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ORTECH

Report:

Annual Compliance Emission Testing Program at the Clean Harbors Sarnia Incineration Facility (2016)

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EXECUTIVE SUMMARY

ORTECH Environmental (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 and Climate Change (MOECC) 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 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)	5.66 mg/Rm^3 (1)
Mercury	maximum 50 µg/Rm^3 (1)	1.30 µg/Rm^3 (1)
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm^3 (1)	6.21 pg TEQ/Rm^3 (1)
Carbon Monoxide	maximum 100 ppm (1)	31.9 ppm (1)
Oxygen	minimum 8.0 % (2)	8.83 % (2)
Total Hydrocarbons (3)	maximum 100 ppm	7.3 ppm (1)
Total Hydrocarbons (4)	maximum 100 ppm	4.6 ppm (4)
Total Hydrocarbons (5)	maximum 100 ppm	8.4 ppm (5)

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

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

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

The emission testing program was conducted over three days between October 18 and October 20, 2016 during which three tests were completed for each emission component group using several types of sampling trains and sampling methods.

The particulate and metals, semi-volatile organics and combustion gas tests were performed simultaneously at the main stack location. During the time required to complete these tests, acid gas and volatile organics tests were also run.

Testing was performed at a high feed rate, as specified by the ECA, to demonstrate compliance with MOECC emission criteria. During the emission tests, the rich, lean and emulsion feed rates combined were 216.2, 223.8 and 225.2 L/min for Test No. 1, Test No. 2, and Test No. 3, respectively. The Thermal Desorber Unit (TDU) was exhausting to the incinerator during each test.

Also during the emission testing program, process data was recorded and composite samples of the liquid waste materials being incinerated were collected for subsequent analysis. The results of these analyses, coupled with the stack gas emission rate measurements, were used to calculate destruction and removal efficiencies (DREs) for six target principal organic hazardous compounds. The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9991%), Ethyl Acetate (99.9996%), Tetrachloroethene (99.9979%), Toluene (99.9925%), 1,2,4-Trichlorobenzene (100.0000%) and Total Xylenes (99.9953%). 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 2016 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.

ORTECH

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 - 24 hour	1.00	g/s	0.4884	µg/m³				
Base Case - 1 hour	1.00	g/s	1.8104	µg/m³				
Base Case - 1/2 hour	1.00	g/s	2.1725	µg/m³				
Particulate matter	0.12	g/s	0.059	µg/m³	120	µg/m³	0.049	S
Sulphur dioxide	13.3	g/s	6.50	µg/m³	275	µg/m³	2.36	S - 24 hour
Sulphur dioxide	13.3	g/s	24.1	µg/m³	690	µg/m³	3.49	S - 1 hour
Nitrogen oxides	3.56	g/s	1.74	µg/m³	200	µg/m³	0.87	S - 24 hour
Nitrogen oxides	3.56	g/s	6.44	µg/m³	400	µg/m³	1.61	S - 1 hour
Carbon monoxide	0.80	g/s	1.74	µg/m³	6000	µg/m³	0.029	S - 1/2 hour
Hydrogen chloride	0.73	g/s	0.36	µg/m³	20	µg/m³	1.78	S
Fluorides (as hydrogen fluoride)	0.011	g/s	0.0054	µg/m³	0.86	µg/m³	0.62	S
Hydrogen cyanide	0.000013	g/s	0.0000063	µg/m³	8	µg/m³	<0.0001	S
Dioxins & Furans (TEQ) *	0.14	ng TEQ/s	0.000068	pg TEQ/m³				
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.098	ng TEQ/s	0.000048	pg TEQ/m³	1	pg TEQ/m³	0.0048	URT
Naphthalene	9.94	µg/s	0.0000049	µg/m³	22.5	µg/m³	<0.0001	G
Biphenyl	0.81	µg/s	0.0000015	µg/m³	60	µg/m³	<0.0001	G - 1 hour
Benzo (a) pyrene	0.052	µg/s	0.000000025	µg/m³	0.0011	µg/m³	0.0023	G
1,2-Dichlorobenzene	1.19	µg/s	0.0000022	µg/m³	30500	µg/m³	<0.0001	G - 1 hour
1,4-Dichlorobenzene	0.89	µg/s	0.00000043	µg/m³	95	µg/m³	<0.0001	S
1,2,4-Trichlorobenzene	1.15	µg/s	0.00000056	µg/m³	400	µg/m³	<0.0001	G
Pentachlorophenol	0.26	µg/s	0.00000013	µg/m³	20	µg/m³	<0.0001	G
Polychlorinated biphenyls	0.20	µg/s	0.00000010	µg/m³	0.15	µg/m³	<0.0001	G

S - Standard
G - Guideline
URT - Upper Risk Threshold
* 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 - 24 hour	1.00	g/s	0.4884	μg/m^3				
Aluminum oxide	3.24	mg/s	0.0016	μg/m^3	120	μg/m^3	0.0013	G
Antimony	0.0057	mg/s	0.0000028	μg/m^3	25	μg/m^3	<0.0001	S
Arsenic	0.43	mg/s	0.00021	μg/m^3	0.3	μg/m^3	0.071	G
Barium (as water soluble)	0.29	mg/s	0.00014	μg/m^3	10	μg/m^3	0.0014	G
Beryllium*	0.00074	mg/s	0.00000036	μg/m^3	0.01	μg/m^3	0.0036	S
Boron	8.73	mg/s	0.0043	μg/m^3	120	μg/m^3	0.0036	S
Cadmium	0.0050	mg/s	0.0000024	μg/m^3	0.025	μg/m^3	0.0097	S
Calcium oxide	11.7	mg/s	0.0057	μg/m^3	10	μg/m^3	0.057	S
Chromium	0.18	mg/s	0.000090	μg/m^3	1.5	μg/m^3	0.0060	G
Cobalt	0.0067	mg/s	0.0000033	μg/m^3	0.1	μg/m^3	0.0033	G
Copper	0.21	mg/s	0.00010	μg/m^3	50	μg/m^3	0.00020	S
Iron (as metal)	5.26	mg/s	0.0026	μg/m^3	4	μg/m^3	0.064	S
Lead	0.030	mg/s	0.000015	μg/m^3	0.5	μg/m^3	0.0029	S
Lithium	0.0039	mg/s	0.0000019	μg/m^3	20	μg/m^3	<0.0001	S
Magnesium oxide	1.46	mg/s	0.00071	μg/m^3	120	μg/m^3	0.00059	S
Manganese (as compounds)	0.30	mg/s	0.00015	μg/m^3	2.5	μg/m^3	0.0059	G
Mercury	0.029	mg/s	0.000014	μg/m^3	2	μg/m^3	0.00070	S
Molybdenum	0.10	mg/s	0.000050	μg/m^3	120	μg/m^3	<0.0001	G
Nickel	0.062	mg/s	0.000030	μg/m^3	2	μg/m^3	0.0015	S
Phosphorus pentachloride	24.9	mg/s	0.012	μg/m^3	10	μg/m^3	0.12	G
Potassium hydroxide	10.5	mg/s	0.0051	μg/m^3	14	μg/m^3	0.037	G
Selenium	0.41	mg/s	0.00020	μg/m^3	10	μg/m^3	0.0020	G
Silica (as respirable silica)	11.7	mg/s	0.0057	μg/m^3	5	μg/m^3	0.11	G
Silver	0.00039	mg/s	0.00000019	μg/m^3	1	μg/m^3	<0.0001	S
Sodium hydroxide	28.4	mg/s	0.014	μg/m^3	10	μg/m^3	0.14	G
Strontium	0.026	mg/s	0.000013	μg/m^3	120	μg/m^3	<0.0001	G
Tin	0.11	mg/s	0.000056	μg/m^3	10	μg/m^3	0.00056	S
Titanium	0.68	mg/s	0.00033	μg/m^3	120	μg/m^3	0.00028	S
Vanadium	0.052	mg/s	0.000026	μg/m^3	2	μg/m^3	0.0013	S
Zinc	0.31	mg/s	0.00015	μg/m^3	120	μg/m^3	0.00013	S

S - Standard
G - Guideline
URT - Upper Risk Threshold
* 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 - 24 hour	1.00 g/s	0.4884 μg/m³			
Base Case - 1 hour	1.00 g/s	1.8104 μg/m³			
Benzene	0.62 mg/s	0.00030 μg/m³	100 μg/m³	0.00030	URT
Bromomethane (methyl bromide)	0.019 mg/s	0.000009 μg/m³	1350 μg/m³	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.11 mg/s	0.000054 μg/m³	1000 μg/m³	<0.0001	S
Chloroethene (vinyl chloride)*	0 mg/s	0 μg/m³	1 μg/m³	<0.0001	S
1,1-Dichloroethane (ethylene dichloride) *	0 mg/s	0 μg/m³	2 μg/m³	<0.0001	S
trans-1,2-Dichloroethene *	0 mg/s	0 μg/m³	105 μg/m³	<0.0001	G
Dichloromethane (methylene chloride)	0.55 mg/s	0.00027 μg/m³	220 μg/m³	0.00012	G
Ethyl Acetate *	0 mg/s	0 μg/m³	19000 μg/m³	<0.0001	G - 1 hour
Ethylbenzene	0.017 mg/s	0.0000083 μg/m³	1000 μg/m³	<0.0001	S
Isopropylbenzene (cumene) *	0 mg/s	0 μg/m³	400 μg/m³	<0.0001	S
2-Propanone (acetone)	0.095 mg/s	0.000046 μg/m³	11880 μg/m³	<0.0001	S
Styrene	0.034 mg/s	0.000017 μg/m³	400 μg/m³	<0.0001	S
Tetrachloroethene (perchloroethylene) *	0 mg/s	0 μg/m³	360 μg/m³	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0 mg/s	0 μg/m³	2.4 μg/m³	<0.0001	S
Toluene	0.20 mg/s	0.000098 μg/m³	2000 μg/m³	<0.0001	S
Tribromomethane (bromoform)	0.023 mg/s	0.000011 μg/m³	55 μg/m³	<0.0001	G
1,1,1-Trichloroethane (methyl chloroform)*	0 mg/s	0 μg/m³	115000 μg/m³	<0.0001	S
Trichloroethene *	0 mg/s	0 μg/m³	12 μg/m³	<0.0001	S
Trichlorofluoromethane *	0 mg/s	0 μg/m³	6000 μg/m³	<0.0001	G
Trichloromethane (chloroform)	0.0070 mg/s	0.0000034 μg/m³	1 μg/m³	0.00034	S
Trichlorotrifluoroethane*	0 mg/s	0 μg/m³	800000 μg/m³	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene)	0.0022 mg/s	0.0000011 μg/m³	220 μg/m³	<0.0001	S
1,3,5-Trimethylbenzene *	0 mg/s	0 μg/m³	220 μg/m³	<0.0001	S
Xylenes	0.078 mg/s	0.000038 μg/m³	730 μg/m³	<0.0001	S

S - Standard
G - Guideline
URT - Upper Risk Threshold

* 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	99.9997	99.9983	99.9993	99.9991	0.00074
Ethyl Acetate	99.9999	99.9990	99.9999	99.9996	0.00048
Tetrachloroethene	99.9993	99.9951	99.9993	99.9979	0.0024
Toluene	99.9971	99.9864	99.9941	99.9925	0.0055
Total Xylenes	99.9983	99.9903	99.9972	99.9953	0.0043
1,2,4-Trichlorobenzene	100.0000	100.0000	100.0000	100.0000	0.0000085

1. INTRODUCTION

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

ORTECH Environmental (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 and Climate Change (MOECC) 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 1532°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 194°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	32.4	0.95	29.6
Lean	174.3	1.04	4.58
Emulsion	15.1	1.00	17.2
Total	221.7		

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

The powdered activated carbon (PAC) injection rate during the test program was 10.4 kg/h (23.0 lb/h).

3. EMISSION TESTING PROGRAM

The emission testing program was conducted over three days between October 18 and October 20, 2016 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 MOECC 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 and Climate Change (MOECC)
- Clean Harbors Canada Inc. (Clean Harbors)
- ORTECH Environmental (ORTECH)
- ALS Laboratory Group
- Petro Laboratories Inc.

The program responsibilities of the various organizations are summarized as follows. The MOECC was responsible for evaluating and approving the Pre-Test Plan (PTP), witnessing portions of the test program and reviewing the final emission testing report.

Clean Harbors was responsible for the overall program and issuing the contract with ORTECH. Clean Harbors was also responsible to the MOECC 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 MOECC approved Pre-Test Plan, attending meetings with the MOECC 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

6.1 Isokinetic Sampling Trains

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.

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 for the three particulate and metals tests performed at the main stack are provided in Appendix 4. Field data 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 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 plugging 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. Note the third tube pair for Test No. 2 broke during sampling and as a result only three tube pairs were collected for Test No. 2.

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 MSML is shown schematically in Figure 6.

A Siemens Oxymat 61 analyzer was used to measure oxygen concentrations. The method used for sampling was US EPA (40 CFR 60) Method 3A[(7)]. A Siemens Ultramat 23 analyzer was used to measure carbon dioxide concentrations. The method used for sampling was also 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 Horiba VA VIA-510 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, where the trains were initially prepared, 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 8) 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 5% 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 placed in coolers with ice until they were transported to the ALS Laboratory Group for analysis.

Particulate samples (front half acetone rinse and filter) collected from the metals trains underwent gravimetric determination before metals analysis. The gravimetric analysis followed the procedures outlined in Method 5 of the Ontario Source Testing Code(1). The gravimetric analysis required measuring the weight gain on the particulate filter and the residue left over from the acetone rinse of the front half train components (performed by the analytical laboratory). The gravimetric analysis required desiccation of the samples prior to weight determination. Particulate filters were not desiccated prior to weight determination but were maintained in a temperature and humidity controlled environment. Samples were weighed to a constant weight of $\pm$ 0.5 milligrams. When gravimetric determinations were completed, the samples were processed and analyzed by ALS Laboratory Group for metals.

The analytical reports for the 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, where the trains were initially prepared, 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 placed in coolers with ice 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, recovery data sheets were prepared to record initial volumes of the test train components. These sheets were also used during sample recovery to record final volumes. The train recovery data sheets for the three tests are 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 stored in coolers with ice 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.

Due to target analytes that tend to exceed the instrument calibration range of 1µg/trap pair, the traps were desorbed through an aqueous purge and into a 0.5 L Tedlar bag. A sub-sample of the bag was taken with a gas-tight syringe and injected onto the secondary trap for analysis.

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 (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 MOECC.

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 September 7, 2016, was sent to the MOECC 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 letters received from the MOECC. 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 13.8% 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 low (limit 85-115%) likely due to a spiking error by the analytical laboratory. Data quality is not expected to be impacted by the low spike recoveries.
- One matrix spike (performed as a post digestion spike) was analyzed for this program. All of the results were between 80-120% of the true value (limit of 80-120%), except for beryllium, boron, lithium and sulphur in the nitric acid digest sample, barium, beryllium and sulphur in the hydrofluoric acid digest sample, and arsenic, barium, beryllium and phosphorus in the impinger solution sample.

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 9.8% well within the acceptable limit of less than ±20%, for fractions that are greater than 5 times the minimum detection limit.
- One blank spike (performed as a pre-digestion spike) was analyzed for this program. All of the results were between 85-98% 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 83-100% within the acceptable limit of 80-120% of the true value.

8.5.2 Dioxin and Furan Sample Analysis QA/QC

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

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

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

8.5.3 Acid Gas Sample Analysis QA/QC

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

- A 6 point calibration bracketing the expected range.
- An instrument check calibration standard was analyzed immediately after the calibration and must be within 90%-110% of the actual concentration.
- A complete set of calibration standards were analyzed at the end of the analysis and must be within 10% of the true value.
- One mid-range calibration standard was analyzed after 10 samples and at the end of the run and actual concentration and must be within 90%-110% of the actual concentration.

- Instrument calibration blank check sample were analyzed with every 10 samples and must be within three times the minimum detection limit for each ion.
- All samples were analyzed in duplicate for each compound except for hydrogen cyanide, and the results had a relative percent difference of less than 2.2%, for analyses that are greater than 5 times the minimum detection limit.
- One blank spike was analyzed for this program. All of the results were between 93-97% within the acceptable limit of 80-120% of the true value.
- A matrix spike (spike confirmation) sample was analyzed with every 20 samples to confirm the identity of each peak. The results of the matrix spike sample must be within 80%-120% of the true value. The matrix spikes for this test program were between 98-102%.

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. Due to the expected high levels of certain compounds, the tubes were desorbed into Tedlar bags and analyzed either straight or at a 1-10 dilution.

Run Conditions: Perkin Elmer Turbomatrix 650 Concentrator, Agilent 7890 GC, 5975C MSD, Chemstation, using a DB-624 capillary column, 30 m x 0.25 ID x 1.0 µm film thickness.

The oven was maintained at 35°C for 2 minutes, then the temperature was increased at a rate of 10°C/min. to 130°C. The temperature was then increased from 130°C to 180°C at 8°C/min, then from 180°C to 250°C at 20°C/min, and held at 250°C for 2 minutes.

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 59-133%, 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)	194	195
Moisture by Volume (%)	48.7	49.2
Velocity (m/s)	30.7	31.2
Absolute Pressure (kPa)	99.6	99.6
Carbon Dioxide by Volume (%)*	8.89	8.89
Oxygen by Volume (%)*	8.83	8.83

* 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)	56.1	56.8
Dry Reference Flowrate (Rm^3/s)*	18.1	18.1
Dry Adjusted Flowrate (Rm^3/s)**	22.0	22.0
Wet Reference Flowrate (Rm^3/s)*	35.2	35.6

* 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)	2.22
Dry Reference Concentration (mg/Rm^3)*	6.90
Dry Adjusted Concentration (mg/Rm^3)**	5.66
Wet Reference Concentration (mg/Rm^3)*	3.54
Particulate Emission Rate (g/s)	0.12

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

9.5 Acid Gases Emission Data

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

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

Parameter	HCl	HF	HBr	HI	HCN
Actual Conc. (mg/m^3)	12.8	0.19	0.82	0.23	0.00022
Dry Reference Conc. (mg/Rm^3)*	40.0	0.59	2.55	0.71	0.00070
Dry Adjusted Conc. (mg/Rm^3)**	32.7	0.48	2.09	0.58	0.00058
Dry Conc. (ppm)	20.4	0.30	1.30	0.36	0.00036
Emission Rate (g/s)	0.73	0.011	0.046	0.013	0.000013

* 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)	51192	14.3	63.1	40.1	36981	235	1.86
Dry Reference Conc. (mg/Rm^3)**	159879	44.5	197	125	115491	733	5.81
Dry Adjusted Conc. (mg/Rm^3)***	131136	36.5	162	103	143873	601	4.76
Dry Conc. (ppm)	88900	38.9	105	102	88300	280	4.5*
Emission Rate (g/s)	2889	0.80	3.56	2.26	2087	13.3	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 (1.72 mg/s), boron (8.73 mg/s), calcium (8.35 mg/s), iron (5.26 mg/s), phosphorus (3.69 mg/s), potassium (7.34 mg/s), silicon (5.46 mg/s) and sodium (16.3 mg/s). The average sulphur emission rate was 7645 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 detected in quantities slightly greater than analytical detection limit in two of the three fractions. 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)	0.51
Dry Reference Concentration (µg/Rm^3)*	1.59
Dry Adjusted Concentration (µg/Rm^3)**	1.30
Wet Reference Concentration (µg/Rm^3)*	0.82
Emission Rate (mg/s)	0.029

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

9.9 Semi-Volatile Organic Emission Data

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

9.9.1 *Dioxins and Furans Emission Data*

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

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

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

In Ontario, the MOECC 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 MOECC to use only specific isomers in the higher congener groups to compare emission data with the MOECC 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 MOECC.

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 three tests performed during the emission testing program are provided in Tables 38, 39, 40, 41, and 42, respectively. A summary of the dioxin and furan congener group emission data is detailed in Table 43.

The total dioxin and furan congener emission rates were 1.16 ng/s for dioxins and 1.04 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 (<174 pg) and in the lab blank (<143 pg) were significant compared to the amounts detected in the test trains (from 308 to 582 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 MOECC, 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 MOECC "Summary of Standards and Guidelines to Support Ontario Regulation 419/05 – Air Pollution – Local Air Quality", dated April 2012, provides a new framework for calculating dioxin and furan toxicity equivalent concentrations which includes emission data for 12 dioxin-like PCBs.

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 (7.56 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 impingement concentration was calculated using the methodology detailed in the "Summary of Standards and Guidelines to Support Ontario Regulation 419/05 – Air Pollution – Local Air Quality", dated April 2012 and includes the 12 dioxin-like PCBs. Table 61 shows the dioxins, furans and dioxin-like PCBs emission data calculated using the new framework detailed in the MOECC 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 2016 test program is presented below:

Dioxin and Furan Emission Parameter	Calculated using Schedule 3 of the ECA (Table 60)	Calculated using O. Reg. 419* (Table 61)
Actual Conc. (pg TEQ/m^3)	2.41	1.71
Dry Reference Conc. (pg TEQ/Rm^3)**	7.56	6.20
Dry Adjusted Conc. (pg TEQ/Rm^3)***	6.21	4.41
Wet Reference Conc. (pg TEQ/Rm^3)**	3.84	2.73
Emission Rate (ng TEQ/s)	0.14	0.098

*   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 MOECC 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 0.20 µg/s for the three 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.

Only three chlorobenzene isomers (1,2-dichlorobenzene or 1,2-D2CB, 1,4-dichlorobenzene or 1,4-D2CB and 1,2,4-trichlorobenzene or 1,2,4-T3CB) and one chlorophenol isomer (pentachlorophenol or P5CP) are included under Ontario air emission standards and guidelines. However, analyses were performed for a variety of chlorobenzene and chlorophenol isomers for the present emission testing program.

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	3.54
Trichlorobenzenes	1.92
Tetrachlorobenzenes	0.38
Pentachlorobenzene	0.13
Hexachlorobenzene	0.13

The total chlorobenzene congener group emission rate averaged 6.11 µg/s for the three 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. During previous testing programs hexachlorobutadiene and octachlorostyrene were also analyzed with the chlorobenzenes; these compounds are now being analyzed with the related chlorophenol compounds in order to achieve lower detection limits.

The chlorobenzene isomer and congener lab blank and blank train analyses are summarized in Table 81. All of the blank analysis, for both the blank train and the laboratory blank, were below the reportable detection limit. The analytical results for the test train samples were not blank corrected.

The average emission rates for the regulated chlorobenzene isomers were 1.19 μg/s for 1,2-dichlorobenzene, 0.89 μg/s for 1,4-dichlorobenzene and 1.15 μg/s for 1,2,4-trichlorobenzene.

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 for the three tests performed.

The average chlorophenol congener emission rates were as follows:

Congener Group	Average Emission Rates (μg/s)
Dichlorophenols	1.60
Trichlorophenols	2.28
Tetrachlorophenols	0.52
Pentachlorophenol	0.26

The total chlorophenol congener group emission rate averaged 4.66 μg/s for the three tests performed.

The average emission rate for the only regulated chlorophenol isomer, pentachlorophenol, was 0.26 μg/s.

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

All of the blank analyses (Table 91), for both the blank train and the laboratory blank samples, were below the analytical method detection limits for all compounds. The analytical results for the test train samples were not blank corrected.

9.9.4 Polycyclic Aromatic Hydrocarbon Emission Data

Of the many polycyclic aromatic hydrocarbons (PAH) compounds, only benzo(a)pyrene, biphenyl and naphthalene are included in Ontario Regulation 419/05 air emission standards and guidelines. However, a large number of compounds were analyzed in the present program. 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 average PAH emission rates of the three regulated compounds were as follows:

Compound	Average Emission Rates (µg/s)
Benzo(a)pyrene	0.052
Biphenyl	0.81
Naphthalene	9.94

The total PAH emission rate averaged 24.0 µg/s for the three tests performed with biphenyl and naphthalene representing approximately 45% of the total PAH emissions.

Table 101 summarizes the lab blank and blank train PAH analysis. Note the amounts of naphthalene and tetralin detected in the blank train were significant 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.

Fifteen 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.

The total average volatile organic emission rate was 1.97 mg/s for the three tests performed with benzene and dichloromethane representing 59% 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 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 (99.9991%), Ethyl Acetate (99.9996%), Tetrachloroethene (99.9979%), Toluene (99.9925%), Total Xylenes (99.9953%) and 1,2,4-Trichlorobenzene (100.0000%). Note the contribution of the Thermal Desorber Unit was not included in the DRE calculations.

11. DISPERSION MODELLING

The AERMOD dispersion model (version 14134) has been used to assess compliance for the facility. The dispersion modelling was completed in accordance with the MOECC publication, “Air Dispersion Modelling Guideline for Ontario, Version 3.0” (ADMGO), dated March 2009.

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 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	194	1.22	48.0	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 MOECC 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 MOECC 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 MOECC 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 dispersion factor.

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 MOECC 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 and 24-hour 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	2.1725
1-hour	1.8104
24-Hour	0.4884

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 MOECC "Summary of Standards and Guidelines to Support Ontario Regulation 419: Air Pollution – Local Air Quality) (April 2012) where available.

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

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

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

Of the calculated maximum point-of-impingement concentrations for inorganic and semi-volatile organic compounds (Table 127) the only percentage of allowable concentrations that were higher than 1% were for sulphur dioxide (2.36% for the 24-hour standard and 3.49% for the 1-hour standard), nitrogen oxides (1.61% for the 1-hour standard) and hydrogen chloride (1.78%).

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 0.001% 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 material, 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)	5.66 mg/Rm^{3}(1)
Mercury	maximum 50 µg/Rm^{3}(1)	1.30 µg/Rm^{3}(1)
Dioxin and Furan TEQ	maximum 80 pg TEQ/Rm^{3}(1)	6.21 pg TEQ/Rm^{3}(1)
Carbon Monoxide	maximum 100 ppm(1)	31.9 ppm(1)
Oxygen	minimum 8.0 %(2)	8.83 %(2)
Total Hydrocarbons(3)	maximum 100 ppm	7.3 ppm(1)
Total Hydrocarbons(4)	maximum 100 ppm	4.6 ppm(4)
Total Hydrocarbons(5)	maximum 100 ppm	8.4 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.

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 216.2, 223.8 and 225.2 L/min for Test No. 1, Test No. 2, and Test No. 3, respectively. The Thermal Desorber Unit (TDU) was exhausting to the incinerator during each test.

In addition, the waste fed into the incinerator should not contain more than 2% organic chlorine by weight. The organic chlorine content in the individual waste feed streams was as follows:

Test No.	Organic Chlorine Content (% w/w)		
	Rich	Lean	Emulsion
1	0.11	0.038	0.061
2	0.11	0	0.038
3	0	0.020	0.020
Average	0.071	0.019	0.040

Organic 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, %	8.9	9.1
Carbon monoxide, ppm	38.9	33.2
Oxygen, %	8.8	8.9
Sulphur dioxide, ppm	280	324
Total hydrocarbons, ppm	8.9	5.4

* 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*	26.8	12.3
Moisture, %	49.0	47.6

* 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	0.2	0	0
2	1.0	0.7	0.8
3	1.7	0.2	0.9

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 221.7 L/min.
- The average total hydrocarbon concentration at the stack was 4.6 ppm (wet basis) for the three tests performed. The average total dry adjusted hydrocarbon concentration in the stack was 7.3 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 5.66 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 1.30 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 (36.5 mg/Rm^3 or 31.9 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 (6.21 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 8.83%, which is above the minimum 8.0% oxygen criterion.
- The average DREs calculated for the emission testing program were as follows: 2-Butanone (99.9991%), Ethyl Acetate (99.9996%), Tetrachloroethene (99.9979%), Toluene (99.9925%), Total Xylenes (99.9953%) and 1,2,4-Trichlorobenzene (100.0000%). Note the contribution of the Thermal Desorber Unit 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.

REFERENCES

1. “Source Testing Code”. Ontario Ministry of the Environment Report No. PIBs-1310e03. June 2010.
2. “Determination of Metals Emissions From Stationary Sources”. U. S. Environmental Protection Agency, Method 29. September 2014.
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. September 2014.
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. September 2014.
8. “Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)”. U.S. Environmental Protection Agency, Method 7E, Federal Register, Part 60, Appendix A. December 2014.
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. September 2014.
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. September 2014.
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. September 2014.
12. “Environmental Protection Act”. Revised Statutes of Ontario, 1990, c.E.19.
13. “Summary of Ontario Regulation 419/05 Standards and Point of Impingement Guidelines and Ambient Air Quality Criteria (AAQCs)”. Standards Development Branch, Ontario Ministry of the Environment, April 2012.

Figure 1
Incinerator Schematic

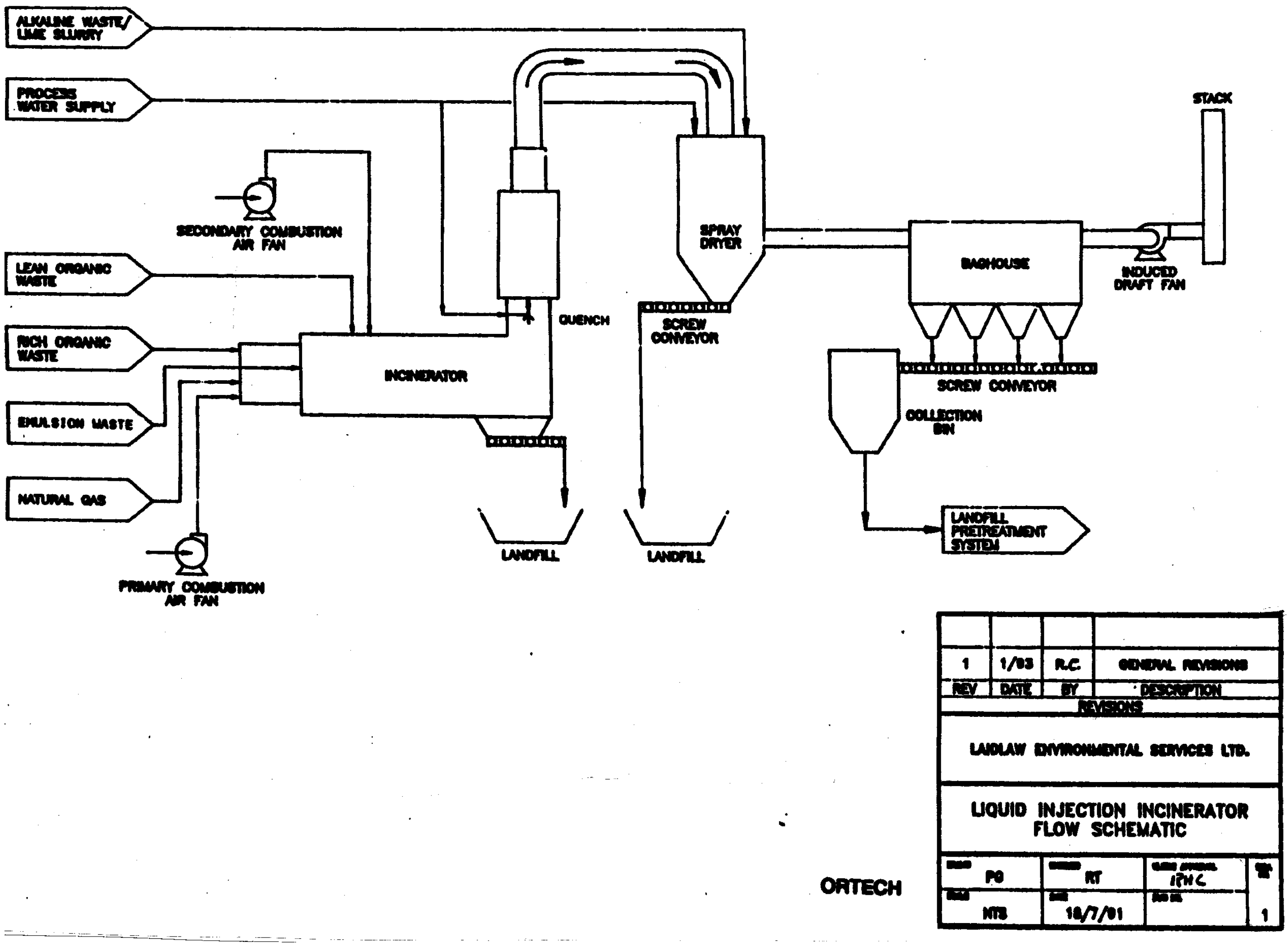
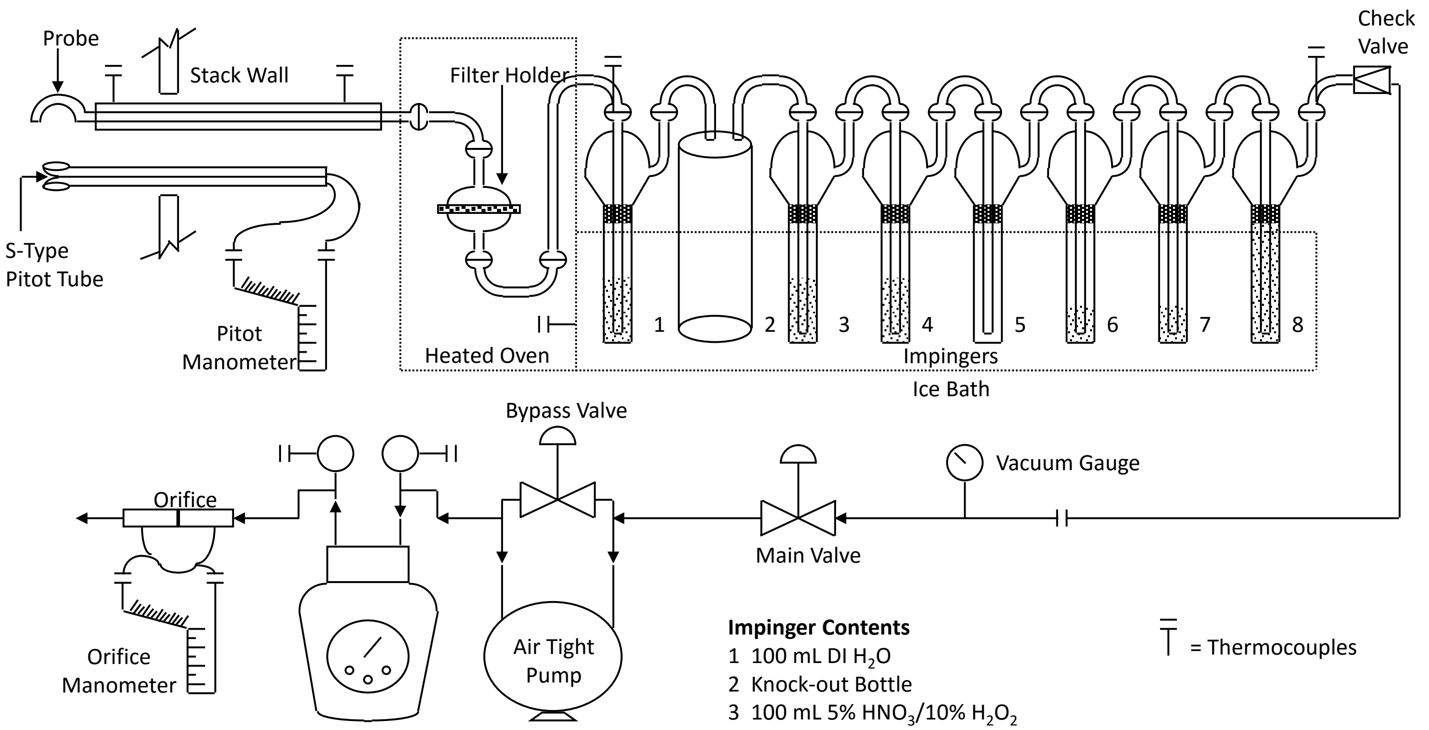


Figure 2
Particulate Matter and Metals Sampling Train



Impinger Contents

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

Figure 3
Semi Volatile Organic Train

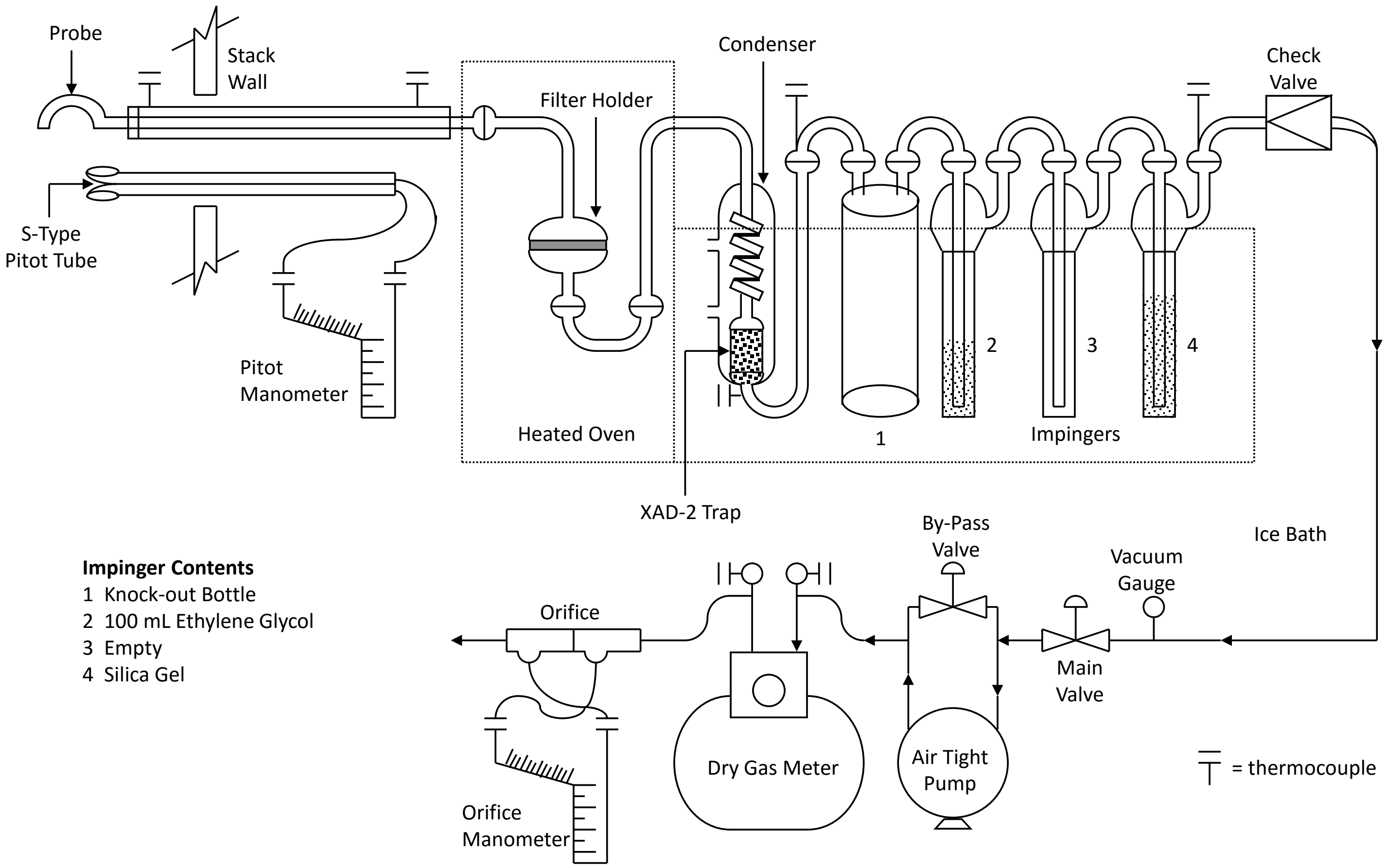
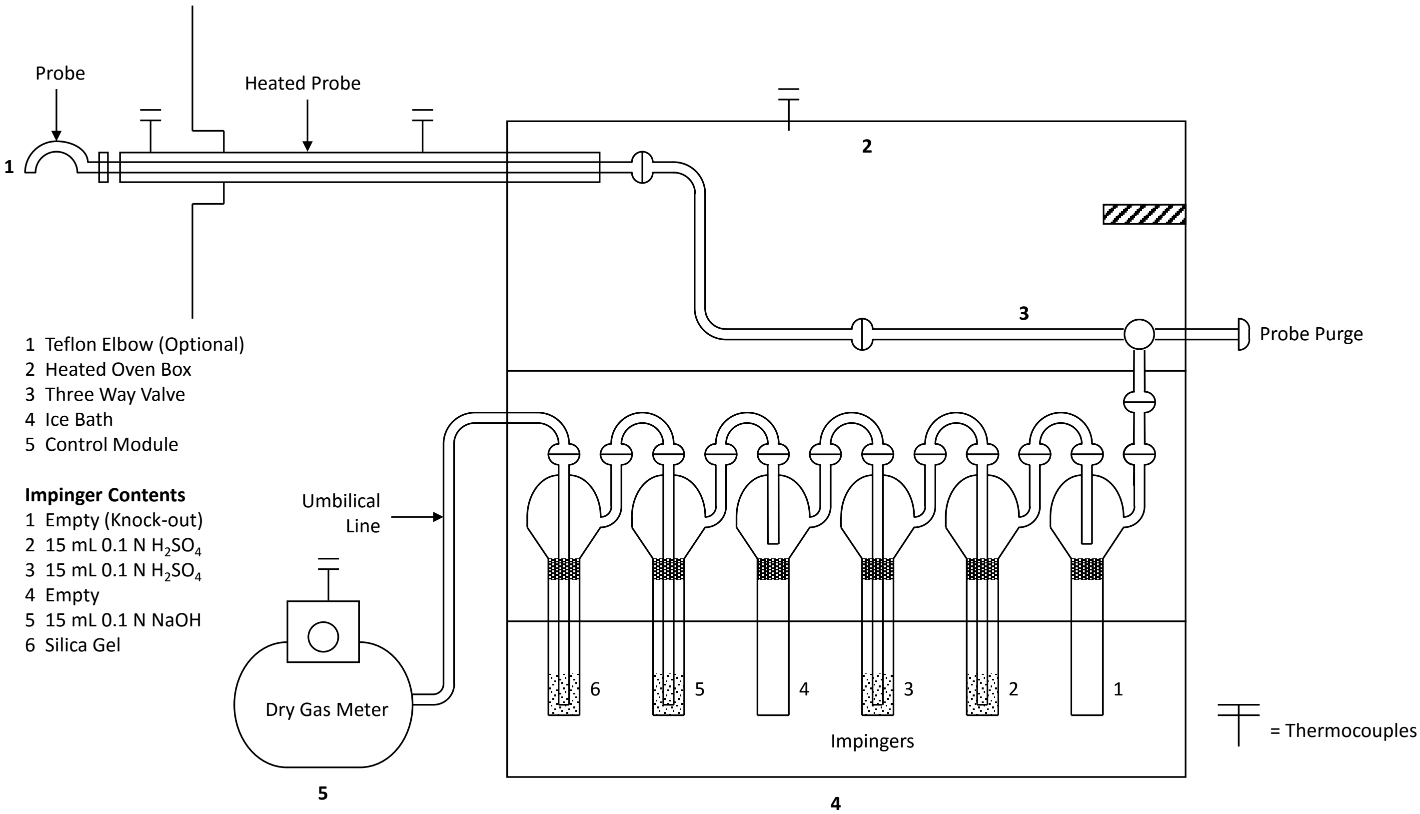


