22145	13876	94568	1367.5	152.8	506.8	185.0	175.2	-8.5	-37.2	-95.8	294.9
13:28:00	31.1	10.7	179.5	193.7	13.8	277.4	25.5	22580	13994	101151	1374.8	164.4	506.7	185.0	175.2	-29.0	-62.1	-124.7	249.8
13:29:00	30.7	11.6	180.1	198.5	15.0	276.9	25.4	22228	13899	97376	1366.5	166.1	506.6	185.0	175.2	-13.1	-42.9	-102.9	286.3
13:30:00	31.0	11.2	179.8	195.7	15.0	284.1	25.8	22221	13899	99915	1366.9	170.0	506.7	184.5	175.2	-23.8	-57.5	-113.9	245.4
13:31:00	30.5	10.5	180.3	195.9	14.1	278.6	25.7	22318	13910	96979	1362.1	163.7	507.0	184.5	175.2	-15.1	-45.1	-103.7	269.6
13:32:00	30.0	10.7	180.0	193.4	14.1	284.8	25.8	22138	13989	95210	1357.4	165.5	506.7	184.5	175.2	-11.4	-42.2	-98.2	275.2
13:33:00	30.3	10.3	180.6	195.1	14.1	284.2	25.0	22138	13989	96979	1353.3	153.6	506.4	185.0	175.2	-9.1	-35.1	-96.7	293.4
13:34:00	29.9	9.9	179.6	193.4	14.1	290.7	25.8	22138	13949	93826	1355.5	146.2	506.1	184.5	175.2	-8.4	-34.3	-93.7	298.3
13:35:00	29.6	10.9	180.0	192.7	14.1	294.5	25.9	22138	14073	95241	1349.5	128.3	505.9	184.5	175.2	-15.8	-44.6	-102.7	294.4
13:36:00	29.7	10.9	181.1	194.4	14.2	288.5	25.0	22228	13972	96153	1345.9	131.4	505.4	184.5	175.2	-10.0	-38.1	-94.7	299.2
13:37:00	29.6	10.4	179.5	194.9	14.2	290.0	24.5	22490	13983	97299	1342.0	99.7	505.0	184.0	175.2	-18.4	-46.3	-111.0	281.1
13:38:00	30.3	11.6	180.4	196.3	14.9	293.6	24.7	22318	13983	96741	1339.9	100.0	504.5	184.0	175.2	-12.3	-41.8	-100.5	282.7
13:39:00	29.9	11.1	179.7	192.7	13.8	280.8	25.0	22408	14090	97328	1340.0	81.2	504.3	183.5	175.2	-19.7	-49.3	-111.5	264.3