Figure 4
Hydrogen Chloride Sampling Train



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

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

Figure 5
VOST Train

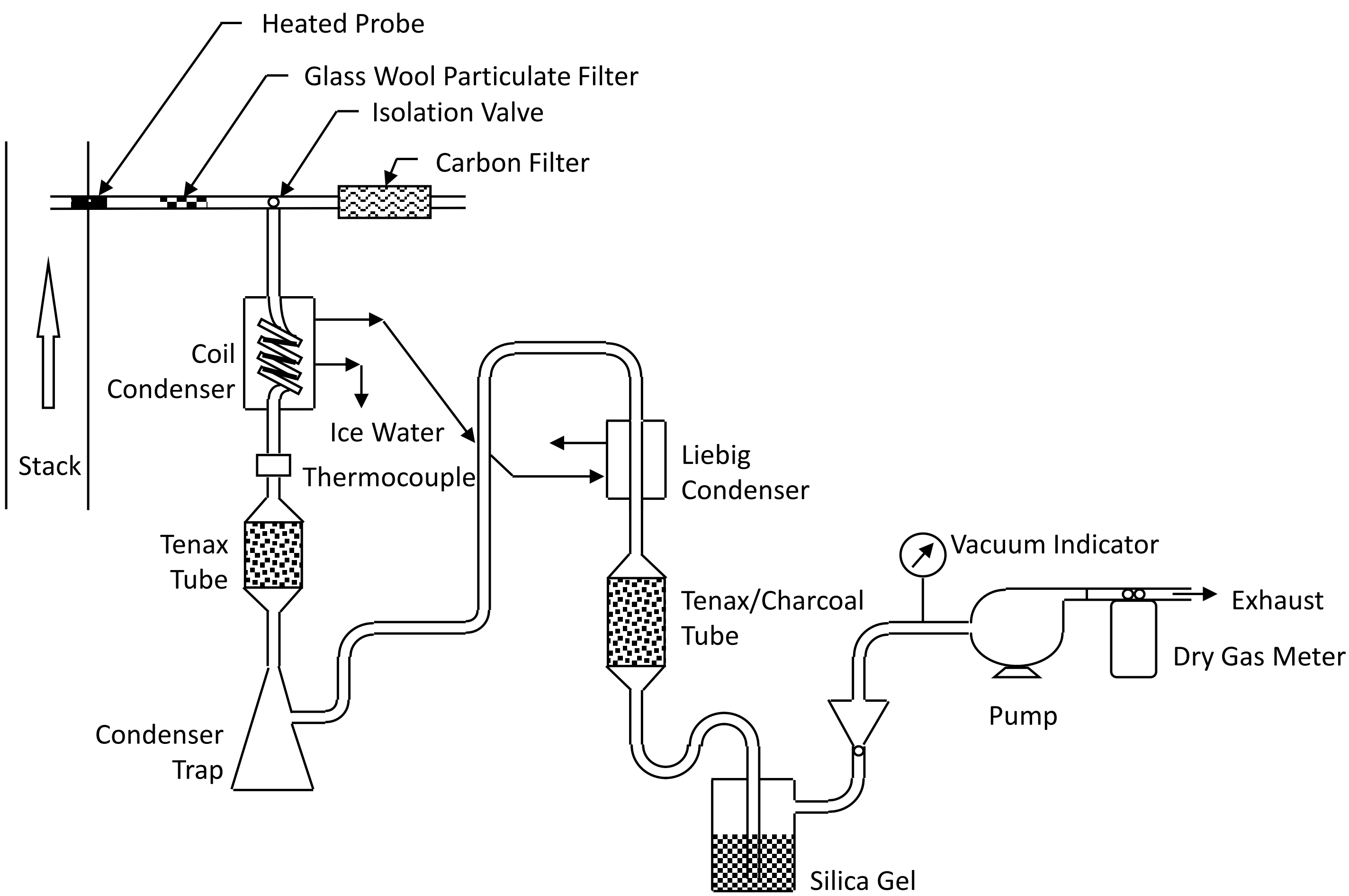
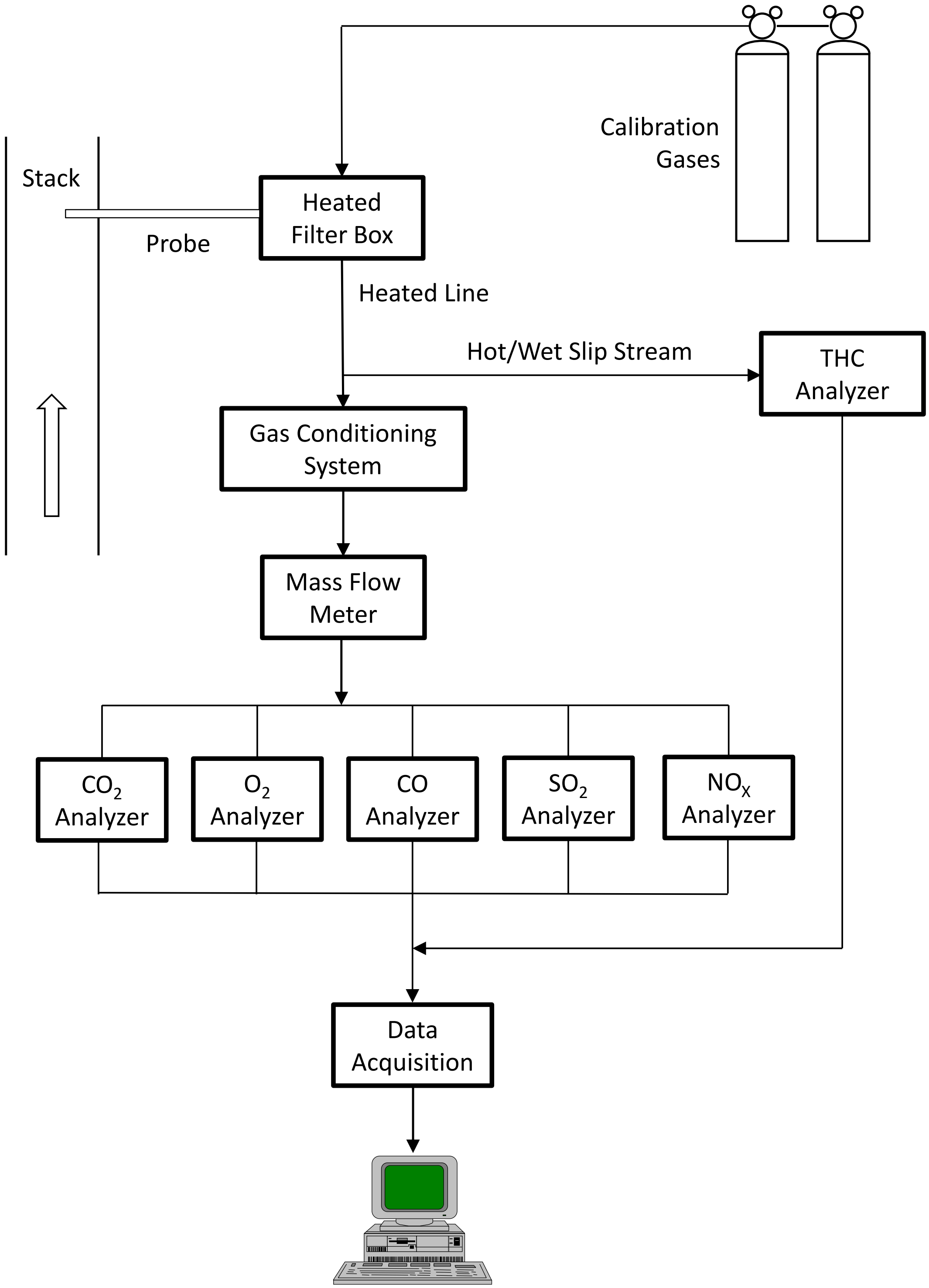


Figure 6
MSML #1 Schematic



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(j/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
	Ethylbenzene
	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 / >4m^3	Integrated	Modified US EPA Method 29	Gravimetric (MOE Method 5) ICAP, HGAA, CVAA
Semi-Volatile Organics	3	Main Stack	240 minutes / >4m^3	Integrated	EPS 1/RM/2	Modified EPS 1/RM/2 Modified EPS 1/RM/3* EPS 1/RM/23 US EPA Method 23 High and Low Res. GC/MS
Acid Gas	3	Main Stack	60 minutes /~0.12 m^3	Continuous	Modified US EPA Method 26	Modified US EPA Method 26, APHA 4500CN
Volatile Organics	3	Main Stack	3 pair @ 20 minutes / ~0.02 m^3	Continuous	US EPA SW-846 Method 0030	US EPA SW-846 Method 5040 US EPA SW-846 Method 8260
Carbon Dioxide	3	Breaching	Continuous	1 minute	US EPA Method 3A	CEM
Carbon Monoxide	3	Breaching	Continuous	1 minute	US EPA Method 10	CEM
Nitrogen Oxides	3	Breaching	Continuous	1 minute	US EPA Method 7E	CEM
Oxygen	3	Breaching	Continuous	1 minute	US EPA Method 3A	CEM
Sulfur Dioxide	3	Breaching	Continuous	1 minute	US EPA Method 6C	CEM
Total Hydrocarbons	3	Breaching	Continuous	1 minute	US EPA Method 25A	CEM (as CH_4)
Feed Samples and Baghouse Dust	3	Various	NA	Grab Sample	NA	ASTM D-808, D-240 (mod) D-1744, D-2983 (mod), D-70 (mod), D-1552, D-3176 (mod), HRGC/LRMS, HRGC/HRMS ICP/FAA, CVAA.

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

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

Particulate and Metals Trains

Test Number	Test Date	Sampling Period Start	Finish	Sampling Time* min
1	October 18, 2016	11:16	16:20	240
2	October 19, 2016	10:47	15:38	240
3	October 20, 2016	9:46	14:37	240

Semi-Volatile Organics Trains

Test Number	Test Date	Sampling Period Start	Finish	Sampling Time* min
1	October 18, 2016	11:16	16:20	240
2	October 19, 2016	10:47	15:38	240
3	October 20, 2016	9:46	14:37	240

Acid Gases Trains

Test Number	Test Date	Sampling Period Start	Finish	Sampling Time* min
1	October 18, 2016	15:05	16:05	60
2	October 19, 2016	11:03	12:03	60
3	October 20, 2016	13:32	14:32	60

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

TABLE 11
Clean Harbors Sarnia
Combustion Gases Train Test Schedule

Test Number	Test Date	Sampling Period * Start	Finish	Sampling Time min
1	October 18, 2016	11:16	16:20	249
2	October 19, 2016	10:47	15:38	242
3	October 20, 2016	9:46	14:37	242

* Covers the sampling periods for the isokinetic sampling trains

TABLE 12
Clean Harbors Sarnia
Volatile Organics Train Test Schedule

Test Number	Tube Pair	Test Date	Sampling Period Start	Sampling Period Finish	Sampling Time min
1	1	October 18, 2016	11:26	11:46	20
1	2	October 18, 2016	12:00	12:20	20
1	3	October 18, 2016	12:49	13:09	20
1	4	October 18, 2016	14:20	14:40	20
2	1	October 19, 2016	12:22	12:42	20
2	2	October 19, 2016	13:54	14:14	20
2	3	October 19, 2016	15:06	15:26	20
3	1	October 20, 2016	10:13	10:33	20
3	2	October 20, 2016	10:48	11:08	20
3	3	October 20, 2016	11:18	11:38	20
3	4	October 20, 2016	12:43	13:03	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	0.846	0.989	6.54	5.079	106.7
2	0.846	0.989	6.54	4.818	100.5
3	0.846	0.989	6.54	4.856	100.5

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	0.848	0.993	6.50	5.057	104.0
2	0.848	0.993	6.50	4.724	102.0
3	0.848	0.993	6.50	4.755	101.0

* Dry at 25°C and 1 atmosphere

TABLE 14
Clean Harbors Sarnia
Stack Gas Physical Parameters

Particulate and Metals Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	193	48.8	30.9	98.4	8.82	8.80
2	192	48.5	30.3	100.2	8.81	8.99
3	196	48.7	31.0	100.2	9.04	8.70
Average	194	48.7	30.7	99.6	8.89	8.83

Semi-Volatile Organics Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	194	48.9	32.1	98.4	8.82	8.80
2	194	49.6	30.4	100.2	8.81	8.99
3	197	49.1	30.9	100.2	9.04	8.70
Average	195	49.2	31.2	99.6	8.89	8.83

Averaged Metals and Semi-Volatile Organics Trains

Test No.	Gas Temp. °C	Moisture by Volume %	Gas Velocity m/s	Absolute Pressure kPa	Carbon Dioxide by Volume % *	Oxygen by Volume % *
1	193	48.9	31.5	98.4	8.82	8.80
2	193	49.1	30.4	100.2	8.81	8.99
3	197	48.9	30.9	100.2	9.04	8.70
Average	194	48.9	30.9	99.6	8.89	8.83
Coefficient of Variation, %	1.1	0.2	1.8	1.0	1.5	1.7

* 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	56.3	18.0	21.9	35.1
2	55.3	18.1	21.7	35.1
3	56.5	18.2	22.4	35.5
Average	56.1	18.1	22.0	35.2

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	58.6	18.6	22.7	36.4
2	55.5	17.7	21.3	35.1
3	56.4	18.0	22.1	35.3
Average	56.8	18.1	22.0	35.6

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	57.5	18.3	22.3	35.7
2	55.4	17.9	21.5	35.1
3	56.4	18.1	22.3	35.4
Average	56.4	18.1	22.0	35.4
Coefficient of Variation, %	1.8	1.1	2.1	0.9

* At 25°C and 1 atmosphere

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

TABLE 16
Clean Harbors Sarnia
Particulate Emission Data

Test No.	Particulate Collected Probe Rinse mg	Main Filter mg	Total mg	Dry Gas Volume Sampled Rm^3*	Particulate Concentration Actual mg/m^3	Dry Reference mg/Rm^3*	Dry Adjusted mg/Rm^3**	Wet Reference mg/Rm^3*	Particulate Emission Rate g/s
1	9.5	31.3	40.8	5.079	2.56	8.03	6.57	4.12	0.14
2	10.5	20.0	30.5	4.818	2.07	6.33	5.26	3.26	0.11
3	9.2	21.5	30.7	4.856	2.04	6.32	5.13	3.24	0.12
Average					2.22	6.90	5.66	3.54	0.12
Coefficient of Variation, %					13.2	14.3	14.1	14.1	13.7

* 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 Rm³*	Actual mg/m³	Hydrogen Chloride Concentration Dry Reference mg/Rm³*	Dry Adjusted mg/Rm³**	Wet Reference mg/Rm³*	HCl Emission Rate g/s
1	5.5	0.1174	14.9	46.8	38.4	24.0	0.86
2	2.5	0.1206	6.72	20.8	17.3	10.6	0.37
3	6.4	0.1217	16.8	52.4	42.5	26.8	0.95
Average			12.8	40.0	32.7	20.4	0.73

Hydrogen Fluoride

Test No.	HF Collected mg	Dry Volume Sampled Rm³*	Actual mg/m³	Hydrogen Fluoride Concentration Dry Reference mg/Rm³*	Dry Adjusted mg/Rm³**	Wet Reference mg/Rm³*	HF Emission Rate g/s
1	<0.059	0.1174	0.16	0.50	0.41	0.26	0.0092
2	<0.058	0.1206	0.16	0.48	0.40	0.25	0.0086
3	0.096	0.1217	0.25	0.79	0.64	0.40	0.014
Average			0.19	0.59	0.48	0.30	0.011

Hydrogen Bromide

Test No.	HBr Collected mg	Dry Volume Sampled Rm³*	Actual mg/m³	Hydrogen Bromide Concentration Dry Reference mg/Rm³*	Dry Adjusted mg/Rm³**	Wet Reference mg/Rm³*	HBr Emission Rate g/s
1	<0.28	0.1174	0.77	2.42	1.98	1.24	0.044
2	<0.28	0.1206	0.75	2.32	1.93	1.18	0.042
3	0.35	0.1217	0.93	2.91	2.36	1.49	0.053
Average			0.82	2.55	2.09	1.30	0.046

Hydrogen Iodide

Test No.	HI Collected mg	Dry Volume Sampled Rm³*	Actual mg/m³	Hydrogen Iodide Concentration Dry Reference mg/Rm³*	Dry Adjusted mg/Rm³**	Wet Reference mg/Rm³*	HI Emission Rate g/s
1	<0.085	0.1174	0.23	0.72	0.59	0.37	0.013
2	<0.084	0.1206	0.22	0.69	0.58	0.35	0.0124
3	<0.086	0.1217	0.23	0.70	0.57	0.36	0.013
Average			0.23	0.71	0.58	0.36	0.013

Hydrogen Cyanide

Test No.	HCN Collected µg	Dry Volume Sampled Rm³*	Actual mg/m³	Hydrogen Cyanide Concentration Dry Reference mg/Rm³*	Dry Adjusted mg/Rm³**	Wet Reference mg/Rm³*	HCN Emission Rate g/s
1	<0.21	0.1174	0.00056	0.0018	0.0015	0.00091	0.000032
2	<0.021	0.1206	0.000056	0.00017	0.00014	0.000088	0.0000031
3	<0.021	0.1217	0.000055	0.00017	0.00014	0.000087	0.0000031
Average			0.00022	0.00070	0.00058	0.00036	0.000013

* 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
<0.031	0.11	4.79

Hydrogen Fluoride

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.018	<0.059	<0.071

Hydrogen Bromide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.084	<0.28	<0.31

Hydrogen Iodide

Method Blank Analysis mg	Reagent Blank Analysis mg	Average Analysis of Test No. 1 to No. 3 mg
<0.025	<0.085	<0.085

Hydrogen Cyanide

Method Blank Analysis µg	Reagent Blank Analysis µg	Average Analysis of Test No. 1 to No. 3 µg
<0.021	<0.021	<0.083

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	8.82	41.7	94.4	92.5	8.80	313	5.8
2	8.81	40.4	111	108	8.99	263	4.1
3	9.04	34.6	109	106	8.70	265	3.7
Average	8.89	38.9	105	102	8.83	280	4.5

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	7.22	34.12	77.2	75.7	-	256	9.3
2	7.32	33.6	92.3	89.8	-	219	6.7
3	7.34	28.1	88.5	86.0	-	215	5.9
Average	7.29	31.9	86.0	83.8	-	230	7.3

* Nitric oxide and nitrogen dioxide
** Wet basis as methane

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	88200	72164	158620	129780	50403	81132	2896
	Carbon Monoxide	41.7	34.1	47.7	39.0	15.2	24.4	0.87
	Nitrogen Oxides ****	94.4	77.2	177	145	56.4	90.8	3.24
	Nitric Oxide	92.5	75.7	113	92.8	36.0	58.0	2.07
	Oxygen	88000	110000	115099	143873	36574	58871	2102
	Sulphur Dioxide	313	256	819	670	260	419	15.0
	Total Hydrocarbons	5.8 *	9.28	7.42	6.07	2.36	3.79	0.14
2	Carbon Dioxide	88100	73232	158440	131701	51094	80687	2832
	Carbon Monoxide	40.4	33.6	46.2	38.4	14.9	23.5	0.83
	Nitrogen Oxides ****	111	92.3	209	173	67.3	106	3.73
	Nitric Oxide	108	89.8	132	110	42.7	67.4	2.37
	Oxygen	89900	110000	117584	143873	37918	59881	2102
	Sulphur Dioxide	263	219	688	572	222	350	12.3
	Total Hydrocarbons	4.1 *	6.69	5.27	4.38	1.70	2.68	0.094
3	Carbon Dioxide	90400	73357	162577	131927	52080	83033	2939
	Carbon Monoxide	34.6	28.1	39.6	32.1	12.7	20.2	0.72
	Nitrogen Oxides ****	109	88.5	205	166	65.6	105	3.71
	Nitric Oxide	106	86.0	130	105	41.6	66.4	2.35
	Oxygen	87000	110000	113791	143873	36452	58117	2057
	Sulphur Dioxide	265	215	693	563	222	354	12.5
	Total Hydrocarbons	3.7 *	5.88	4.74	3.84	1.52	2.42	0.086

* 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 Test No. 1 mg/m^3	Test No. 2 mg/m^3	Test No. 3 mg/m^3	Average mg/m^3	Coefficient of Variation %
Carbon Dioxide	50403	51094	52080	51192	1.6
Carbon Monoxide	15.2	14.9	12.7	14.3	9.6
Nitrogen Oxides ***	56.4	67.3	65.6	63.1	9.3
Nitric Oxide	36.0	42.7	41.6	40.1	8.9
Oxygen	36574	37918	36452	36981	2.2
Sulphur Dioxide	260	222	222	235	9.4
Total Hydrocarbons	2.36	1.70	1.52	1.86	23.8

Combustion Gas	Dry Reference Concentration Test No. 1 mg/Rm^3*	Test No. 2 mg/Rm^3*	Test No. 3 mg/Rm^3*	Average mg/Rm^3*	Coefficient of Variation %
Carbon Dioxide	158620	158440	162577	159879	1.5
Carbon Monoxide	47.7	46.2	39.6	44.5	9.7
Nitrogen Oxides ***	177	209	205	197	8.6
Nitric Oxide	113	132	130	125	8.3
Oxygen	115099	117584	113791	115491	1.7
Sulphur Dioxide	819	688	693	733	10.1
Total Hydrocarbons	7.42	5.27	4.74	5.81	24.4

Combustion Gas	Dry Adjusted Concentration Test No. 1 mg/Rm^3**	Test No. 2 mg/Rm^3**	Test No. 3 mg/Rm^3**	Average mg/Rm^3**	Coefficient of Variation %
Carbon Dioxide	129780	131701	131927	131136	0.9
Carbon Monoxide	39.0	38.4	32.1	36.5	10.5
Nitrogen Oxides ***	145	173	166	162	9.1
Nitric Oxide	92.8	110	105	103	8.7
Oxygen	143873	143873	143873	143873	-
Sulphur Dioxide	670	572	563	601	9.9
Total Hydrocarbons	6.07	4.38	3.84	4.76	24.4

Combustion Gas	Emission Rate Test No. 1 g/s	Test No. 2 g/s	Test No. 3 g/s	Average g/s	Coefficient of Variation %
Carbon Dioxide	2896	2832	2939	2889	1.9
Carbon Monoxide	0.87	0.83	0.72	0.80	9.9
Nitrogen Oxides ***	3.24	3.73	3.71	3.56	7.7
Nitric Oxide	2.07	2.37	2.35	2.26	7.3
Oxygen	2102	2102	2057	2087	1.2
Sulphur Dioxide	15.0	12.3	12.5	13.3	11.1
Total Hydrocarbons	0.14	0.094	0.086	0.11	25.3

* 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 µg	Probe & Filter Hydrofluoric Acid Digest µg	Impingers & Rinses µg	Total Collected µg
Aluminum *	518	117	78.4	596
Antimony	0.66	0.77	0.29	1.72
Arsenic	106	16.2	13.1	135
Barium	67.9	18.9	4.55	91.4
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	2660	2660
Cadmium	1.10	0.36	0.20	1.66
Calcium *	1700	<500	738	2438
Chromium	19.1	12.0	84.9	116
Cobalt	1.25	0.81	0.22	2.28
Copper	29.6	7.06	31.8	68.5
Iron	1000	1550	248	2798
Lead	4.39	3.22	1.55	9.16
Lithium	1.43	<0.5	<0.25	1.43
Magnesium *	181	34.9	98.7	280
Manganese	95.0	22.9	19.6	138
Mercury **	0.86	0.12	4.82	5.81
Molybdenum	9.21	18.2	<0.1	27.4
Nickel	7.41	6.13	4.73	18.3
Phosphorus	948	<100	95.6	1044
Potassium	2020	145	115	2280
Selenium	37.3	5.49	119	162
Silicon *	735	-	2123	2858
Silver	<0.2	<0.2	0.12	0.12
Sodium *	3420	232	1640	5060
Strontium	5.76	0.72	1.32	7.80
Sulphur	<10000	<10000	2300000	2300000
Tin	1.37	2.10	34.5	38.0
Titanium	63.2	31.1	78.3	173
Vanadium	6.32	1.09	22.5	29.9
Zinc	40.3	29.9	24.4	94.6
Total				2321135

* 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 µg	Probe & Filter Hydrofluoric Acid Digest µg	Impingers & Rinses µg	Total Collected µg
Aluminum *	390	232	41.0	431
Antimony	0.39	0.90	0.20	1.49
Arsenic	84.6	29.5	2.39	116
Barium	46.5	27.4	3.55	77.5
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	1890	1890
Cadmium	0.59	0.40	0.31	1.30
Calcium *	1780	530	555	2335
Chromium	7.45	9.44	4.21	21.1
Cobalt	0.73	0.73	0.27	1.74
Copper	19.9	9.83	17.9	47.6
Iron	349	392	170	911
Lead	3.06	4.09	0.80	7.95
Lithium	0.92	<0.5	<0.25	0.92
Magnesium *	142	72.3	73.9	216
Manganese	21.4	13.1	18.3	52.8
Mercury **	0.87	0.35	5.30	6.51
Molybdenum	6.61	21.9	<0.1	28.5
Nickel	5.62	7.50	4.04	17.2
Phosphorus	777	237	46.4	1060
Potassium	1460	426	<100	1886
Selenium	29.8	9.03	31.5	70.3
Silicon *	395	-	394	789
Silver	<0.2	<0.2	<0.1	<0.10
Sodium *	2550	713	1200	3750
Strontium	4.77	1.60	0.77	7.14
Sulphur	<10000	<10000	1840000	1840000
Tin	0.99	1.83	22.6	25.4
Titanium	37.3	30.4	113	181
Vanadium	4.88	2.31	0.19	7.38
Zinc	24.6	38.9	16.0	79.5
Total				1854020

* Hydrofluoric acid digest not included in the total.

** Includes the permanganate impingers

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

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

Metal	Probe & Filter Nitric Acid Digest μg	Probe & Filter Hydrofluoric Acid Digest μg	Impingers & Rinses μg	Total Collected μg
Aluminum *	338	186	39.2	377
Antimony	0.40	0.80	0.28	1.47
Arsenic	76.1	22.7	3.75	103
Barium	40.7	22.7	4.20	67.6
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	2580	2580
Cadmium	0.57	0.31	0.23	1.12
Calcium *	1290	<500	751	2041
Chromium	6.00	7.97	2.46	16.4
Cobalt	0.65	0.72	0.10	1.47
Copper	20.2	7.92	24.4	52.5
Iron	233	276	144	653
Lead	2.60	3.94	0.86	7.40
Lithium	0.88	<0.5	<0.25	0.88
Magnesium *	133	61.6	87.8	221
Manganese	15.1	10.1	33.1	58.3
Mercury **	1.14	0.31	9.58	11.0
Molybdenum	6.20	20.7	<0.1	26.9
Nickel	4.34	7.33	3.54	15.2
Phosphorus	682	178	46.3	906
Potassium	1490	338	<100	1828
Selenium	26.9	7.04	72.7	107
Silicon *	478	-	396	874
Silver	<0.2	<0.2	<0.1	<0.10
Sodium *	2470	543	2040	4510
Strontium	4.37	1.24	0.88	6.49
Sulphur	<10000	<10000	2100000	2100000
Tin	0.51	1.78	27.3	29.6
Titanium	38.7	28.8	134	202
Vanadium	4.26	1.85	0.18	6.29
Zinc	21.7	38.8	16.7	77.2
Total				2114781

* Hydrofluoric acid digest not included in the total.

** Includes the permanganate impingers

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

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

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	596	37.5	117	96.5	60.2	2.11
Antimony	1.72	0.11	0.34	0.28	0.17	0.0061
Arsenic	135	8.52	26.6	21.9	13.7	0.48
Barium	91.4	5.75	18.0	14.8	9.22	0.32
Beryllium	<0.20	0.013	0.039	0.032	0.020	0.00071
Boron	2660	167	524	430	269	9.43
Cadmium	1.66	0.10	0.33	0.27	0.17	0.0059
Calcium	2438	153	480	395	246	8.64
Chromium	116	7.30	22.8	18.8	11.7	0.41
Cobalt	2.28	0.14	0.45	0.37	0.23	0.0081
Copper	68.5	4.31	13.5	11.1	6.91	0.24
Iron	2798	176	551	453	283	9.92
Lead	9.16	0.58	1.80	1.48	0.92	0.032
Lithium	1.43	0.090	0.28	0.23	0.14	0.0051
Magnesium	280	17.6	55.1	45.3	28.2	0.99
Manganese	138	8.66	27.1	22.3	13.9	0.49
Mercury	5.81	0.37	1.14	0.94	0.59	0.021
Molybdenum	27.4	1.73	5.40	4.44	2.77	0.097
Nickel	18.3	1.15	3.60	2.96	1.84	0.065
Phosphorus	1044	65.7	205	169	105	3.70
Potassium	2280	144	449	369	230	8.08
Selenium	162	10.2	31.9	26.2	16.3	0.57
Silicon	2858	180	563	463	289	10.1
Silver	0.12	0.0072	0.023	0.019	0.012	0.00041
Sodium	5060	319	996	819	511	17.9
Strontium	7.80	0.49	1.53	1.26	0.79	0.028
Sulphur	2300000	144782	452845	372201	232228	8151
Tin	38.0	2.39	7.48	6.14	3.83	0.13
Titanium	173	10.9	34.0	27.9	17.4	0.61
Vanadium	29.9	1.88	5.89	4.84	3.02	0.11
Zinc	94.6	5.95	18.6	15.3	9.55	0.34
Total	2321135	146112	457006	375622	234362	8226

Dry Gas Volume Sampled (Rm³*) :	5.079
Actual Flowrate (m³/s) :	56.3
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	21.9
Wet Reference Flowrate (Rm³/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	431	29.3	89.5	74.6	46.1	1.62
Antimony	1.49	0.10	0.31	0.26	0.16	0.0056
Arsenic	116	7.91	24.2	20.2	12.5	0.44
Barium	77.5	5.26	16.1	13.4	8.29	0.29
Beryllium	<0.20	0.014	0.042	0.035	0.021	0.00075
Boron	1890	128	392	327	202	7.10
Cadmium	1.30	0.088	0.27	0.22	0.14	0.0049
Calcium	2335	159	485	404	250	8.77
Chromium	21.1	1.43	4.38	3.65	2.26	0.079
Cobalt	1.74	0.12	0.36	0.30	0.19	0.0065
Copper	47.6	3.24	9.89	8.25	5.10	0.18
Iron	911	61.9	189	158	97.5	3.42
Lead	7.95	0.54	1.65	1.38	0.85	0.030
Lithium	0.92	0.062	0.19	0.16	0.098	0.0034
Magnesium	216	14.7	44.8	37.4	23.1	0.81
Manganese	52.8	3.59	11.0	9.14	5.65	0.20
Mercury	6.51	0.44	1.35	1.13	0.70	0.024
Molybdenum	28.5	1.94	5.92	4.94	3.05	0.11
Nickel	17.2	1.17	3.56	2.97	1.84	0.064
Phosphorus	1060	72.0	220	184	113	3.98
Potassium	1886	128	391	327	202	7.09
Selenium	70.3	4.78	14.6	12.2	7.53	0.26
Silicon	789	53.6	164	137	84.4	2.96
Silver	<0.10	0.0068	0.021	0.017	0.011	0.00038
Sodium	3750	255	778	649	401	14.1
Strontium	7.14	0.49	1.48	1.24	0.76	0.027
Sulphur	1840000	124998	381901	318544	196935	6912
Tin	25.4	1.73	5.28	4.40	2.72	0.095
Titanium	181	12.3	37.5	31.3	19.3	0.68
Vanadium	7.38	0.50	1.53	1.28	0.79	0.028
Zinc	79.5	5.40	16.5	13.8	8.51	0.30
Total	1854020	125951	384811	320972	198435	6965

Dry Gas Volume Sampled (Rm³*) :	4.818
Actual Flowrate (m³/s) :	55.3
Dry Reference Flowrate (Rm³/s*) :	18.1
Dry Adjusted Flowrate (Rm³/s**) :	21.7
Wet Reference Flowrate (Rm³/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

Metal	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	377	25.0	77.7	63.1	39.8	1.41
Antimony	1.47	0.098	0.30	0.25	0.16	0.0055
Arsenic	103	6.80	21.1	17.2	10.8	0.38
Barium	67.6	4.48	13.9	11.3	7.14	0.25
Beryllium	<0.20	0.013	0.041	0.033	0.021	0.00075
Boron	2580	171	531	432	272	9.67
Cadmium	1.12	0.074	0.23	0.19	0.12	0.0042
Calcium	2041	135	420	341	215	7.65
Chromium	16.4	1.09	3.38	2.75	1.73	0.062
Cobalt	1.47	0.097	0.30	0.25	0.15	0.0055
Copper	52.5	3.48	10.8	8.79	5.54	0.20
Iron	653	43.3	134	109	68.9	2.45
Lead	7.40	0.49	1.52	1.24	0.78	0.028
Lithium	0.88	0.058	0.18	0.15	0.093	0.0033
Magnesium	221	14.6	45.5	36.9	23.3	0.83
Manganese	58.3	3.87	12.0	9.75	6.16	0.22
Mercury	11.0	0.73	2.27	1.85	1.17	0.041
Molybdenum	26.9	1.78	5.54	4.50	2.84	0.10
Nickel	15.2	1.01	3.13	2.54	1.61	0.057
Phosphorus	906	60.1	187	152	95.7	3.40
Potassium	1828	121	376	306	193	6.85
Selenium	107	7.07	22.0	17.8	11.3	0.40
Silicon	874	58.0	180	146	92.3	3.28
Silver	<0.10	0.0066	0.021	0.017	0.011	0.00037
Sodium	4510	299	929	755	476	16.9
Strontium	6.49	0.43	1.34	1.09	0.69	0.024
Sulphur	2100000	139304	432455	351369	221709	7871
Tin	29.6	1.96	6.09	4.95	3.12	0.11
Titanium	202	13.4	41.5	33.7	21.3	0.76
Vanadium	6.29	0.42	1.30	1.05	0.66	0.024
Zinc	77.2	5.12	15.9	12.9	8.15	0.29
Total	2114781	140285	435499	353843	223270	7926

Dry Gas Volume Sampled (Rm³*) :	4.856
Actual Flowrate (m³/s) :	56.5
Dry Reference Flowrate (Rm³/s*) :	18.2
Dry Adjusted Flowrate (Rm³/s**) :	22.4
Wet Reference Flowrate (Rm³/s*) :	35.5

* At 25°C and 1 atmosphere

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

TABLE 28
Clean Harbors Sarnia
Summary of Metal Actual Concentrations

Metal	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	μg/m³	μg/m³	μg/m³	μg/m³	%
Aluminum	37.5	29.3	25.0	30.6	20.8
Antimony	0.11	0.10	0.098	0.10	5.3
Arsenic	8.52	7.91	6.80	7.74	11.2
Barium	5.75	5.26	4.48	5.17	12.4
Beryllium	0.013	0.014	0.013	0.013	3.9
Boron	167	128	171	156	15.2
Cadmium	0.10	0.088	0.074	0.089	17.1
Calcium	153	159	135	149	8.2
Chromium	7.30	1.43	1.09	3.28	107
Cobalt	0.14	0.12	0.097	0.12	19.3
Copper	4.31	3.24	3.48	3.68	15.3
Iron	176	61.9	43.3	93.8	76.7
Lead	0.58	0.54	0.49	0.54	8.1
Lithium	0.090	0.062	0.058	0.070	24.6
Magnesium	17.6	14.7	14.6	15.6	10.9
Manganese	8.66	3.59	3.87	5.37	53.1
Mercury	0.37	0.44	0.73	0.51	37.6
Molybdenum	1.73	1.94	1.78	1.82	6.0
Nickel	1.15	1.17	1.01	1.11	7.8
Phosphorus	65.7	72.0	60.1	65.9	9.0
Potassium	144	128	121	131	8.7
Selenium	10.2	4.78	7.07	7.35	36.9
Silicon	180	53.6	58.0	97.2	73.8
Silver	0.0072	0.0068	0.0066	0.0069	4.6
Sodium	319	255	299	291	11.2
Strontium	0.49	0.49	0.43	0.47	7.1
Sulphur	144782	124998	139304	136361	7.5
Tin	2.39	1.73	1.96	2.03	16.6
Titanium	10.9	12.3	13.4	12.2	10.3
Vanadium	1.88	0.50	0.42	0.93	88.1
Zinc	5.95	5.40	5.12	5.49	7.7
Total	146112	125951	140285	137449	7.5

TABLE 29
Clean Harbors Sarnia
Summary of Metal Dry Reference Concentrations

Metal	Dry Reference Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	117	89.5	77.7	94.9	21.5
Antimony	0.34	0.31	0.30	0.32	6.0
Arsenic	26.6	24.2	21.1	24.0	11.5
Barium	18.0	16.1	13.9	16.0	12.7
Beryllium	0.039	0.042	0.041	0.041	2.8
Boron	524	392	531	482	16.2
Cadmium	0.33	0.27	0.23	0.27	17.6
Calcium	480	485	420	462	7.8
Chromium	22.8	4.38	3.38	10.2	107
Cobalt	0.45	0.36	0.30	0.37	19.9
Copper	13.5	9.89	10.8	11.4	16.4
Iron	551	189	134	291	77.6
Lead	1.80	1.65	1.52	1.66	8.5
Lithium	0.28	0.19	0.18	0.22	25.5
Magnesium	55.1	44.8	45.5	48.5	11.9
Manganese	27.1	11.0	12.0	16.7	54.1
Mercury	1.14	1.35	2.27	1.59	37.8
Molybdenum	5.40	5.92	5.54	5.62	4.8
Nickel	3.60	3.56	3.13	3.43	7.5
Phosphorus	205	220	187	204	8.2
Potassium	449	391	376	406	9.4
Selenium	31.9	14.6	22.0	22.8	38.0
Silicon	563	164	180	302	74.7
Silver	0.023	0.021	0.021	0.021	5.3
Sodium	996	778	929	901	12.4
Strontium	1.53	1.48	1.34	1.45	7.1
Sulphur	452845	381901	432455	422400	8.6
Tin	7.48	5.28	6.09	6.28	17.7
Titanium	34.0	37.5	41.5	37.7	10.0
Vanadium	5.89	1.53	1.30	2.91	89.0
Zinc	18.6	16.5	15.9	17.0	8.4
Total	457006	384811	435499	425772	8.7

* At 25°C and 1 atmosphere

TABLE 30
Clean Harbors Sarnia
Summary of Metal Dry Adjusted Concentrations

Metal	Dry Adjusted Concentration Test No. 1 µg/Rm³*	Test No. 2 µg/Rm³*	Test No. 3 µg/Rm³*	Average µg/Rm³*	Coefficient of Variation %
Aluminum	96.5	74.6	63.1	78.1	21.7
Antimony	0.28	0.26	0.25	0.26	6.2
Arsenic	21.9	20.2	17.2	19.7	12.1
Barium	14.8	13.4	11.3	13.2	13.3
Beryllium	0.032	0.035	0.033	0.033	3.4
Boron	430	327	432	396	15.1
Cadmium	0.27	0.22	0.19	0.23	18.0
Calcium	395	404	341	380	8.9
Chromium	18.8	3.65	2.75	8.39	107
Cobalt	0.37	0.30	0.25	0.30	20.3
Copper	11.1	8.25	8.79	9.37	16.0
Iron	453	158	109	240	77.5
Lead	1.48	1.38	1.24	1.37	9.0
Lithium	0.23	0.16	0.15	0.18	25.5
Magnesium	45.3	37.4	36.9	39.9	11.7
Manganese	22.3	9.14	9.75	13.7	53.9
Mercury	0.94	1.13	1.85	1.30	36.7
Molybdenum	4.44	4.94	4.50	4.62	5.9
Nickel	2.96	2.97	2.54	2.82	8.6
Phosphorus	169	184	152	168	9.5
Potassium	369	327	306	334	9.6
Selenium	26.2	12.2	17.8	18.7	37.6
Silicon	463	137	146	248	74.6
Silver	0.019	0.017	0.017	0.018	5.5
Sodium	819	649	755	741	11.6
Strontium	1.26	1.24	1.09	1.19	7.9
Sulphur	372201	318544	351369	347372	7.8
Tin	6.14	4.40	4.95	5.17	17.3
Titanium	27.9	31.3	33.7	31.0	9.4
Vanadium	4.84	1.28	1.05	2.39	88.9
Zinc	15.3	13.8	12.9	14.0	8.7
Total	375622	320972	353843	350145	7.9