Test No. 3 - September 27, 2018

	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 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
13:40:00	30.1	11.0	179.8	198.2	14.7	285.3	24.9	22228	13989	95970	1340.8	89.6	504.0	183.5	175.2	-13.2	-41.6	-103.3	268.6
13:41:00	30.0	10.7	179.5	195.5	14.7	285.5	25.7	22760	14006	96425	1341.0	90.4	503.4	183.0	174.1	-15.9	-44.6	-107.0	291.4
13:42:00	30.4	11.2	180.1	198.0	14.4	291.7	25.5	22138	13916	95414	1342.9	105.3	503.0	182.5	174.1	-8.6	-36.4	-95.4	294.0
13:43:00	29.6	10.5	178.3	194.1	14.6	284.8	25.6	22490	14135	99554	1347.0	116.9	502.6	182.0	174.1	-34.2	-65.4	-129.2	260.2
13:44:00	29.6	10.8	180.8	194.0	14.5	290.9	25.8	22408	13905	96525	1342.6	119.6	502.4	182.0	174.1	-10.7	-39.4	-97.2	294.7
13:45:00	29.2	10.5	179.1	194.5	14.6	283.7	25.0	22318	14006	103219	1340.0	126.0	502.0	181.5	173.1	-32.7	-64.2	-129.6	248.4
13:46:00	29.6	10.0	179.9	192.6	14.3	292.4	25.3	22318	14006	95369	1329.3	101.0	501.8	181.5	173.1	-16.2	-45.2	-107.7	285.9
13:47:00	29.5	10.3	180.6	192.5	14.4	297.9	24.9	22318	13910	95753	1330.0	96.7	501.4	182.0	173.1	-13.9	-42.8	-102.9	282.9
13:48:00	29.4	11.2	180.6	192.7	14.2	291.6	25.3	22408	13905	97406	1322.9	79.8	501.4	182.0	173.1	-16.5	-45.4	-107.3	266.3
13:49:00	29.9	10.4	179.4	194.7	14.2	299.3	25.0	22408	14028	95538	1325.5	90.1	501.0	182.5	173.1	-13.3	-40.9	-102.3	271.6
13:50:00	30.1	10.4	181.0	192.4	14.2	304.1	25.4	22228	13927	95486	1325.0	96.0	500.7	182.0	173.1	-11.0	-37.9	-100.9	289.3
13:51:00	31.5	10.2	180.0	199.2	15.2	302.1	25.8	22048	13927	94945	1342.5	114.0	500.4	181.5	173.1	-9.6	-36.4	-96.9	297.2
13:52:00	31.4	10.2	180.0	194.0	14.0	316.2	24.9	22228	13933	95008	1346.9	124.6	500.7	181.5	173.1	-10.9	-37.8	-102.4	291.8
13:53:00	31.8	11.1	180.2	196.1	15.1	357.8	25.2	22055	13832	96673	1359.1	158.2	500.8	181.5	173.1	-7.2	-35.1	-94.4	298.1
13:54:00	31.5	10.6	179.5	194.9	13.5	351.8	25.8	22580	14079	97746	1358.3	170.3	501.1	181.0	173.1	-16.1	-48.8	-110.7	285.8
13:55:00	31.1	11.1	179.8	197.2	14.6	354.1	24.6	22138	13966	95776	1358.4	181.6	501.4	181.5	173.1	-13.1	-39.6	-102.7	289.5
13:56:00	30.6	10.5	179.0	193.0	14.4	316.7	25.9	22497	14011	95481	1355.1	176.7	501.7	182.0	173.1	-20.7	-51.3	-114.0	268.1
13:57:00	30.9	10.4	180.3	195.7	14.4	318.0	24.5	22138	14011	96681	1349.4	179.3	502.1	182.5	173.1	-13.9	-42.2	-102.5	270.7
13:58:00	30.6	9.6	180.0	192.7	14.3	312.8	25.1	22670	14011	94515	1348.0	177.3	502.1	183.0	173.1	-17.9	-44.7	-114.5	293.9
13:59:00	30.7	10.5	179.2	195.4	14.4	308.3	25.0	22318	13955	94118	1350.0	172.1	502.3	183.5	173.1	-9.9	-36.8	-97.5	296.9
14:00:00	30.5	9.7	179.2	187.9	14.4	297.0	25.1	22670	14045	97743	1353.8	173.1	502.2	183.5	173.1	-32.4	-64.3	-130.0	250.1
14:01:00	31.0	10.6	180.7	194.1	14.5	300.8	25.4	22138	13938	94734	1350.0	164.6	502.1	183.5	173.1	-9.9	-36.6	-99.3	292.9
14:02:00	30.8	10.8	179.6	198.6	14.3	299.5	25.8	22497	13832	98788	1356.3	173.5	501.7	183.5	173.1	-28.2	-59.2	-116.4	248.3
14:03:00	31.4	10.9	180.2	198.2	15.4	296.3	25.8	22325	13983	96579	1352.4	168.6	502.0	183.5	173.1	-14.5	-44.1	-104.7	285.3
14:04:00	31.2	10.6	179.8	199.6	15.0	286.1	25.4	22138	14084	95420	1357.3	180.8	502.0	183.0	174.2	-11.7	-38.3	-99.0	288.6
14:05:00	31.1	10.7	180.7	198.5	14.1	288.2	25.7	22408	13983	95158	1354.6	176.3	502.1	183.0	174.2	-15.8	-45.5	-106.1	267.8
14:06:00	31.5	11.4	179.4	198.4	14.3	286.7	24.6	22055	13893	94292	1359.0	185.8	502.1	183.0	174.2	-10.7	-37.2	-102.1	273.9
14:07:00	30.9	10.8	179.9	196.2	14.3	289.1	24.6	22228	14034	97338	1357.5	179.8	502.5	183.0	174.2	-10.4	-38.0	-99.7	294.6
14:08:00	31.2	10.6	178.5	196.3	14.3	283.1	24.9	22055	13921	94600	1364.6	186.2	502.3	183.0	174.2	-10.3	-37.7	-94.5	301.2
14:09:00	30.6	10.1	179.5	191.4	14.3	280.7	25.8	22497	14023	94832	1362.6	171.6	502.5	182.5	174.2	-14.3	-43.2	-105.2	296.3
14:10:00	30.8	10.2	180.3	196.1	14.1	282.7	25.7	22138	13910	96177	1362.8	182.8	502.5	183.5	174.2	-10.0	-39.4	-97.1	300.1
14:11:00	30.4	10.1	179.9	190.5	14.1	285.3	25.8	22760	14023	95885	1357.5	163.0	502.7	183.5	174.2	-20.0	-49.7	-114.8	285.8
14:12:00	30.8	10.5	179.9	194.9	13.7	277.7	25.3	22235	14028	94987	1355.6	172.7	502.8	184.0	174.2	-12.6	-41.2	-104.6	287.5
14:13:00	30.7	10.4	181.6	194.0	14.0	279.6	24.9	22760	14124	96734	1353.1	166.1	502.9	184.5	174.2	-18.8	-46.9	-116.6	267.1
14:14:00	31.3	10.9	180.9	198.5	15.0	275.2	24.9	22228	14023	97486	1351.3	167.5	503.0	185.0	174.2	-14.4	-42.5	-101.9	269.5
14:15:00	30.9	10.9	179.2	201.8	15.1	275.4	25.0	22580	13983	98251	1356.0	170.3	502.9	184.5	174.2	-31.4	-60.7	-128.0	272.9
14:16:00	31.2	11.0	180.9	197.5	14.4	275.9	24.7	22145	13882	95312	1358.8	177.2	502.9	184.5	174.2	-10.1	-32.5	-97.5	298.7
Max	33.2	28.1	184.2	208.8	15.4	357.8	25.9	23279	14450	103219	1383.1	186.2	514.5	187.0	176.2	-2.5	-27.3	-83.7	305.9
Min	29.1	0.0	129.2	187.9	12.1	258.7	24.4	21965	13820	92784	1322.5	-52.0	489.9	179.5	172.3	-35.4	-69.7	-130.8	241.7
Average	30.9	11.0	180.3	199.4	13.7	285.4	25.2	22442	14057	96454	1354.3	103.4	499.4	183.0	173.5	-13.9	-43.3	-102.9	282.4

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.: 10802 - 1 to 3
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Re: Process Samples from Clean Harbors, Lambton, Ortech Project no. 21874
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.
10802	Test #1 18-21874	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	2.31	0.52	64.25	12.52	0.47	19.93	13.23
2	FL-4 Lean Feed	4.26	0.25	8.68	11.57	0.86	74.38	80.31
3	FE-4 Emulsion Feed	4.70	0.41	42.47	11.25	0.45	40.72	38.41

* 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.

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.: 10802 - 4, to 6
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Lambton, Ortech Project no. 21874
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.
10802	Test #1 18-21874	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	2.30	0.34	63.72	12.33	0.33	20.98	14.09
5	FL-9 Lean Feed	2.70	0.39	8.32	11.22	0.90	76.47	81.45
6	FE-9 Emulsion Feed	3.25	0.40	27.07	11.57	0.42	57.29	76.89

* 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.: 10802 - 7 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Lambton, Ortech Project no. 21874
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.
10802	Test #1 18-21874	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	2.33	0.32	63.51	12.30	0.38	21.16	14.26
8	FL-14 Lean Feed	2.80	0.37	10.79	11.07	0.93	74.04	78.66
9	FE-14 Emulsion Feed	3.62	0.28	32.08	11.48	0.65	51.89	76.48

* 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.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Ash content - % by weight -test method- ASTM D482

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	2.36	2.26	2.31	0.10
2	FL-4 Lean feed	4.14	4.38	4.26	0.24
3	FE-4 Emulsion feed	4.63	4.77	4.70	0.14
4	FR-9 Rich feed	2.24	2.36	2.30	0.12
5	FL-9 Lean feed	2.78	2.62	2.70	0.16
6	FE-9 Emulsion feed	3.18	3.32	3.25	0.14
7	FR-14 Rich feed	2.39	2.27	2.33	0.12
8	FL-14 Lean feed	2.74	2.86	2.80	0.12
9	FE-14 Emulsion feed	3.67	3.57	3.62	0.10