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

TABLE 31
Clean Harbors Sarnia
Summary of Metal Wet Reference Concentrations

Metal	Wet Reference Concentration				Coefficient
	Test No. 1	Test No. 2	Test No. 3	Average	of Variation
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*	%
Aluminum	60.2	46.1	39.8	48.7	21.4
Antimony	0.17	0.16	0.16	0.16	5.9
Arsenic	13.7	12.5	10.8	12.3	11.6
Barium	9.22	8.29	7.14	8.22	12.7
Beryllium	0.020	0.021	0.021	0.021	3.0
Boron	269	202	272	248	15.9
Cadmium	0.17	0.14	0.12	0.14	17.6
Calcium	246	250	215	237	8.0
Chromium	11.7	2.26	1.73	5.24	107
Cobalt	0.23	0.19	0.15	0.19	19.9
Copper	6.91	5.10	5.54	5.85	16.2
Iron	283	97.5	68.9	150	77.5
Lead	0.92	0.85	0.78	0.85	8.5
Lithium	0.14	0.098	0.093	0.11	25.4
Magnesium	28.2	23.1	23.3	24.9	11.7
Manganese	13.9	5.65	6.16	8.56	53.9
Mercury	0.59	0.70	1.17	0.82	37.6
Molybdenum	2.77	3.05	2.84	2.89	5.1
Nickel	1.84	1.84	1.61	1.76	7.7
Phosphorus	105	113	95.7	105	8.5
Potassium	230	202	193	208	9.3
Selenium	16.3	7.53	11.3	11.7	37.8
Silicon	289	84.4	92.3	155	74.6
Silver	0.012	0.011	0.011	0.011	5.2
Sodium	511	401	476	463	12.1
Strontium	0.79	0.76	0.69	0.75	7.2
Sulphur	232228	196935	221709	216957	8.4
Tin	3.83	2.72	3.12	3.23	17.5
Titanium	17.4	19.3	21.3	19.3	9.9
Vanadium	3.02	0.79	0.66	1.49	88.9
Zinc	9.55	8.51	8.15	8.74	8.3
Total	234362	198435	223270	218689	8.4

* At 25°C and 1 atmosphere

TABLE 32
Clean Harbors Sarnia
Summary of Metal Emission Rates

Metal	Emission Rate Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s	Coefficient of Variation %
Aluminum	2.11	1.62	1.41	1.72	21.0
Antimony	0.0061	0.0056	0.0055	0.0057	5.5
Arsenic	0.48	0.44	0.38	0.43	11.0
Barium	0.32	0.29	0.25	0.29	12.2
Beryllium	0.00071	0.00075	0.00075	0.00074	3.3
Boron	9.43	7.10	9.67	8.73	16.2
Cadmium	0.0059	0.0049	0.0042	0.0050	17.1
Calcium	8.64	8.77	7.65	8.35	7.3
Chromium	0.41	0.079	0.062	0.18	107
Cobalt	0.0081	0.0065	0.0055	0.0067	19.4
Copper	0.24	0.18	0.20	0.21	15.9
Iron	9.92	3.42	2.45	5.26	77.2
Lead	0.032	0.030	0.028	0.030	7.9
Lithium	0.0051	0.0034	0.0033	0.0039	25.0
Magnesium	0.99	0.81	0.83	0.88	11.4
Manganese	0.49	0.20	0.22	0.30	53.5
Mercury	0.021	0.024	0.041	0.029	38.3
Molybdenum	0.097	0.11	0.10	0.10	5.0
Nickel	0.065	0.064	0.057	0.062	7.1
Phosphorus	3.70	3.98	3.40	3.69	7.9
Potassium	8.08	7.09	6.85	7.34	8.9
Selenium	0.57	0.26	0.40	0.41	37.6
Silicon	10.1	2.96	3.28	5.46	74.2
Silver	0.00041	0.00038	0.00037	0.00039	4.8
Sodium	17.9	14.1	16.9	16.3	12.2
Strontium	0.028	0.027	0.024	0.026	6.5
Sulphur	8151	6912	7871	7645	8.5
Tin	0.13	0.095	0.11	0.11	17.3
Titanium	0.61	0.68	0.76	0.68	10.5
Vanadium	0.11	0.028	0.024	0.052	88.5
Zinc	0.34	0.30	0.29	0.31	7.9
Total	8226	6965	7926	7706	8.5

TABLE 33
Clean Harbors Sarnia
Summary of Metal Emission Data

Metal	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Aluminum	30.6	94.9	78.1	48.7	1.72
Antimony	0.10	0.32	0.26	0.16	0.0057
Arsenic	7.74	24.0	19.7	12.3	0.43
Barium	5.17	16.0	13.2	8.22	0.29
Beryllium	0.013	0.041	0.033	0.021	0.00074
Boron	156	482	396	248	8.73
Cadmium	0.089	0.27	0.23	0.14	0.0050
Calcium	149	462	380	237	8.35
Chromium	3.28	10.2	8.39	5.24	0.18
Cobalt	0.12	0.37	0.30	0.19	0.0067
Copper	3.68	11.4	9.37	5.85	0.21
Iron	93.8	291	240	150	5.26
Lead	0.54	1.66	1.37	0.85	0.030
Lithium	0.070	0.22	0.18	0.11	0.0039
Magnesium	15.6	48.5	39.9	24.9	0.88
Manganese	5.37	16.7	13.7	8.56	0.30
Mercury	0.51	1.59	1.30	0.82	0.029
Molybdenum	1.82	5.62	4.62	2.89	0.10
Nickel	1.11	3.43	2.82	1.76	0.062
Phosphorus	65.9	204	168	105	3.69
Potassium	131	406	334	208	7.34
Selenium	7.35	22.8	18.7	11.7	0.41
Silicon	97.2	302	248	155	5.46
Silver	0.007	0.021	0.018	0.011	0.00039
Sodium	291	901	741	463	16.3
Strontium	0.47	1.45	1.19	0.75	0.026
Sulphur	136361	422400	347372	216957	7645
Tin	2.03	6.28	5.17	3.23	0.11
Titanium	12.2	37.7	31.0	19.3	0.68
Vanadium	0.93	2.91	2.39	1.49	0.052
Zinc	5.49	17.0	14.0	8.74	0.31
Total	137449	425772	350145	218689	7706

* 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	31.0	11.7	11.7
Antimony	<0.2	<0.2	<0.1	<0.20
Arsenic	<1	<1	<0.2	<1.00
Barium	<5	<5	1.14	1.14
Beryllium	<0.2	<0.2	<0.1	<0.20
Boron *	<30	<30	21.8	21.8
Cadmium	<0.1	<0.1	0.17	0.17
Calcium *	<500	<500	124	124
Chromium	12.2	6.13	5.13	23.5
Cobalt	<0.2	<0.2	0.63	0.63
Copper	1.00	<1	4.34	5.34
Iron	<200	<200	<15	<200
Lead	<0.5	<0.5	0.45	0.45
Lithium	<0.5	<0.5	<0.25	<0.50
Magnesium *	<10	18.3	15.2	15.2
Manganese	0.92	0.69	2.27	3.88
Mercury **	<0.015	0.068	0.55	0.61
Molybdenum	<0.2	18.9	<0.1	18.9
Nickel	7.59	3.09	120	131
Phosphorus	<100	<100	26.7	26.7
Potassium	<100	<100	<100	<100
Selenium	<2	<2	<1	<1.00
Silicon *	177	-	366	543
Silver	<0.2	<0.2	<0.1	<0.10
Sodium *	179	75.5	200	379
Strontium	0.23	<0.2	0.26	0.50
Sulphur	<10000	<10000	<50000	<50000
Tin	5.87	3.57	15.9	25.3
Titanium	<10	<10	<1	<1.00
Vanadium	<1	<1	<0.1	<1.00
Zinc	8.86	<6	<3	8.86
Total				51646

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

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

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

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	87.1	0.0055	0.017	0.014	0.0088	0.32
Pentachlorodibenzo-p-dioxins	71.9	0.0045	0.014	0.012	0.0073	0.26
Hexachlorodibenzo-p-dioxins	48.5	0.0030	0.0096	0.0079	0.0049	0.18
Heptachlorodibenzo-p-dioxins	158	0.0099	0.031	0.026	0.016	0.58
Octachlorodibenzo-p-dioxin	143	0.0090	0.028	0.023	0.014	0.53
Total	509	0.032	0.10	0.082	0.051	1.87

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	32.3	0.0020	0.0064	0.0052	0.0033	0.12
Pentachlorodibenzofurans	179	0.011	0.035	0.029	0.018	0.66
Hexachlorodibenzofurans	67.2	0.0042	0.013	0.011	0.0068	0.25
Heptachlorodibenzofurans	84.9	0.0053	0.017	0.014	0.0086	0.31
Octachlorodibenzofuran	69.1	0.0043	0.014	0.011	0.0070	0.25
Total	433	0.027	0.086	0.070	0.044	1.59

Dry Gas Volume Sampled (Rm³*) :	5.057
Actual Flowrate (m³/s) :	58.6
Dry Reference Flowrate (Rm³/s*) :	18.6
Dry Adjusted Flowrate (Rm³/s**) :	22.7
Wet Reference Flowrate (Rm³/s*) :	36.4

* At 25°C and 1 atmosphere
** At 25°C and 1 atmosphere, adjusted to 11% oxygen by volume
Note: "<" indicates that the amount detected is less than the analytical detection limit (<MDL). In these cases the value of the detection limit was used to calculate the emission data.

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

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	24.2	0.0016	0.0051	0.0043	0.0026	0.091
Pentachlorodibenzo-p-dioxins	<7.4	0.00050	0.0016	0.0013	0.00079	0.028
Hexachlorodibenzo-p-dioxins	43.4	0.0029	0.0092	0.0076	0.0046	0.16
Heptachlorodibenzo-p-dioxins	59.0	0.0040	0.012	0.010	0.0063	0.22
Octachlorodibenzo-p-dioxin	<120	0.0081	0.025	0.021	0.013	0.45
Total	254	0.017	0.054	0.045	0.027	0.95

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	95.8	0.0065	0.020	0.017	0.010	0.36
Pentachlorodibenzofurans	93.1	0.0063	0.020	0.016	0.0099	0.35
Hexachlorodibenzofurans	35.9	0.0024	0.0076	0.0063	0.0038	0.13
Heptachlorodibenzofurans	77.8	0.0053	0.016	0.014	0.0083	0.29
Octachlorodibenzofuran	<33	0.0022	0.0070	0.0058	0.0035	0.12
Total	336	0.023	0.071	0.059	0.036	1.26

Dry Gas Volume Sampled (Rm³*) :	4.724
Actual Flowrate (m³/s) :	55.5
Dry Reference Flowrate (Rm³/s*) :	17.7
Dry Adjusted Flowrate (Rm³/s**) :	21.3
Wet Reference Flowrate (Rm³/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

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

Dioxins

Congener Group	Total Collected pg	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	<17	0.0011	0.0036	0.0029	0.0018	0.064
Pentachlorodibenzo-p-dioxins	<10	0.00067	0.0021	0.0017	0.0011	0.038
Hexachlorodibenzo-p-dioxins	42.2	0.0028	0.0089	0.0072	0.0045	0.16
Heptachlorodibenzo-p-dioxins	36.3	0.0024	0.0076	0.0062	0.0039	0.14
Octachlorodibenzo-p-dioxin	69.9	0.0047	0.015	0.012	0.0075	0.26
Total	175	0.012	0.037	0.030	0.019	0.66

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	<11	0.00074	0.0023	0.0019	0.0012	0.042
Pentachlorodibenzofurans	<9.9	0.00066	0.0021	0.0017	0.0011	0.037
Hexachlorodibenzofurans	<12	0.00081	0.0025	0.0021	0.0013	0.045
Heptachlorodibenzofurans	<11	0.00074	0.0023	0.0019	0.0012	0.042
Octachlorodibenzofuran	<31	0.0021	0.0065	0.0053	0.0033	0.12
Total	74.9	0.0050	0.016	0.013	0.0080	0.28

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

* 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 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0055	0.0016	0.0011	0.0027	86.2
Pentachlorodibenzo-p-dioxins	0.0045	0.00050	0.00067	0.0019	120
Hexachlorodibenzo-p-dioxins	0.0030	0.0029	0.0028	0.0029	3.6
Heptachlorodibenzo-p-dioxins	0.0099	0.0040	0.0024	0.0054	72.5
Octachlorodibenzo-p-dioxin	0.0090	0.0081	0.0047	0.0073	31.2
Total	0.032	0.017	0.012	0.020	51.4

Furans

Congener Group	Actual Concentration Test No. 1 ng/m³	Test No. 2 ng/m³	Test No. 3 ng/m³	Average ng/m³	Coefficient of Variation %
Tetrachlorodibenzofurans	0.0020	0.0065	0.00074	0.0031	97.7
Pentachlorodibenzofurans	0.011	0.0063	0.00066	0.0061	87.3
Hexachlorodibenzofurans	0.0042	0.0024	0.00081	0.0025	68.8
Heptachlorodibenzofurans	0.0053	0.0053	0.00074	0.0038	69.7
Octachlorodibenzofuran	0.0043	0.0022	0.0021	0.0029	43.8
Total	0.027	0.023	0.0050	0.018	64.0

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	0.0051	0.0036	0.0086	86.5
Pentachlorodibenzo-p-dioxins	0.014	0.0016	0.0021	0.0060	120
Hexachlorodibenzo-p-dioxins	0.0096	0.0092	0.0089	0.0092	3.9
Heptachlorodibenzo-p-dioxins	0.031	0.012	0.0076	0.017	72.8
Octachlorodibenzo-p-dioxin	0.028	0.025	0.015	0.023	31.4
Total	0.10	0.054	0.037	0.064	51.7

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	0.0064	0.020	0.0023	0.0097	97.5
Pentachlorodibenzofurans	0.035	0.020	0.0021	0.019	87.4
Hexachlorodibenzofurans	0.013	0.0076	0.0025	0.0078	69.0
Heptachlorodibenzofurans	0.017	0.016	0.0023	0.012	69.7
Octachlorodibenzofuran	0.014	0.0070	0.0065	0.0091	44.1
Total	0.086	0.071	0.016	0.057	64.1

* At 25°C and 1 atmosphere

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

Dioxins

Congener Group	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.014	0.0043	0.0029	0.0071	86.2
Pentachlorodibenzo-p-dioxins	0.012	0.0013	0.0017	0.0049	120
Hexachlorodibenzo-p-dioxins	0.0079	0.0076	0.0072	0.0076	4.2
Heptachlorodibenzo-p-dioxins	0.026	0.010	0.0062	0.014	72.5
Octachlorodibenzo-p-dioxin	0.023	0.021	0.012	0.019	31.8
Total	0.082	0.045	0.030	0.052	51.6

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	0.0052	0.017	0.0019	0.0080	98.3
Pentachlorodibenzofurans	0.029	0.016	0.0017	0.016	87.1
Hexachlorodibenzofurans	0.011	0.0063	0.0021	0.0064	68.8
Heptachlorodibenzofurans	0.014	0.014	0.0019	0.0098	69.9
Octachlorodibenzofuran	0.011	0.0058	0.0053	0.0074	43.9
Total	0.070	0.059	0.013	0.047	64.2

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

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

Dioxins

Congener Group	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.0088	0.0026	0.0018	0.0044	87.0
Pentachlorodibenzo-p-dioxins	0.0073	0.00079	0.0011	0.0030	120
Hexachlorodibenzo-p-dioxins	0.0049	0.0046	0.0045	0.0047	4.1
Heptachlorodibenzo-p-dioxins	0.016	0.0063	0.0039	0.0087	73.3
Octachlorodibenzo-p-dioxin	0.014	0.013	0.0075	0.012	31.4
Total	0.051	0.027	0.019	0.032	52.2

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	0.0033	0.010	0.0012	0.0049	96.9
Pentachlorodibenzofurans	0.018	0.0099	0.0011	0.0097	87.8
Hexachlorodibenzofurans	0.0068	0.0038	0.0013	0.0040	69.4
Heptachlorodibenzofurans	0.0086	0.0083	0.0012	0.0060	69.7
Octachlorodibenzofuran	0.0070	0.0035	0.0033	0.0046	44.6
Total	0.044	0.036	0.0080	0.029	64.2

* At 25°C and 1 atmosphere

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

Dioxins

Congener Group	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
Tetrachlorodibenzo-p-dioxins	0.32	0.091	0.064	0.16	88.9
Pentachlorodibenzo-p-dioxins	0.26	0.028	0.038	0.11	122
Hexachlorodibenzo-p-dioxins	0.18	0.16	0.16	0.17	6.0
Heptachlorodibenzo-p-dioxins	0.58	0.22	0.14	0.31	75.3
Octachlorodibenzo-p-dioxin	0.53	0.45	0.26	0.41	32.5
Total	1.87	0.95	0.66	1.16	54.2

Furans

Congener Group	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
Tetrachlorodibenzofurans	0.12	0.36	0.042	0.17	95.6
Pentachlorodibenzofurans	0.66	0.35	0.037	0.35	89.2
Hexachlorodibenzofurans	0.25	0.13	0.045	0.14	71.0
Heptachlorodibenzofurans	0.31	0.29	0.042	0.22	70.0
Octachlorodibenzofuran	0.25	0.12	0.12	0.17	46.8
Total	1.59	1.26	0.28	1.04	65.1

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

Dioxins

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzo-p-dioxins	0.0027	0.0086	0.0071	0.0044	0.16
Pentachlorodibenzo-p-dioxins	0.0019	0.0060	0.0049	0.0030	0.11
Hexachlorodibenzo-p-dioxins	0.0029	0.0092	0.0076	0.0047	0.17
Heptachlorodibenzo-p-dioxins	0.0054	0.017	0.014	0.0087	0.31
Octachlorodibenzo-p-dioxin	0.0073	0.023	0.019	0.012	0.41
Total	0.020	0.064	0.052	0.032	1.16

Furans

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate ng/s
Tetrachlorodibenzofurans	0.0031	0.0097	0.0080	0.0049	0.17
Pentachlorodibenzofurans	0.0061	0.019	0.016	0.0097	0.35
Hexachlorodibenzofurans	0.0025	0.0078	0.0064	0.0040	0.14
Heptachlorodibenzofurans	0.0038	0.012	0.0098	0.0060	0.22
Octachlorodibenzofuran	0.0029	0.0091	0.0074	0.0046	0.17
Total	0.018	0.057	0.047	0.029	1.04

* At 25°C and 1 atmosphere

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

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

Dioxins

Congener Group	Blank Train pg	Laboratory Blank pg
Tetrachlorodibenzo-p-dioxins	<9.2	<8.8
Pentachlorodibenzo-p-dioxins	<7.4	<7.7
Hexachlorodibenzo-p-dioxins	<8.1	<6.1
Heptachlorodibenzo-p-dioxins	<6.4	<7.1
Octachlorodibenzo-p-dioxin	<36	<34
Total	<67.1	<63.7

Furans

Congener Group	Blank Train pg	Laboratory Blank pg
Tetrachlorodibenzofurans	<7.6	<5.5
Pentachlorodibenzofurans	<5.7	<5.1
Hexachlorodibenzofurans	<8.9	<6.9
Heptachlorodibenzofurans	11.6	<5.4
Octachlorodibenzofuran	20.7	<14
Total	<54.5	<36.9

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

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

Specific Isomer	Total Collected pg	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<10	0.63	1.98	1.62	1.01	0.037
12378-pentachlorodibenzo-p-dioxin	10.0	0.63	1.98	1.62	1.01	0.037
123478-hexachlorodibenzo-p-dioxin	<11	0.69	2.18	1.78	1.11	0.040
123678-hexachlorodibenzo-p-dioxin	16.2	1.02	3.20	2.62	1.64	0.060
123789-hexachlorodibenzo-p-dioxin	16.2	1.02	3.20	2.62	1.64	0.060
1234678-heptachlorodibenzo-p-dioxin	81.9	5.14	16.2	13.3	8.28	0.30
Octachlorodibenzo-p-dioxin	143	8.98	28.3	23.2	14.4	0.53
2378-tetrachlorodibenzofuran	<9.0	0.56	1.78	1.46	0.91	0.033
12378-pentachlorodibenzofuran	<18	1.13	3.56	2.92	1.82	0.066
23478-pentachlorodibenzofuran	20.3	1.27	4.01	3.29	2.05	0.075
123478-hexachlorodibenzofuran	<21	1.32	4.15	3.40	2.12	0.077
123678-hexachlorodibenzofuran	26.3	1.65	5.20	4.26	2.66	0.097
234678-hexachlorodibenzofuran	<20	1.26	3.95	3.24	2.02	0.074
123789-hexachlorodibenzofuran	<11	0.69	2.18	1.78	1.11	0.040
1234678-heptachlorodibenzofuran	84.9	5.33	16.8	13.8	8.58	0.31
1234789-heptachlorodibenzofuran	<14	0.88	2.77	2.27	1.41	0.051
Octachlorodibenzofuran	69.1	4.34	13.7	11.2	6.98	0.25
PCB 77	5820	365	1151	943	588	21.4
PCB 81	14.6	0.92	2.89	2.37	1.48	0.054
PCB 126	53.4	3.35	10.6	8.65	5.40	0.20
PCB 169	<11	0.69	2.18	1.78	1.11	0.040
PCB 105	418	26.2	82.7	67.7	42.2	1.54
PCB 114	<32	2.01	6.33	5.18	3.23	0.12
PCB 118	1340	84.1	265	217	135	4.93
PCB 123	22.0	1.38	4.35	3.56	2.22	0.081
PCB 156/157	52.1	3.27	10.3	8.44	5.26	0.19
PCB 167	19.2	1.21	3.80	3.11	1.94	0.071
PCB 189	<7.4	0.46	1.46	1.20	0.75	0.027
Total Dioxins & Furans Only	582	36.5	115	94.3	58.8	2.14

Dry Gas Volume Sampled (Rm³*) :	5.057
Actual Flowrate (m³/s) :	58.6
Dry Reference Flowrate (Rm³/s*) :	18.6
Dry Adjusted Flowrate (Rm³/s**) :	22.7
Wet Reference Flowrate (Rm³/s*) :	36.4

* At 25°C and 1 atmosphere

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

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

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

Specific Isomer	Total Collected pg	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<10	0.68	2.12	1.76	1.07	0.037
12378-pentachlorodibenzo-p-dioxin	<7.4	0.50	1.57	1.30	0.79	0.028
123478-hexachlorodibenzo-p-dioxin	<13	0.88	2.75	2.29	1.39	0.049
123678-hexachlorodibenzo-p-dioxin	<12	0.81	2.54	2.11	1.28	0.045
123789-hexachlorodibenzo-p-dioxin	<13	0.88	2.75	2.29	1.39	0.049
1234678-heptachlorodibenzo-p-dioxin	59.0	3.98	12.5	10.4	6.30	0.22
Octachlorodibenzo-p-dioxin	<120	8.10	25.4	21.1	12.8	0.45
2378-tetrachlorodibenzofuran	<8.6	0.58	1.82	1.51	0.92	0.032
12378-pentachlorodibenzofuran	<14	0.95	2.96	2.46	1.49	0.052
23478-pentachlorodibenzofuran	<14	0.95	2.96	2.46	1.49	0.052
123478-hexachlorodibenzofuran	<15	1.01	3.18	2.64	1.60	0.056
123678-hexachlorodibenzofuran	<14	0.95	2.96	2.46	1.49	0.052
234678-hexachlorodibenzofuran	<10	0.68	2.12	1.76	1.07	0.037
123789-hexachlorodibenzofuran	<11	0.74	2.33	1.93	1.17	0.041
1234678-heptachlorodibenzofuran	70.4	4.75	14.9	12.4	7.51	0.26
1234789-heptachlorodibenzofuran	<8.1	0.55	1.71	1.42	0.86	0.030
Octachlorodibenzofuran	<33	2.23	6.99	5.80	3.52	0.12
PCB 77	101	6.82	21.4	17.8	10.8	0.38
PCB 81	17.1	1.15	3.62	3.01	1.83	0.064
PCB 126	13.2	0.89	2.79	2.32	1.41	0.049
PCB 169	<7.4	0.50	1.57	1.30	0.79	0.028
PCB 105	582	39.3	123	102	62.1	2.18
PCB 114	<40	2.70	8.47	7.04	4.27	0.15
PCB 118	1930	130	409	340	206	7.23
PCB 123	27.3	1.84	5.78	4.80	2.91	0.10
PCB 156/157	68.8	4.64	14.6	12.1	7.34	0.26
PCB 167	25.0	1.69	5.29	4.40	2.67	0.094
PCB 189	<9.1	0.61	1.93	1.60	0.97	0.034
Total Dioxins & Furans Only	433	29.2	91.6	76.1	46.2	1.62

Dry Gas Volume Sampled (Rm³*) :	4.724
Actual Flowrate (m³/s) :	55.5
Dry Reference Flowrate (Rm³/s*) :	17.7
Dry Adjusted Flowrate (Rm³/s**) :	21.3
Wet Reference Flowrate (Rm³/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

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

Specific Isomer	Total Collected pg	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	<17	1.14	3.58	2.91	1.82	0.064
12378-pentachlorodibenzo-p-dioxin	<10	0.67	2.10	1.71	1.07	0.038
123478-hexachlorodibenzo-p-dioxin	<9.9	0.66	2.08	1.70	1.06	0.037
123678-hexachlorodibenzo-p-dioxin	<8.8	0.59	1.85	1.51	0.94	0.033
123789-hexachlorodibenzo-p-dioxin	<9.8	0.66	2.06	1.68	1.05	0.037
1234678-heptachlorodibenzo-p-dioxin	36.3	2.44	7.63	6.22	3.89	0.14
Octachlorodibenzo-p-dioxin	69.9	4.69	14.7	12.0	7.50	0.26
2378-tetrachlorodibenzofuran	<11	0.74	2.31	1.88	1.18	0.042
12378-pentachlorodibenzofuran	<9.9	0.66	2.08	1.70	1.06	0.037
23478-pentachlorodibenzofuran	<9.7	0.65	2.04	1.66	1.04	0.037
123478-hexachlorodibenzofuran	<10	0.67	2.10	1.71	1.07	0.038
123678-hexachlorodibenzofuran	<9.1	0.61	1.91	1.56	0.98	0.034
234678-hexachlorodibenzofuran	<9.9	0.66	2.08	1.70	1.06	0.037
123789-hexachlorodibenzofuran	<12	0.81	2.52	2.06	1.29	0.045
1234678-heptachlorodibenzofuran	<33	2.21	6.94	5.65	3.54	0.12
1234789-heptachlorodibenzofuran	<11	0.74	2.31	1.88	1.18	0.042
Octachlorodibenzofuran	<31	2.08	6.52	5.31	3.32	0.12
PCB 77	87.0	5.84	18.3	14.9	9.33	0.33
PCB 81	12.3	0.83	2.59	2.11	1.32	0.047
PCB 126	<22	1.48	4.63	3.77	2.36	0.083
PCB 169	13.6	0.91	2.86	2.33	1.46	0.051
PCB 105	522	35.0	110	89.4	56.0	1.98
PCB 114	42.8	2.87	9.00	7.33	4.59	0.16
PCB 118	1690	113	355	289	181	6.40
PCB 123	<22	1.48	4.63	3.77	2.36	0.083
PCB 156/157	65.4	4.39	13.8	11.2	7.01	0.25
PCB 167	25.6	1.72	5.38	4.39	2.75	0.097
PCB 189	<5.1	0.34	1.07	0.87	0.55	0.019
Total Dioxins & Furans Only	308	20.7	64.8	52.8	33.1	1.17

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

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

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

Specific Isomer	Actual Concentration Test No. 1 pg/m³	Test No. 2 pg/m³	Test No. 3 pg/m³	Average pg/m³	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	0.63	0.68	1.14	0.81	34.8
12378-pentachlorodibenzo-p-dioxin	0.63	0.50	0.67	0.60	14.9
123478-hexachlorodibenzo-p-dioxin	0.69	0.88	0.66	0.74	15.6
123678-hexachlorodibenzo-p-dioxin	1.02	0.81	0.59	0.81	26.4
123789-hexachlorodibenzo-p-dioxin	1.02	0.88	0.66	0.85	21.3
1234678-heptachlorodibenzo-p-dioxin	5.14	3.98	2.44	3.85	35.2
Octachlorodibenzo-p-dioxin	8.98	8.10	4.69	7.26	31.2
2378-tetrachlorodibenzofuran	0.56	0.58	0.74	0.63	15.3
12378-pentachlorodibenzofuran	1.13	0.95	0.66	0.91	25.7
23478-pentachlorodibenzofuran	1.27	0.95	0.65	0.96	32.6
123478-hexachlorodibenzofuran	1.32	1.01	0.67	1.00	32.3
123678-hexachlorodibenzofuran	1.65	0.95	0.61	1.07	49.7
234678-hexachlorodibenzofuran	1.26	0.68	0.66	0.86	39.1
123789-hexachlorodibenzofuran	0.69	0.74	0.81	0.75	7.7
1234678-heptachlorodibenzofuran	5.33	4.75	2.21	4.10	40.4
1234789-heptachlorodibenzofuran	0.88	0.55	0.74	0.72	23.1
Octachlorodibenzofuran	4.34	2.23	2.08	2.88	43.8
PCB 77	365	6.82	5.84	126	165
PCB 81	0.92	1.15	0.83	0.97	17.6
PCB 126	3.35	0.89	1.48	1.91	67.4
PCB 169	0.69	0.50	0.91	0.70	29.5
PCB 105	26.2	39.3	35.0	33.5	19.9
PCB 114	2.01	2.70	2.87	2.53	18.1
PCB 118	84.1	130	113	109	21.4
PCB 123	1.38	1.84	1.48	1.57	15.6
PCB 156/157	3.27	4.64	4.39	4.10	17.8
PCB 167	1.21	1.69	1.72	1.54	18.7
PCB 189	0.46	0.61	0.34	0.47	28.8
Total Dioxins & Furans Only	36.5	29.2	20.7	28.8	27.5

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

Specific Isomer	Dry Reference Concentration Test No. 1 pg/Rm³*	Test No. 2 pg/Rm³*	Test No. 3 pg/Rm³*	Average pg/Rm³*	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	1.98	2.12	3.58	2.56	34.6
12378-pentachlorodibenzo-p-dioxin	1.98	1.57	2.10	1.88	14.9
123478-hexachlorodibenzo-p-dioxin	2.18	2.75	2.08	2.34	15.5
123678-hexachlorodibenzo-p-dioxin	3.20	2.54	1.85	2.53	26.7
123789-hexachlorodibenzo-p-dioxin	3.20	2.75	2.06	2.67	21.5
1234678-heptachlorodibenzo-p-dioxin	16.2	12.5	7.63	12.1	35.5
Octachlorodibenzo-p-dioxin	28.3	25.4	14.7	22.8	31.4
2378-tetrachlorodibenzofuran	1.78	1.82	2.31	1.97	15.1
12378-pentachlorodibenzofuran	3.56	2.96	2.08	2.87	25.9
23478-pentachlorodibenzofuran	4.01	2.96	2.04	3.01	32.9
123478-hexachlorodibenzofuran	4.15	3.18	2.10	3.14	32.6
123678-hexachlorodibenzofuran	5.20	2.96	1.91	3.36	50.0
234678-hexachlorodibenzofuran	3.95	2.12	2.08	2.72	39.4
123789-hexachlorodibenzofuran	2.18	2.33	2.52	2.34	7.5
1234678-heptachlorodibenzofuran	16.8	14.9	6.94	12.9	40.6
1234789-heptachlorodibenzofuran	2.77	1.71	2.31	2.27	23.3
Octachlorodibenzofuran	13.7	6.99	6.52	9.06	44.1
PCB 77	1151	21.4	18.3	397	165
PCB 81	2.89	3.62	2.59	3.03	17.5
PCB 126	10.6	2.79	4.63	5.99	67.7
PCB 169	2.18	1.57	2.86	2.20	29.4
PCB 105	82.7	123	110	105	19.6
PCB 114	6.33	8.47	9.00	7.93	17.8
PCB 118	265	409	355	343	21.2
PCB 123	4.35	5.78	4.63	4.92	15.4
PCB 156/157	10.3	14.6	13.8	12.9	17.6
PCB 167	3.80	5.29	5.38	4.82	18.5
PCB 189	1.46	1.93	1.07	1.49	28.7
Total Dioxins & Furans Only	115	91.6	64.8	90.5	27.8

* At 25°C and 1 atmosphere

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

Specific Isomer	Dry Adjusted Concentration Test No. 1 pg/Rm³*	Test No. 2 pg/Rm³*	Test No. 3 pg/Rm³*	Average pg/Rm³*	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	1.62	1.76	2.91	2.10	33.8
12378-pentachlorodibenzo-p-dioxin	1.62	1.30	1.71	1.54	14.0
123478-hexachlorodibenzo-p-dioxin	1.78	2.29	1.70	1.92	16.6
123678-hexachlorodibenzo-p-dioxin	2.62	2.11	1.51	2.08	26.9
123789-hexachlorodibenzo-p-dioxin	2.62	2.29	1.68	2.20	21.8
1234678-heptachlorodibenzo-p-dioxin	13.3	10.4	6.22	9.96	35.6
Octachlorodibenzo-p-dioxin	23.2	21.1	12.0	18.8	31.8
2378-tetrachlorodibenzofuran	1.46	1.51	1.88	1.62	14.3
12378-pentachlorodibenzofuran	2.92	2.46	1.70	2.36	26.2
23478-pentachlorodibenzofuran	3.29	2.46	1.66	2.47	32.9
123478-hexachlorodibenzofuran	3.40	2.64	1.71	2.58	32.7
123678-hexachlorodibenzofuran	4.26	2.46	1.56	2.76	49.8
234678-hexachlorodibenzofuran	3.24	1.76	1.70	2.23	39.2
123789-hexachlorodibenzofuran	1.78	1.93	2.06	1.92	7.1
1234678-heptachlorodibenzofuran	13.8	12.4	5.65	10.6	40.9
1234789-heptachlorodibenzofuran	2.27	1.42	1.88	1.86	22.7
Octachlorodibenzofuran	11.2	5.80	5.31	7.44	43.9
PCB 77	943	17.8	14.9	325	165
PCB 81	2.37	3.01	2.11	2.49	18.6
PCB 126	8.65	2.32	3.77	4.91	67.5
PCB 169	1.78	1.30	2.33	1.80	28.5
PCB 105	67.7	102	89.4	86.5	20.2
PCB 114	5.18	7.04	7.33	6.52	17.9
PCB 118	217	340	289	282	21.8
PCB 123	3.56	4.80	3.77	4.05	16.4
PCB 156/157	8.44	12.1	11.2	10.6	18.0
PCB 167	3.11	4.40	4.39	3.96	18.6
PCB 189	1.20	1.60	0.87	1.22	29.7
Total Dioxins & Furans Only	94.3	76.1	52.8	74.4	27.9

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

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

Specific Isomer	Wet Reference Concentration Test No. 1 pg/Rm³*	Test No. 2 pg/Rm³*	Test No. 3 pg/Rm³*	Average pg/Rm³*	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	1.01	1.07	1.82	1.30	34.9
12378-pentachlorodibenzo-p-dioxin	1.01	0.79	1.07	0.96	15.5
123478-hexachlorodibenzo-p-dioxin	1.11	1.39	1.06	1.19	14.8
123678-hexachlorodibenzo-p-dioxin	1.64	1.28	0.94	1.29	26.9
123789-hexachlorodibenzo-p-dioxin	1.64	1.39	1.05	1.36	21.6
1234678-heptachlorodibenzo-p-dioxin	8.28	6.30	3.89	6.16	35.7
Octachlorodibenzo-p-dioxin	14.4	12.8	7.50	11.6	31.4
2378-tetrachlorodibenzofuran	0.91	0.92	1.18	1.00	15.3
12378-pentachlorodibenzofuran	1.82	1.49	1.06	1.46	26.0
23478-pentachlorodibenzofuran	2.05	1.49	1.04	1.53	33.1
123478-hexachlorodibenzofuran	2.12	1.60	1.07	1.60	32.8
123678-hexachlorodibenzofuran	2.66	1.49	0.98	1.71	50.4
234678-hexachlorodibenzofuran	2.02	1.07	1.06	1.38	39.9
123789-hexachlorodibenzofuran	1.11	1.17	1.29	1.19	7.5
1234678-heptachlorodibenzofuran	8.58	7.51	3.54	6.54	40.6
1234789-heptachlorodibenzofuran	1.41	0.86	1.18	1.15	23.9
Octachlorodibenzofuran	6.98	3.52	3.32	4.61	44.6
PCB 77	588	10.8	9.33	203	165
PCB 81	1.48	1.83	1.32	1.54	16.8
PCB 126	5.40	1.41	2.36	3.05	68.2
PCB 169	1.11	0.79	1.46	1.12	29.9
PCB 105	42.2	62.1	56.0	53.4	19.1
PCB 114	3.23	4.27	4.59	4.03	17.6
PCB 118	135	206	181	174	20.6
PCB 123	2.22	2.91	2.36	2.50	14.7
PCB 156/157	5.26	7.34	7.01	6.54	17.1
PCB 167	1.94	2.67	2.75	2.45	18.1
PCB 189	0.75	0.97	0.55	0.76	28.1
Total Dioxins & Furans Only	58.8	46.2	33.1	46.0	28.0

* At 25°C and 1 atmosphere

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

Specific Isomer	Emission Rate Test No. 1 ng/s	Test No. 2 ng/s	Test No. 3 ng/s	Average ng/s	Coefficient of Variation %
2378-tetrachlorodibenzo-p-dioxin	0.037	0.037	0.064	0.046	34.0
12378-pentachlorodibenzo-p-dioxin	0.037	0.028	0.038	0.034	16.3
123478-hexachlorodibenzo-p-dioxin	0.040	0.049	0.037	0.042	13.8
123678-hexachlorodibenzo-p-dioxin	0.060	0.045	0.033	0.046	28.6
123789-hexachlorodibenzo-p-dioxin	0.060	0.049	0.037	0.048	23.2
1234678-heptachlorodibenzo-p-dioxin	0.30	0.22	0.14	0.22	37.3
Octachlorodibenzo-p-dioxin	0.53	0.45	0.26	0.41	32.5
2378-tetrachlorodibenzofuran	0.033	0.032	0.042	0.036	14.6
12378-pentachlorodibenzofuran	0.066	0.052	0.037	0.052	27.6
23478-pentachlorodibenzofuran	0.075	0.052	0.037	0.055	34.9
123478-hexachlorodibenzofuran	0.077	0.056	0.038	0.057	34.5
123678-hexachlorodibenzofuran	0.097	0.052	0.034	0.061	52.4
234678-hexachlorodibenzofuran	0.074	0.037	0.037	0.050	42.1
123789-hexachlorodibenzofuran	0.040	0.041	0.045	0.042	6.3
1234678-heptachlorodibenzofuran	0.31	0.26	0.12	0.23	41.6
1234789-heptachlorodibenzofuran	0.051	0.030	0.042	0.041	25.7
Octachlorodibenzofuran	0.25	0.12	0.12	0.17	46.8
PCB 77	21.4	0.38	0.33	7.37	165
PCB 81	0.054	0.064	0.047	0.055	16.1
PCB 126	0.20	0.049	0.083	0.11	70.1
PCB 169	0.040	0.028	0.051	0.040	29.8
PCB 105	1.54	2.18	1.98	1.90	17.3
PCB 114	0.12	0.15	0.16	0.14	16.0
PCB 118	4.93	7.23	6.40	6.19	18.8
PCB 123	0.081	0.10	0.083	0.089	13.2
PCB 156/157	0.19	0.26	0.25	0.23	15.3
PCB 167	0.071	0.094	0.097	0.087	16.5
PCB 189	0.027	0.034	0.019	0.027	27.5
Total Dioxins & Furans Only	2.14	1.62	1.17	1.64	29.6

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

Specific Isomer	Actual Concentration pg/m³	Dry Reference Concentration pg/Rm³*	Dry Adjusted Concentration pg/Rm³**	Wet Reference Concentration pg/Rm³*	Emission Rate ng/s
2378-tetrachlorodibenzo-p-dioxin	0.81	2.56	2.10	1.30	0.046
12378-pentachlorodibenzo-p-dioxin	0.60	1.88	1.54	0.96	0.034
123478-hexachlorodibenzo-p-dioxin	0.74	2.34	1.92	1.19	0.042
123678-hexachlorodibenzo-p-dioxin	0.81	2.53	2.08	1.29	0.046
123789-hexachlorodibenzo-p-dioxin	0.85	2.67	2.20	1.36	0.048
1234678-heptachlorodibenzo-p-dioxin	3.85	12.1	9.96	6.16	0.22
Octachlorodibenzo-p-dioxin	7.26	22.8	18.8	11.6	0.41
2378-tetrachlorodibenzofuran	0.63	1.97	1.62	1.00	0.036
12378-pentachlorodibenzofuran	0.91	2.87	2.36	1.46	0.052
23478-pentachlorodibenzofuran	0.96	3.01	2.47	1.53	0.055
123478-hexachlorodibenzofuran	1.00	3.14	2.58	1.60	0.057
123678-hexachlorodibenzofuran	1.07	3.36	2.76	1.71	0.061
234678-hexachlorodibenzofuran	0.86	2.72	2.23	1.38	0.050
123789-hexachlorodibenzofuran	0.75	2.34	1.92	1.19	0.042
1234678-heptachlorodibenzofuran	4.10	12.9	10.6	6.54	0.23
1234789-heptachlorodibenzofuran	0.72	2.27	1.86	1.15	0.041
Octachlorodibenzofuran	2.88	9.06	7.44	4.61	0.17
PCB 77	126	397	325	203	7.37
PCB 81	0.97	3.03	2.49	1.54	0.055
PCB 126	1.91	5.99	4.91	3.05	0.11
PCB 169	0.70	2.20	1.80	1.12	0.040
PCB 105	33.5	105	86.5	53.4	1.90
PCB 114	2.53	7.93	6.52	4.03	0.14
PCB 118	109	343	282	174	6.19
PCB 123	1.57	4.92	4.05	2.50	0.089
PCB 156/157	4.10	12.9	10.6	6.54	0.23
PCB 167	1.54	4.82	3.96	2.45	0.087
PCB 189	0.47	1.49	1.22	0.76	0.027
Total Dioxins & Furans Only	28.8	90.5	74.4	46.0	1.64

* At 25°C and 1 atmosphere

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

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

Specific Isomer	Blank Train pg	Laboratory Blank pg
2378-tetrachlorodibenzo-p-dioxin	<9.2	<8.8
12378-pentachlorodibenzo-p-dioxin	<7.4	<7.7
123478-hexachlorodibenzo-p-dioxin	<8.1	<6.1
123678-hexachlorodibenzo-p-dioxin	<7.3	<5.5
123789-hexachlorodibenzo-p-dioxin	<8.1	<6.1
1234678-heptachlorodibenzo-p-dioxin	<6.4	<7.1
Octachlorodibenzo-p-dioxin	<36	<34
2378-tetrachlorodibenzofuran	<7.6	<5.5
12378-pentachlorodibenzofuran	<5.7	<5.1
23478-pentachlorodibenzofuran	<5.6	<5.0
123478-hexachlorodibenzofuran	<7.5	<5.9
123678-hexachlorodibenzofuran	<6.8	<5.3
234678-hexachlorodibenzofuran	<7.3	<5.7
123789-hexachlorodibenzofuran	<8.9	<6.9
1234678-heptachlorodibenzofuran	11.6	<9.2
1234789-heptachlorodibenzofuran	<9.4	<5.4
Octachlorodibenzofuran	20.7	<14
PCB 77	58.8	<17
PCB 81	<11	12.5
PCB 126	<17	<10
PCB 169	11.0	9.23
PCB 105	405	<9.4
PCB 114	36.0	<10
PCB 118	1100	14.2
PCB 123	<4.5	11.8
PCB 156/157	<49	18.3
PCB 167	21.3	<7.8
PCB 189	<3.9	<6.7
Total Dioxins & Furans Only	174	143

"<" 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	0.63	0.68	1.14	0.81
12378-pentachlorodibenzo-p-dioxin	0.500	0.31	0.25	0.34	0.30
123478-hexachlorodibenzo-p-dioxin	0.100	0.069	0.088	0.066	0.074
123678-hexachlorodibenzo-p-dioxin	0.100	0.10	0.081	0.059	0.081
123789-hexachlorodibenzo-p-dioxin	0.100	0.10	0.088	0.066	0.085
1234678-heptachlorodibenzo-p-dioxin	0.010	0.051	0.040	0.024	0.0385
Octachlorodibenzo-p-dioxin	0.001	0.0090	0.0081	0.0047	0.0073
2378-tetrachlorodibenzofuran	0.100	0.056	0.058	0.074	0.063
12378-pentachlorodibenzofuran	0.050	0.056	0.047	0.033	0.046
23478-pentachlorodibenzofuran	0.500	0.64	0.47	0.33	0.48
123478-hexachlorodibenzofuran	0.100	0.13	0.10	0.067	0.10
123678-hexachlorodibenzofuran	0.100	0.17	0.095	0.061	0.11
234678-hexachlorodibenzofuran	0.100	0.13	0.068	0.066	0.086
123789-hexachlorodibenzofuran	0.100	0.069	0.074	0.081	0.075
1234678-heptachlorodibenzofuran	0.010	0.053	0.048	0.022	0.041
1234789-heptachlorodibenzofuran	0.010	0.0088	0.0055	0.0074	0.0072
Octachlorodibenzofuran	0.001	0.0043	0.0022	0.0021	0.0029
PCB 77	0.0001	0.037	0.00068	0.00058	0.013
PCB 81	0.0003	0.00027	0.00035	0.00025	0.00029
PCB 126	0.1000	0.34	0.089	0.15	0.19
PCB 169	0.0300	0.021	0.015	0.027	0.021
PCB 105	0.00003	0.00079	0.0012	0.0011	0.0010
PCB 114	0.00003	0.000060	0.000081	0.000086	0.000076
PCB 118	0.00003	0.0025	0.0039	0.0034	0.0033
PCB 123	0.00003	0.000041	0.000055	0.000044	0.000047
PCB 156/157	0.00003	0.000098	0.00014	0.00013	0.00012
PCB 167	0.00003	0.000036	0.000051	0.000052	0.000046
PCB 189	0.00003	0.000014	0.000018	0.000010	0.000014
Total Dioxins & Furans Only		2.58	2.20	2.44	2.41

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

Specific Isomer	Toxicity Equivalency Factor	Dry Reference Concentration Test No. 1 pg TEQ/Rm³*	Test No. 2 pg TEQ/Rm³*	Test No. 3 pg TEQ/Rm³*	Average pg TEQ/Rm³*
2378-tetrachlorodibenzo-p-dioxin	1.000	1.98	2.12	3.58	2.56
12378-pentachlorodibenzo-p-dioxin	0.500	0.99	0.78	1.05	0.94
123478-hexachlorodibenzo-p-dioxin	0.100	0.22	0.28	0.21	0.23
123678-hexachlorodibenzo-p-dioxin	0.100	0.32	0.25	0.19	0.25
123789-hexachlorodibenzo-p-dioxin	0.100	0.32	0.28	0.21	0.27
1234678-heptachlorodibenzo-p-dioxin	0.010	0.16	0.12	0.076	0.12
Octachlorodibenzo-p-dioxin	0.001	0.028	0.025	0.015	0.023
2378-tetrachlorodibenzofuran	0.100	0.18	0.18	0.23	0.20
12378-pentachlorodibenzofuran	0.050	0.18	0.15	0.10	0.14
23478-pentachlorodibenzofuran	0.500	2.01	1.48	1.02	1.50
123478-hexachlorodibenzofuran	0.100	0.42	0.32	0.21	0.31
123678-hexachlorodibenzofuran	0.100	0.52	0.30	0.19	0.34
234678-hexachlorodibenzofuran	0.100	0.40	0.21	0.21	0.27
123789-hexachlorodibenzofuran	0.100	0.22	0.23	0.25	0.23
1234678-heptachlorodibenzofuran	0.010	0.17	0.15	0.069	0.13
1234789-heptachlorodibenzofuran	0.010	0.028	0.017	0.023	0.023
Octachlorodibenzofuran	0.001	0.014	0.0070	0.0065	0.0091
PCB 77	0.0001	0.12	0.0021	0.0018	0.040
PCB 81	0.0003	0.00087	0.0011	0.00078	0.00091
PCB 126	0.1000	1.06	0.28	0.46	0.60
PCB 169	0.0300	0.065	0.047	0.086	0.066
PCB 105	0.00003	0.0025	0.0037	0.0033	0.0032
PCB 114	0.00003	0.00019	0.00025	0.00027	0.00024
PCB 118	0.00003	0.0079	0.012	0.011	0.010
PCB 123	0.00003	0.00013	0.00017	0.00014	0.00015
PCB 156/157	0.00003	0.00031	0.00044	0.00041	0.00039
PCB 167	0.00003	0.00011	0.00016	0.00016	0.00014
PCB 189	0.00003	0.000044	0.000058	0.000032	0.000045
Total Dioxins & Furans Only		8.14	6.90	7.63	7.56

* At 25°C and 1 atmosphere

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	1.62	1.76	2.91	2.10
12378-pentachlorodibenzo-p-dioxin	0.500	0.81	0.65	0.86	0.77
123478-hexachlorodibenzo-p-dioxin	0.100	0.18	0.23	0.17	0.19
123678-hexachlorodibenzo-p-dioxin	0.100	0.26	0.21	0.15	0.21
123789-hexachlorodibenzo-p-dioxin	0.100	0.26	0.23	0.17	0.22
1234678-heptachlorodibenzo-p-dioxin	0.010	0.13	0.10	0.062	0.10
Octachlorodibenzo-p-dioxin	0.001	0.023	0.021	0.012	0.019
2378-tetrachlorodibenzofuran	0.100	0.15	0.15	0.19	0.16
12378-pentachlorodibenzofuran	0.050	0.15	0.12	0.085	0.12
23478-pentachlorodibenzofuran	0.500	1.64	1.23	0.83	1.24
123478-hexachlorodibenzofuran	0.100	0.34	0.26	0.17	0.26
123678-hexachlorodibenzofuran	0.100	0.43	0.25	0.16	0.28
234678-hexachlorodibenzofuran	0.100	0.32	0.18	0.17	0.22
123789-hexachlorodibenzofuran	0.100	0.18	0.19	0.21	0.19
1234678-heptachlorodibenzofuran	0.010	0.14	0.12	0.057	0.11
1234789-heptachlorodibenzofuran	0.010	0.023	0.014	0.019	0.019
Octachlorodibenzofuran	0.001	0.011	0.0058	0.0053	0.0074
PCB 77	0.0001	0.094	0.0018	0.0015	0.033
PCB 81	0.0003	0.00071	0.00090	0.00063	0.00075
PCB 126	0.1000	0.87	0.23	0.38	0.49
PCB 169	0.0300	0.053	0.039	0.070	0.054
PCB 105	0.00003	0.0020	0.0031	0.0027	0.0026
PCB 114	0.00003	0.00016	0.00021	0.00022	0.00020
PCB 118	0.00003	0.0065	0.010	0.0087	0.0085
PCB 123	0.00003	0.00011	0.00014	0.00011	0.00012
PCB 156/157	0.00003	0.00025	0.00036	0.00034	0.00032
PCB 167	0.00003	0.000093	0.00013	0.00013	0.00012
PCB 189	0.00003	0.000036	0.000048	0.000026	0.000037
Total Dioxins & Furans Only		6.67	5.73	6.22	6.21

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

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	1.01	1.07	1.82	1.30
12378-pentachlorodibenzo-p-dioxin	0.500	0.51	0.39	0.54	0.48
123478-hexachlorodibenzo-p-dioxin	0.100	0.11	0.14	0.11	0.12
123678-hexachlorodibenzo-p-dioxin	0.100	0.16	0.13	0.094	0.13
123789-hexachlorodibenzo-p-dioxin	0.100	0.16	0.14	0.11	0.14
1234678-heptachlorodibenzo-p-dioxin	0.010	0.083	0.063	0.039	0.062
Octachlorodibenzo-p-dioxin	0.001	0.014	0.013	0.0075	0.012
2378-tetrachlorodibenzofuran	0.100	0.091	0.092	0.12	0.10
12378-pentachlorodibenzofuran	0.050	0.091	0.075	0.053	0.073
23478-pentachlorodibenzofuran	0.500	1.03	0.75	0.52	0.76
123478-hexachlorodibenzofuran	0.100	0.21	0.16	0.11	0.16
123678-hexachlorodibenzofuran	0.100	0.27	0.15	0.098	0.17
234678-hexachlorodibenzofuran	0.100	0.20	0.11	0.11	0.14
123789-hexachlorodibenzofuran	0.100	0.11	0.12	0.13	0.12
1234678-heptachlorodibenzofuran	0.010	0.086	0.075	0.035	0.065
1234789-heptachlorodibenzofuran	0.010	0.014	0.0086	0.012	0.012
Octachlorodibenzofuran	0.001	0.0070	0.0035	0.0033	0.0046
PCB 77	0.0001	0.0588	0.0011	0.00093	0.020
PCB 81	0.0003	0.00044	0.00055	0.00040	0.00046
PCB 126	0.1000	0.54	0.14	0.24	0.31
PCB 169	0.0300	0.033	0.024	0.044	0.034
PCB 105	0.00003	0.0013	0.0019	0.0017	0.0016
PCB 114	0.00003	0.000097	0.00013	0.00014	0.00012
PCB 118	0.00003	0.0041	0.0062	0.0054	0.0052
PCB 123	0.00003	0.000067	0.000087	0.000071	0.000075
PCB 156/157	0.00003	0.00016	0.00022	0.00021	0.00020
PCB 167	0.00003	0.000058	0.000080	0.000082	0.000074
PCB 189	0.00003	0.000022	0.000029	0.000016	0.000023
Total Dioxins & Furans Only		4.16	3.48	3.89	3.84

* At 25°C and 1 atmosphere

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	0.037	0.037	0.064	0.046
12378-pentachlorodibenzo-p-dioxin	0.500	0.018	0.014	0.019	0.017
123478-hexachlorodibenzo-p-dioxin	0.100	0.0040	0.0049	0.0037	0.0042
123678-hexachlorodibenzo-p-dioxin	0.100	0.0060	0.0045	0.0033	0.0046
123789-hexachlorodibenzo-p-dioxin	0.100	0.0060	0.0049	0.0037	0.0048
1234678-heptachlorodibenzo-p-dioxin	0.010	0.0030	0.0022	0.0014	0.0022
Octachlorodibenzo-p-dioxin	0.001	0.00053	0.00045	0.00026	0.00041
2378-tetrachlorodibenzofuran	0.100	0.0033	0.0032	0.0042	0.0036
12378-pentachlorodibenzofuran	0.050	0.0033	0.0026	0.0019	0.0026
23478-pentachlorodibenzofuran	0.500	0.037	0.026	0.018	0.027
123478-hexachlorodibenzofuran	0.100	0.0077	0.0056	0.0038	0.0057
123678-hexachlorodibenzofuran	0.100	0.0097	0.0052	0.0034	0.0061
234678-hexachlorodibenzofuran	0.100	0.0074	0.0037	0.0037	0.0050
123789-hexachlorodibenzofuran	0.100	0.0040	0.0041	0.0045	0.0042
1234678-heptachlorodibenzofuran	0.010	0.0031	0.0026	0.0012	0.0023
1234789-heptachlorodibenzofuran	0.010	0.00051	0.00030	0.00042	0.00041
Octachlorodibenzofuran	0.001	0.00025	0.00012	0.00012	0.00017
PCB 77	0.0001	0.0021	0.000038	0.000033	0.00074
PCB 81	0.0003	0.000016	0.000019	0.000014	0.000016
PCB 126	0.1000	0.020	0.0049	0.0083	0.011
PCB 169	0.0300	0.0012	0.00083	0.0015	0.0012
PCB 105	0.00003	0.000046	0.000065	0.000059	0.000057
PCB 114	0.00003	0.0000035	0.0000045	0.0000049	0.0000043
PCB 118	0.00003	0.00015	0.00022	0.00019	0.00019
PCB 123	0.00003	0.0000024	0.0000031	0.0000025	0.0000027
PCB 156/157	0.00003	0.0000057	0.0000077	0.0000074	0.0000070
PCB 167	0.00003	0.0000021	0.0000028	0.0000029	0.0000026
PCB 189	0.00003	0.00000082	0.0000010	0.00000058	0.00000081
Total Dioxins & Furans Only		0.15	0.12	0.14	0.14

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

Specific Isomer	Actual Concentration pg TEQ/m³	Dry Reference Concentration pg TEQ/Rm³*	Dry Adjusted Concentration pg TEQ/Rm³**	Wet Reference Concentration pg TEQ/Rm³*	Emission Rate ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	0.81	2.56	2.10	1.30	0.046
12378-pentachlorodibenzo-p-dioxin	0.30	0.94	0.77	0.48	0.017
123478-hexachlorodibenzo-p-dioxin	0.074	0.23	0.19	0.12	0.0042
123678-hexachlorodibenzo-p-dioxin	0.081	0.25	0.21	0.13	0.0046
123789-hexachlorodibenzo-p-dioxin	0.085	0.27	0.22	0.14	0.0048
1234678-heptachlorodibenzo-p-dioxin	0.039	0.12	0.10	0.062	0.0022
Octachlorodibenzo-p-dioxin	0.0073	0.023	0.019	0.012	0.00041
2378-tetrachlorodibenzofuran	0.063	0.20	0.16	0.10	0.0036
12378-pentachlorodibenzofuran	0.046	0.14	0.12	0.073	0.0026
23478-pentachlorodibenzofuran	0.48	1.50	1.24	0.76	0.027
123478-hexachlorodibenzofuran	0.10	0.31	0.26	0.16	0.0057
123678-hexachlorodibenzofuran	0.11	0.34	0.28	0.17	0.0061
234678-hexachlorodibenzofuran	0.086	0.27	0.22	0.14	0.0050
123789-hexachlorodibenzofuran	0.075	0.23	0.19	0.12	0.0042
1234678-heptachlorodibenzofuran	0.041	0.13	0.11	0.065	0.0023
1234789-heptachlorodibenzofuran	0.0072	0.023	0.019	0.012	0.00041
Octachlorodibenzofuran	0.0029	0.0091	0.0074	0.0046	0.00017
PCB 77	0.013	0.040	0.033	0.020	0.00074
PCB 81	0.00029	0.00091	0.00075	0.00046	0.000016
PCB 126	0.19	0.60	0.49	0.31	0.011
PCB 169	0.021	0.066	0.054	0.034	0.0012
PCB 105	0.0010	0.0032	0.0026	0.0016	0.000057
PCB 114	0.000076	0.00024	0.00020	0.00012	0.0000043
PCB 118	0.0033	0.010	0.0085	0.0052	0.00019
PCB 123	0.000047	0.00015	0.00012	0.000075	0.0000027
PCB 156/157	0.00012	0.00039	0.00032	0.00020	0.0000070
PCB 167	0.000046	0.00014	0.00012	0.000074	0.0000026
PCB 189	0.000014	0.000045	0.000037	0.000023	0.00000081
Total Dioxins & Furans Only	2.41	7.56	6.21	3.84	0.14

* At 25°C and 1 atmosphere

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

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

Specific Isomer	Actual Concentration pg TEQ/m³	Dry Reference Concentration pg TEQ/Rm³*	Dry Adjusted Concentration pg TEQ/Rm³**	Wet Reference Concentration pg TEQ/Rm³*	Emission Rate ng TEQ/s
2378-tetrachlorodibenzo-p-dioxin	0.41	2.11	1.05	0.65	0.023
12378-pentachlorodibenzo-p-dioxin	0.40	1.27	1.04	0.65	0.023
123478-hexachlorodibenzo-p-dioxin	0.037	0.12	0.096	0.059	0.0021
123678-hexachlorodibenzo-p-dioxin	0.057	0.18	0.15	0.092	0.0033
123789-hexachlorodibenzo-p-dioxin	0.059	0.19	0.15	0.095	0.0034
1234678-heptachlorodibenzo-p-dioxin	0.039	0.12	0.10	0.062	0.0022
Octachlorodibenzo-p-dioxin	0.0018	0.0056	0.0046	0.0028	0.00010
2378-tetrachlorodibenzofuran	0.031	0.099	0.081	0.050	0.0018
12378-pentachlorodibenzofuran	0.014	0.043	0.035	0.022	0.00078
23478-pentachlorodibenzofuran	0.21	0.65	0.54	0.33	0.012
123478-hexachlorodibenzofuran	0.050	0.16	0.13	0.080	0.0029
123678-hexachlorodibenzofuran	0.081	0.25	0.21	0.13	0.0047
234678-hexachlorodibenzofuran	0.043	0.14	0.11	0.069	0.0025
123789-hexachlorodibenzofuran	0.037	0.12	0.096	0.060	0.0021
1234678-heptachlorodibenzofuran	0.037	0.12	0.097	0.060	0.0021
1234789-heptachlorodibenzofuran	0.0036	0.011	0.0093	0.0058	0.00021
Octachlorodibenzofuran	0.00065	0.0020	0.0017	0.0010	0.000037
PCB 77	0.013	0.040	0.033	0.020	0.00074
PCB 81	0.00029	0.00091	0.00075	0.00046	0.000016
PCB 126	0.17	0.52	0.43	0.27	0.0096
PCB 169	0.015	0.047	0.039	0.024	0.00086
PCB 105	0.0010	0.0032	0.0026	0.0016	0.000057
PCB 114	0.000052	0.00016	0.00013	0.000083	0.0000030
PCB 118	0.0033	0.010	0.0085	0.0052	0.00019
PCB 123	0.000040	0.00012	0.00010	0.000063	0.0000022
PCB 156/157	0.00012	0.00039	0.00032	0.00020	0.0000070
PCB 167	0.000046	0.00014	0.00012	0.000074	0.0000026
PCB 189	0.0000071	0.000022	0.000018	0.000011	0.00000040
Total Dioxins & Furans Only	1.51	5.58	3.90	2.42	0.086
Total Dioxins, Furans and PCBs	1.71	6.20	4.41	2.73	0.098

* 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 ng	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
Dichlorinated biphenyls	9.81	0.62	1.94	1.59	0.99	0.036
Trichlorinated biphenyls	12.6	0.79	2.49	2.04	1.27	0.046
Tetrachlorinated biphenyls	20.7	1.30	4.09	3.35	2.09	0.076
Pentachlorinated biphenyls	20.7	1.30	4.09	3.35	2.09	0.076
Hexachlorinated biphenyls	3.20	0.20	0.63	0.52	0.32	0.012
Heptachlorinated biphenyls	0.31	0.019	0.061	0.050	0.031	0.0011
Octachlorinated biphenyls	0.12	0.0074	0.023	0.019	0.012	0.00043
Nonachlorinated biphenyls	0.018	0.0011	0.0036	0.0029	0.0018	0.000066
Decachlorinated biphenyl	0.014	0.00087	0.0027	0.0023	0.0014	0.000051
Total	67.5	4.23	13.3	10.9	6.82	0.25

Dry Gas Volume Sampled (Rm^3*) :	5.057
Actual Flowrate (m^3/s) :	58.6
Dry Reference Flowrate (Rm^3/s*) :	18.6
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	36.4

* At 25°C and 1 atmosphere

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

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

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

Congener Group	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Dichlorinated biphenyls	2.85	0.19	0.60	0.50	0.30	0.011
Trichlorinated biphenyls	3.05	0.21	0.65	0.54	0.33	0.011
Tetrachlorinated biphenyls	18.3	1.24	3.87	3.22	1.95	0.069
Pentachlorinated biphenyls	25.3	1.71	5.36	4.45	2.70	0.095
Hexachlorinated biphenyls	4.77	0.32	1.01	0.84	0.51	0.018
Heptachlorinated biphenyls	0.38	0.026	0.081	0.067	0.041	0.0014
Octachlorinated biphenyls	0.071	0.0048	0.015	0.012	0.0075	0.00026
Nonachlorinated biphenyls	<0.0086	0.00058	0.0018	0.0015	0.00092	0.000032
Decachlorinated biphenyl	0.0098	0.00066	0.0021	0.0017	0.0010	0.000037
Total	54.7	3.70	11.6	9.63	5.84	0.21

Dry Gas Volume Sampled (Rm³*) :	4.724
Actual Flowrate (m³/s) :	55.5
Dry Reference Flowrate (Rm³/s*) :	17.7
Dry Adjusted Flowrate (Rm³/s**) :	21.3
Wet Reference Flowrate (Rm³/s*) :	35.1

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

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

Congener Group	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Dichlorinated biphenyls	2.20	0.15	0.46	0.38	0.24	0.0083
Trichlorinated biphenyls	2.39	0.16	0.50	0.41	0.26	0.0090
Tetrachlorinated biphenyls	11.3	0.76	2.38	1.94	1.21	0.043
Pentachlorinated biphenyls	16.4	1.10	3.45	2.81	1.76	0.062
Hexachlorinated biphenyls	3.35	0.22	0.70	0.57	0.36	0.013
Heptachlorinated biphenyls	0.39	0.026	0.082	0.067	0.042	0.0015
Octachlorinated biphenyls	0.081	0.0054	0.017	0.014	0.0087	0.00031
Nonachlorinated biphenyls	<0.013	0.00087	0.0027	0.0022	0.0014	0.000049
Decachlorinated biphenyl	0.0089	0.00060	0.0019	0.0015	0.00095	0.000034
Total	36.1	2.43	7.60	6.19	3.87	0.14

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

* At 25°C and 1 atmosphere

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

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

TABLE 65
Clean Harbors Sarnia
Polychlorinated Biphenyl Congener Group Actual Concentrations

Congener Group	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
Dichlorinated biphenyls	0.62	0.19	0.15	0.32	81.1
Trichlorinated biphenyls	0.79	0.21	0.16	0.39	91.1
Tetrachlorinated biphenyls	1.30	1.24	0.76	1.10	26.9
Pentachlorinated biphenyls	1.30	1.71	1.10	1.37	22.6
Hexachlorinated biphenyls	0.20	0.32	0.22	0.25	25.7
Heptachlorinated biphenyls	0.019	0.026	0.026	0.024	16.1
Octachlorinated biphenyls	0.0074	0.0048	0.0054	0.0059	23.4
Nonachlorinated biphenyls	0.0011	0.00058	0.00087	0.00086	31.9
Decachlorinated biphenyl	0.00087	0.00066	0.00060	0.00071	20.2
Total	4.23	3.70	2.43	3.45	26.9

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

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 %
Dichlorinated biphenyls	1.94	0.60	0.46	1.00	81.4
Trichlorinated biphenyls	2.49	0.65	0.50	1.21	91.4
Tetrachlorinated biphenyls	4.09	3.87	2.38	3.45	27.1
Pentachlorinated biphenyls	4.09	5.36	3.45	4.30	22.6
Hexachlorinated biphenyls	0.63	1.01	0.70	0.78	25.6
Heptachlorinated biphenyls	0.061	0.081	0.082	0.075	15.8
Octachlorinated biphenyls	0.023	0.015	0.017	0.018	23.7
Nonachlorinated biphenyls	0.0036	0.0018	0.0027	0.0027	32.2
Decachlorinated biphenyl	0.0027	0.0021	0.0019	0.0022	20.5
Total	13.3	11.6	7.60	10.8	27.1

* At 25°C and 1 atmosphere

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

Congener Group	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Dichlorinated biphenyls	1.59	0.50	0.38	0.82	81.1
Trichlorinated biphenyls	2.04	0.54	0.41	1.00	91.2
Tetrachlorinated biphenyls	3.35	3.22	1.94	2.84	27.6
Pentachlorinated biphenyls	3.35	4.45	2.81	3.54	23.6
Hexachlorinated biphenyls	0.52	0.84	0.57	0.64	26.6
Heptachlorinated biphenyls	0.050	0.067	0.067	0.061	16.0
Octachlorinated biphenyls	0.019	0.012	0.014	0.015	23.3
Nonachlorinated biphenyls	0.0029	0.0015	0.0022	0.0022	31.6
Decachlorinated biphenyl	0.0023	0.0017	0.0015	0.0018	20.5
Total	10.9	9.63	6.19	8.92	27.5

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

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

Congener Group	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Dichlorinated biphenyls	0.99	0.30	0.24	0.51	81.8
Trichlorinated biphenyls	1.27	0.33	0.26	0.62	91.9
Tetrachlorinated biphenyls	2.09	1.95	1.21	1.75	27.0
Pentachlorinated biphenyls	2.09	2.70	1.76	2.18	21.9
Hexachlorinated biphenyls	0.32	0.51	0.36	0.40	24.8
Heptachlorinated biphenyls	0.031	0.041	0.042	0.038	15.5
Octachlorinated biphenyls	0.012	0.0075	0.0087	0.0094	24.2
Nonachlorinated biphenyls	0.0018	0.00092	0.0014	0.0014	32.7
Decachlorinated biphenyl	0.0014	0.0010	0.00095	0.0011	20.9
Total	6.82	5.84	3.87	5.51	27.2

* At 25°C and 1 atmosphere

TABLE 69
Clean Harbors Sarnia
Polychlorinated Biphenyl Emission Rates

Congener Group	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
Dichlorinated biphenyls	0.036	0.011	0.0083	0.018	83.8
Trichlorinated biphenyls	0.046	0.011	0.0090	0.022	93.7
Tetrachlorinated biphenyls	0.076	0.069	0.043	0.062	28.0
Pentachlorinated biphenyls	0.076	0.095	0.062	0.078	21.1
Hexachlorinated biphenyls	0.012	0.018	0.013	0.014	23.3
Heptachlorinated biphenyls	0.0011	0.0014	0.0015	0.0013	13.8
Octachlorinated biphenyls	0.00043	0.00026	0.00031	0.00033	26.3
Nonachlorinated biphenyls	0.000066	0.000032	0.000049	0.000049	34.5
Decachlorinated biphenyl	0.000051	0.000037	0.000034	0.000041	22.9
Total	0.25	0.21	0.14	0.20	28.6

TABLE 70
Clean Harbors Sarnia
Summary of Polychlorinated Biphenyl Emission Data

Congener Group	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Dichlorinated biphenyls	0.32	1.00	0.82	0.51	0.018
Trichlorinated biphenyls	0.39	1.21	1.00	0.62	0.022
Tetrachlorinated biphenyls	1.10	3.45	2.84	1.75	0.062
Pentachlorinated biphenyls	1.37	4.30	3.54	2.18	0.078
Hexachlorinated biphenyls	0.25	0.78	0.64	0.40	0.014
Heptachlorinated biphenyls	0.024	0.075	0.061	0.038	0.0013
Octachlorinated biphenyls	0.0059	0.018	0.015	0.0094	0.00033
Nonachlorinated biphenyls	0.00086	0.0027	0.0022	0.0014	0.000049
Decachlorinated biphenyl	0.00071	0.0022	0.0018	0.0011	0.000041
Total	3.45	10.8	8.92	5.51	0.20

* 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 ng	Laboratory Blank ng
Dichlorinated biphenyls	1.07	0.38
Trichlorinated biphenyls	1.30	0.081
Tetrachlorinated biphenyls	6.67	0.068
Pentachlorinated biphenyls	13.1	0.074
Hexachlorinated biphenyls	3.00	0.047
Heptachlorinated biphenyls	0.25	0.014
Octachlorinated biphenyls	0.040	0.0016
Nonachlorinated biphenyls	<0.0071	<0.0053
Decachlorinated biphenyl	0.0067	0.0089
Total	25.4	0.68

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

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

Specific Isomer	Total Collected ng	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
1,3-Dichlorobenzene	499	31.3	98.7	80.9	50.4	1.84
1,4-Dichlorobenzene	310	19.5	61.3	50.2	31.3	1.14
1,2-Dichlorobenzene	382	24.0	75.5	61.9	38.6	1.41
Total Dichlorobenzene	1191	74.8	236	193	120	4.38
1,3,5-trichlorobenzene	102	6.40	20.2	16.5	10.3	0.38
1,2,4-trichlorobenzene	470	29.5	92.9	76.2	47.5	1.73
1,2,3-trichlorobenzene	179	11.2	35.4	29.0	18.1	0.66
Total Trichlorobenzene	751	47.1	149	122	75.9	2.76
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	90.4	5.67	17.9	14.6	9.13	0.33
1,2,3,4-tetrachlorobenzene	<35	2.20	6.92	5.67	3.54	0.13
Total Tetrachlorobenzene	125	7.87	24.8	20.3	12.7	0.46
Pentachlorobenzene	<35	2.20	6.92	5.67	3.54	0.13
Hexachlorobenzene	<35	2.20	6.92	5.67	3.54	0.13
Total Chlorobenzenes	2137	134	423	346	216	7.86
Hexachloroethane	<35	2.20	6.92	5.67	3.54	0.13
a,2,6-Trichlorotoluene	<35	2.20	6.92	5.67	3.54	0.13

Dry Gas Volume Sampled (Rm^3*) :	5.057
Actual Flowrate (m^3/s) :	58.6
Dry Reference Flowrate (Rm^3/s*) :	18.6
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	36.4

* 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	302	20.4	63.9	53.1	32.2	1.13
1,4-Dichlorobenzene	201	13.6	42.5	35.4	21.5	0.75
1,2-Dichlorobenzene	228	15.4	48.3	40.1	24.3	0.85
Total Dichlorobenzene	731	49.4	155	129	78.0	2.74
1,3,5-trichlorobenzene	46.8	3.16	9.91	8.23	5.00	0.18
1,2,4-trichlorobenzene	252	17.0	53.3	44.3	26.9	0.94
1,2,3-trichlorobenzene	113	7.63	23.9	19.9	12.1	0.42
Total Trichlorobenzene	412	27.8	87.2	72.4	44.0	1.54
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	44.9	3.03	9.50	7.90	4.79	0.17
1,2,3,4-tetrachlorobenzene	<35	2.36	7.41	6.16	3.74	0.13
Total Tetrachlorobenzene	79.9	5.39	16.9	14.1	8.53	0.30
Pentachlorobenzene	<35	2.36	7.41	6.16	3.74	0.13
Hexachlorobenzene	<35	2.36	7.41	6.16	3.74	0.13
Total Chlorobenzenes	1293	87.3	274	227	138	4.84
Hexachloroethane	<35	2.36	7.41	6.16	3.74	0.13
a,2,6-Trichlorotoluene	<35	2.36	7.41	6.16	3.74	0.13

Dry Gas Volume Sampled (Rm^3*) :	4.724
Actual Flowrate (m^3/s) :	55.5
Dry Reference Flowrate (Rm^3/s*) :	17.7
Dry Adjusted Flowrate (Rm^3/s**) :	21.3
Wet Reference Flowrate (Rm^3/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

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

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
1,3-Dichlorobenzene	374	25.1	78.7	64.1	40.1	1.42
1,4-Dichlorobenzene	209	14.0	44.0	35.8	22.4	0.79
1,2-Dichlorobenzene	345	23.2	72.6	59.1	37.0	1.31
Total Dichlorobenzene	928	62.3	195	159	99.5	3.51
1,3,5-trichlorobenzene	64.8	4.35	13.6	11.1	6.95	0.25
1,2,4-trichlorobenzene	203	13.6	42.7	34.8	21.8	0.77
1,2,3-trichlorobenzene	118	7.92	24.8	20.2	12.7	0.45
Total Trichlorobenzene	386	25.9	81.1	66.1	41.4	1.46
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	68.3	4.58	14.4	11.7	7.32	0.26
1,2,3,4-tetrachlorobenzene	<35	2.35	7.36	6.00	3.75	0.13
Total Tetrachlorobenzene	103	6.93	21.7	17.7	11.1	0.39
Pentachlorobenzene	<35	2.35	7.36	6.00	3.75	0.13
Hexachlorobenzene	<35	2.35	7.36	6.00	3.75	0.13
Total Chlorobenzenes	1487	99.8	313	255	159	5.63
Hexachloroethane	<35	2.35	7.36	6.00	3.75	0.13
a,2,6-Trichlorotoluene	<35	2.35	7.36	6.00	3.75	0.13

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

* 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/m^3	ng/m^3	ng/m^3	ng/m^3	%
1,3-Dichlorobenzene	31.3	20.4	25.1	25.6	21.4
1,4-Dichlorobenzene	19.5	13.6	14.0	15.7	20.9
1,2-Dichlorobenzene	24.0	15.4	23.2	20.8	22.7
Total Dichlorobenzene	74.8	49.4	62.3	62.1	20.4
1,3,5-trichlorobenzene	6.40	3.16	4.35	4.64	35.4
1,2,4-trichlorobenzene	29.5	17.0	13.6	20.0	41.7
1,2,3-trichlorobenzene	11.2	7.63	7.92	8.93	22.4
Total Trichlorobenzene	47.1	27.8	25.9	33.6	35.0
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	5.67	3.03	4.58	4.43	30.0
1,2,3,4-tetrachlorobenzene	2.20	2.36	2.35	2.30	4.0
Total Tetrachlorobenzene	7.87	5.39	6.93	6.73	18.6
Pentachlorobenzene	2.20	2.36	2.35	2.30	4.0
Hexachlorobenzene	2.20	2.36	2.35	2.30	4.0
Total Chlorobenzenes	134	87.3	99.8	107	22.7
Hexachloroethane	2.20	2.36	2.35	2.30	4.0
a,2,6-Trichlorotoluene	2.20	2.36	2.35	2.30	4.0

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

Specific Isomer	Dry Reference Concentration Test No. 1 ng/Rm^3*	Test No. 2 ng/Rm^3*	Test No. 3 ng/Rm^3*	Average ng/Rm^3*	Coefficient of Variation %
1,3-Dichlorobenzene	98.7	63.9	78.7	80.4	21.7
1,4-Dichlorobenzene	61.3	42.5	44.0	49.3	21.2
1,2-Dichlorobenzene	75.5	48.3	72.6	65.5	22.9
Total Dichlorobenzene	236	155	195	195	20.7
1,3,5-trichlorobenzene	20.2	9.91	13.6	14.6	35.7
1,2,4-trichlorobenzene	92.9	53.3	42.7	63.0	42.0
1,2,3-trichlorobenzene	35.4	23.9	24.8	28.0	22.8
Total Trichlorobenzene	149	87.2	81.1	106	35.3
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	17.9	9.50	14.4	13.9	30.2
1,2,3,4-tetrachlorobenzene	6.92	7.41	7.36	7.23	3.7
Total Tetrachlorobenzene	24.8	16.9	21.7	21.1	18.8
Pentachlorobenzene	6.92	7.41	7.36	7.23	3.7
Hexachlorobenzene	6.92	7.41	7.36	7.23	3.7
Total Chlorobenzenes	423	274	313	336	23.0
Hexachloroethane	6.92	7.41	7.36	7.23	3.7
a,2,6-Trichlorotoluene	6.92	7.41	7.36	7.23	3.7

* At 25°C and 1 atmosphere

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

Specific Isomer	Dry Adjusted Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
1,3-Dichlorobenzene	80.9	53.1	64.1	66.0	21.2
1,4-Dichlorobenzene	50.2	35.4	35.8	40.5	20.9
1,2-Dichlorobenzene	61.9	40.1	59.1	53.7	22.1
Total Dichlorobenzene	193	129	159	160	20.1
1,3,5-trichlorobenzene	16.5	8.23	11.1	12.0	35.2
1,2,4-trichlorobenzene	76.2	44.3	34.8	51.8	41.9
1,2,3-trichlorobenzene	29.0	19.9	20.2	23.0	22.5
Total Trichlorobenzene	122	72.4	66.1	86.7	35.1
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	14.6	7.90	11.7	11.4	29.6
1,2,3,4-tetrachlorobenzene	5.67	6.16	6.00	5.94	4.2
Total Tetrachlorobenzene	20.3	14.1	17.7	17.4	18.1
Pentachlorobenzene	5.67	6.16	6.00	5.94	4.2
Hexachlorobenzene	5.67	6.16	6.00	5.94	4.2
Total Chlorobenzenes	346	227	255	276	22.6
Hexachloroethane	5.67	6.16	6.00	5.94	4.2
a,2,6-Trichlorotoluene	5.67	6.16	6.00	5.94	4.2

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

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

Specific Isomer	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
1,3-Dichlorobenzene	50.4	32.2	40.1	40.9	22.3
1,4-Dichlorobenzene	31.3	21.5	22.4	25.1	21.7
1,2-Dichlorobenzene	38.6	24.3	37.0	33.3	23.5
Total Dichlorobenzene	120	78.0	99.5	99.3	21.3
1,3,5-trichlorobenzene	10.3	5.00	6.95	7.42	36.2
1,2,4-trichlorobenzene	47.5	26.9	21.8	32.1	42.5
1,2,3-trichlorobenzene	18.1	12.1	12.7	14.3	23.3
Total Trichlorobenzene	75.9	44.0	41.4	53.7	35.8
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	9.13	4.79	7.32	7.08	30.8
1,2,3,4-tetrachlorobenzene	3.54	3.74	3.75	3.68	3.3
Total Tetrachlorobenzene	12.7	8.53	11.1	10.8	19.4
Pentachlorobenzene	3.54	3.74	3.75	3.68	3.3
Hexachlorobenzene	3.54	3.74	3.75	3.68	3.3
Total Chlorobenzenes	216	138	159	171	23.5
Hexachloroethane	3.54	3.74	3.75	3.68	3.3
a,2,6-Trichlorotoluene	3.54	3.74	3.75	3.68	3.3

* At 25°C and 1 atmosphere

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

Specific Isomer	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
1,3-Dichlorobenzene	1.84	1.13	1.42	1.46	24.2
1,4-Dichlorobenzene	1.14	0.75	0.79	0.89	23.8
1,2-Dichlorobenzene	1.41	0.85	1.31	1.19	24.7
Total Dichlorobenzene	4.38	2.74	3.51	3.54	23.2
1,3,5-trichlorobenzene	0.38	0.18	0.25	0.27	38.2
1,2,4-trichlorobenzene	1.73	0.94	0.77	1.15	44.6
1,2,3-trichlorobenzene	0.66	0.42	0.45	0.51	25.4
Total Trichlorobenzene	2.76	1.54	1.46	1.92	37.9
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	0.33	0.17	0.26	0.25	32.5
1,2,3,4-tetrachlorobenzene	0.13	0.13	0.13	0.13	1.5
Total Tetrachlorobenzene	0.46	0.30	0.39	0.38	21.1
Pentachlorobenzene	0.13	0.13	0.13	0.13	1.5
Hexachlorobenzene	0.13	0.13	0.13	0.13	1.5
Total Chlorobenzenes	7.86	4.84	5.63	6.11	25.6
Hexachloroethane	0.13	0.13	0.13	0.13	1.5
a,2,6-Trichlorotoluene	0.13	0.13	0.13	0.13	1.5

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

Specific Isomer	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
1,3-Dichlorobenzene	25.6	80.4	66.0	40.9	1.46
1,4-Dichlorobenzene	15.7	49.3	40.5	25.1	0.89
1,2-Dichlorobenzene	20.8	65.5	53.7	33.3	1.19
Total Dichlorobenzene	62.1	195	160	99.3	3.54
1,3,5-trichlorobenzene	4.64	14.6	12.0	7.42	0.27
1,2,4-trichlorobenzene	20.0	63.0	51.8	32.1	1.15
1,2,3-trichlorobenzene	8.93	28.0	23.0	14.3	0.51
Total Trichlorobenzene	33.6	106	86.7	53.7	1.92
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	4.43	13.9	11.4	7.08	0.25
1,2,3,4-tetrachlorobenzene	2.30	7.23	5.94	3.68	0.13
Total Tetrachlorobenzene	6.73	21.1	17.4	10.8	0.38
Pentachlorobenzene	2.30	7.23	5.94	3.68	0.13
Hexachlorobenzene	2.30	7.23	5.94	3.68	0.13
Total Chlorobenzenes	107	336	276	171	6.11
Hexachloroethane	2.30	7.23	5.94	3.68	0.13
a,2,6-Trichlorotoluene	2.30	7.23	5.94	3.68	0.13

* 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	<35	<35
1,4-Dichlorobenzene	<35	<35
1,2-Dichlorobenzene	<35	<35
Total Dichlorobenzene	<105	<105
1,3,5-trichlorobenzene	<35	<35
1,2,4-trichlorobenzene	<35	<35
1,2,3-trichlorobenzene	<35	<35
Total Trichlorobenzene	<105	<105
1,2,3,5- & 1,2,4,5-tetrachlorobenzenes	<35	<35
1,2,3,4-tetrachlorobenzene	<35	<35
Total Tetrachlorobenzene	<70	<70
Pentachlorobenzene	<35	<35
Hexachlorobenzene	<35	<35
Total Chlorobenzenes	<350	<350
Hexachloroethane	<35	<35
a,2,6-Trichlorotoluene	<35	<35