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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E-mail: petrolab@gmail.com

QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Sulfur content - % by weight -test method- ASTM D1552

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	0.50	0.54	0.52	0.04
2	FL-4 Lean feed	0.28	0.22	0.25	0.06
3	FE-4 Emulsion feed	0.38	0.44	0.41	0.06
4	FR-9 Rich feed	0.37	0.31	0.34	0.06
5	FL-9 Lean feed	0.35	0.43	0.39	0.08
6	FE-9 Emulsion feed	0.43	0.37	0.40	0.06
7	FR-14 Rich feed	0.29	0.35	0.32	0.06
8	FL-14 Lean feed	0.33	0.41	0.37	0.08
9	FE-14 Emulsion feed	0.31	0.25	0.28	0.06

Tested by : P.S. (chemist)

Member of ASTM
JS:TL

Approved by *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.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Carbon content - % by weight -test method- ASTM D3176

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	64.34	64.16	64.25	0.18
2	FL-4 Lean feed	8.63	8.73	8.68	0.10
3	FE-4 Emulsion feed	42.38	42.56	42.47	0.18
4	FR-9 Rich feed	63.62	63.82	63.72	0.20
5	FL-9 Lean feed	8.38	8.26	8.32	0.12
6	FE-9 Emulsion feed	36.98	37.16	27.07	0.18
7	FR-14 Rich feed	63.35	63.42	63.51	0.18
8	FL-14 Lean feed	10.73	10.85	10.79	0.12
9	FE-14 Emulsion feed	31.98	32.08	32.08	0.20

Tested by : A.C.(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.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Hydrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	12.43	12.61	12.52	0.18
2	FL-4 Lean feed	11.49	11.65	11.57	0.16
3	FE-4 Emulsion feed	11.34	11.16	11.25	0.18
4	FR-9 Rich feed	12.23	12.43	12.33	0.20
5	FL-9 Lean feed	11.14	11.30	11.22	0.16
6	FE-9 Emulsion feed	11.48	11.66	11.57	0.18
7	FR-14 Rich feed	12.38	12.22	12.30	0.16
8	FL-14 Lean feed	10.98	11.16	11.07	0.18
9	FE-14 Emulsion feed	11.56	11.40	11.48	0.16

Tested by : A.C.(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.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Nitrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	0.42	0.52	0.47	0.10
2	FL-4 Lean feed	0.90	0.82	0.86	0.08
3	FE-4 Emulsion feed	0.41	0.49	0.45	0.08
4	FR-9 Rich feed	0.36	0.30	0.33	0.06
5	FL-9 Lean feed	0.94	0.86	0.90	0.08
6	FE-9 Emulsion feed	0.38	0.46	0.42	0.08
7	FR-14 Rich feed	0.41	0.35	0.38	0.06
8	FL-14 Lean feed	0.97	0.89	0.93	0.08
9	FE-14 Emulsion feed	0.61	0.69	0.65	0.08

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.
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Mississauga, Ontario
L5J 2Y4

Lab no.: 10802 - 1 to 9
Report date: Oct 26, 2018
Sample in: Oct 12, 2018
P.O. no.: 21874-J2542

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Sarnia Ortech Project #21874
Water content - % by weight -test method- ASTM D3113, D1744

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
10802	18-21874				Difference between Run 1 and 2
1	FR-4 Rich feed	13.12	13.34	13.23	0.22
2	FL-4 Lean feed	80.57	80.05	80.31	0.52
3	FE-4 Emulsion feed	38.57	38.25	38.41	0.32
4	FR-9 Rich feed	13.98	12.20	14.09	0.22
5	FL-9 Lean feed	81.18	81.72	81.45	0.54
6	FE-9 Emulsion feed	76.70	77.08	76.89	0.38
7	FR-14 Rich feed	14.38	14.14	14.26	0.24
8	FL-14 Lean feed	78.45	78.87	78.66	0.42
9	FE-14 Emulsion feed	76.71	76.25	76.48	0.46

Tested by : A.C.(chemist)

Member of ASTM
JS: LN

Approved by *James Szeto*
James Szeto, B.Sc.
Chief Chemist