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

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

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
2,4 & 2,5-dichlorophenol	107	6.72	21.2	17.3	10.8	0.39
3,5-dichlorophenol	<131	8.22	25.9	21.2	13.2	0.48
2,3-dichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
3,4-dichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
Total Dichlorophenols	<448	28.1	88.6	72.6	45.3	1.65
2,4,6-trichlorophenol	248	15.6	49.0	40.2	25.1	0.91
2,3,6-trichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
2,3,5-trichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
2,4,5-trichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
2,3,4-trichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
3,4,5-trichlorophenol	<70	4.39	13.8	11.3	7.07	0.26
Total Trichlorophenols	<598	37.5	118	96.9	60.4	2.20
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<70	4.39	13.8	11.3	7.07	0.26
2,3,4,5-tetrachlorophenol	<70	4.39	13.8	11.3	7.07	0.26
Total Tetrachlorophenols	<140	8.79	27.7	22.7	14.1	0.51
Pentachlorophenol	<70	4.39	13.8	11.3	7.07	0.26
Total Chlorophenols	<1256	78.8	248	204	127	4.62
Heptachlor	<0.024	0.0015	0.0047	0.0039	0.0024	0.000088
Heptachlor Epoxide A	<0.33	0.021	0.065	0.053	0.033	0.0012
Heptachlor Epoxide B	<0.060	0.0038	0.012	0.0097	0.0061	0.00022
Total Heptachlor	<0.41	0.026	0.082	0.067	0.042	0.0015
Oxychlorodane	<0.17	0.011	0.034	0.028	0.017	0.00063
trans-Chlorodane	<0.55	0.035	0.11	0.089	0.056	0.0020
cis-Chlorodane	<0.46	0.029	0.091	0.075	0.046	0.0017
Total Chlorodane	<1.18	0.074	0.23	0.19	0.12	0.0043
Parlar-26	<0.76	0.048	0.15	0.12	0.077	0.0028
Parlar-50	<1.5	0.094	0.30	0.24	0.15	0.0055
Parlar-62	<2.9	0.18	0.57	0.47	0.29	0.011
Total Toxaphene	<5.16	0.32	1.02	0.84	0.52	0.019
Hexachlorophene	<70	4.39	13.8	11.3	7.07	0.26
Hexachlorobutadiene	2.84	0.18	0.56	0.46	0.29	0.010
Octachlorostyrene	<0.029	0.0018	0.0057	0.0047	0.0029	0.00011
Tributyltin	<11	0.69	2.18	1.78	1.11	0.040

Dry Gas Volume Sampled (Rm^3*) :	5.057
Actual Flowrate (m^3/s) :	58.6
Dry Reference Flowrate (Rm^3/s*) :	18.6
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	36.4

* 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	<70	4.73	14.8	12.3	7.47	0.26
2,4 & 2,5-dichlorophenol	84.1	5.68	17.8	14.8	8.98	0.32
3,5-dichlorophenol	<117	7.90	24.8	20.6	12.5	0.44
2,3-dichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
3,4-dichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
Total Dichlorophenols	<411	27.8	87.0	72.3	43.9	1.54
2,4,6-trichlorophenol	198	13.4	41.9	34.8	21.1	0.74
2,3,6-trichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
2,3,5-trichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
2,4,5-trichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
2,3,4-trichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
3,4,5-trichlorophenol	<70	4.73	14.8	12.3	7.47	0.26
Total Trichlorophenols	<548	37.0	116	96.4	58.5	2.05
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<70	4.73	14.8	12.3	7.47	0.26
2,3,4,5-tetrachlorophenol	<70	4.73	14.8	12.3	7.47	0.26
Total Tetrachlorophenols	<140	9.45	29.6	24.6	14.9	0.52
Pentachlorophenol	<70	4.73	14.8	12.3	7.47	0.26
Total Chlorophenols	<1169	78.9	247	206	125	4.38
Heptachlor	<0.022	0.0015	0.0047	0.0039	0.0023	0.000082
Heptachlor Epoxide A	<0.22	0.015	0.047	0.039	0.023	0.00082
Heptachlor Epoxide B	<0.039	0.0026	0.0083	0.0069	0.0042	0.00015
Total Heptachlor	<0.28	0.019	0.059	0.049	0.030	0.0011
Oxychlorodane	<0.15	0.010	0.032	0.026	0.016	0.00056
trans-Chlorodane	<0.56	0.038	0.12	0.099	0.060	0.0021
cis-Chlorodane	<0.48	0.032	0.10	0.084	0.051	0.0018
Total Chlorodane	<1.19	0.080	0.25	0.21	0.13	0.0045
Parlar-26	<0.70	0.047	0.15	0.12	0.075	0.0026
Parlar-50	<1.4	0.095	0.30	0.25	0.15	0.0052
Parlar-62	<2.7	0.18	0.57	0.47	0.29	0.010
Total Toxaphene	<4.80	0.32	1.02	0.84	0.51	0.018
Hexachlorophene	<70	4.73	14.8	12.3	7.47	0.26
Hexachlorobutadiene	3.58	0.24	0.76	0.63	0.38	0.013
Octachlorostyrene	<0.022	0.0015	0.0047	0.0039	0.0023	0.000082
Tributyltin	<11	0.74	2.33	1.93	1.17	0.041

Dry Gas Volume Sampled (Rm³*) :	4.724
Actual Flowrate (m³/s) :	55.5
Dry Reference Flowrate (Rm³/s*) :	17.7
Dry Adjusted Flowrate (Rm³/s**) :	21.3
Wet Reference Flowrate (Rm³/s*) :	35.1

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

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

Specific Isomer	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
2,4 & 2,5-dichlorophenol	90	6.04	18.9	15.4	9.65	0.34
3,5-dichlorophenol	<124	8.32	26.1	21.2	13.3	0.47
2,3-dichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
3,4-dichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
Total Dichlorophenols	<424	28.5	89.2	72.6	45.5	1.61
2,4,6-trichlorophenol	333	22.4	70.0	57.0	35.7	1.26
2,3,6-trichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
2,3,5-trichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
2,4,5-trichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
2,3,4-trichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
3,4,5-trichlorophenol	<70	4.70	14.7	12.0	7.51	0.26
Total Trichlorophenols	<683	45.8	144	117	73.2	2.59
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<70	4.70	14.7	12.0	7.51	0.26
2,3,4,5-tetrachlorophenol	<70	4.70	14.7	12.0	7.51	0.26
Total Tetrachlorophenols	<140	9.40	29.4	24.0	15.0	0.53
Pentachlorophenol	<70	4.70	14.7	12.0	7.51	0.26
Total Chlorophenols	<1317	88.4	277	226	141	4.99
Heptachlor	<0.018	0.0012	0.0038	0.0031	0.0019	0.000068
Heptachlor Epoxide A	<0.29	0.019	0.061	0.050	0.031	0.0011
Heptachlor Epoxide B	<0.052	0.0035	0.011	0.0089	0.0056	0.00020
Total Heptachlor	<0.36	0.024	0.076	0.062	0.039	0.0014
Oxychlorodane	<0.13	0.0087	0.027	0.022	0.014	0.00049
trans-Chlorodane	<0.47	0.032	0.099	0.081	0.050	0.0018
cis-Chlorodane	<0.40	0.027	0.084	0.069	0.043	0.0015
Total Chlorodane	<1.00	0.067	0.21	0.17	0.11	0.0038
Parlar-26	<0.32	0.021	0.067	0.055	0.034	0.0012
Parlar-50	<0.91	0.061	0.19	0.16	0.098	0.0034
Parlar-62	<1.8	0.12	0.38	0.31	0.19	0.0068
Total Toxaphene	<3.03	0.20	0.64	0.52	0.32	0.011
Hexachlorophene	<70	4.70	14.7	12.0	7.51	0.26
Hexachlorobutadiene	7.86	0.53	1.65	1.35	0.84	0.030
Octachlorostyrene	<0.014	0.00094	0.0029	0.0024	0.0015	0.000053
Tributyltin	<11	0.74	2.31	1.88	1.18	0.042

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

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

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

Specific Isomer	Actual Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m³	ng/m³	ng/m³	ng/m³	%
2,6-dichlorophenol	4.39	4.73	4.70	4.61	4.0
2,4 & 2,5-dichlorophenol	6.72	5.68	6.04	6.14	8.6
3,5-dichlorophenol	8.22	7.90	8.32	8.15	2.7
2,3-dichlorophenol	4.39	4.73	4.70	4.61	4.0
3,4-dichlorophenol	4.39	4.73	4.70	4.61	4.0
Total Dichlorophenols	28.1	27.8	28.5	28.1	1.3
2,4,6-trichlorophenol	15.6	13.4	22.4	17.1	27.4
2,3,6-trichlorophenol	4.39	4.73	4.70	4.61	4.0
2,3,5-trichlorophenol	4.39	4.73	4.70	4.61	4.0
2,4,5-trichlorophenol	4.39	4.73	4.70	4.61	4.0
2,3,4-trichlorophenol	4.39	4.73	4.70	4.61	4.0
3,4,5-trichlorophenol	4.39	4.73	4.70	4.61	4.0
Total Trichlorophenols	37.5	37.0	45.8	40.1	12.4
2,3,5,6 & 2,3,4,6-tetrachlorophenol	4.39	4.73	4.70	4.61	4.0
2,3,4,5-tetrachlorophenol	4.39	4.73	4.70	4.61	4.0
Total Tetrachlorophenols	8.79	9.45	9.40	9.21	4.0
Pentachlorophenol	4.39	4.73	4.70	4.61	4.0
Total Chlorophenols	78.8	78.9	88.4	82.1	6.7
Heptachlor	0.0015	0.0015	0.0012	0.0014	11.9
Heptachlor Epoxide A	0.021	0.015	0.019	0.018	16.8
Heptachlor Epoxide B	0.0038	0.0026	0.0035	0.0033	17.9
Total Heptachlor	0.026	0.019	0.024	0.023	15.8
Oxychlorodane	0.011	0.010	0.0087	0.0098	10.2
trans-Chlorodane	0.035	0.038	0.032	0.035	9.0
cis-Chlorodane	0.029	0.032	0.027	0.029	9.6
Total Chlorodane	0.074	0.080	0.067	0.074	9.0
Parlar-26	0.048	0.047	0.021	0.039	38.7
Parlar-50	0.094	0.095	0.061	0.083	23.1
Parlar-62	0.18	0.18	0.12	0.16	21.9
Total Toxaphene	0.32	0.32	0.20	0.28	24.5
Hexachlorophene	4.39	4.73	4.70	4.61	4.0
Hexachlorobutadiene	0.18	0.24	0.53	0.32	58.9
Octachlorostyrene	0.0018	0.0015	0.00094	0.0014	31.4
Tributyltin	0.69	0.74	0.74	0.72	4.0

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	13.8	14.8	14.7	14.5	3.7
2,4 & 2,5-dichlorophenol	21.2	17.8	18.9	19.3	8.9
3,5-dichlorophenol	25.9	24.8	26.1	25.6	2.8
2,3-dichlorophenol	13.8	14.8	14.7	14.5	3.7
3,4-dichlorophenol	13.8	14.8	14.7	14.5	3.7
Total Dichlorophenols	88.6	87.0	89.2	88.3	1.3
2,4,6-trichlorophenol	49.0	41.9	70.0	53.7	27.2
2,3,6-trichlorophenol	13.8	14.8	14.7	14.5	3.7
2,3,5-trichlorophenol	13.8	14.8	14.7	14.5	3.7
2,4,5-trichlorophenol	13.8	14.8	14.7	14.5	3.7
2,3,4-trichlorophenol	13.8	14.8	14.7	14.5	3.7
3,4,5-trichlorophenol	13.8	14.8	14.7	14.5	3.7
Total Trichlorophenols	118	116	144	126	12.2
2,3,5,6 & 2,3,4,6-tetrachlorophenol	13.8	14.8	14.7	14.5	3.7
2,3,4,5-tetrachlorophenol	13.8	14.8	14.7	14.5	3.7
Total Tetrachlorophenols	27.7	29.6	29.4	28.9	3.7
Pentachlorophenol	13.8	14.8	14.7	14.5	3.7
Total Chlorophenols	248	247	277	258	6.5
Heptachlor	0.0047	0.0047	0.0038	0.0044	12.1
Heptachlor Epoxide A	0.065	0.047	0.061	0.058	17.0
Heptachlor Epoxide B	0.012	0.0083	0.011	0.010	18.1
Total Heptachlor	0.082	0.059	0.076	0.072	16.0
Oxychlorodane	0.034	0.032	0.027	0.031	10.4
trans-Chlorodane	0.11	0.12	0.099	0.11	9.1
cis-Chlorodane	0.091	0.10	0.084	0.092	9.6
Total Chlorodane	0.23	0.25	0.21	0.23	9.0
Parlar-26	0.15	0.15	0.067	0.12	38.8
Parlar-50	0.30	0.30	0.19	0.26	23.2
Parlar-62	0.57	0.57	0.38	0.51	22.1
Total Toxaphene	1.02	1.02	0.64	0.89	24.7
Hexachlorophene	13.8	14.8	14.7	14.5	3.7
Hexachlorobutadiene	0.56	0.76	1.65	0.99	58.7
Octachlorostyrene	0.0057	0.0047	0.0029	0.0044	31.7
Tributyltin	2.18	2.33	2.31	2.27	3.7

* At 25°C and 1 atmosphere

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

Specific Isomer	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
2,6-dichlorophenol	11.3	12.3	12.0	11.9	4.2
2,4 & 2,5-dichlorophenol	17.3	14.8	15.4	15.8	8.4
3,5-dichlorophenol	21.2	20.6	21.2	21.0	1.8
2,3-dichlorophenol	11.3	12.3	12.0	11.9	4.2
3,4-dichlorophenol	11.3	12.3	12.0	11.9	4.2
Total Dichlorophenols	72.6	72.3	72.6	72.5	0.2
2,4,6-trichlorophenol	40.2	34.8	57.0	44.0	26.3
2,3,6-trichlorophenol	11.3	12.3	12.0	11.9	4.2
2,3,5-trichlorophenol	11.3	12.3	12.0	11.9	4.2
2,4,5-trichlorophenol	11.3	12.3	12.0	11.9	4.2
2,3,4-trichlorophenol	11.3	12.3	12.0	11.9	4.2
3,4,5-trichlorophenol	11.3	12.3	12.0	11.9	4.2
Total Trichlorophenols	96.9	96.4	117	103	11.4
2,3,5,6 & 2,3,4,6-tetrachlorophenol	11.3	12.3	12.0	11.9	4.2
2,3,4,5-tetrachlorophenol	11.3	12.3	12.0	11.9	4.2
Total Tetrachlorophenols	22.7	24.6	24.0	23.8	4.2
Pentachlorophenol	11.3	12.3	12.0	11.9	4.2
Total Chlorophenols	204	206	226	212	5.8
Heptachlor	0.0039	0.0039	0.0031	0.0036	12.7
Heptachlor Epoxide A	0.053	0.039	0.050	0.047	16.2
Heptachlor Epoxide B	0.0097	0.0069	0.0089	0.0085	17.4
Total Heptachlor	0.067	0.049	0.062	0.059	15.2
Oxychlorodane	0.028	0.026	0.022	0.025	10.9
trans-Chlorodane	0.089	0.099	0.081	0.089	10.1
cis-Chlorodane	0.075	0.084	0.069	0.076	10.6
Total Chlorodane	0.19	0.21	0.17	0.19	10.0
Parlar-26	0.12	0.12	0.055	0.10	39.3
Parlar-50	0.24	0.25	0.16	0.22	23.8
Parlar-62	0.47	0.47	0.31	0.42	22.7
Total Toxaphene	0.84	0.84	0.52	0.73	25.3
Hexachlorophene	11.3	12.3	12.0	11.9	4.2
Hexachlorobutadiene	0.46	0.63	1.35	0.81	57.9
Octachlorostyrene	0.0047	0.0039	0.0024	0.0037	31.9
Tributyltin	1.78	1.93	1.88	1.87	4.2

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

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

Specific Isomer	Wet Reference Concentration Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/Rm³*	ng/Rm³*	ng/Rm³*	ng/Rm³*	%
2,6-dichlorophenol	7.07	7.47	7.51	7.35	3.3
2,4 & 2,5-dichlorophenol	10.8	8.98	9.65	9.81	9.5
3,5-dichlorophenol	13.2	12.5	13.3	13.0	3.5
2,3-dichlorophenol	7.07	7.47	7.51	7.35	3.3
3,4-dichlorophenol	7.07	7.47	7.51	7.35	3.3
Total Dichlorophenols	45.3	43.9	45.5	44.9	1.9
2,4,6-trichlorophenol	25.1	21.1	35.7	27.3	27.6
2,3,6-trichlorophenol	7.07	7.47	7.51	7.35	3.3
2,3,5-trichlorophenol	7.07	7.47	7.51	7.35	3.3
2,4,5-trichlorophenol	7.07	7.47	7.51	7.35	3.3
2,3,4-trichlorophenol	7.07	7.47	7.51	7.35	3.3
3,4,5-trichlorophenol	7.07	7.47	7.51	7.35	3.3
Total Trichlorophenols	60.4	58.5	73.2	64.1	12.5
2,3,5,6 & 2,3,4,6-tetrachlorophenol	7.07	7.47	7.51	7.35	3.3
2,3,4,5-tetrachlorophenol	7.07	7.47	7.51	7.35	3.3
Total Tetrachlorophenols	14.1	14.9	15.0	14.7	3.3
Pentachlorophenol	7.07	7.47	7.51	7.35	3.3
Total Chlorophenols	127	125	141	131	6.8
Heptachlor	0.0024	0.0023	0.0019	0.0022	11.9
Heptachlor Epoxide A	0.033	0.023	0.031	0.029	17.6
Heptachlor Epoxide B	0.0061	0.0042	0.0056	0.0053	18.7
Total Heptachlor	0.042	0.030	0.039	0.037	16.6
Oxychlorodane	0.017	0.016	0.014	0.016	10.4
trans-Chlorodane	0.056	0.060	0.050	0.055	8.5
cis-Chlorodane	0.046	0.051	0.043	0.047	8.9
Total Chlorodane	0.12	0.13	0.11	0.12	8.5
Parlar-26	0.077	0.075	0.034	0.062	38.7
Parlar-50	0.15	0.15	0.098	0.13	23.0
Parlar-62	0.29	0.29	0.19	0.26	21.9
Total Toxaphene	0.52	0.51	0.32	0.45	24.5
Hexachlorophene	7.07	7.47	7.51	7.35	3.3
Hexachlorobutadiene	0.29	0.38	0.84	0.50	59.0
Octachlorostyrene	0.0029	0.0023	0.0015	0.0023	31.8
Tributyltin	1.11	1.17	1.18	1.16	3.3

* At 25°C and 1 atmosphere

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

Specific Isomer	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
2,6-dichlorophenol	0.26	0.26	0.26	0.26	1.5
2,4 & 2,5-dichlorophenol	0.39	0.32	0.34	0.35	11.4
3,5-dichlorophenol	0.48	0.44	0.47	0.46	4.8
2,3-dichlorophenol	0.26	0.26	0.26	0.26	1.5
3,4-dichlorophenol	0.26	0.26	0.26	0.26	1.5
Total Dichlorophenols	1.65	1.54	1.61	1.60	3.4
2,4,6-trichlorophenol	0.91	0.74	1.26	0.97	27.2
2,3,6-trichlorophenol	0.26	0.26	0.26	0.26	1.5
2,3,5-trichlorophenol	0.26	0.26	0.26	0.26	1.5
2,4,5-trichlorophenol	0.26	0.26	0.26	0.26	1.5
2,3,4-trichlorophenol	0.26	0.26	0.26	0.26	1.5
3,4,5-trichlorophenol	0.26	0.26	0.26	0.26	1.5
Total Trichlorophenols	2.20	2.05	2.59	2.28	12.1
2,3,5,6 & 2,3,4,6-tetrachlorophenol	0.26	0.26	0.26	0.26	1.5
2,3,4,5-tetrachlorophenol	0.26	0.26	0.26	0.26	1.5
Total Tetrachlorophenols	0.51	0.52	0.53	0.52	1.5
Pentachlorophenol	0.26	0.26	0.26	0.26	1.5
Total Chlorophenols	4.62	4.38	4.99	4.66	6.5
Heptachlor	0.000088	0.000082	0.000068	0.000080	13.0
Heptachlor Epoxide A	0.0012	0.00082	0.0011	0.0010	19.1
Heptachlor Epoxide B	0.00022	0.00015	0.00020	0.00019	20.3
Total Heptachlor	0.0015	0.0011	0.0014	0.0013	18.2
Oxychlorodane	0.00063	0.00056	0.00049	0.00056	11.9
trans-Chlorodane	0.0020	0.0021	0.0018	0.0020	8.5
cis-Chlorodane	0.0017	0.0018	0.0015	0.0017	8.6
Total Chlorodane	0.0043	0.0045	0.0038	0.0042	8.6
Parlar-26	0.0028	0.0026	0.0012	0.0022	39.3
Parlar-50	0.0055	0.0052	0.0034	0.0047	23.8
Parlar-62	0.011	0.010	0.0068	0.0092	22.7
Total Toxaphene	0.019	0.018	0.011	0.016	25.3
Hexachlorophene	0.26	0.26	0.26	0.26	1.5
Hexachlorobutadiene	0.010	0.013	0.030	0.018	58.2
Octachlorostyrene	0.00011	0.000082	0.000053	0.000081	33.3
Tributyltin	0.040	0.041	0.042	0.041	1.5

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

Specific Isomer	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
2,6-dichlorophenol	4.61	14.5	11.9	7.35	0.26
2,4 & 2,5-dichlorophenol	6.14	19.3	15.8	9.81	0.35
3,5-dichlorophenol	8.15	25.6	21.0	13.0	0.46
2,3-dichlorophenol	4.61	14.5	11.9	7.35	0.26
3,4-dichlorophenol	4.61	14.5	11.9	7.35	0.26
Total Dichlorophenols	28.1	88.3	72.5	44.9	1.60
2,4,6-trichlorophenol	17.1	53.7	44.0	27.3	0.97
2,3,6-trichlorophenol	4.61	14.5	11.9	7.35	0.26
2,3,5-trichlorophenol	4.61	14.5	11.9	7.35	0.26
2,4,5-trichlorophenol	4.61	14.5	11.9	7.35	0.26
2,3,4-trichlorophenol	4.61	14.5	11.9	7.35	0.26
3,4,5-trichlorophenol	4.61	14.5	11.9	7.35	0.26
Total Trichlorophenols	40.1	126	103	64.1	2.28
2,3,5,6 & 2,3,4,6-tetrachlorophenol	4.61	14.5	11.9	7.35	0.26
2,3,4,5-tetrachlorophenol	4.61	14.5	11.9	7.35	0.26
Total Tetrachlorophenols	9.21	28.9	23.8	14.7	0.52
Pentachlorophenol	4.61	14.5	11.9	7.35	0.26
Total Chlorophenols	82.1	258	212	131	4.66
Heptachlor	0.0014	0.0044	0.0036	0.0022	0.000080
Heptachlor Epoxide A	0.018	0.058	0.047	0.029	0.0010
Heptachlor Epoxide B	0.0033	0.010	0.0085	0.0053	0.00019
Total Heptachlor	0.023	0.072	0.059	0.037	0.0013
Oxychlorodane	0.0098	0.031	0.025	0.016	0.00056
trans-Chlorodane	0.035	0.11	0.089	0.055	0.0020
cis-Chlorodane	0.029	0.092	0.076	0.047	0.0017
Total Chlorodane	0.074	0.23	0.19	0.12	0.0042
Parlar-26	0.039	0.12	0.10	0.062	0.0022
Parlar-50	0.083	0.26	0.22	0.13	0.0047
Parlar-62	0.16	0.51	0.42	0.26	0.0092
Total Toxaphene	0.28	0.89	0.73	0.45	0.016
Hexachlorophene	4.61	14.5	11.9	7.35	0.26
Hexachlorobutadiene	0.32	0.99	0.81	0.50	0.018
Octachlorostyrene	0.0014	0.0044	0.0037	0.0023	0.000081
Tributyltin	0.72	2.27	1.87	1.16	0.041

* At 25°C and 1 atmosphere

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

TABLE 91
Clean Harbors Sarnia
Chlorophenol and Related Compounds
Blank Analyses

Congener Group	Lab Blank ng	Blank Train ng
2,6-dichlorophenol	<70	<70
2,4 & 2,5-dichlorophenol	<70	<70
3,5-dichlorophenol	<70	<70
2,3-dichlorophenol	<70	<70
3,4-dichlorophenol	<70	<70
Total Dichlorophenols	<350	<350
2,4,6-trichlorophenol	<70	<70
2,3,6-trichlorophenol	<70	<70
2,3,5-trichlorophenol	<70	<70
2,4,5-trichlorophenol	<70	<70
2,3,4-trichlorophenol	<70	<70
3,4,5-trichlorophenol	<70	<70
Total Trichlorophenols	<420	<420
2,3,5,6 & 2,3,4,6-tetrachlorophenol	<70	<70
2,3,4,5-tetrachlorophenol	<70	<70
Total Tetrachlorophenols	<140	<140
Pentachlorophenol	<70	<70
Total Chlorophenols	<980	<980
Heptachlor	<0.040	<0.040
Heptachlor Epoxide A	<0.46	<0.52
Heptachlor Epoxide B	<0.082	<0.093
Total Heptachlor	<0.58	<0.65
Oxychlorodane	<0.31	<0.30
trans-Chlorodane	<0.72	<0.44
cis-Chlorodane	<0.61	<0.37
Total Chlorodane	<1.64	<1.11
Parlar-26	<1.4	<0.83
Parlar-50	<2.8	<1.1
Parlar-62	<5.5	<2.1
Total Toxaphene	<9.70	<4.03
Hexachlorophene	<70	<70
Hexachlorobutadiene	<0.019	<0.023
Octachlorostyrene	<0.045	<0.030
Tributyltin	<11	<11

"<" 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 ng	Actual Concentration ng/m^3	Dry Reference Concentration ng/Rm^3*	Dry Adjusted Concentration ng/Rm^3**	Wet Reference Concentration ng/Rm^3*	Emission Rate µg/s
Acenaphthene	24.6	1.54	4.86	3.99	2.49	0.090
Acenaphthylene	25.9	1.63	5.12	4.20	2.62	0.095
Anthracene	21.8	1.37	4.31	3.53	2.20	0.080
Benzo(a)Anthracene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(b)Fluoranthene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(j/k)Fluoranthene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(a)fluorene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(b)fluorene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(g,h,i)Perylene	30.5	1.91	6.03	4.94	3.08	0.11
Benzo(a)Pyrene	<14	0.88	2.77	2.27	1.41	0.051
Benzo(e)Pyrene	28.7	1.80	5.68	4.65	2.90	0.11
Biphenyl	203	12.7	40.1	32.9	20.5	0.75
2-Chloronaphthalene	18.4	1.15	3.64	2.98	1.86	0.068
Chrysene/Triphenylene/Benzo(b)anthracene	14.6	0.92	2.89	2.37	1.48	0.054
Coronene	17.9	1.12	3.54	2.90	1.81	0.066
Dibenzo(a,c/a,h)Anthracene	<14	0.88	2.77	2.27	1.41	0.051
Dibenzo(a,e)pyrene	<14	0.88	2.77	2.27	1.41	0.051
9,10-dimethylanthracene	<14	0.88	2.77	2.27	1.41	0.051
7,12-Dimethylbenzo(a)anthracene	<14	0.88	2.77	2.27	1.41	0.051
Fluoranthene	46.1	2.89	9.12	7.47	4.66	0.17
Fluorene	45.2	2.84	8.94	7.32	4.57	0.17
Indeno(1,2,3-cd)Pyrene	14.5	0.91	2.87	2.35	1.47	0.053
2-methylanthracene	36.9	2.32	7.30	5.98	3.73	0.14
3-Methylcholanthrene	<14	0.88	2.77	2.27	1.41	0.051
1-Methylnaphthalene	324	20.3	64.1	52.5	32.7	1.19
2-Methylnaphthalene	517	32.4	102	83.8	52.2	1.90
1-Methylphenanthrene	33.1	2.08	6.55	5.36	3.34	0.122
9-Methylphenanthrene	36.6	2.30	7.24	5.93	3.70	0.13
Naphthalene	3070	193	607	497	310	11.3
Perylene	<14	0.88	2.77	2.27	1.41	0.051
Phenanthrene	299	18.8	59.1	48.4	30.2	1.10
Picene	<14	0.88	2.77	2.27	1.41	0.051
Pyrene	77.1	4.84	15.2	12.5	7.79	0.28
Quinoline	117	7.34	23.1	19.0	11.8	0.43
m-terphenyl	<14	0.88	2.77	2.27	1.41	0.051
o-Terphenyl	<14	0.88	2.77	2.27	1.41	0.051
p-terphenyl	<14	0.88	2.77	2.27	1.41	0.051
Tetralin	2260	142	447	366	228	8.31
Total	<7486	470	1480	1213	756	27.5

Dry Gas Volume Sampled (Rm^3*) :	5.057
Actual Flowrate (m^3/s) :	58.6
Dry Reference Flowrate (Rm^3/s*) :	18.6
Dry Adjusted Flowrate (Rm^3/s**) :	22.7
Wet Reference Flowrate (Rm^3/s*) :	36.4

* 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	30.8	2.08	6.52	5.42	3.29	0.12
Acenaphthylene	21.9	1.48	4.64	3.85	2.34	0.082
Anthracene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(a)Anthracene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(b)Fluoranthene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(j/k)Fluoranthene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(a)fluorene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(b)fluorene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(g,h,i)Perylene	66.6	4.50	14.1	11.7	7.11	0.25
Benzo(a)Pyrene	<14	0.95	2.96	2.46	1.49	0.052
Benzo(e)Pyrene	32.0	2.16	6.77	5.63	3.42	0.12
Biphenyl	337	22.8	71.3	59.3	36.0	1.26
2-Chloronaphthalene	17.9	1.21	3.79	3.15	1.91	0.067
Chrysene/Triphenylene/Benzo(b)anthracene	<14	0.95	2.96	2.46	1.49	0.052
Coronene	32.8	2.21	6.94	5.77	3.50	0.12
Dibenzo(a,c/a,h)Anthracene	<14	0.95	2.96	2.46	1.49	0.052
Dibenzo(a,e)pyrene	<14	0.95	2.96	2.46	1.49	0.052
9,10-dimethylanthracene	<14	0.95	2.96	2.46	1.49	0.052
7,12-Dimethylbenzo(a)anthracene	<14	0.95	2.96	2.46	1.49	0.052
Fluoranthene	38.2	2.58	8.09	6.72	4.08	0.14
Fluorene	57.1	3.85	12.1	10.0	6.10	0.21
Indeno(1,2,3-cd)Pyrene	<14	0.95	2.96	2.46	1.49	0.052
2-methylanthracene	<14	0.95	2.96	2.46	1.49	0.052
3-Methylcholanthrene	<14	0.95	2.96	2.46	1.49	0.052
1-Methylnaphthalene	213	14.4	45.1	37.5	22.7	0.80
2-Methylnaphthalene	253	17.1	53.6	44.5	27.0	0.95
1-Methylphenanthrene	67.4	4.55	14.3	11.9	7.19	0.25
9-Methylphenanthrene	19.0	1.28	4.02	3.34	2.03	0.071
Naphthalene	2170	146	459	382	232	8.13
Perylene	<14	0.95	2.96	2.46	1.49	0.052
Phenanthrene	164	11.1	34.7	28.8	17.5	0.61
Picene	<14	0.95	2.96	2.46	1.49	0.052
Pyrene	51.3	3.46	10.9	9.02	5.48	0.19
Quinoline	27.9	1.88	5.91	4.91	2.98	0.10
m-terphenyl	<14	0.95	2.96	2.46	1.49	0.052
o-Terphenyl	<14	0.95	2.96	2.46	1.49	0.052
p-terphenyl	<14	0.95	2.96	2.46	1.49	0.052
Tetralin	1910	129	404	336	204	7.16
Total	<5790	391	1226	1018	618	21.7

Dry Gas Volume Sampled (Rm³*) :	4.724
Actual Flowrate (m³/s) :	55.5
Dry Reference Flowrate (Rm³/s*) :	17.7
Dry Adjusted Flowrate (Rm³/s**) :	21.3
Wet Reference Flowrate (Rm³/s*) :	35.1

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

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

Compound	Total Collected ng	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Acenaphthene	21.6	1.45	4.54	3.70	2.32	0.082
Acenaphthylene	28.7	1.93	6.04	4.92	3.08	0.11
Anthracene	14.4	0.97	3.03	2.47	1.54	0.055
Benzo(a)Anthracene	<14	0.94	2.94	2.40	1.50	0.053
Benzo(b)Fluoranthene	<14	0.94	2.94	2.40	1.50	0.053
Benzo(j/k)Fluoranthene	18.0	1.21	3.79	3.08	1.93	0.068
Benzo(a)fluorene	<14	0.94	2.94	2.40	1.50	0.053
Benzo(b)fluorene	<14	0.94	2.94	2.40	1.50	0.053
Benzo(g,h,i)Perylene	18.4	1.23	3.87	3.15	1.97	0.070
Benzo(a)Pyrene	<14	0.94	2.94	2.40	1.50	0.053
Benzo(e)Pyrene	26.4	1.77	5.55	4.52	2.83	0.10
Biphenyl	109	7.32	22.9	18.7	11.7	0.41
2-Chloronaphthalene	20.7	1.39	4.35	3.55	2.22	0.078
Chrysene/Triphenylene/Benzo(b)anthracene	<14	0.94	2.94	2.40	1.50	0.053
Coronene	<14	0.94	2.94	2.40	1.50	0.053
Dibenzo(a,c/a,h)Anthracene	<14	0.94	2.94	2.40	1.50	0.053
Dibenzo(a,e)pyrene	<14	0.94	2.94	2.40	1.50	0.053
9,10-dimethylanthracene	<14	0.94	2.94	2.40	1.50	0.053
7,12-Dimethylbenzo(a)anthracene	<14	0.94	2.94	2.40	1.50	0.053
Fluoranthene	37.4	2.51	7.87	6.41	4.01	0.14
Fluorene	27.2	1.83	5.72	4.66	2.92	0.10
Indeno(1,2,3-cd)Pyrene	<14	0.94	2.94	2.40	1.50	0.053
2-methylanthracene	<14	0.94	2.94	2.40	1.50	0.053
3-Methylcholanthrene	<14	0.94	2.94	2.40	1.50	0.053
1-Methylnaphthalene	198	13.3	41.6	33.9	21.2	0.75
2-Methylnaphthalene	227	15.2	47.7	38.9	24.3	0.86
1-Methylphenanthrene	24.4	1.64	5.13	4.18	2.62	0.092
9-Methylphenanthrene	16.4	1.10	3.45	2.81	1.76	0.062
Naphthalene	2750	185	578	471	295	10.4
Perylene	<14	0.94	2.94	2.40	1.50	0.053
Phenanthrene	117	7.85	24.6	20.0	12.5	0.44
Picene	<14	0.94	2.94	2.40	1.50	0.053
Pyrene	51.7	3.47	10.9	8.86	5.54	0.20
Quinoline	116	7.79	24.4	19.9	12.4	0.44
m-terphenyl	<14	0.94	2.94	2.40	1.50	0.053
o-Terphenyl	<14	0.94	2.94	2.40	1.50	0.053
p-terphenyl	<14	0.94	2.94	2.40	1.50	0.053
Tetralin	1930	130	406	331	207	7.31
Total	<6018	404	1266	1031	645	22.8

Dry Gas Volume Sampled (Rm³*) :	4.755
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.0
Dry Adjusted Flowrate (Rm³/s**) :	22.1
Wet Reference Flowrate (Rm³/s*) :	35.3

* 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 Test No. 1	Test No. 2	Test No. 3	Average	Coefficient of Variation
	ng/m^3	ng/m^3	ng/m^3	ng/m^3	%
Acenaphthene	1.54	2.08	1.45	1.69	20.1
Acenaphthylene	1.63	1.48	1.93	1.68	13.6
Anthracene	1.37	0.95	0.97	1.09	21.8
Benzo(a)Anthracene	0.88	0.95	0.94	0.92	4.0
Benzo(b)Fluoranthene	0.88	0.95	0.94	0.92	4.0
Benzo(j/k)Fluoranthene	0.88	0.95	1.21	1.01	17.2
Benzo(a)fluorene	0.88	0.95	0.94	0.92	4.0
Benzo(b)fluorene	0.88	0.95	0.94	0.92	4.0
Benzo(g,h,i)Perylene	1.91	4.50	1.23	2.55	68
Benzo(a)Pyrene	0.88	0.95	0.94	0.92	4.0
Benzo(e)Pyrene	1.80	2.16	1.77	1.91	11.3
Biphenyl	12.7	22.8	7.32	14.3	54.9
2-Chloronaphthalene	1.15	1.21	1.39	1.25	9.8
Chrysene/Triphenylene/Benzo(b)anthracene	0.92	0.95	0.94	0.93	1.6
Coronene	1.12	2.21	0.94	1.43	48.3
Dibenzo(a,c/a,h)Anthracene	0.88	0.95	0.94	0.92	4.0
Dibenzo(a,e)pyrene	0.88	0.95	0.94	0.92	4.0
9,10-dimethylanthracene	0.88	0.95	0.94	0.92	4.0
7,12-Dimethylbenzo(a)anthracene	0.88	0.95	0.94	0.92	4.0
Fluoranthene	2.89	2.58	2.51	2.66	7.7
Fluorene	2.84	3.85	1.83	2.84	35.7
Indeno(1,2,3-cd)Pyrene	0.91	0.95	0.94	0.93	2.0
2-methylanthracene	2.32	0.95	0.94	1.40	56.6
3-Methylcholanthrene	0.88	0.95	0.94	0.92	4.0
1-Methylnaphthalene	20.3	14.4	13.3	16.0	23.7
2-Methylnaphthalene	32.4	17.1	15.2	21.6	43.8
1-Methylphenanthrene	2.08	4.55	1.64	2.76	57.0
9-Methylphenanthrene	2.30	1.28	1.10	1.56	41.3
Naphthalene	193	146	185	175	14.1
Perylene	0.88	0.95	0.94	0.92	4.0
Phenanthrene	18.8	11.1	7.85	12.6	44.6
Picene	0.88	0.95	0.94	0.92	4.0
Pyrene	4.84	3.46	3.47	3.92	20.2
Quinoline	7.34	1.88	7.79	5.67	58.0
m-terphenyl	0.88	0.95	0.94	0.92	4.0
o-Terphenyl	0.88	0.95	0.94	0.92	4.0
p-terphenyl	0.88	0.95	0.94	0.92	4.0
Tetralin	142	129	130	133	5.5
Total	470	391	404	422	10.0

TABLE 96
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Dry Reference Concentrations

Compound	Dry Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Acenaphthene	4.86	6.52	4.54	5.31	20.0
Acenaphthylene	5.12	4.64	6.04	5.26	13.5
Anthracene	4.31	2.96	3.03	3.43	22.1
Benzo(a)Anthracene	2.77	2.96	2.94	2.89	3.7
Benzo(b)Fluoranthene	2.77	2.96	2.94	2.89	3.7
Benzo(j/k)Fluoranthene	2.77	2.96	3.79	3.17	17.0
Benzo(a)fluorene	2.77	2.96	2.94	2.89	3.7
Benzo(b)fluorene	2.77	2.96	2.94	2.89	3.7
Benzo(g,h,i)Perylene	6.03	14.1	3.87	8.00	67
Benzo(a)Pyrene	2.77	2.96	2.94	2.89	3.7
Benzo(e)Pyrene	5.68	6.77	5.55	6.00	11.2
Biphenyl	40.1	71.3	22.9	44.8	54.8
2-Chloronaphthalene	3.64	3.79	4.35	3.93	9.6
Chrysene/Triphenylene/Benzo(b)anthracene	2.89	2.96	2.94	2.93	1.4
Coronene	3.54	6.94	2.94	4.48	48.2
Dibenzo(a,c/a,h)Anthracene	2.77	2.96	2.94	2.89	3.7
Dibenzo(a,e)pyrene	2.77	2.96	2.94	2.89	3.7
9,10-dimethylanthracene	2.77	2.96	2.94	2.89	3.7
7,12-Dimethylbenzo(a)anthracene	2.77	2.96	2.94	2.89	3.7
Fluoranthene	9.12	8.09	7.87	8.36	8.0
Fluorene	8.94	12.1	5.72	8.92	35.7
Indeno(1,2,3-cd)Pyrene	2.87	2.96	2.94	2.93	1.7
2-methylanthracene	7.30	2.96	2.94	4.40	57.0
3-Methylcholanthrene	2.77	2.96	2.94	2.89	3.7
1-Methylnaphthalene	64.1	45.1	41.6	50.3	24.0
2-Methylnaphthalene	102	53.6	47.7	67.8	44.1
1-Methylphenanthrene	6.55	14.3	5.13	8.65	56.9
9-Methylphenanthrene	7.24	4.02	3.45	4.90	41.7
Naphthalene	607	459	578	548	14.3
Perylene	2.77	2.96	2.94	2.89	3.7
Phenanthrene	59.1	34.7	24.6	39.5	44.9
Picene	2.77	2.96	2.94	2.89	3.7
Pyrene	15.2	10.9	10.9	12.3	20.5
Quinoline	23.1	5.91	24.4	17.8	58.0
m-terphenyl	2.77	2.96	2.94	2.89	3.7
o-Terphenyl	2.77	2.96	2.94	2.89	3.7
p-terphenyl	2.77	2.96	2.94	2.89	3.7
Tetralin	447	404	406	419	5.8
Total	1480	1226	1266	1324	10.3

* At 25°C and 1 atmosphere

TABLE 97
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Dry Adjusted Concentrations

Compound	Dry Adjusted Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Acenaphthene	3.99	5.42	3.70	4.37	21.1
Acenaphthylene	4.20	3.85	4.92	4.32	12.6
Anthracene	3.53	2.46	2.47	2.82	21.9
Benzo(a)Anthracene	2.27	2.46	2.40	2.38	4.2
Benzo(b)Fluoranthene	2.27	2.46	2.40	2.38	4.2
Benzo(j/k)Fluoranthene	2.27	2.46	3.08	2.60	16.3
Benzo(a)fluorene	2.27	2.46	2.40	2.38	4.2
Benzo(b)fluorene	2.27	2.46	2.40	2.38	4.2
Benzo(g,h,i)Perylene	4.94	11.7	3.15	6.60	68
Benzo(a)Pyrene	2.27	2.46	2.40	2.38	4.2
Benzo(e)Pyrene	4.65	5.63	4.52	4.93	12.3
Biphenyl	32.9	59.3	18.7	36.9	55.8
2-Chloronaphthalene	2.98	3.15	3.55	3.23	9.0
Chrysene/Triphenylene/Benzo(b)anthracene	2.37	2.46	2.40	2.41	2.1
Coronene	2.90	5.77	2.40	3.69	49.3
Dibenzo(a,c/a,h)Anthracene	2.27	2.46	2.40	2.38	4.2
Dibenzo(a,e)pyrene	2.27	2.46	2.40	2.38	4.2
9,10-dimethylanthracene	2.27	2.46	2.40	2.38	4.2
7,12-Dimethylbenzo(a)anthracene	2.27	2.46	2.40	2.38	4.2
Fluoranthene	7.47	6.72	6.41	6.87	8.0
Fluorene	7.32	10.0	4.66	7.34	36.7
Indeno(1,2,3-cd)Pyrene	2.35	2.46	2.40	2.40	2.4
2-methylanthracene	5.98	2.46	2.40	3.61	56.7
3-Methylcholanthrene	2.27	2.46	2.40	2.38	4.2
1-Methylnaphthalene	52.5	37.5	33.9	41.3	23.9
2-Methylnaphthalene	83.8	44.5	38.9	55.7	43.9
1-Methylphenanthrene	5.36	11.9	4.18	7.13	57.9
9-Methylphenanthrene	5.93	3.34	2.81	4.03	41.5
Naphthalene	497	382	471	450	13.5
Perylene	2.27	2.46	2.40	2.38	4.2
Phenanthrene	48.4	28.8	20.0	32.4	44.8
Picene	2.27	2.46	2.40	2.38	4.2
Pyrene	12.5	9.02	8.86	10.1	20.3
Quinoline	19.0	4.91	19.9	14.6	57.5
m-terphenyl	2.27	2.46	2.40	2.38	4.2
o-Terphenyl	2.27	2.46	2.40	2.38	4.2
p-terphenyl	2.27	2.46	2.40	2.38	4.2
Tetralin	366	336	331	344	5.6
Total	1213	1018	1031	1087	10.0

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

TABLE 98
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Wet Reference Concentrations

Compound	Wet Reference Concentration Test No. 1 ng/Rm³*	Test No. 2 ng/Rm³*	Test No. 3 ng/Rm³*	Average ng/Rm³*	Coefficient of Variation %
Acenaphthene	2.49	3.29	2.32	2.70	19.2
Acenaphthylene	2.62	2.34	3.08	2.68	14.0
Anthracene	2.20	1.49	1.54	1.75	22.6
Benzo(a)Anthracene	1.41	1.49	1.50	1.47	3.3
Benzo(b)Fluoranthene	1.41	1.49	1.50	1.47	3.3
Benzo(j/k)Fluoranthene	1.41	1.49	1.93	1.61	17.2
Benzo(a)fluorene	1.41	1.49	1.50	1.47	3.3
Benzo(b)fluorene	1.41	1.49	1.50	1.47	3.3
Benzo(g,h,i)Perylene	3.08	7.11	1.97	4.05	67
Benzo(a)Pyrene	1.41	1.49	1.50	1.47	3.3
Benzo(e)Pyrene	2.90	3.42	2.83	3.05	10.5
Biphenyl	20.5	36.0	11.7	22.7	54.1
2-Chloronaphthalene	1.86	1.91	2.22	2.00	9.8
Chrysene/Triphenylene/Benzo(b)anthracene	1.48	1.49	1.50	1.49	0.9
Coronene	1.81	3.50	1.50	2.27	47.4
Dibenzo(a,c/a,h)Anthracene	1.41	1.49	1.50	1.47	3.3
Dibenzo(a,e)pyrene	1.41	1.49	1.50	1.47	3.3
9,10-dimethylanthracene	1.41	1.49	1.50	1.47	3.3
7,12-Dimethylbenzo(a)anthracene	1.41	1.49	1.50	1.47	3.3
Fluoranthene	4.66	4.08	4.01	4.25	8.4
Fluorene	4.57	6.10	2.92	4.53	35.1
Indeno(1,2,3-cd)Pyrene	1.47	1.49	1.50	1.49	1.3
2-methylanthracene	3.73	1.49	1.50	2.24	57.5
3-Methylcholanthrene	1.41	1.49	1.50	1.47	3.3
1-Methylnaphthalene	32.7	22.7	21.2	25.6	24.5
2-Methylnaphthalene	52.2	27.0	24.3	34.5	44.6
1-Methylphenanthrene	3.34	7.19	2.62	4.39	56.1
9-Methylphenanthrene	3.70	2.03	1.76	2.50	42.1
Naphthalene	310	232	295	279	14.9
Perylene	1.41	1.49	1.50	1.47	3.3
Phenanthrene	30.2	17.5	12.5	20.1	45.4
Picene	1.41	1.49	1.50	1.47	3.3
Pyrene	7.79	5.48	5.54	6.27	21.0
Quinoline	11.8	2.98	12.4	9.08	58.3
m-terphenyl	1.41	1.49	1.50	1.47	3.3
o-Terphenyl	1.41	1.49	1.50	1.47	3.3
p-terphenyl	1.41	1.49	1.50	1.47	3.3
Tetralin	228	204	207	213	6.3
Total	756	618	645	673	10.9

* At 25°C and 1 atmosphere

TABLE 99
Clean Harbors Sarnia
Polycyclic Aromatic Hydrocarbon Emission Rates

Compound	Emission Rate Test No. 1 µg/s	Test No. 2 µg/s	Test No. 3 µg/s	Average µg/s	Coefficient of Variation %
Acenaphthene	0.090	0.12	0.082	0.096	18.2
Acenaphthylene	0.095	0.082	0.11	0.095	13.9
Anthracene	0.080	0.052	0.055	0.062	24.8
Benzo(a)Anthracene	0.051	0.052	0.053	0.052	1.5
Benzo(b)Fluoranthene	0.051	0.052	0.053	0.052	1.5
Benzo(j/k)Fluoranthene	0.051	0.052	0.068	0.057	16.3
Benzo(a)fluorene	0.051	0.052	0.053	0.052	1.5
Benzo(b)fluorene	0.051	0.052	0.053	0.052	1.5
Benzo(g,h,i)Perylene	0.11	0.25	0.070	0.14	65
Benzo(a)Pyrene	0.051	0.052	0.053	0.052	1.5
Benzo(e)Pyrene	0.11	0.12	0.10	0.11	9.5
Biphenyl	0.75	1.26	0.41	0.81	53.0
2-Chloronaphthalene	0.068	0.067	0.078	0.071	8.9
Chrysene/Triphenylene/Benzo(b)anthracene	0.054	0.052	0.053	0.053	1.2
Coronene	0.066	0.12	0.053	0.081	46.2
Dibenzo(a,c/a,h)Anthracene	0.051	0.052	0.053	0.052	1.5
Dibenzo(a,e)pyrene	0.051	0.052	0.053	0.052	1.5
9,10-dimethylanthracene	0.051	0.052	0.053	0.052	1.5
7,12-Dimethylbenzo(a)anthracene	0.051	0.052	0.053	0.052	1.5
Fluoranthene	0.17	0.14	0.14	0.15	10.4
Fluorene	0.17	0.21	0.10	0.16	34.6
Indeno(1,2,3-cd)Pyrene	0.053	0.052	0.053	0.053	0.8
2-methylanthracene	0.14	0.052	0.053	0.080	59.6
3-Methylcholanthrene	0.051	0.052	0.053	0.052	1.5
1-Methylnaphthalene	1.19	0.80	0.75	0.91	26.6
2-Methylnaphthalene	1.90	0.95	0.86	1.24	46.7
1-Methylphenanthrene	0.12	0.25	0.092	0.16	54.8
9-Methylphenanthrene	0.13	0.071	0.062	0.089	44.2
Naphthalene	11.3	8.13	10.4	9.94	16.4
Perylene	0.051	0.052	0.053	0.052	1.5
Phenanthrene	1.10	0.61	0.44	0.72	47.4
Picene	0.051	0.052	0.053	0.052	1.5
Pyrene	0.28	0.19	0.20	0.22	23.1
Quinoline	0.43	0.10	0.44	0.32	58.7
m-terphenyl	0.051	0.052	0.053	0.052	1.5
o-Terphenyl	0.051	0.052	0.053	0.052	1.5
p-terphenyl	0.051	0.052	0.053	0.052	1.5
Tetralin	8.31	7.16	7.31	7.59	8.3
Total	27.5	21.7	22.8	24.0	12.9

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

Compound	Actual Concentration ng/m³	Dry Reference Concentration ng/Rm³*	Dry Adjusted Concentration ng/Rm³**	Wet Reference Concentration ng/Rm³*	Emission Rate µg/s
Acenaphthene	1.69	5.31	4.37	2.70	0.096
Acenaphthylene	1.68	5.26	4.32	2.68	0.095
Anthracene	1.09	3.43	2.82	1.75	0.062
Benzo(a)Anthracene	0.92	2.89	2.38	1.47	0.052
Benzo(b)Fluoranthene	0.92	2.89	2.38	1.47	0.052
Benzo(j/k)Fluoranthene	1.01	3.17	2.60	1.61	0.057
Benzo(a)fluorene	0.92	2.89	2.38	1.47	0.052
Benzo(b)fluorene	0.92	2.89	2.38	1.47	0.052
Benzo(g,h,i)Perylene	2.55	8.00	6.60	4.05	0.14
Benzo(a)Pyrene	0.92	2.89	2.38	1.47	0.052
Benzo(e)Pyrene	1.91	6.00	4.93	3.05	0.11
Biphenyl	14.3	44.8	36.9	22.7	0.81
2-Chloronaphthalene	1.25	3.93	3.23	2.00	0.071
Chrysene/Triphenylene/Benzo(b)anthracene	0.93	2.93	2.41	1.49	0.053
Coronene	1.43	4.48	3.69	2.27	0.081
Dibenzo(a,c/a,h)Anthracene	0.92	2.89	2.38	1.47	0.052
Dibenzo(a,e)pyrene	0.92	2.89	2.38	1.47	0.052
9,10-dimethylanthracene	0.92	2.89	2.38	1.47	0.052
7,12-Dimethylbenzo(a)anthracene	0.92	2.89	2.38	1.47	0.052
Fluoranthene	2.66	8.36	6.87	4.25	0.15
Fluorene	2.84	8.92	7.34	4.53	0.16
Indeno(1,2,3-cd)Pyrene	0.93	2.93	2.40	1.49	0.053
2-methylanthracene	1.40	4.40	3.61	2.24	0.080
3-Methylcholanthrene	0.92	2.89	2.38	1.47	0.052
1-Methylnaphthalene	16.0	50.3	41.3	25.6	0.91
2-Methylnaphthalene	21.6	67.8	55.7	34.5	1.24
1-Methylphenanthrene	2.76	8.65	7.13	4.39	0.16
9-Methylphenanthrene	1.56	4.90	4.03	2.50	0.089
Naphthalene	175	548	450	279	9.94
Perylene	0.92	2.89	2.38	1.47	0.052
Phenanthrene	12.6	39.5	32.4	20.1	0.72
Picene	0.92	2.89	2.38	1.47	0.052
Pyrene	3.92	12.3	10.1	6.27	0.22
Quinoline	5.67	17.8	14.6	9.08	0.32
m-terphenyl	0.92	2.89	2.38	1.47	0.052
o-Terphenyl	0.92	2.89	2.38	1.47	0.052
p-terphenyl	0.92	2.89	2.38	1.47	0.052
Tetralin	133	419	344	213	7.59
Total	422	1324	1087	673	24.0

* At 25°C and 1 atmosphere

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

TABLE 101
Clean Harbors Sarnia
Blank Polycyclic Aromatic Hydrocarbon Analyses

Compound	Blank Train ng	Laboratory Blank ng
Acenaphthene	<14	<14
Acenaphthylene	<14	<14
Anthracene	<14	<14
Benzo(a)Anthracene	<14	<14
Benzo(b)Fluoranthene	<14	<14
Benzo(j/k)Fluoranthene	<14	<14
Benzo(a)fluorene	<14	<14
Benzo(b)fluorene	<14	<14
Benzo(g,h,i)Perylene	17.6	<14
Benzo(a)Pyrene	<14	<14
Benzo(e)Pyrene	17.3	<14
Biphenyl	16.2	<14
2-Chloronaphthalene	<14	<14
Chrysene/Triphenylene/Benzo(b)anthracene	<14	<14
Coronene	<14	<14
Dibenzo(a,c/a,h)Anthracene	<14	<14
Dibenzo(a,e)pyrene	<14	<14
9,10-dimethylanthracene	<14	<14
7,12-Dimethylbenzo(a)anthracene	<14	<14
Fluoranthene	<14	<14
Fluorene	17.6	<14
Indeno(1,2,3-cd)Pyrene	<14	<14
2-methylanthracene	<14	<14
3-Methylcholanthrene	<14	<14
1-Methylnaphthalene	29.2	<14
2-Methylnaphthalene	41.3	<14
1-Methylphenanthrene	<14	<14
9-Methylphenanthrene	<14	<14
Naphthalene	290	<14
Perylene	<14	<14
Phenanthrene	56.6	<14
Picene	<14	<14
Pyrene	23.6	<14
Quinoline	<14	<14
m-terphenyl	<14	<14
o-Terphenyl	<14	<14
p-terphenyl	<14	<14
Tetralin	523	<14
Total	<1424	<532

"<" 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				Coefficient	Total
	Run No. 1 Tube 1A/1B	Run No. 2 Tube 2A/2B	Run No. 3 Tube 3A/3B	Average	of Variation	Collected
	µg	µg	µg	µg	%	µg
Benzene	0.79	0.60	0.59	0.66	17.0	1.98
Bromodichloromethane	0.029	0.028	0.024	0.027	9.6	0.081
Bromomethane	0.30	0.11	0.19	0.20	48.3	0.59
2-Butanone	0.026	0.046	0.037	0.036	27.4	0.11
Chloroethene	<0.02	<0.02	<0.02	-	-	0
Dibromochloromethane	0.037	0.038	0.031	0.036	10.5	0.11
1,2-Dibromoethane	<0.02	0.024	<0.02	0.0081	173	0.024
Dichlorodifluoromethane	<0.02	<0.02	<0.02	-	-	0
1,1-Dichloroethane	<0.01	<0.01	<0.01	-	-	0
1,1-Dichloroethene	<0.01	<0.01	<0.01	-	-	0
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	-	-	0
Dichloromethane	<0.1	<0.1	<0.1	-	-	0
1,2-Dichloropropane	<0.01	<0.01	<0.01	-	-	0
Ethyl Acetate	<0.02	<0.02	<0.02	-	-	0
Ethylbenzene	0.031	0.015	0.013	0.020	50.4	0.059
Isopropylbenzene	<0.02	<0.02	<0.02	-	-	0
2-Propanone	<0.1	0.10	<0.1	0.035	173	0.10
Styrene	0.056	0.042	0.034	0.044	25.9	0.13
Tetrachloroethene	<0.01	<0.01	<0.01	-	-	0
Tetrachloromethane	<0.01	<0.01	<0.01	-	-	0
Toluene	0.24	0.15	0.15	0.18	27.3	0.54
Tribromomethane	0.033	0.047	0.033	0.038	22.0	0.11
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	-	-	0
Trichloroethene	<0.01	<0.01	<0.01	-	-	0
Trichlorofluoromethane	<0.02	<0.02	<0.02	-	-	0
Trichloromethane	<0.01	0.017	0.011	0.0093	92.3	0.028
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	-	-	0
1,2,4-Trimethylbenzene	0.022	<0.02	<0.02	0.0074	173	0.022
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	-	-	0
Xylenes (total)	0.15	0.066	0.060	0.093	55.9	0.28
Total	1.71	1.28	1.18	1.39	20.2	4.17

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0206
Run No. 2	0.0194
Run No. 3	0.0205

* 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				Coefficient	Total
	Run No. 1 Tube 6A/6B	Run No. 2 Tube 7A/7B	Run No. 4 Tube 9A/9B	Average	of Variation	Collected
	µg	µg	µg	µg	%	µg
Benzene	1.47	0.61	0.70	0.93	51.0	2.78
Bromodichloromethane	0.018	<0.1	<0.1	0.0060	173	0.018
Bromomethane	0.44	<0.9	<0.9	0.15	173	0.44
2-Butanone	0.065	0.31	0.36	0.24	64.1	0.73
Chloroethene	<0.02	<0.2	<0.2	-	-	0
Dibromochloromethane	0.019	<0.1	<0.1	0.0065	173	0.019
1,2-Dibromoethane	<0.02	<0.2	<0.2	-	-	0
Dichlorodifluoromethane	<0.02	<0.2	<0.2	-	-	0
1,1-Dichloroethane	<0.01	<0.1	<0.1	-	-	0
1,1-Dichloroethene	<0.01	<0.1	<0.1	-	-	0
trans-1,2-Dichloroethene	<0.01	<0.1	<0.1	-	-	0
Dichloromethane	<0.1	1.05	4.61	1.89	128	5.66
1,2-Dichloropropane	<0.01	<0.1	<0.1	-	-	0
Ethyl Acetate	<0.02	<0.2	<0.2	-	-	0
Ethylbenzene	0.038	<0.1	<0.1	0.013	173	0.038
Isopropylbenzene	<0.02	<0.2	<0.2	-	-	0
2-Propanone	<0.1	<1	<1	-	-	0
Styrene	0.053	<0.2	<0.2	0.018	173	0.053
Tetrachloroethene	<0.01	<0.1	<0.1	-	-	0
Tetrachloromethane	<0.01	<0.1	<0.1	-	-	0
Toluene	0.59	<0.5	<0.5	0.20	173	0.59
Tribromomethane	0.019	<0.1	<0.1	0.0062	173	0.019
1,1,1-Trichloroethane	<0.01	<0.1	<0.1	-	-	0
Trichloroethene	<0.01	<0.1	<0.1	-	-	0
Trichlorofluoromethane	<0.02	<0.2	<0.2	-	-	0
Trichloromethane	<0.01	<0.1	<0.1	-	-	0
Trichlorotrifluoroethane	<0.02	<0.2	<0.2	-	-	0
1,2,4-Trimethylbenzene	<0.02	<0.2	<0.2	-	-	0
1,3,5-Trimethylbenzene	<0.02	<0.2	<0.2	-	-	0
Xylenes (total)	0.17	<0.4	<0.4	0.057	173	0.17
Total	2.88	1.97	5.67	3.50	55.0	10.5

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0207
Run No. 2	0.0208
Run No. 4	0.0209

* 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				Coefficient	Total
	Run No. 1 Tube 11A/11B	Run No. 3 Tube 13A/13B	Run No. 4 Tube 14A/14B	Average	of Variation	Collected
	µg	µg	µg	µg	%	µg
Benzene	0.49	0.51	0.55	0.52	6.2	1.55
Bromodichloromethane	0.050	0.022	0.023	0.03	49.9	0.095
Bromomethane	0.23	0.39	0.20	0.27	37.2	0.82
2-Butanone	0.18	0.096	0.038	0.10	67.1	0.31
Chloroethene	<0.02	<0.02	<0.02	-	-	0
Dibromochloromethane	0.020	0.026	0.030	0.025	19.5	0.076
1,2-Dibromoethane	0.028	0.025	<0.02	0.018	87.3	0.053
Dichlorodifluoromethane	<0.02	<0.02	<0.02	-	-	0
1,1-Dichloroethane	<0.01	<0.01	<0.01	-	-	0
1,1-Dichloroethene	<0.01	<0.01	<0.01	-	-	0
trans-1,2-Dichloroethene	<0.01	<0.01	<0.01	-	-	0
Dichloromethane	<0.1	0.10	<0.1	0.034	173	0.10
1,2-Dichloropropane	<0.01	<0.01	<0.01	-	-	0
Ethyl Acetate	<0.02	<0.02	<0.02	-	-	0
Ethylbenzene	0.022	0.023	0.032	0.026	20.3	0.077
Isopropylbenzene	<0.02	<0.02	<0.02	-	-	0
2-Propanone	0.44	0.24	0.16	0.28	51.1	0.85
Styrene	0.049	0.058	0.051	0.053	8.7	0.16
Tetrachloroethene	<0.01	<0.01	<0.01	-	-	0
Tetrachloromethane	<0.01	<0.01	<0.01	-	-	0
Toluene	0.17	0.37	0.32	0.29	36.6	0.87
Tribromomethane	0.032	0.031	0.033	0.032	3.7	0.096
1,1,1-Trichloroethane	<0.01	<0.01	<0.01	-	-	0
Trichloroethene	<0.01	<0.01	<0.01	-	-	0
Trichlorofluoromethane	<0.02	<0.02	<0.02	-	-	0
Trichloromethane	0.012	0.016	0.015	0.014	13.7	0.042
Trichlorotrifluoroethane	<0.02	<0.02	<0.02	-	-	0
1,2,4-Trimethylbenzene	<0.02	<0.02	<0.02	-	-	0
1,3,5-Trimethylbenzene	<0.02	<0.02	<0.02	-	-	0
Xylenes (total)	0.078	0.094	0.17	0.11	41.7	0.34
Total	1.80	2.00	1.63	1.81	10.4	5.43

Dry Gas Volume Sampled (Rm^3*) :

Run No. 1	0.0207
Run No. 3	0.0207
Run No. 4	0.0190

* 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	1.98	10.4	32.8	26.9	16.8	0.60
Bromodichloromethane	0.081	0.43	1.35	1.10	0.69	0.025
Bromomethane	0.59	3.12	9.80	8.04	5.02	0.18
2-Butanone	0.11	0.58	1.81	1.48	0.93	0.033
Chloroethene	0	0	0	0	0	0
Dibromochloromethane	0.11	0.56	1.77	1.45	0.91	0.032
1,2-Dibromoethane	0.024	0.13	0.40	0.33	0.20	0.0073
Dichlorodifluoromethane	0	0	0	0	0	0
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	0	0	0	0	0	0
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0.059	0.31	0.97	0.79	0.50	0.018
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	0.10	0.55	1.73	1.42	0.89	0.032
Styrene	0.13	0.70	2.19	1.80	1.12	0.040
Tetrachloroethene	0	0	0	0	0	0
Tetrachloromethane	0	0	0	0	0	0
Toluene	0.54	2.83	8.89	7.30	4.56	0.16
Tribromomethane	0.11	0.59	1.87	1.53	0.96	0.034
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.028	0.15	0.46	0.38	0.24	0.0085
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0.022	0.12	0.37	0.30	0.19	0.0067
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.28	1.47	4.61	3.78	2.36	0.084
Total	4.17	22.0	69.0	56.6	35.4	1.26

Dry Gas Volume Sampled (Rm^3*) :	0.0605
Actual Flowrate (m^3/s) :	57.5
Dry Reference Flowrate (Rm^3/s*) :	18.3
Dry Adjusted Flowrate (Rm^3/s**) :	22.3
Wet Reference Flowrate (Rm^3/s*) :	35.7

* 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	2.78	14.4	44.5	37.1	22.7	0.80
Bromodichloromethane	0.018	0.093	0.29	0.24	0.15	0.0052
Bromomethane	0.44	2.27	7.04	5.86	3.59	0.13
2-Butanone	0.73	3.77	11.7	9.70	5.94	0.21
Chloroethene	0	0	0	0	0	0
Dibromochloromethane	0.019	0.10	0.31	0.26	0.16	0.0056
1,2-Dibromoethane	0	0	0	0	0	0
Dichlorodifluoromethane	0	0	0	0	0	0
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	5.66	29.3	90.7	75.5	46.2	1.62
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0.038	0.20	0.60	0.50	0.31	0.011
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	0	0	0	0	0	0
Styrene	0.053	0.27	0.84	0.70	0.43	0.015
Tetrachloroethene	0	0	0	0	0	0
Tetrachloromethane	0	0	0	0	0	0
Toluene	0.59	3.05	9.44	7.86	4.82	0.17
Tribromomethane	0.019	0.097	0.30	0.25	0.15	0.0054
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0	0	0	0	0	0
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.17	0.89	2.74	2.28	1.40	0.049
Total	10.5	54.4	168	140	85.9	3.01

Dry Gas Volume Sampled (Rm^3*) :	0.0624
Actual Flowrate (m^3/s) :	55.4
Dry Reference Flowrate (Rm^3/s*) :	17.9
Dry Adjusted Flowrate (Rm^3/s**) :	21.5
Wet Reference Flowrate (Rm^3/s*) :	35.1

* At 25°C and 1 atmosphere

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

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

Compound	Total Collected µg	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³**	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Benzene	1.55	8.24	25.7	20.8	13.1	0.46
Bromodichloromethane	0.095	0.50	1.57	1.27	0.80	0.028
Bromomethane	0.82	4.38	13.7	11.1	6.98	0.25
2-Butanone	0.31	1.66	5.17	4.19	2.64	0.094
Chloroethene	0	0	0	0	0	0
Dibromochloromethane	0.076	0.40	1.26	1.02	0.64	0.023
1,2-Dibromoethane	0.053	0.28	0.88	0.71	0.45	0.016
Dichlorodifluoromethane	0	0	0	0	0	0
1,1-Dichloroethane	0	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0	0
Dichloromethane	0.10	0.54	1.68	1.36	0.86	0.030
1,2-Dichloropropane	0	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0	0
Ethylbenzene	0.077	0.41	1.28	1.04	0.65	0.023
Isopropylbenzene	0	0	0	0	0	0
2-Propanone	0.85	4.50	14.0	11.4	7.17	0.25
Styrene	0.16	0.84	2.62	2.12	1.34	0.047
Tetrachloroethene	0	0	0	0	0	0
Tetrachloromethane	0	0	0	0	0	0
Toluene	0.87	4.60	14.3	11.6	7.33	0.26
Tribromomethane	0.096	0.51	1.59	1.29	0.81	0.029
1,1,1-Trichloroethane	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0
Trichlorofluoromethane	0	0	0	0	0	0
Trichloromethane	0.042	0.22	0.70	0.57	0.36	0.013
Trichlorotrifluoroethane	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0
Xylenes (total)	0.34	1.79	5.59	4.53	2.86	0.10
Total	5.43	28.9	90.0	73.0	46.0	1.63

Dry Gas Volume Sampled (Rm³*) :	0.0604
Actual Flowrate (m³/s) :	56.4
Dry Reference Flowrate (Rm³/s*) :	18.1
Dry Adjusted Flowrate (Rm³/s**) :	22.3
Wet Reference Flowrate (Rm³/s*) :	35.4

* At 25°C and 1 atmosphere

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

TABLE 108
Clean Harbors Sarnia
Volatile Organic Actual Concentrations

Compound	Actual Concentration			
	Test No. 1	Test No. 2	Test No. 3	Average
	μg/m³	μg/m³	μg/m³	μg/m³
Benzene	10.4	14.4	8.24	11.0
Bromodichloromethane	0.43	0.093	0.50	0.34
Bromomethane	3.12	2.27	4.38	3.26
2-Butanone	0.58	3.77	1.66	2.00
Chloroethene	0	0	0	0
Dibromochloromethane	0.56	0.10	0.40	0.36
1,2-Dibromoethane	0.13	0	0.28	0.14
Dichlorodifluoromethane	0	0	0	0
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0	29.3	0.54	9.95
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0.31	0.20	0.41	0.30
Isopropylbenzene	0	0	0	0
2-Propanone	0.55	0	4.50	1.68
Styrene	0.70	0.27	0.84	0.60
Tetrachloroethene	0	0	0	0
Tetrachloromethane	0	0	0	0
Toluene	2.83	3.05	4.60	3.49
Tribromomethane	0.59	0.097	0.51	0.40
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0	0	0	0
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.15	0	0.22	0.12
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.12	0	0	0.039
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	1.47	0.89	1.79	1.38
Total	22.0	54.4	28.9	35.1

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	32.8	44.5	25.7	34.3
Bromodichloromethane	1.35	0.29	1.57	1.07
Bromomethane	9.80	7.04	13.7	10.2
2-Butanone	1.81	11.7	5.17	6.21
Chloroethene	0	0	0	0
Dibromochloromethane	1.77	0.31	1.26	1.11
1,2-Dibromoethane	0.40	0	0.88	0.43
Dichlorodifluoromethane	0	0	0	0
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0	90.7	1.68	30.8
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0.97	0.60	1.28	0.95
Isopropylbenzene	0	0	0	0
2-Propanone	1.73	0	14.0	5.25
Styrene	2.19	0.84	2.62	1.88
Tetrachloroethene	0	0	0	0
Tetrachloromethane	0	0	0	0
Toluene	8.89	9.44	14.3	10.9
Tribromomethane	1.87	0.30	1.59	1.25
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0	0	0	0
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.46	0	0.70	0.39
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.37	0	0	0.12
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	4.61	2.74	5.59	4.31
Total	69.0	168	90.0	109

* 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	26.9	37.1	20.8	28.3
Bromodichloromethane	1.10	0.24	1.27	0.87
Bromomethane	8.04	5.86	11.1	8.33
2-Butanone	1.48	9.70	4.19	5.13
Chloroethene	0	0	0	0
Dibromochloromethane	1.45	0.26	1.02	0.91
1,2-Dibromoethane	0.33	0	0.71	0.35
Dichlorodifluoromethane	0	0	0	0
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0	75.5	1.36	25.6
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0.79	0.50	1.04	0.78
Isopropylbenzene	0	0	0	0
2-Propanone	1.42	0	11.4	4.27
Styrene	1.80	0.70	2.12	1.54
Tetrachloroethene	0	0	0	0
Tetrachloromethane	0	0	0	0
Toluene	7.30	7.86	11.6	8.93
Tribromomethane	1.53	0.25	1.29	1.02
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0	0	0	0
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.38	0	0.57	0.32
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.30	0	0	0.10
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	3.78	2.28	4.53	3.53
Total	56.6	140	73.0	90.0

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

TABLE 111
Clean Harbors Sarnia
Volatile Organic Wet Reference Concentrations

Compound	Wet Reference Concentration Test No. 1	Test No. 2	Test No. 3	Average
	µg/Rm³*	µg/Rm³*	µg/Rm³*	µg/Rm³*
Benzene	16.8	22.7	13.1	17.5
Bromodichloromethane	0.69	0.15	0.80	0.55
Bromomethane	5.02	3.59	6.98	5.20
2-Butanone	0.93	5.94	2.64	3.17
Chloroethene	0	0	0	0
Dibromochloromethane	0.91	0.16	0.64	0.57
1,2-Dibromoethane	0.20	0	0.45	0.22
Dichlorodifluoromethane	0	0	0	0
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0	46.2	0.86	15.7
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0.50	0.31	0.65	0.49
Isopropylbenzene	0	0	0	0
2-Propanone	0.89	0	7.17	2.69
Styrene	1.12	0.43	1.34	0.96
Tetrachloroethene	0	0	0	0
Tetrachloromethane	0	0	0	0
Toluene	4.56	4.82	7.33	5.57
Tribromomethane	0.96	0.15	0.81	0.64
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0	0	0	0
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.24	0	0.36	0.20
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.19	0	0	0.062
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	2.36	1.40	2.86	2.20
Total	35.4	85.9	46.0	55.8

* 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	0.60	0.80	0.46	0.62
Bromodichloromethane	0.025	0.0052	0.028	0.019
Bromomethane	0.18	0.13	0.25	0.18
2-Butanone	0.033	0.21	0.094	0.11
Chloroethene	0	0	0	0
Dibromochloromethane	0.032	0.0056	0.023	0.020
1,2-Dibromoethane	0.0073	0	0.016	0.0077
Dichlorodifluoromethane	0	0	0	0
1,1-Dichloroethane	0	0	0	0
1,1-Dichloroethene	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0
Dichloromethane	0	1.62	0.030	0.55
1,2-Dichloropropane	0	0	0	0
Ethyl Acetate	0	0	0	0
Ethylbenzene	0.018	0.011	0.023	0.017
Isopropylbenzene	0	0	0	0
2-Propanone	0.032	0	0.25	0.095
Styrene	0.040	0.015	0.047	0.034
Tetrachloroethene	0	0	0	0
Tetrachloromethane	0	0	0	0
Toluene	0.16	0.17	0.26	0.20
Tribromomethane	0.034	0.0054	0.029	0.023
1,1,1-Trichloroethane	0	0	0	0
Trichloroethene	0	0	0	0
Trichlorofluoromethane	0	0	0	0
Trichloromethane	0.0085	0	0.013	0.0070
Trichlorotrifluoroethane	0	0	0	0
1,2,4-Trimethylbenzene	0.0067	0	0	0.0022
1,3,5-Trimethylbenzene	0	0	0	0
Xylenes (total)	0.084	0.049	0.10	0.078
Total	1.26	3.01	1.63	1.97

TABLE 113
Clean Harbors Sarnia
Summary of Volatile Organic Emission Data

Compound	Actual Concentration µg/m³	Dry Reference Concentration µg/Rm³*	Dry Adjusted Concentration µg/Rm³*	Wet Reference Concentration µg/Rm³*	Emission Rate mg/s
Benzene	11.0	34.3	28.3	17.5	0.62
Bromodichloromethane	0.34	1.07	0.87	0.55	0.019
Bromomethane	3.26	10.2	8.33	5.20	0.18
2-Butanone	2.00	6.21	5.13	3.17	0.11
Chloroethene	0	0	0	0	0
Dibromochloromethane	0.36	1.11	0.91	0.57	0.020
1,2-Dibromoethane	0.14	0.43	0.35	0.22	0.0077
Dichlorodifluoromethane	0	0	0	0	0
1,1-Dichloroethane	0	0	0	0	0
1,1-Dichloroethene	0	0	0	0	0
trans-1,2-Dichloroethene	0	0	0	0	0
Dichloromethane	9.95	30.8	25.6	15.7	0.55
1,2-Dichloropropane	0	0	0	0	0
Ethyl Acetate	0	0	0	0	0
Ethylbenzene	0.30	0.95	0.78	0.49	0.017
Isopropylbenzene	0	0	0	0	0
2-Propanone	1.68	5.25	4.27	2.69	0.095
Styrene	0.60	1.88	1.54	0.96	0.034
Tetrachloroethene	0	0	0	0	0
Tetrachloromethane	0	0	0	0	0
Toluene	3.49	10.9	8.93	5.57	0.20
Tribromomethane	0.40	1.25	1.02	0.64	0.023
1,1,1-Trichloroethane	0	0	0	0	0
Trichloroethene	0	0	0	0	0
Trichlorofluoromethane	0	0	0	0	0
Trichloromethane	0.12	0.39	0.32	0.20	0.0070
Trichlorotrifluoroethane	0	0	0	0	0
1,2,4-Trimethylbenzene	0.039	0.12	0.10	0.062	0.0022
1,3,5-Trimethylbenzene	0	0	0	0	0
Xylenes (total)	1.38	4.31	3.53	2.20	0.078
Total	35.1	109	90.0	55.8	1.97

* 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 µg	Trip Blank Tube 16A/16B µg	Method Blank 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 µg/Rm^3 *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
1	2-Butanone	26.2	0.0206	1.27	18.3	0.023
	Ethyl Acetate	< 20	0.0206	0.97	18.3	0.018
	Tetrachloroethene	< 10	0.0206	0.49	18.3	0.0089
	Toluene	236	0.0206	11.5	18.3	0.21
	Total Xylenes	153	0.0206	7.43	18.3	0.14
	1,2,4-Trichlorobenzene**	-	-	-	-	-
2	2-Butanone	46.2	0.0194	2.38	18.3	0.044
	Ethyl Acetate	< 20	0.0194	1.03	18.3	0.019
	Tetrachloroethene	< 10	0.0194	0.52	18.3	0.0094
	Toluene	147	0.0194	7.60	18.3	0.14
	Total Xylenes	65.8	0.0194	3.40	18.3	0.062
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	37.0	0.0205	1.80	18.3	0.033
	Ethyl Acetate	< 20	0.0205	0.97	18.3	0.018
	Tetrachloroethene	< 10	0.0205	0.49	18.3	0.0089
	Toluene	155	0.0205	7.54	18.3	0.14
	Total Xylenes	60.1	0.0205	2.92	18.3	0.053
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	109	0.0605	1.81	18.3	0.033
	Ethyl Acetate	< 60	0.0605	0.99	18.3	0.018
	Tetrachloroethene	< 30	0.0605	0.50	18.3	0.0091
	Toluene	538	0.0605	8.89	18.3	0.16
	Total Xylenes	279	0.0605	4.61	18.3	0.084
	1,2,4-Trichlorobenzene**	470	5.057	0.09	18.6	0.0017

* At 25°C and 1 atmosphere.

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

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

TABLE 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 µg/Rm^3 *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
1	2-Butanone	65.3	0.0207	3.15	17.9	0.056
	Ethyl Acetate	< 20	0.0207	0.96	17.9	0.017
	Tetrachloroethene	< 10	0.0207	0.48	17.9	0.0086
	Toluene	589	0.0207	28.4	17.9	0.51
	Total Xylenes	171	0.0207	8.24	17.9	0.15
	1,2,4-Trichlorobenzene**	-	-	-	-	-
2	2-Butanone	306	0.0208	14.8	17.9	0.26
	Ethyl Acetate	< 200	0.0208	9.63	17.9	0.17
	Tetrachloroethene	< 100	0.0208	4.82	17.9	0.086
	Toluene	< 500	0.0208	24.1	17.9	0.43
	Total Xylenes	< 400	0.0208	19.3	17.9	0.34
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	356	0.0209	17.0	17.9	0.30
	Ethyl Acetate	< 200	0.0209	9.57	17.9	0.17
	Tetrachloroethene	< 100	0.0209	4.79	17.9	0.086
	Toluene	< 500	0.0209	23.9	17.9	0.43
	Total Xylenes	< 400	0.0209	19.1	17.9	0.34
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	727	0.0624	11.7	17.9	0.21
	Ethyl Acetate	< 420	0.0624	6.73	17.9	0.12
	Tetrachloroethene	< 210	0.0624	3.36	17.9	0.060
	Toluene	< 1589	0.0624	25.5	17.9	0.46
	Total Xylenes	< 971	0.0624	15.6	17.9	0.28
	1,2,4-Trichlorobenzene**	252	4.724	0.053	17.7	0.00094

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

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

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

Run No.	Compound	Amount Collected ng	Dry Gas Volume Sampled Rm^3 *	Dry Reference Concentration $\mu g/Rm^3$ *	Dry Reference Flowrate Rm^3/s *	Emission Rate mg/s
1	2-Butanone	177	0.0207	8.57	18.1	0.16
	Ethyl Acetate	< 20	0.0207	0.97	18.1	0.018
	Tetrachloroethene	< 10	0.0207	0.48	18.1	0.0088
	Toluene	171	0.0207	8.26	18.1	0.15
	Total Xylenes	77.6	0.0207	3.75	18.1	0.068
	1,2,4-Trichlorobenzene**	-	-	-	-	-
3	2-Butanone	96.5	0.0207	4.65	18.1	0.084
	Ethyl Acetate	< 20	0.0207	0.96	18.1	0.017
	Tetrachloroethene	< 10	0.0207	0.48	18.1	0.0087
	Toluene	374	0.0207	18.1	18.1	0.33
	Total Xylenes	94.0	0.0207	4.54	18.1	0.082
	1,2,4-Trichlorobenzene**	-	-	-	-	-
4	2-Butanone	38.3	0.0190	2.02	18.1	0.037
	Ethyl Acetate	< 20	0.0190	1.05	18.1	0.019
	Tetrachloroethene	< 10	0.0190	0.53	18.1	0.0095
	Toluene	320	0.0190	16.9	18.1	0.31
	Total Xylenes	166	0.0190	8.74	18.1	0.16
	1,2,4-Trichlorobenzene**	-	-	-	-	-
Total	2-Butanone	312	0.0604	5.17	18.1	0.094
	Ethyl Acetate	< 60	0.0604	0.99	18.1	0.018
	Tetrachloroethene	< 30	0.0604	0.50	18.1	0.0090
	Toluene	865	0.0604	14.3	18.1	0.26
	Total Xylenes	337	0.0604	5.59	18.1	0.10
	1,2,4-Trichlorobenzene**	203	4.755	0.043	18.0	0.00077

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

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

TABLE 118
Clean Harbors Sarnia
Summary of DRE Compound Emission Rates

Compound	Average Emission Rate Test No. 1 mg/s	Test No. 2 mg/s	Test No. 3 mg/s	Average mg/s	Coefficient of Variation %
2-Butanone	0.033	0.21	0.094	0.11	79.8
Ethyl Acetate	<0.018	<0.12	<0.018	<0.052	113
Tetrachloroethene	<0.0091	<0.060	<0.0090	<0.026	113
Toluene	0.16	<0.46	0.26	<0.29	51.0
Total Xylenes	0.084	<0.28	0.10	<0.15	69.6
1,2,4-Trichlorobenzene	0.0017	0.00094	0.00077	0.0011	44.6

TABLE 119
Clean Harbors Sarnia
Blank Volatile Organic Analyses

Compound	Field Blank Tube 5A/5B 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	30.5	0.95	0.48	<2000	0.97
	Ethyl Acetate	30.5	0.95	0.48	<2000	0.97
	Tetrachloroethene	30.5	0.95	0.48	<200	0.097
	Toluene	30.5	0.95	0.48	3470	1.68
	Total Xylenes	30.5	0.95	0.48	2612	1.26
	1,2,4-Trichlorobenzene	30.5	0.95	0.48	<1000	0.48
Lean	2-Butanone	170.1	1.04	2.95	<2000	5.90
	Ethyl Acetate	170.1	1.04	2.95	<2000	5.90
	Tetrachloroethene	170.1	1.04	2.95	<200	0.59
	Toluene	170.1	1.04	2.95	1100	3.24
	Total Xylenes	170.1	1.04	2.95	1011	2.98
	1,2,4-Trichlorobenzene	170.1	1.04	2.95	<1000	2.95
Emulsion	2-Butanone	15.6	1.01	0.26	<2000	0.53
	Ethyl Acetate	15.6	1.01	0.26	<2000	0.53
	Tetrachloroethene	15.6	1.01	0.26	<200	0.053
	Toluene	15.6	1.01	0.26	450	0.12
	Total Xylenes	15.6	1.01	0.26	609	0.16
	1,2,4-Trichlorobenzene	15.6	1.01	0.26	<1000	0.26
Alkaline	2-Butanone	128.8	1.00	2.15	<2000	4.29
	Ethyl Acetate	128.8	1.00	2.15	<2000	4.29
	Tetrachloroethene	128.8	1.00	2.15	<200	0.43
	Toluene	128.8	1.00	2.15	<200	0.43
	Total Xylenes	128.8	1.00	2.15	<200	0.43
	1,2,4-Trichlorobenzene	128.8	1.00	2.15	<1000	2.15
Leachate	2-Butanone	15.7	1.00	0.26	<2000	0.52
	Ethyl Acetate	15.7	1.00	0.26	<2000	0.52
	Tetrachloroethene	15.7	1.00	0.26	<200	0.052
	Toluene	15.7	1.00	0.26	<200	0.052
	Total Xylenes	15.7	1.00	0.26	<200	0.052
	1,2,4-Trichlorobenzene	15.7	1.00	0.26	<1000	0.26
Total	2-Butanone					12.2
	Ethyl Acetate					12.2
	Tetrachloroethene					1.22
	Toluene					5.52
	Total Xylenes					4.88
	1,2,4-Trichlorobenzene					6.10

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	33.0	0.95	0.52	<2000	1.05
	Ethyl Acetate	33.0	0.95	0.52	<2000	1.05
	Tetrachloroethene	33.0	0.95	0.52	<200	0.10
	Toluene	33.0	0.95	0.52	2930	1.5
	Total Xylenes	33.0	0.95	0.52	2184	1.14
	1,2,4-Trichlorobenzene	33.0	0.95	0.52	<1000	0.52
Lean	2-Butanone	175.0	1.05	3.06	<2000	6.13
	Ethyl Acetate	175.0	1.05	3.06	<2000	6.13
	Tetrachloroethene	175.0	1.05	3.06	<200	0.61
	Toluene	175.0	1.05	3.06	420	1.29
	Total Xylenes	175.0	1.05	3.06	367	1.12
	1,2,4-Trichlorobenzene	175.0	1.05	3.06	<1000	3.06
Emulsion	2-Butanone	15.8	1.00	0.26	<2000	0.53
	Ethyl Acetate	15.8	1.00	0.26	<2000	0.53
	Tetrachloroethene	15.8	1.00	0.26	<200	0.053
	Toluene	15.8	1.00	0.26	350	0.092
	Total Xylenes	15.8	1.00	0.26	591	0.16
	1,2,4-Trichlorobenzene	15.8	1.00	0.26	<1000	0.26
Alkaline	2-Butanone	118.9	1.00	1.98	<2000	3.96
	Ethyl Acetate	118.9	1.00	1.98	<2000	3.96
	Tetrachloroethene	118.9	1.00	1.98	<200	0.40
	Toluene	118.9	1.00	1.98	<200	0.40
	Total Xylenes	118.9	1.00	1.98	<200	0.40
	1,2,4-Trichlorobenzene	118.9	1.00	1.98	<1000	1.98
Leachate	2-Butanone	17.3	1.00	0.29	<2000	0.58
	Ethyl Acetate	17.3	1.00	0.29	<2000	0.58
	Tetrachloroethene	17.3	1.00	0.29	<200	0.058
	Toluene	17.3	1.00	0.29	<200	0.058
	Total Xylenes	17.3	1.00	0.29	<200	0.058
	1,2,4-Trichlorobenzene	17.3	1.00	0.29	<1000	0.29
Total	2-Butanone					12.2
	Ethyl Acetate					12.2
	Tetrachloroethene					1.22
	Toluene					3.36
	Total Xylenes					2.87
	1,2,4-Trichlorobenzene					6.12

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	33.7	0.95	0.53	<2000	1.07
	Ethyl Acetate	33.7	0.95	0.53	<2000	1.07
	Tetrachloroethene	33.7	0.95	0.53	<200	0.11
	Toluene	33.7	0.95	0.53	2730	1.46
	Total Xylenes	33.7	0.95	0.53	2032	1.09
	1,2,4-Trichlorobenzene	33.7	0.95	0.53	<1000	0.53
Lean	2-Butanone	177.7	1.02	3.03	<2000	6.07
	Ethyl Acetate	177.7	1.02	3.03	<2000	6.07
	Tetrachloroethene	177.7	1.02	3.03	<200	0.61
	Toluene	177.7	1.02	3.03	700	2.12
	Total Xylenes	177.7	1.02	3.03	547	1.66
	1,2,4-Trichlorobenzene	177.7	1.02	3.03	<1000	3.03
Emulsion	2-Butanone	13.8	0.99	0.23	7400	1.68
	Ethyl Acetate	13.8	0.99	0.23	<2000	0.46
	Tetrachloroethene	13.8	0.99	0.23	<200	0.046
	Toluene	13.8	0.99	0.23	1420	0.32
	Total Xylenes	13.8	0.99	0.23	1469	0.33
	1,2,4-Trichlorobenzene	13.8	0.99	0.23	<1000	0.23
Alkaline	2-Butanone	128.8	1.02	2.20	<2000	4.40
	Ethyl Acetate	128.8	1.02	2.20	<2000	4.40
	Tetrachloroethene	128.8	1.02	2.20	<200	0.44
	Toluene	128.8	1.02	2.20	<200	0.44
	Total Xylenes	128.8	1.02	2.20	<200	0.44
	1,2,4-Trichlorobenzene	128.8	1.02	2.20	<1000	2.20
Leachate	2-Butanone	16.5	1.00	0.28	<2000	0.55
	Ethyl Acetate	16.5	1.00	0.28	<2000	0.55
	Tetrachloroethene	16.5	1.00	0.28	<200	0.055
	Toluene	16.5	1.00	0.28	<200	0.055
	Total Xylenes	16.5	1.00	0.28	<200	0.055
	1,2,4-Trichlorobenzene	16.5	1.00	0.28	<1000	0.28
Total	2-Butanone					13.8
	Ethyl Acetate					12.5
	Tetrachloroethene					1.25
	Toluene					4.40
	Total Xylenes					3.57
	1,2,4-Trichlorobenzene					6.27

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	12.2	0.023	99.9998
	Ethyl Acetate	12.2	0.018	99.9999
	Tetrachloroethene	1.22	0.0089	99.9993
	Toluene	5.52	0.21	99.9962
	Total Xylenes	4.88	0.14	99.9972
2	2-Butanone	12.2	0.044	99.9996
	Ethyl Acetate	12.2	0.019	99.9998
	Tetrachloroethene	1.22	0.0094	99.9992
	Toluene	5.52	0.14	99.9975
	Total Xylenes	4.88	0.062	99.9987
3	2-Butanone	12.2	0.033	99.9997
	Ethyl Acetate	12.2	0.018	99.9999
	Tetrachloroethene	1.22	0.0089	99.9993
	Toluene	5.52	0.14	99.9975
	Total Xylenes	4.88	0.053	99.9989
Total	2-Butanone	12.2	0.033	99.9997
	Ethyl Acetate	12.2	0.018	99.9999
	Tetrachloroethene	1.22	0.0091	99.9993
	Toluene	5.52	0.16	99.9971
	Total Xylenes	4.88	0.084	99.9983
	1,2,4-Trichlorobenzene	6.10	0.0017	100.0000

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

Run No.	Compound	Total Feed Rate g/s	Emission Rate mg/s	Destruction and Removal Efficiency %
1	2-Butanone	12.2	0.056	99.9995
	Ethyl Acetate	12.2	0.017	99.9999
	Tetrachloroethene	1.22	0.0086	99.9993
	Toluene	3.36	0.51	99.9849
	Total Xylenes	2.87	0.15	99.9949
2	2-Butanone	12.2	0.26	99.9978
	Ethyl Acetate	12.2	0.17	99.9986
	Tetrachloroethene	1.22	0.086	99.9930
	Toluene	3.36	0.43	99.9872
	Total Xylenes	2.87	0.34	99.9880
4	2-Butanone	12.2	0.30	99.9975
	Ethyl Acetate	12.2	0.17	99.9986
	Tetrachloroethene	1.22	0.086	99.9930
	Toluene	3.36	0.43	99.9873
	Total Xylenes	2.87	0.34	99.9881
Total	2-Butanone	12.2	0.21	99.9983
	Ethyl Acetate	12.2	0.12	99.9990
	Tetrachloroethene	1.22	0.060	99.9951
	Toluene	3.36	0.46	99.9864
	Total Xylenes	2.87	0.28	99.9903
	1,2,4-Trichlorobenzene	6.12	0.00094	100.0000

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

Run No.	Compound	Total Feed Rate g/s	Emission Rate mg/s	Destruction and Removal Efficiency %
1	2-Butanone	13.8	0.16	99.9989
	Ethyl Acetate	12.5	0.018	99.9999
	Tetrachloroethene	1.25	0.0088	99.9993
	Toluene	4.40	0.15	99.9966
	Total Xylenes	3.57	0.068	99.9981
3	2-Butanone	13.8	0.084	99.9994
	Ethyl Acetate	12.5	0.017	99.9999
	Tetrachloroethene	1.25	0.0087	99.9993
	Toluene	4.40	0.33	99.9926
	Total Xylenes	3.57	0.082	99.9977
4	2-Butanone	13.8	0.037	99.9997
	Ethyl Acetate	12.5	0.019	99.9998
	Tetrachloroethene	1.25	0.0095	99.9992
	Toluene	4.40	0.31	99.9931
	Total Xylenes	3.57	0.16	99.9956
Total	2-Butanone	13.8	0.094	99.9993
	Ethyl Acetate	12.5	0.018	99.9999
	Tetrachloroethene	1.25	0.0090	99.9993
	Toluene	4.40	0.26	99.9941
	Total Xylenes	3.57	0.10	99.9972
	1,2,4-Trichlorobenzene	6.27	0.00077	100.0000

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

Compund	Destruction and Removal Efficiency Test No. 1 %	Test No. 2 %	Test No. 3 %	Average %	Coefficient of Variation %
2-Butanone	99.9997	99.9983	99.9993	99.9991	0.00074
Ethyl Acetate	99.9999	99.9990	99.9999	99.9996	0.00048
Tetrachloroethene	99.9993	99.9951	99.9993	99.9979	0.0024
Toluene	99.9971	99.9864	99.9941	99.9925	0.0055
Total Xylenes	99.9983	99.9903	99.9972	99.9953	0.0043
1,2,4-Trichlorobenzene	100.0000	100.0000	100.0000	100.0000	0.0000085

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 - 24 hour	1.00 g/s	0.4884 μg/m³			
Base Case - 1 hour	1.00 g/s	1.8104 μg/m³			
Base Case - 1/2 hour	1.00 g/s	2.1725 μg/m³			
Particulate matter	0.12 g/s	0.059 μg/m³	120 μg/m³	0.049	S
Sulphur dioxide	13.3 g/s	6.50 μg/m³	275 μg/m³	2.36	S - 24 hour
Sulphur dioxide	13.3 g/s	24.1 μg/m³	690 μg/m³	3.49	S - 1 hour
Nitrogen oxides	3.56 g/s	1.74 μg/m³	200 μg/m³	0.87	S - 24 hour
Nitrogen oxides	3.56 g/s	6.44 μg/m³	400 μg/m³	1.61	S - 1 hour
Carbon monoxide	0.80 g/s	1.74 μg/m³	6000 μg/m³	0.029	S - 1/2 hour
Hydrogen chloride	0.73 g/s	0.36 μg/m³	20 μg/m³	1.78	S
Fluorides (as hydrogen fluoride)	0.011 g/s	0.0054 μg/m³	0.86 μg/m³	0.62	S
Hydrogen cyanide	0.000013 g/s	0.0000063 μg/m³	8 μg/m³	<0.0001	S
Dioxins & Furans (TEQ) *	0.14 ng TEQ/s	0.000068 pg TEQ/m³			
Dioxins, Furans and Dioxin-Like PCBs (TEQ) **	0.098 ng TEQ/s	0.000048 pg TEQ/m³	1 pg TEQ/m³	0.0048	URT
Naphthalene	9.94 μg/s	0.0000049 μg/m³	22.5 μg/m³	<0.0001	G
Biphenyl	0.81 μg/s	0.0000015 μg/m³	60 μg/m³	<0.0001	G - 1 hour
Benzo (a) pyrene	0.052 μg/s	0.000000025 μg/m³	0.0011 μg/m³	0.0023	G
1,2-Dichlorobenzene	1.19 μg/s	0.0000022 μg/m³	30500 μg/m³	<0.0001	G - 1 hour
1,4-Dichlorobenzene	0.89 μg/s	0.00000043 μg/m³	95 μg/m³	<0.0001	S
1,2,4-Trichlorobenzene	1.15 μg/s	0.00000056 μg/m³	400 μg/m³	<0.0001	G
Pentachlorophenol	0.26 μg/s	0.00000013 μg/m³	20 μg/m³	<0.0001	G
Polychlorinated biphenyls	0.20 μg/s	0.00000010 μg/m³	0.15 μg/m³	<0.0001	G

S - Standard
G - Guideline
URT - Upper Risk Threshold
* 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 - 24 hour	1.00 g/s	0.4884 µg/m^3			
Aluminum oxide	3.24 mg/s	0.0016 µg/m^3	120 µg/m^3	0.0013	G
Antimony	0.0057 mg/s	0.0000028 µg/m^3	25 µg/m^3	<0.0001	S
Arsenic	0.43 mg/s	0.00021 µg/m^3	0.3 µg/m^3	0.071	G
Barium (as water soluble)	0.29 mg/s	0.00014 µg/m^3	10 µg/m^3	0.0014	G
Beryllium*	0.00074 mg/s	0.00000036 µg/m^3	0.01 µg/m^3	0.0036	S
Boron	8.73 mg/s	0.0043 µg/m^3	120 µg/m^3	0.0036	S
Cadmium	0.0050 mg/s	0.0000024 µg/m^3	0.025 µg/m^3	0.0097	S
Calcium oxide	11.7 mg/s	0.0057 µg/m^3	10 µg/m^3	0.057	S
Chromium	0.18 mg/s	0.000090 µg/m^3	1.5 µg/m^3	0.0060	G
Cobalt	0.0067 mg/s	0.0000033 µg/m^3	0.1 µg/m^3	0.0033	G
Copper	0.21 mg/s	0.00010 µg/m^3	50 µg/m^3	0.00020	S
Iron (as metal)	5.26 mg/s	0.0026 µg/m^3	4 µg/m^3	0.064	S
Lead	0.030 mg/s	0.000015 µg/m^3	0.5 µg/m^3	0.0029	S
Lithium	0.0039 mg/s	0.0000019 µg/m^3	20 µg/m^3	<0.0001	S
Magnesium oxide	1.46 mg/s	0.00071 µg/m^3	120 µg/m^3	0.00059	S
Manganese (as compounds)	0.30 mg/s	0.00015 µg/m^3	2.5 µg/m^3	0.0059	G
Mercury	0.029 mg/s	0.000014 µg/m^3	2 µg/m^3	0.00070	S
Molybdenum	0.10 mg/s	0.000050 µg/m^3	120 µg/m^3	<0.0001	G
Nickel	0.062 mg/s	0.000030 µg/m^3	2 µg/m^3	0.0015	S
Phosphorus pentachloride	24.9 mg/s	0.012 µg/m^3	10 µg/m^3	0.12	G
Potassium hydroxide	10.5 mg/s	0.0051 µg/m^3	14 µg/m^3	0.037	G
Selenium	0.41 mg/s	0.00020 µg/m^3	10 µg/m^3	0.0020	G
Silica (as respirable silica)	11.7 mg/s	0.0057 µg/m^3	5 µg/m^3	0.11	G
Silver	0.00039 mg/s	0.00000019 µg/m^3	1 µg/m^3	<0.0001	S
Sodium hydroxide	28.4 mg/s	0.014 µg/m^3	10 µg/m^3	0.14	G
Strontium	0.026 mg/s	0.000013 µg/m^3	120 µg/m^3	<0.0001	G
Tin	0.11 mg/s	0.000056 µg/m^3	10 µg/m^3	0.00056	S
Titanium	0.68 mg/s	0.00033 µg/m^3	120 µg/m^3	0.00028	S
Vanadium	0.052 mg/s	0.000026 µg/m^3	2 µg/m^3	0.0013	S
Zinc	0.31 mg/s	0.00015 µg/m^3	120 µg/m^3	0.00013	S

S - Standard
G - Guideline
URT - Upper Risk Threshold
* 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 - 24 hour	1.00	g/s	0.4884	$\mu g/m^3$				
Base Case - 1 hour	1.00	g/s	1.8104	$\mu g/m^3$				
Benzene	0.62	mg/s	0.00030	$\mu g/m^3$	100	$\mu g/m^3$	0.00030	URT
Bromomethane (methyl bromide)	0.019	mg/s	0.000009	$\mu g/m^3$	1350	$\mu g/m^3$	<0.0001	G
2-Butanone (methyl ethyl ketone)	0.11	mg/s	0.000054	$\mu g/m^3$	1000	$\mu g/m^3$	<0.0001	S
Chloroethene (vinyl chloride)*	0	mg/s	0	$\mu g/m^3$	1	$\mu g/m^3$	<0.0001	S
1,1-Dichloroethane (ethylene dichloride) *	0	mg/s	0	$\mu g/m^3$	2	$\mu g/m^3$	<0.0001	S
trans-1,2-Dichloroethene *	0	mg/s	0	$\mu g/m^3$	105	$\mu g/m^3$	<0.0001	G
Dichloromethane (methylene chloride)	0.55	mg/s	0.00027	$\mu g/m^3$	220	$\mu g/m^3$	0.00012	G
Ethyl Acetate *	0	mg/s	0	$\mu g/m^3$	19000	$\mu g/m^3$	<0.0001	G - 1 hour
Ethylbenzene	0.017	mg/s	0.0000083	$\mu g/m^3$	1000	$\mu g/m^3$	<0.0001	S
Isopropylbenzene (cumene) *	0	mg/s	0	$\mu g/m^3$	400	$\mu g/m^3$	<0.0001	S
2-Propanone (acetone)	0.095	mg/s	0.000046	$\mu g/m^3$	11880	$\mu g/m^3$	<0.0001	S
Styrene	0.034	mg/s	0.000017	$\mu g/m^3$	400	$\mu g/m^3$	<0.0001	S
Tetrachloroethene (perchloroethylene) *	0	mg/s	0	$\mu g/m^3$	360	$\mu g/m^3$	<0.0001	S
Tetrachloromethane (carbon tetrachloride) *	0	mg/s	0	$\mu g/m^3$	2.4	$\mu g/m^3$	<0.0001	S
Toluene	0.20	mg/s	0.000098	$\mu g/m^3$	2000	$\mu g/m^3$	<0.0001	S
Tribromomethane (bromoform)	0.023	mg/s	0.000011	$\mu g/m^3$	55	$\mu g/m^3$	<0.0001	G
1,1,1-Trichloroethane (methyl chloroform)*	0	mg/s	0	$\mu g/m^3$	115000	$\mu g/m^3$	<0.0001	S
Trichloroethene *	0	mg/s	0	$\mu g/m^3$	12	$\mu g/m^3$	<0.0001	S
Trichlorofluoromethane *	0	mg/s	0	$\mu g/m^3$	6000	$\mu g/m^3$	<0.0001	G
Trichloromethane (chloroform)	0.0070	mg/s	0.0000034	$\mu g/m^3$	1	$\mu g/m^3$	0.00034	S
Trichlorotrifluoroethane*	0	mg/s	0	$\mu g/m^3$	800000	$\mu g/m^3$	<0.0001	S
1,2,4-Trimethylbenzene (pseudocumene)	0.0022	mg/s	0.0000011	$\mu g/m^3$	220	$\mu g/m^3$	<0.0001	S
1,3,5-Trimethylbenzene *	0	mg/s	0	$\mu g/m^3$	220	$\mu g/m^3$	<0.0001	S
Xylenes	0.078	mg/s	0.000038	$\mu g/m^3$	730	$\mu g/m^3$	<0.0001	S

S - Standard
G - Guideline
URT - Upper Risk Threshold

* 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	33.6	<50	0.95	0.11	52.85	11.19	0.53	33.71	0.55	1.17
2	27.4	<50	0.95	0.11	53.59	10.81	0.62	33.48	0.34	1.16
3	27.9	<100	0.95	0	53.84	11.90	0.64	31.95	0.55	1.12
Average	29.6	<66.7	0.95	0.071	53.43	11.30	0.60	33.05	0.48	1.15

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	4.26	-	1.04	0.038	10.91	11.47	0.84	73.50	0.39	2.89
2	4.87	-	1.05	0	9.98	10.69	0.74	75.28	0.29	3.02
3	4.60	-	1.02	0.020	11.06	11.55	0.93	73.02	0.43	3.01
Average	4.58	-	1.04	0.019	10.65	11.24	0.84	73.93	0.370	2.97

Emulsion Feed

Test No.	Heat of Combustion MJ/kg	Viscosity cps @ 25°C	Density g/mL	Organic Chlorine % wt.	Carbon % wt.	Hydrogen % wt.	Nitrogen % wt.	Oxygen* % wt.	Sulphur % wt.	Ash % wt.
1	14.9	<100	1.01	0.061	36.62	10.83	0.59	50.16	0.26	1.54
2	17.9	<100	1.00	0.038	41.40	11.31	0.57	44.95	0.35	1.42
3	18.9	<100	0.99	0.020	46.75	11.35	0.57	39.94	0.29	1.10
Average	17.2	<100	1.00	0.040	41.59	11.16	0.58	45.02	0.30	1.35

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).

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	632	668	<10	1200	<10
Antimony	<0.4	0.61	<0.4	0.53	<0.4
Arsenic	2.8	182	<0.4	4.39	2.95
Barium	181	114	<1	256	<1
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	<10	<10	<10	<10	60.5
Cadmium	0.64	1.48	<0.1	0.12	<0.1
Calcium	579	1000	5020	1170	514
Chromium	<4	22.9	<4	<4	<4
Cobalt	<1	2.88	<1	1.15	<1
Copper	13.0	42.6	<2.5	13.1	<2.5
Iron	457	564	<200	880	<200
Lead	8.69	6.56	<0.1	14.7	0.24
Lithium	<1	1.03	<1	<1	11.1
Magnesium	176	275	92.0	243	306
Manganese	<15	53.1	<15	68.6	<15
Mercury	0.19	0.56	<0.010	0.33	<0.010
Molybdenum	6.40	12.2	<1	10.3	4.64
Nickel	5.36	14.9	<0.5	13.2	<0.5
Phosphorus	124	1640	<100	173	<100
Potassium	<150	2720	<150	<150	2370
Selenium	<2	7.75	<2	4.17	<2
Silicon	973	<150	<150	231	<150
Silver	<0.1	0.12	<0.1	<0.1	<0.1
Sodium	816	3890	26.0	443	8860
Strontium	6.07	6.88	2.05	9.04	5.37
Sulphur	1800	4100	<1500	2420	2460
Tin	<2	<2	<2	<2	52.5
Titanium	5.72	6.15	<1	11.5	1.12
Vanadium	12.50	7.68	<1	21.6	<1
Zinc	62.0	56.2	<20	114	<20
Total	6047	15559	7314	7470	15157

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 132
Clean Harbors Sarnia
Metal Analyses in Baghouse Dust Samples

Metal	Concentration mg/kg
Aluminum	14400
Antimony	9.54
Arsenic	2960
Barium	406
Beryllium	<0.5
Boron	146
Cadmium	18.9
Calcium	77800
Chromium	219
Cobalt	37.0
Copper	569
Iron	9030
Lead	89.6
Lithium	36.3
Magnesium	5470
Manganese	687
Mercury	13.7
Molybdenum	268
Nickel	195
Phosphorus	23300
Potassium	50600
Selenium	231
Silicon	517
Silver	3.58
Sodium	78700
Strontium	168
Sulphur	39400
Tin	12.1
Titanium	189
Vanadium	188
Zinc	623
Total	306287

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

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

Dioxins

Congener Group	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Tetrachlorodibenzo-p-dioxins	<1.8	87.9	<1.7	6.10
Pentachlorodibenzo-p-dioxins	3.24	22.9	<0.78	<0.47
Hexachlorodibenzo-p-dioxins	20.2	38.8	<0.85	4.59
Heptachlorodibenzo-p-dioxins	239	128	1.35	15.6
Octachlorodibenzo-p-dioxin	1390	538	4.26	153
Total	1654	816	8.94	180

Furans

Congener Group	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
Tetrachlorodibenzofurans	<1.4	79.6	<1.4	<0.60
Pentachlorodibenzofurans	5.61	11.6	<0.60	1.22
Hexachlorodibenzofurans	19.7	14.0	<0.68	5.39
Heptachlorodibenzofurans	134	45.2	<0.65	8.20
Octachlorodibenzofuran	226	75.9	<1.4	36.2
Total	387	226	4.73	51.6

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

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

Specific Isomer	Rich Feed pg/g	Lean Feed pg/g	Alkaline Feed pg/g	Emulsion Feed pg/g
2378-tetrachlorodibenzo-p-dioxin	<1.8	<1.7	<1.7	<0.78
12378-pentachlorodibenzo-p-dioxin	<1.5	2.70	<0.78	<0.52
123478-hexachlorodibenzo-p-dioxin	<1.0	<0.95	<0.79	<0.63
123678-hexachlorodibenzo-p-dioxin	5.37	<6.1	<0.81	<0.63
123789-hexachlorodibenzo-p-dioxin	<1.6	<5.8	<0.85	<0.89
1234678-heptachlorodibenzo-p-dioxin	153	69.2	1.35	<14
Octachlorodibenzo-p-dioxin	1390	538	4.26	153
2378-tetrachlorodibenzofuran	<1.4	<2.4	<1.4	<0.60
12378-pentachlorodibenzofuran	<1.3	1.82	<0.60	<0.51
23478-pentachlorodibenzofuran	1.41	2.91	<0.58	0.60
123478-hexachlorodibenzofuran	<2.3	3.26	<0.53	<0.58
123678-hexachlorodibenzofuran	<1.4	1.68	<0.51	0.71
234678-hexachlorodibenzofuran	1.66	1.33	<0.54	<0.44
123789-hexachlorodibenzofuran	<1.7	<1.8	<1.1	<0.61
1234678-heptachlorodibenzofuran	37.3	14.8	<0.55	6.87
1234789-heptachlorodibenzofuran	<1.9	1.91	<0.65	1.33
Octachlorodibenzofuran	226	75.9	<1.4	36.2
Total	1831	732	18.4	219

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	1110	5070	25.9	910
Trichlorinated biphenyls	1630	3810	<1.4	1260
Tetrachlorinated biphenyls	5730	7520	6.41	5060
Pentachlorinated biphenyls	9410	11400	<0.34	7080
Hexachlorinated biphenyls	4470	6830	<0.50	4470
Heptachlorinated biphenyls	1070	1640	1.00	977
Octachlorinated biphenyls	50.0	376	<0.44	45.6
Nonachlorinated biphenyls	<70	118	<1.2	<71
Decachlorinated biphenyl	190	713	2.10	71.0
Total	23730	37477	39.3	19945

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	8.8	41.7	8.8	313	31.4	48.9	11.4
1	Clean Harbors	9.0	34.8	8.8	346	12.9	47.7	6.6
2	ORTECH	8.8	40.4	9.0	263	14.0	49.1	8.1
2	Clean Harbors	9.0	34.7	9.1	293	8.4	47.4	5.1
3	ORTECH	9.0	34.6	8.7	265	35	48.9	7.2
3	Clean Harbors	9.2	30.0	8.9	334	15.7	47.6	4.6
Average	ORTECH	8.9	38.9	8.8	280	26.8	49.0	8.9
	Clean Harbors	9.1	33.2	8.9	324	12.3	47.6	5.4

* 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 8-1030-94-00

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

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

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

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

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

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

TERMS AND CONDITIONS

DEFINITIONS

1. For the purpose of this Certificate of Approval:

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

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

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

   d. "°C" means degrees Celsius;

   e. "CEM" means continuous emission monitor;

f. "CEM-CSA" means Continuous Emission Monitoring Methods, Canadian Standards Method: CAN/CSA-Z2223.2-M86, ISSN 0317-5669, September 1986, Canadian Standards Association;

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

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

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

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

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

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

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

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

o. "kPa" means kiloPascals;

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

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

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

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

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

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

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

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

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

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

Applicability of the Certificate

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

Requirements

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

Interpretation (Severability and Conflicts)

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

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

Compliance

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

Changes to be Reported

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

a. change of address of the company;

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

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

Information

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

a. the receipt of said information by the Ministry;

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

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

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

Adverse Impact

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

Conditions for Ministry Order of Immediate Shutdown

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

SECTION 2: OPERATION AND MAINTENANCE

Operation and Maintenance

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

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

i. funding, staffing, training of staff, laboratory and proces controls, quality assurance and quality control procedures o. 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 bellow 800°C.

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

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

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

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

vii. Spray dryer outlet temperature exceeds 225°C.

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

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

ii. Loss of flame in the incinerator.

i. During start-up and shut-down of the incinerator, waste must not b introduced into the incinerator unless the incinerator is operatin within the conditions specified in subconditions "a" through "f inclusive;

17. Within six months following the issue date of this certificate, the company shall submit to the Regional Director a report outlining a timetable and steps which it will undertake to decrease the spray dryer outlet temperature to less than 200°C.

SECTION 3: CONTINUOUS MONITORING AND STACK TESTING

Continuous Emission and Process Monitoring

18. All CEMs presently installed on site shall be maintained and operated in accordance with the procedures described in the attached copies of CEM procedures. The monitored parameters include the following:

a. opacity;

b. stack concentrations of: sulphur dioxide, total hydrocarbons (THC), carbon monoxide and oxygen;

c. feed rates to the incinerator, temperature in the incinerator primary zone, incinerator exit temperature, incinerator exit pressure, exit spray dryer temperature, stack gas temperature and stack gas flow;

d. Continuous emission monitoring equipment and process monitoring equipment for parameters listed in subcondition a and subcondition b and subcondition c shall be equipped with continuous recording devices and with appropriate alarms for indication of exceedances of set points where applicable;

e. Audible and/or visible alarms indicating exceedances of set points will be activated at the values specified in subcondition 13 a., subcondition 13b and subcondition 13c of this certificate;

f. Continuous stack monitors shall be properly maintained and calibrated as described in the attached copies of the U.S. opacity guideline, GCM-THC and CEM-CSA and confirmed by the Manager.

Stack Testing

19. The company shall carry out stack testing annually to determine th emissions of the following;

   a. Total particulates and trace metals specified in Table 6 c Schedule B to this certificate;

   b. Volatile organic contaminants specified in Table 3 of Schedule B t this certificate;

   c. Semivolatile trace organic species specified in Tables 1, 2, 4, ar 5 of Schedule B to this certificate;

   d. Oxides of nitrogen;

   e. Sulphur dioxide;

   f. Hydrogen chloride.

20. The company shall use sampling and analytical procedures which are i agreement with the Source Testing Code and approved by the Manager;

   a. Each pollutant category listed in condition 19 shall be sampled minimum of three times to obtain three valid test samples as par of one sampling campaign;

   b. Each sampling test shall be considered a compliance test as define in the Source Testing Code.

21. In preparation for stack testing, the company shall, within the limitations imposed by the availability of waste, tank farm capacity anc time constraints, attempt to accumulate sufficient quantities of waste which are representative of waste causing highest stack emissions ir normal operation;

   a. Prior to stack testing the company shall analyze the composite samples of all wastes fed to the facility for the following: total PCBs, total dioxins and furans, hexachlorobenzene, pentachlorophenol, hexachloroethane, carbon tetrachloride and solids content in addition to all parameters listed in the company report on analyses of daily process samples titled "Incineration of Intermediate Heat Value Wastes at Tricil (Sarnia) Limited." dated 1987;

   b. A record of THC and opacity monitor readings shall be kept while incinerating wastes of known composition as per subcondition a;

c. Company shall make every effort to secure sufficient quantity o representative waste for feeding the facility during stack testing The representative waste shall be similar in composition to th waste which caused the highest THC and opacity readings in pre-tes work described in subcondition a and subcondition b;

d. Upon consulting the District Manager, the company may exceed th maximum feeding rates shown in condition 15 in the period of on month prior to and during stack tests providing the increased fee rates do not violate other terms of this certificate.

Incinerator Operation During Stack Testing

22. For the purpose and duration of stack tests only, or after obtaining the approval from the Director, the company may change the minimum temperatures in the incinerator imposed by subcondition 16b and subcondition 16c providing none of the limits imposed by condition 13 has been exceeded.

23. The Company shall call a meeting between the stack sampling consultant, the Manager and the District Manager, at least two weeks prior to tests, to discuss:

a. sampling protocol, process conditions and individual responsibilities during testing;

b. timing of tests so that witnessing can be arranged at Manager's discretion;

c. procedure for execution of a new tests in place of any compliance test which, in the opinion of the Manager or its designate, deviated significantly from the Source Testing Code.

Sampling of Process Effluents

24. The Company shall prepare three composite samples of rich waste, lean waste and baghouse ash during each stack test. The composite samples shall be analyzed for contaminants to be specified by the company and approved by the Regional Director prior to stack testing. Sampling procedure and frequency shall be determined at the meeting referred to in condition 23.

Reporting of Stack Testing Results

25. The company shall provide to the District Manager;

a. A report summarizing test results not later than 30 days after the receipt of the results from the laboratory.

b. A stack test report conforming with the requirements of the Source Testing Code and containing stack testing results, continuous monitoring data obtained during each stack sampling test, results of analyses on process samples, process data and feed rates, assessment of operation and interpretation of results not later than 90 days after the receipt of the results from the laboratory.

c. Any test including sampling and laboratory analyses which in the opinion of the Director has not been performed in accordance with the Source Testing Code or sampling methods as agreed to by the Manager, shall be repeated by the company in the shortest time practicable.

Reporting of Continuous Emission Monitoring Data

26. The company shall provide to the District Manager monthly summaries of continuous emission monitoring data; the summaries shall include average monthly values of all parameters listed subcondition 18a and subcondition 18b and the concomitant standard deviations; the number and duration of exceedances of the operational ranges listed in subcondition 13a, subcondition 13b and subcondition 13c; and reasons for exceedances and corrective actions.

The reasons for the imposition of these terms and conditions are as follows:

SECTION 1: GENERAL CONDITIONS

Definitions

1. Condition 1 is included to define special terms used throughout this certificate.

Applicability of the Certificate

2. Condition 2 is imposed to emphasize that in addition to conditions in this certificate the company shall comply with conditions contained in the Provisional Certificate of Approval A 031813 issued for a Waste Disposal Site.

Requirements

3. Condition 3 is included to emphasize that the issuance of th certificate does not diminish any other statutory and regulator obligations to which the company is subject in the construction maintenance and operation of the facility, and in particular th requirements of Regulation 346.

Interpretation (Severability and Conflict)

4. Condition 4 is included to clarify how the certificate is to be judicially interpreted and specifically, to clarify that the requirements of the certificate are severable and that they prevail over supporting documentation.

Compliance

5. Condition 5 is included to emphasize that the company is under a statutory obligation to ensure compliance with the certificate.

Changes to be Reported

6. Condition 6 is included to ensure that the Ministry records are kept accurate and current with respect to approved facility and to ensure that subsequent owners of the facility are made aware of the certificate and continue to operate the facility in compliance with it.

Information

7. Condition 7 is included to ensure that Ministry personnel, when acting in the course of their duties, will be given information and records related to the facility which are the subject of this certificate, to enable the Ministry to be assured of the company's compliance with the terms and conditions of this certificate. Subsection c is included to make the company aware that the mere provision of information in accordance with this certificate shall not exonerate it from enforcement in relation to any non-compliance disclosed by that information simply because the Ministry fails to note the non-compliance, require corrective action or prosecute.

Adverse Impact

8. Condition 8 is included to emphasize that the company has an ongoing duty to mitigate any adverse impacts resulting from non-compliance with the certificate.

Conditions for Ministry Order of Immediate Shutdown

9. Condition 9 is included to emphasize that the company will not be permitted to operate the facility in case of non-compliance with the conditions in this certificate.

SECTION 2: OPERATION AND MAINTENANCE

Operation and Maintenance

10. Condition 10 is included to ensure that the facility will be operated maintained, funded, staffed and equipped in a manner enabling complianc with the terms and conditions of this certificate, such that th environment is protected and deterioration, loss, injury or damage t any person or property is prevented.

Operating Manual

11. Condition 11 is included to ensure that the company shall follow 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 on 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 Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provi that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary, Environmental Appeal Board, 112 St. Clair Avenue West, Suite 502, Toronto, Ontario. M4V 1N3	AND	The Director, Section 9, Environmental Protection Act, Ministry of the Environment and Energy, 250 Davisville Avenue, 3rd Floor, Toronto, Ontario. M4S 1H2

The above noted works are approved under Section 9 of the Environmental Protection Act.

DATED AT TORONTO this 19th *day of.* April 1994

P. DeAngelis, P. Eng.,
Director,
Section 9,
Environmental Protection Act.

VO/pm
cc MOEE Sarnia District Manager
J. Zend, Science & Technology Branch

SCHEDULE A - POINT OF IMPINGEMENT CONCENTRATIONS

Column 1

NAME OF CONTAMINANT

Column 2

HALF HOUR AVERAGE CONCENTRATION AT POINT OF IMPINGEMENT

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

** ng/cubic metre = nanograms per cubic metre

Aluminum Oxide	
Arsenic	100
Barium-total water soluble	1
Chromium (Di,Tri and Hexavalent forms)	30
Manganese	5
Molybdenum	7.5
Nickel	100
Phosphorous Pentachloride	5
Potassium Hydroxide	30
Selenium	28
Sodium Hydroxide	20
Silica-respirable (d≤10 micron)	20
Strontium	15
Vinyl Chloride	100
Trichlorofluoromethane	3
Trifluorotrichloroethane	18000
Methylene Chloride	2400000
Chloroform	5300
1,1,1-Trichloroethane	1500
1,2-Dichloroethane	350000
Perchloroethylene	1200
Isopropyl Benzene(Cumene)	10000
1,2,4-Trimethyl Benzene(Mesitylene)	100
Carbon Tetrachloride	500
1,2,4-Trichlorobenzene	1800
Naphthalene	100
Benzo(a)pyrene	36
Pentachlorophenol	3.3 ng/cubic metre*
Polychlorinated Biphenyls (PCBs)	60
	0.45

Polychlorinated Dibenzodioxins (PCCD's) in pg/cubic metre - see formula
Polychlorinated Dibenzofurans (PCDF's) in pg/cubic metre - see formula

formula: (PCDD's/450) + (PCDF's/22500) ≤ 1

SCHEDULE B - MONITORING PARAMETERS

TABLE 1: PCBs and Chlorobenzenes in Stack Samples

Octachlorostyrene
Hexachlorobenzene
1,3,5-Trichlorobenzene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
Hexachlorobutadiene
2,4,5-Trichlorobenzene
2,3,6-Trichlorobenzene
1,2,4,5-Tetrachlorobenzene
Hexachloroethane
1,2,3,5-Tetrachlorobenzene
α,2,6-Trichlorotoluene
1,2,3,4-tetrachlorobenzene
Pentachlorobenzene
Dichlorobiphenyls
Trichlorobiphenyls
Tetrachlorobiphenyls
Pentachlorobiphenyls
Hexachlorobiphenyls
Heptachlorobiphenyls
Octachlorobiphenyls
Nonachlorobiphenyls
Decachlorobiphenyl
Total PCB congeners

TABLE 2: Polychlorinated Dibenzodioxins and Polychlorinated Furans

T_4CDD	T_4CDF
P_5CDD	P_5CDF
H_6CDD	H_6CDF
H_7CDD	H_7CDF
O_8CDD	O_8CDF

2,3,7,8-T_4CDD	2,3,7,8-T_4CDF
1,2,3,7,8-P_5CDD	1,2,3,7,8-P_5CDF
1,2,3,4,7,8-H_6CDD	2,3,4,7,8-P_5CDF
1,2,3,6,7,8-H_6CDD	1,2,3,4,7,8-H_6CDF
1,2,3,7,8,9-H_6CDD	1,2,3,6,7,8-H_6CDF
1,2,3,4,6,7,8-H_7CDD	1,2,3,7,8,9-H_6CDF
	2,3,4,6,7,8-H_6CDF
	1,2,3,4,6,7,8-H_7CDF
	1,2,3,4,7,8,9-H_7CDF

SCHEDULE B - MONITORING PARAMETERS

TABLE 3: Volatile Organics in Stack Samples

Dichlorodifluoromethane
Vinyl Chloride
Bromomethane
Trichlorofluoromethane
1,1-Dichloroethene
Trichlorotrifluoroethane
Methylene chloride
trans-1,2-Dichloroethene
Chloroform
1,1,1-Trichloroethane
1,2-Dichloroethane
Benzene
1,2-Dichloropropane
Trichloroethene
Bromodichloromethane
Toluene
Dibromochloromethane
Ethylene dibromide
Tetrachloroethene
Ethylbenzene
m & p-Xylene
Bromoform
o-Xylene
Cumene
Mesitylene
Acetone
2-Butanone
Carbontetrachloride
Styrene

SCHEDULE B - MONITORING PARAMETERS

TABLE A: PAH's in Stack Samples

Tetralin
Naphthalene
2-Methylnaphthalene
1-Methylnaphthalene
2-Chloronaphthalene
Biphenyl
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
2-Methylanthracene
o-Terphenyl
1-Methylphenanthrene
9-Methylphenanthrene
Fluoranthrene
Pyrene
9,10-Dimethylanthracene
m-Terphenyl
p-Terphenyl
Benzo (a) Fluorene
Benzo (b) Fluorene
Benzo (a) Anthracene
Triphenylene + Chrysene
Perylene
Benzo (b) Fluoranthene
Benzo (k) Fluoranthene
Benzo (e) Pyrene
Benzo (a) Pyrene
3-Methylchloranthrene
Indeno (1,2,3,c,d) Pyrene
Dibenzo (a,c) Anthracene and Dibenzo (a,h) Anthracene
Picene
Benzo (g,h,i) Perylene
Coronene
Benzo (b) Anthracene
Quinoline
Dibenzo (a,e) Pyrene

SCHEDULE B - MONITORING PARAMETERS

TABLE 5: Chlorophenols in Stack Samples

2,3-dichlorophenol
2,4-dichlorophenol
2,6-dichlorophenol
2,3,4-trichlorophenol
2,4,5-trichlorophenol
2,4,6-trichlorophenol
3,4,5-trichlorophenol
2,3,4,6-tetrachlorophenol
2,3,5,6-tetrachlorophenol
Pentachlorophenol

TABLE 6: Inorganics in Stack Samples

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

APPENDIX A

1. Application for Certificate of Approval for Plant Modifications at Tricil (Sarnia) Limited, Corunna, Ontario, submitted to the Ontario Ministry of the Environment by Tricil Limited on July 15, 1981.

2. Application for Certificate of Approval for Plant Modifications at Tricil Sarnia) Limited, Corunna, Ontario, Supplementary Information, submitted to the Ontario Ministry of the Environment by Tricil Limited on July 15, 1981.

3. "Incineration of Intermediate Heat Value Wastes at Tricil (Sarnia) Ltd.", 1987.

4. Air Emission Testing at the Tricil, Sarnia Incinerator, A Draft Report to: Tricil Limited, 89 The Queensway West, Mississauga, Ontario, P.90-43-EE25 CI, January 30, 1990, Ortech International, 2395 Speakman Drive, Mississauga, Ontario.

5. Application for Certificate of Approval (Air) for the modifications to the incineration feed system received at the Approvals Branch on September 28 1990.

6. A Proposal to Provide Secondary Combustion Air for the L.E.S.L. Lambton Incinerator.

7. Drawing by the MIG Engineering Ltd. of Sarnia, Ontario No. 8881,3745,1562.

8. L.E.S.L. - Lambton Facility, S.I.P.S. Process Vent Control System (a three page description of a system).

9. Drawing no. 15-21, Site Plan.

10. Drawing no. 20E-PFF-808, Fume Incineration, Piping and Instrumentation Diagram.

11. Drawing by the MIG Engineering Ltd. of Sarnia, Ontario No. 8562.

12. Modifications to Existing Sarnia Tank Farm, Conceptual Scope of Work, January 17, 1991.

13. A proposal to Provide Secondary Combustion Air for the L.E.S.L. Lambton Incinerator.

14. Drawing No. DX-03-0-192 dated January 23, 1991, and Drawing No. D-32-2-043 dated February 20, 1991 by Four Nines, Inc.

15. Application letter to Mr. H.O. Wigle dated November 16, 1992 and signed by Mr. Dean C. Edwardson.

16. Application for Certificate of Approval (Air) for the installation of a vent control system (fume incineration) to control emissions from S.I.P.S. plant storage tanks and processing equipment received at the Approvals Branch on December 2, 1991.

17. "Laidlaw Environmental Services Ltd., Lambton Facility, 1993 Stack Test Plan".

18. Application for a Certificate of Approval No. 8-1039-91, dated December 17, 1993, to increase feed rates to the existing unit and to burn wastes with an intermediate heat value (emulsion).

19. Performance Evaluation, Lambton Facility Incineration System, Volume 1, December 1993.

Ministry of the Environment | Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
WASTE/AIR
NUMBER 6547-5G5MSP

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Notice of Amendment (Notice) amends Provisional Certificate of Approval (Waste Disposal Site) No. A031813, dated January 27, 1986 and Notice, dated April 8, 1987 as well as Certificate of Approval (Air) No. 8-1030-94-006, dated April 19, 1994.

Clean Harbors Canada Inc.
4090 Telfer Road
Corunna, ON
N0N 1G0

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

to permit the modification of the facility to incinerate hauled liquid industrial waste in the following manner:

(a) to add additional auxiliary waste injection ports;
(b) to provide for the addition of powdered activated carbon in the air pollution control system;
(c) to add a fume collection and incineration system to the tank farm;
(d) to increase the amount of secondary air supplied to the furnace; and,
(e) to alter the feed rate limitations for the system.

all in accordance with the applications and supporting information as listed in Schedule "A" which is attached to this Notice of Amendment and forms part of this Notice of Amendment, which includes the use of the Site only for the Transfer/Processing/ Incineration of the following categories of waste:

a facility to incinerate hauled liquid industrial waste class numbers:

111 - 114 inclusive; 121, 122, 123, 131 - 135 inclusive;
141 - 150 inclusive; 211 - 213 inclusive; 221, 222,
231 - 233 inclusive; 241, 242, 251 - 254 inclusive;
261 - 270 inclusive; 281, 282, 311, and 321

This amendment also allows the removal of the baghouse bypass duct work which is no longer required.

You are hereby notified that this amendment is issued subject to the terms and conditions of the original Certificate with the following changes:

1. The company shall ensure that the combined feed of all waste streams does not exceed 245 litres per minute.

2. The Company shall optimize the operation of the Incinerator and the Air Pollution Control System by establishing appropriate waste feed mix scenarios to accommodate the variability of heating values encountered with the types of wastes that may be incinerated. The Company shall also establish an Operating Window for the Incinerator and the Air Pollution Control System, including acceptable ranges for the Baseline Parameters and all set points for the continuously monitored parameters. Such an Operating Window shall based upon operating experience and shall be refined not later than during the first Source Testing following the issuance of this amendment. The Company shall submit details of the Operating Window to the Director, Manager and the District Manager as part of the Source Testing Report.

3. The Company shall, at all times, operate the Incinerator and the Air Pollution Control Equipment within the Operating Window, unless the Director determines, in consultation with the Manager and the District Manager that the Operating Window will not, based on the source testing results, adequately guarantee compliance with the Act, O. Reg. 346 and the Performance Conditions of this Certificate.

Concentration Limits:

4. The Company shall, at all times, operate the Incinerator and the Air Pollution Control System in such a manner as to ensure that the following Performance Conditions are met:

   (a) The concentration of organic matter having a carbon content, expressed as equivalent methane, in the Main Stack expressed as a ten minute block average, shall be not more than 100 parts per million by volume on dry basis normalized to 11 percent oxygen.

   (b) The one hour block average concentration of carbon monoxide in the main stack shall be not more than 100 parts per million by volume on a dry basis normalized to 11 percent oxygen; or 110 milligrams per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(c) The concentration of suspended particulate matter in the Stack shall be not more than 20 milligrams per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(d) The opacity at the exit of the Main Stack shall be not more than:

(i) 5 percent, calculated on a 2 hour average; and

(ii) 10 percent, calculated on a 6 minute average.

(e) (i) The toxicity equivalent concentration of dioxins and furans in the Gases in the Main Stack shall be not more than 80 picograms per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

(ii) The toxicity equivalent concentration of dioxins and furans shall be calculated in accordance with the International Scheme set out in Schedule 3 of the Certificate.

(f) The concentration of mercury in the Gases in the Stack shall be not more than 50 micrograms per dry cubic metre normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals.

Interpretation:

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

(b) In all matters requiring the interpretation and implementation of this Notice, the conditions of this Notice shall take precedence, followed in descending order by the chronological approval documents that this Notice amends.

The reasons for the imposition of these conditions are as follows:

1. The reason for Condition 1 is to limit the amount of waste that can be fed to the incinerator at any time. This Condition alters the conditions regarding Feed Rate limitations in certificates of approval numbers A031813 and 8-1030-94-006.

2. Conditions 2 and 3 address the need to optimize the operation and develop a plan for continual monitoring of the optimized operation.

3. Conditions 4. set minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, you may by written notice served upon me, the Environmental Appeal Board and the Environmental Commissioner, Environmental Bill of Rights, S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary, Environmental Appeal Board, 2300 Yonge St., 12th Fl., P.O. Box 2382 Toronto, Ontario M4P 1E4.	The Environmental Commissioner, 1075 Bay Street, Suite 605, 6th Floor Toronto, Ontario M5S 2W5.	The Director, Sections 9 & 39, *Environmental Protection Act* Ministry of the Environment, 2 St. Clair Avenue West, Floor 12A Toronto, Ontario. M4V 1L5

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.

DATED AT TORONTO this 24th *day of* day of January, 2003

Director,
(Section 9 and Section 39,)
Environmental Protection Act

c: District Manager, Sarnia

SCHEDULE "A"

This Schedule "A" forms part of Certificate (Air and Waste Disposal Site):

1. Application for a Certificate of Approval (Air), for Plant Modifications at Safety Kleen Ltd. Corunna, Ontario submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on November 27, 2000 and all supporting documentation.

2. Application for a Certificate of Approval (Air), for Plant Modifications at Safety Kleen Ltd Corunna, Ontario submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on October 31, 2001 and all supporting documentation.

3. Supplemental information on the above Applications for a Certificates of Approval (Air) submitted to the Ontario Ministry of the Environment by Safety Kleen Ltd. on March 1, 2002.

4. "Operating Manual Lambton Incineration System". Chemical Services Division, Clean Harbors Canada Inc. Latest Revision May, 2002

5. "QA/QC Plan for Safety Kleen Lambton Facility" Prepared by CEM Specialties. Draft Revision 1.

APPENDIX 3

Proving Data
(7 pages)

ALS Environmental
5420 Mainway Drive, Unit 5, Burlington ON, L7L 6A4
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Ron McLeod	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L1837923	**Client Contact:**	Chris Belore
Date of Report	12-Oct-16	**Client Project ID:**	21713

COMMENTS:

Toxic PCDD/F and PCB Congeners by GC/HRMS
PCB Congeners by GC/MS
Chlorophenols as acetate derivatives by SIM GC/MS
CB by Low Res SIM GCMS
PAH by CARB method 429 (LR option)- Isotope dilution
VOCs via SW846 Method 5041A/8260B

Certified by:

Ron McLeod, PhD
Director, Air Toxics and Special Chemistries, Eastern Canada

ALS Environmental

Sample Analysis Summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L1837923-13
Matrix	Stack

Target Analyte	**pg/train**
2,3,7,8-TCDD	<50
1,2,3,7,8-PeCDD	<50
1,2,3,4,7,8-HxCDD	<50
1,2,3,6,7,8-HxCDD	<50
1,2,3,7,8,9-HxCDD	<50
1,2,3,4,6,7,8-HpCDD	<50
OCDD	<100
2,3,7,8-TCDF	<50
1,2,3,7,8-PeCDF	<50
2,3,4,7,8-PeCDF	<50
1,2,3,4,7,8-HxCDF	<50
1,2,3,6,7,8-HxCDF	<50
2,3,4,6,7,8-HxCDF	<50
1,2,3,7,8,9-HxCDF	<50
1,2,3,4,6,7,8-HpCDF	<50
1,2,3,4,7,8,9-HpCDF	<50
OCDF	<100

ALS Environmental

Sample Analysis Summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L1837923-13
Matrix	Stack

Target Analytes	**ng/train**
Monochlorobiphenyls	<50
Dichlorobiphenyls	<50
Trichlorobiphenyls	<50
Tetrachlorobiphenyls	<50
Pentachlorobiphenyls	<50
Hexachlorobiphenyls	<50
Heptachlorobiphenyls	<50
Octachlorobiphenyls	<50
Nonachlorobiphenyls	<50
Decachlorobiphenyl	<50
PCB-81	<50
PCB-77	<50
PCB-123	<50
PCB-118	<50
PCB-114	<50
PCB-105	<50
PCB-126	<50
PCB-167	<50
PCB-156	<50
PCB-157	<50
PCB-169	<50
PCB-189	<50

ALS Environmental

Sample Analysis Summary Report

Sample Name	GLASSWARE PROOF
ALS Sample ID	L1837923-13
Matrix	Stack

Target Analytes	ng/train
2-Chlorophenol	<50
3-Chlorophenol	<50
4-Chlorophenol	<50
2,6-Dichlorophenol	<50
2,4/2,5-Dichlorophenol	<50
3,5-Dichlorophenol	<50
2,3-Dichlorophenol	<50
3,4-Dichlorophenol	<50
2,4,6-Trichlorophenol	<50
2,3,6-Trichlorophenol	<50
2,3,5-Trichlorophenol	<50
2,4,5-Trichlorophenol	<50
2,3,4-Trichlorophenol	<50
3,4,5-Trichlorophenol	<50
2,3,5,6/2,3,4,6-Tetrachlorophenol	<50
2,3,4,5-Tetrachlorophenol	<50
Pentachlorophenol	<50

ALS Environmental

Sample Analysis Summary Report

Sample Name	GLASSWARE PROOF
ALS Sample ID	L1837923-13
Matrix	Stack

Target Analytes	ng/sample
1,3-Dichlorobenzene	<25
1,4-Dichlorobenzene	<25
1,2-Dichlorobenzene	<25
1,3,5-Trichlorobenzene	<25
1,2,4-Trichlorobenzene	<25
1,2,3-Trichlorobenzene	<25
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<25
1,2,3,4-Tetrachlorobenzene	<25
Pentachlorobenzene	<25
Hexachlorobenzene	<25

ALS Environmental

Sample Analysis Summary Report

Sample Name	**GLASSWARE PROOF**
ALS Sample ID	L1837923-13

Target Analytes	**ng/train**
Naphthalene	<50
2-Methylnaphthalene	<50
1-Methylnaphthalene	<50
Acenaphthylene	<50
Acenaphthene	<50
Fluorene	<50
Phenanthrene	<50
Anthracene	<50
Fluoranthene	<50
Pyrene	<50
Benzo(a)Anthracene	<50
Chrysene	<50
Benzo(b)Fluoranthene	<50
Benzo(k)Fluoranthene	<50
Benzo(e)Pyrene	<50
Benzo(a)Pyrene	<50
Perylene	<50
Indeno(1,2,3-cd)Pyrene	<50
Dibenzo(a,h)Anthracene	<50
Benzo(g,h,i)Perylene	<50
Tetralin	<50
Quinoline	<50
2-Chloronaphthalene	<50
Biphenyl	<50
o-Terphenyl	<50
1-Methylphenanthrene	<50
9-Methylphenanthrene	<50
2-methylanthracene	<50
9,10-dimethylanthracene	<50
m-terphenyl	<50
p-terphenyl	<50
Benzo(a)fluorene	<50
Benzo(b)fluorene	<50
Benzo(b)anthracene	<50
Benzo(j)fluoranthene	<50
7,12-Dimethylbenzo(a)anthracene	<50
3-Methylcholanthrene	<50
Picene	<50
Dibenzo(a,e)pyrene	<50
Coronene	<50

ALS Environmental

Sample Analysis Summary Report

Instrument	MSD-3	Sample Matrix	VOST Tube
Column	Rxi-624Sil MS 1360231	Analysis Units	ug/sample
Acquisition Start Date	10/7/2016		

Sample Name		**Laboratory Method Blank**	**VOST Proof**	**VOST Proof**	**Recovery Control Limtis**
ALS Sample ID		VOST-blank	L1837923-46	L1837923-47	
Filename		16100704.D	16100707.D	16100708.D	
Sampling date		n/a	n/a	n/a	
Acquisition Time		10/7/2016 13:57	10/7/2016 15:13	10/7/2016 15:39	
Target Analyte	**RL ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	
Dichlorodifluoromethane	0.02	<0.02	<0.02	<0.02	
Vinyl Chloride	0.02	<0.02	<0.02	<0.02	
Bromomethane	0.09	<0.09	<0.09	<0.09	
Trichlorofluoromethane	0.02	<0.02	<0.02	<0.02	
1,1-Dichloroethene	0.01	<0.01	<0.01	<0.01	
Acetone	0.1	<0.1	<0.1	<0.1	
Methylene Chloride	0.1	<0.1	<0.1	<0.1	
trans,1,2-Dichloroethene	0.01	<0.01	<0.01	<0.01	
1,1-Dichloroethane	0.01	<0.01	<0.01	<0.01	
2-Butanone	0.01	<0.01	<0.01	<0.01	
Chloroform	0.01	<0.01	<0.01	<0.01	
1,1,1-Trichloroethane	0.01	<0.01	<0.01	<0.01	
Carbon Tetrachloride	0.01	<0.01	<0.01	<0.01	
Benzene	0.05	<0.05	<0.05	<0.05	
Trichloroethene	0.01	<0.01	<0.01	<0.01	
1,2-Dichloropropane	0.01	<0.01	<0.01	<0.01	
Bromodichloromethane	0.01	<0.01	<0.01	<0.01	
Toluene	0.05	<0.05	<0.05	<0.05	
Tetrachloroethene	0.01	<0.01	<0.01	<0.01	
Chlorodibromomethane	0.01	<0.01	<0.01	<0.01	
Ethylene Dibromide	0.02	<0.02	<0.02	<0.02	
Ethylbenzene	0.01	<0.01	<0.01	<0.01	
M&P-Xylene	0.03	<0.03	<0.03	<0.03	
O-Xylene	0.01	<0.01	<0.01	<0.01	
Styrene	0.02	<0.02	<0.02	<0.02	
Bromoform	0.01	<0.01	<0.01	<0.01	
Isopropylbenzene	0.02	<0.02	<0.02	<0.02	
1,3,5-Trimethylbenzene	0.02	<0.02	<0.02	<0.02	
1,2,4-Trimethylbenzene	0.02	<0.02	<0.02	<0.02	
Ethyl Acetate	0.02	<0.02	<0.02	<0.02	
Trichlorotrifluoroethane	0.02	<0.02	<0.02	<0.02	
Field Standard		**% Rec**	**% Rec**	**% Rec**	
d10-Ethylbenzene		98	101	78	
Surrogate Standards		**% Rec**	**% Rec**	**% Rec**	**% Rec**
d4-1,2-Dichloroethane		102	103	100	50-150
d8-Toluene		96	93	89	50-150
4-Bromofluorobenzene		107	104	115	50-150
Internal Standards		**% Rec**	**% Rec**	**% Rec**	**% Rec**
Bromochloromethane		100	88	89	50-200
1,4-Difluorobenzene		100	93	92	50-200
d5-Chlorobenzene		100	96	101	50-200

APPENDIX 4

Metals Train Field Data Sheets
(15 pages)

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	1 - PARTICULATE + METALS
Test Date	OCTOBER 18, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	[illegible]

Project No.:	21713	
Page	1 of 5	
Probe No.:	6 SERIES	
Meter Box No.:	T2	
Impinger Box No.:	15	

Pitot Factor	0.846	
DGMCF	0.989	
Barometric Pressure	28.97	"Hg
Static Pressure	~~2.1~~ 1.3	"H2O
Nozzle Size	0.2575 ~~0.2559~~	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Particulate Gain

Filter	31.3	mg
Probe	9.5	mg

Moisture Gain

CWTR	3520.7	g
WCBDA	35.3	g

Combustion Gas Concentration

Oxygen	8.80	%
Carbon Dioxide	8.82	%
Carbon Monoxide	41.7	ppm

Measuring Device	MII Numbers
Probe / Pitot	15A B03775
Trendicator	ECWG20092
Control Box	
Incline Manometer	
Comb.Gas.Analyzer	MSHL
Micromanometer	-
Barometer	ENV.CAN
Calipers	B03906

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Nozzle Measurements	
1	~~0.2555~~ 0.2570
2	~~0.2560~~ 0.2585
3	~~0.2560~~ 0.2580
4	~~0.2560~~ 0.2565
Average:	~~0.2559~~ 0.2575

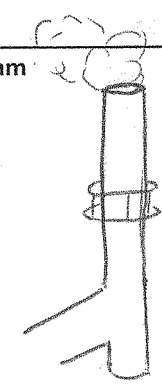
Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None / Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram



Notes:

Field Data Sheet

Date: 10/18/16	Plant: Clean Harbors	Test No.: 1 – Metals & Particulate	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time	Dry Gas Meter ft^3	Pitot ΔP "H_2O	Desired cfm	Stack Temp °F	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F	Meter Temp Inlet °F	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
	*	*	*		*			*		*	*	*	*
1	0	62.66	1.60	.76	358 ~~320~~	256	247	69	67	76	76	2.0	3.5
	3	65.13	1.20	.66	355	259	256	64	136	76	75	1.2	3.0
	6	67.20	.90	.57	363	260	256	62	133	76	76	.90	2.5
	9	68.91	.82	.55	356	259	258	63	129	76	76	.90	2.5
2	12	70.55	.73	.52	353	259	254	63	135	77	76	.88	2.5
	15	72.19	.66	.49	351	259	256	62	130	77	76	.75	2.5
	18	73.74	1.6	.77	380	260	256	61	140	78	77	1.9	4
	21	75.74	1.3	.69	383	275	253	62	137	78	77	1.6	4
3	24	77.94	1.7	.78	386	275	251	61	138	79	77	2.05	4
	27	80.37	1.7	.78	389	275	252	61	126	79	77	2.05	4
	30	82.76	1.7	.78	385	275	248	61	135	80	77	2.05	4
	33	85.18	1.7	.78	384	250	252	63	140	80	77	2	4
4	36	87.57	1.8	.80	386	263	261	64	137	80	78	2	4
	39	90.0	1.8	.80	384	263	261	67	140	81	78	2	4
	42	92.38	1.8	.80	382	263	263	65	128	81	78	2	4
	45	94.81	1.9	.83	381	262	255	64	133	81	78	2.1	4
5	48	97.28	1.8	.80	383	262	254	63	132	81	78	2	4
	51	99.71	2.0	.85	384	263	255	62	136	81	78	2.2	4
	54	102.27	1.9	.83	380	263	257	62	138	81	78	2.1	4
	57	104.78	2.0	.85	380	263	261	62	136	81	79	2.2	4
6	60	107.34	1.9	.83	381	263	257	59	130	82	79	2.1	4

Traverse: NW NW			
Start Time: 11:16	Initial Leak Check: .009	cfm@ 15	"Hg
Finish Time: —	Final Leak Check: —	cfm@ —	"Hg

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

Project No.: 21713

Operator : AW

Field Data Sheet

Date: 10/18/16	Plant: Clean Harbors	Test No.: 1-Metals & Particulate	
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm 0.78	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	109.84	1.7	~~2.0~~	381	263	261	62	138	82	79	2.0	4.0
	66	112.31	1.8	.81	379	264	263	63	138	82	79	2.0	4.0
	69	114.74	1.8	.81	378	264	255	62	132	82	79	2.0	4.0
7	72	117.17	1.7	.79	378	265	262	59	137	84	80	1.9	4.0
	75	119.56	1.8	.81	381	265	261	58	132	82	79	2.0	4.0
	78	121.99	1.7	.79	379	265	264	59	138	82	80	1.9	4.0
	81	124.39	1.8	.81	377	265	261	60	135	82	80	1.9	4.0
8	84	126.77	1.7	.79	376	266	262	61	137	82	80	1.9	4.0
	87	129.14	1.6	.76	378	266	261	60	134	82	80	1.8	4.0
	90	131.49	1.6	.76	379	266	261	55	125	82	80	1.8	4.0
	93	133.80	1.7	.79	376	267	267	56	137	82	80	1.9	4.0
9	96	136.15	1.6	.76	377	267	263	57	135	83	80	1.9	4.0
	99	138.52	1.6	.76	380	263	263	58	133	83	80	1.8	4.0
	102	140.85	1.8	.81	380	263	264	58	144	83	80	2.0	4.0
	105	143.24	1.7	.79	379	263	264	60	136	83	80	1.9	4.0
10	108	145.65	1.8	.81	380	263	264	60	139	83	81	2.0	4.0
	111	148.07	1.7	.79	382	263	263	61	141	83	81	2.0	4.0
	114	150.48	1.7	.78	384	263	265	61	144	83	81	2.0	4.0
	117	152.91	1.7	.79	382	263	262	60	136	83	81	1.9	4.0
	120	155.30											

Traverse: NW			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 13:16	Final Leak Check: .009	cfm@ 15	"Hg

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/18/16	Plant: Clean Harbors	Test No.: 1- Metals & Particulate	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	156.20	1.5	.74	379	254	257	75	83	80	79	1.7	4.0
	3	158.49	1.4	.71	379	257	261	50	142	80	80	1.5	3.5
	6	160.65	1.4	.71	377	257	263	49	147	80	80	1.5	3.5
	9	162.80	1.4	.71	377	257	260	50	161	80	80	1.5	3.5
2	12	164.93	1.4	.71	378	257	259	51	156	80	80	1.5	3.5
	15	167.06	1.4	.71	378	257	261	52	161	80	80	1.6	3.5
	18	169.24	1.4	.71	376	257	261	53	160	80	80	1.6	3.5
	21	171.42	1.3	.69	376	257	261	53	158	81	80	1.5	3.5
3	24	173.55	1.4	.71	380	258	261	54	164	81	80	1.5	3.5
	27	175.66	1.4	.71	380	258	261	55	154	81	80	1.5	3.5
	30	177.81	1.5	.74	378	258	261	55	157	81	80	1.6	3.5
	33	180.01	1.5	.74	378	258	261	56	159	82	80	1.7	3.5
4	36	182.24	1.5	.74	379	258	260	56	159	82	80	1.7	4.0
	39	184.51	1.5	.74	380	258	261	56	163	82	80	1.7	4.0
	42	186.79	1.6	.76	378	258	261	57	150	82	80	1.7	4.0
	45	189.06	1.6	.76	377	259	261	58	162	83	80	1.8	4.0
5	48	191.36	1.6	.76	379	259	261	58	164	83	80	1.8	4.0
	51	193.66	1.7	.79	379	259	262	59	158	84	81	1.9	4.0
	54	196.03	1.7	.79	378	259	261	59	160	84	81	1.9	4.0
	57	198.41	1.7	.79	378	260	262	56	148	85	81	1.9	4.0
6	60	200.77	1.7	.79	378	260	261	55	159	85	81	2.0	4.0

Traverse: NE			
Start Time: 14:13	Initial Leak Check: .008	cfm@ 15	"Hg
Finish Time: —	Final Leak Check: —	cfm@ —	"Hg

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/18/16	Plant: Clean Harbors	Test No.: 1-Metals & Particulate
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot ΔP "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/~~Trap~~ °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure ΔH "H_2O	* Pump Vacuum "Hg Gauge
	63	203.20	1.9	.83	381	260	262	54	156	85	82	2.1	4.5
	66	205.70	1.8	.81	380	260	262	53	164	85	82	2.0	4.5
	69	208.16	1.9	.83	379	261	263	54	162	85	82	2.1	4.5
7	72	210.64	1.9	.83	380	262	263	54	162	85	82	2.2	4.5
	75	213.19	1.9	.83	382	262	263	56	153	85	82	2.2	4.5
	78	215.73	1.9	.83	382	262	263	57	162	86	82	2.2	5.0
	81	218.29	1.9	.84	379	263	263	58	159	86	83	2.2	5.0
* 8	84	220.83	1.9	.84	379	263	265	58	150	86	83	2.2	5.0
	87	223.40	2.1	.88	383	262	266	58	147	86	83	2.4	5.0
	90	226.05	1.9	.83	382	263	270	61	147	86	84	2.2	5.0
	93	228.65	1.9	.83	382	263	263	59	143	86	84	2.1	5.0
9	96	231.19	1.8	.81	385	263	265	55	155	87	84	2.0	5.0
	99	233.64	1.9	.83	385	264	263	63	157	87	84	2.1	5.0
	102	236.13	1.9	.83	383	264	263	55	162	87	84	2.1	5.0
	105	238.70	1.9	.84	383	265	264	56	167	88	85	2.2	5.0
10	108	241.28	1.8	.81	384	265	265	56	169	88	85	2.0	5.0
	111	243.75	1.9	.84	386	265	264	59	156	88	85	2.1	5.0
	114	246.25	1.9	.84	384	265	263	59	154	88	85	2.1	5.0
	117	248.79	1.9	.84	382	265	263	60	158	89	86	2.1	5.0
	120	251.32											

Traverse: NE				
Start Time: —	Initial Leak Check: —	cfm@	—	"Hg
Finish Time: 16:20	Final Leak Check: .004	cfm@	17	"Hg

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

* Pumps off at 15:37 to remove some moisture from K.O. imp. SVOC train

Project No.: 21713

Operator : AN

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	2-PARTICULATE & METALS
Test Date	October 19, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	Angela Malan

Project No.:	21713	
Page	1 of 5	
Probe No.:	6 SERIES	
Meter Box No.:	TEAM 2	
Impinger Box No.:	15	

Pitot Factor	.846	
DGMCF	.989	
Barometric Pressure	29.44	"Hg
Static Pressure	2.1	"H2O
Nozzle Size	.2575	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	20.0	mg
Probe	10.5	mg

Moisture Gain

CWTR	3301.2	g
WCBDA	34.7	g

Combustion Gas Concentration

Oxygen	8.99	%
Carbon Dioxide	8.81	%
Carbon Monoxide	40.4	ppm

Measuring Device	MII Numbers
Probe / Pitot	SEE TEST #1
Trendicator	
Control Box	
Incline Manometer	
Comb.Gas.Analyzer	
Micromanometer	
Barometer	
Calipers	

Nozzle Measurements
1 SEE TEST #1
2
3
4
Average:

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: 10/19/16	Plant: Clean Harbors	Test No.: 2 - Particulate + Metals	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	56.94	1.3	.63	383	253	241	79	81	65	65	1.1	2.5
	3	58.82	1.3	.63	379	255	242	64	174	66	65	1.2	2.5
	6	60.64	1.3	.63	381	255	245	62	189	67	66	1.3	2.5
	9	62.53	1.3	.63	374	256	245	60	195	66	65	1.3	2.5
2	12	64.44	1.2	.61	371	256	245	58	199	66	65	1.2	2.5
	15	66.30	1.2	.61	370	256	246	57	200	67	65	1.2	2.5
	18	68.12	1.2	.61	370	256	244	58	204	67	65	1.2	2.5
	21	69.94	1.2	.61	368	257	246	58	205	68	66	1.2	2.5
3	24	71.78	1.1	.58	366	257	248	58	206	69	66	1.1	3.0
	27	73.58	1.5	.68	378	257	247	59	207	70	67	1.6	3.0
	30	75.65	1.5	.68	377	257	246	57	199	70	67	1.6	3.0
	33	77.76	1.5	.68	379	257	244	55	209	71	67	1.5	3.0
4	36	79.83	1.5	.68	378	257	245	54	208	71	68	1.5	3.0
	39	81.90	1.6	.70	376	258	254	54	208	72	68	1.6	3.0
	42	84.04	1.6	.70	376	258	250	54	208	73	68	1.6	3.0
	45	86.18	1.6	.70	377	258	247	54	208	73	69	1.6	3.0
5	48	88.32	1.8	.75	377	258	247	55	209	73	69	1.8	3.5
	51	90.56	1.7	.73	374	258	248	55	209	74	69	1.7	3.5
	54	92.78	1.9	.77	375	259	249	55	209	74	70	1.9	3.5
	57	95.08	1.7	.73	374	259	247	54	206	75	70	1.7	3.5
6	60	97.33	1.8	.75	375	259	250	54	208	75	70	1.8	3.5

Traverse: NE NW		Traverse:	
Start Time: 10:47	Initial Leak Check: .008 cfm@ 17 "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time: —	Final Leak Check: — cfm@ — "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/19/16 | Plant: Clean Harbors | Test No.: 2-Particulate + Metals |

Plant Location: Corunna, Ontario | Test Location: Incinerator Exhaust Stack

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	99.59	1.9	.77	373	259	247	54	222	75	71	1.9	3.5
	66	101.91	1.9	.77	371	259	246	54	224	76	71	1.9	3.5
	69	104.22	1.9	.77	370	260	250	54	227	76	71	2.0	4.0
7	72	106.58	2.0	.79	373	262	251	58	229	76	72	2.1	4.0
	75	109.01	1.9	.77	371	259	247	56	230	76	72	2.0	4.0
	78	111.44	1.9	.78	369	260	249	56	230	77	72	2.0	4.0
	81	113.83	2.0	.80	368	260	249	56	229	77	73	1.9	4.0
8	84	116.18	2.0	.80	368	260	249	56	230	77	73	1.9	4.0
	87	118.53	2.0	.80	368	260	250	56	231	77	74	1.9	4.0
	90	120.89	1.9	.78	368	260	250	56	234	78	74	1.9	4.0
	93	123.24	1.9	.78	367	260	250	56	234	78	74	1.9	4.0
9	96	125.60	1.9	.78	368	260	247	56	210	78	74	1.9	4.0
	99	127.96	1.9	.78	366	257	254	56	231	78	74	1.9	4.0
	102	130.31	1.9	.78	366	251	249	57	227	78	75	1.9	4.0
	105	132.68	1.9	.78	367	252	257	56	218	78	75	1.9	4.0
10	108	135.03	1.8	.76	369	251	252	56	225	79	75	1.8	4.0
	111	137.33	1.9	.78	372	252	245	57	225	79	75	1.9	4.0
	114	139.66	1.9	.78	371	254	250	58	226	79	75	1.9	4.0
	117	142.03	2.0	.80	371	253	252	57	229	79	76	2.0	4.0
	120	144.42											

Traverse: NE				
Start Time: —	Initial Leak Check: —	cfm@ —		"Hg
Finish Time: 12:47	Final Leak Check: .006	cfm@ 15		"Hg

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/19/16	Plant: Clean Harbors	Test No.: 2-Particulate + Metals	
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	145.37	1.2	.163	356	242	248	75	108	78	78	1.2	3.5
	3	147.38	1.2	.163	355	244	247	60	202	78	78	1.2	3.5
	6	149.76	1.2	.63	355	246	248	59	218	78	78	1.2	3.5
	9	151.10	1.1	.60	355	246	242	59	217	78	78	1.2	3.5
2	12	152.95	~~.98~~ 1.4	~~.84~~ .68	356	245	244	60	216	78	78	1.5	3.5
	15	154.96	1.5	.69	386	245	248	61	222	79	78	1.5	3.5
	18	157.10	1.2	.61	388	246	249	60	223	79	78	1.2	3.5
	21	159.11	1.5	.69	385	245	243	62	220	80	78	1.5	3.5
3	24	161.19	1.5	.69	385	247	249	63	224	81	79	1.5	3.5
	27	163.30	1.8	.75	389	255	257	64	229	81	79	1.9	4.0
	30	165.58	1.6	.71	387	247	242	62	188	82	79	1.7	4.0
	33	167.84	1.7	.73	386	247	246	61	192	82	79	1.7	4.0
4	36	170.06	1.9	.78	386	247	250	61	206	83	80	2.0	4.0
	39	172.43	1.8	.76	388	247	246	61	211	83	80	1.9	4.0
	42	174.81	1.8	.76	390	247	243	62	209	84	81	1.8	4.0
	45	177.11	1.7	.74	388	248	246	63	211	84	81	1.7	4.0
5	48	179.35	1.9	.78	388	248	252	65	212	85	82	1.9	4.0
	51	181.68	1.6	.71	391	248	249	56	212	85	82	1.6	4.0
	54	183.90	1.[illegible]	~~.76~~ .72	390	248	240	56	212	86	83	1.6	4.0
	57	186.07	1.6	.72	389	248	251	56	211	86	83	1.6	4.0
6	60	188.24	1.6	.72	388	249	247	61	211	86	83	1.7	4.0

Traverse: NW				
Start Time: 13:38	Initial Leak Check: .005	cfm@ 15	"Hg	
Finish Time: —	Final Leak Check: —	cfm@ —	"Hg	

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/19/16	Plant: Clean Harbors	Test No.: 2 - Particulate + Metals	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	190.42	1.4	.67	388	249	251	61	210	87	84	1.5	4.0
	66	192.56	1.5	.70	392	250	247	61	210	88	85	1.5	4.0
	69	194.68	1.6	.72	390	251	248	62	200	88	85	1.6	4.0
7	72	196.85	1.6	.72	390	252	245	59	212	89	86	1.6	4.0
	75	199.04	1.6	.72	388	251	253	54	211	90	86	1.6	4.0
	78	201.20	1.5	.70	390	253	252	54	211	90	87	1.5	4.0
	81	203.35	1.5	.70	391	254	251	55	229	91	88	1.5	4
8	84	205.46	1.5	.70	386	254	248	55	231	91	88	1.5	4
	87	207.57	1.4	.68	385	253	251	61	229	91	88	1.4	4
	90	209.65	1.5	.70	387	254	253	61	231	92	89	1.4	4.0
	93	211.70	1.5	.70	386	254	248	62	233	93	89	1.5	4.0
9	96	213.82	1.7	.75	386	254	251	62	228	93	90	1.9	4.0
	99	216.10	1.7	.75	383	256	252	63	231	93	90	1.9	4.0
	102	218.46	1.7	.75	385	255	251	63	234	93	90	1.7	4.0
	105	220.76	1.7	.75	386	255	251	64	229	94	90	1.7	4.0
10	108	223.04	1.7	.75	383	255	250	60	229	94	91	1.7	4.0
	111	225.31	1.9	.80	383	255	252	60	233	94	91	1.9	4.0
	114	227.68	1.8	.77	385	256	251	61	243	95	91	1.8	4.0
	117	230.03	1.8	.77	387	257	252	61	248	95	92	1.8	4.0
	120	232.38											

Traverse: NW			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 15:38	Final Leak Check: .007	cfm@ 16	"Hg

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

Project No.: 21713

Operator : AW

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 - METALS + PARTICULATE
Test Date	OCTOBER 20, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	Angela Nolan

Project No.:	21713	
Page	1 of 5	
Probe No.:	6 SERIES	
Meter Box No.:	TEAM 2	
Impinger Box No.:	15	

Pitot Factor	.846	
DGMCF	.989	
Barometric Pressure	29.40	"Hg
Static Pressure	2.5	"H2O
Nozzle Size	.2575	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	21.5	mg
Probe	9.2	mg

Moisture Gain

CWTR	3357.0	g
WCBDA	39.3	g

Combustion Gas Concentration

Oxygen	8.70	%
Carbon Dioxide	9.04	%
Carbon Monoxide	34.6	ppm

Measuring Device	MII Numbers
Probe / Pitot	SEE
Trendicator	
Control Box	TEST
Incline Manometer	
Comb.Gas.Analyzer	
Micromanometer	#1
Barometer	
Calipers	

Nozzle Measurements

1 SEE
2
3 TEST
4 #1
Average:

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: 10/20/16	Plant: Clean Harbors	Test No.: 3 - Particulate & Metals	Page 2 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp		Meter Temp		Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
								Outlet °F *	Inlet/~~Trap~~ °F	Outlet °F *	Inlet °F *		
1	0	33.30	1.5	.67	366	245	262	54	50	64	63	1.5	3.0
	3	35.40	1.5	.67	362	246	263	45	137	65	64	1.4	3.0
	6	37.41	1.5	.67	362	246	245	45	139	63	63	1.5	3.0
	9	39.42	1.5	.67	362	246	252	45	161	64	63	1.5	3.0
2	12	41.45	1.5	.67	362	246	252	45	169	64	63	1.5	3.0
	15	43.57	1.5	.67	363	246	253	46	174	63	63	1.5	3.0
	18	45.54	1.6	.69	363	246	264	47	191	64	63	1.6	3.0
	21	47.65	1.5	.67	363	247	248	48	200	64	63	1.5	3.0
3	24	49.72	1.9	.76	360	247	245	48	208	64	64	1.9	3.5
	27	52.00	1.8	.73	389	247	250	49	212	66	64	1.8	3.5
	30	54.29	1.9	.75	392	248	263	50	217	66	64	1.8	3.5
	33	56.56	1.8	.73	390	249	258	51	221	66	64	1.8	3.5
4	36	58.81	1.9	.75	390	249	251	53	222	66	64	1.8	3.5
	39	61.06	1.9	.75	390	249	253	53	221	67	64	1.8	3.5
	42	63.30	1.9	.75	392	249	261	52	230	67	64	1.9	3.5
	45	65.60	1.9	.75	392	250	255	52	235	68	64	1.9	3.5
5	48	67.93	1.9	.75	391	250	262	52	229	67	64	1.8	3.5
	51	70.20	1.9	.75	390	249	256	49	230	67	65	1.8	3.5
	54	72.47	1.9	.75	395	249	258	48	227	68	65	1.8	3.5
	57	74.74	1.9	.75	393	249	261	48	228	68	65	1.8	3.5
6	60	77.01	1.8	.73	392	249	256	48	228	67	65	1.8	3.5

Traverse: NW				
Start Time: 9:46	Initial Leak Check: .006	cfm@	15.5	"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.: 21713

Operator : AnJ

Field Data Sheet

Date: 10/20/16	Plant: Clean Harbors	Test No.: 3-Particulate & Metals	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot ΔP "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/~~Trap~~ °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure ΔH "H_2O	* Pump Vacuum "Hg Gauge
	63	79.23	1.8	.73	392	251	267	48	226	68	65	1.8	3.5
	66	81.45	1.8	.73	395	251	257	49	222	68	65	1.8	3.5
	69	83.68	1.8	.73	397	252	256	50	221	68	65	1.8	3.5
7	72	85.88	1.8	.73	394	252	254	52	221	68	66	1.8	3.5
	75	88.06	1.9	.75	394	253	253	55	218	68	66	1.9	3.5
	78	90.35	1.8	.73	398	254	264	52	219	68	66	1.8	3.5
	81	92.62	1.9	.75	397	255	262	50	222	68	66	1.9	2.5
8	84	94.89	1.7	.71	395	254	260	51	220	68	66	1.7	3.5
	87	97.10	1.7	.71	394	254	260	52	220	68	66	1.6	3.5
	90	99.28	1.7	.71	394	255	248	54	218	68	66	1.6	3.5
	93	101.40	1.7	.71	396	255	256	51	223	69	66	1.7	3.5
9	96	103.57	1.7	.71	392	256	250	50	222	69	66	1.7	3.5
	99	105.77	1.7	.71	391	256	266	49	220	69	66	1.6	3.5
	102	107.93	1.7	.71	389	256	246	50	217	69	66	1.6	3.5
	105	110.07	1.7	.71	392	256	245	50	217	69	66	1.7	2.5
10	108	112.23	1.7	.71	390	257	277	52	217	69	66	1.7	3.5
	111	114.38	1.7	.71	388	256	264	51	216	69	67	1.7	3.5
	114	116.53	1.7	.71	388	257	250	51	219	69	66	1.6	3.5
	117	118.69	1.7	.71	392	257	257	50	220	69	67	1.6	3.5
	120	120.85							~~221~~				
									~~221~~				

Traverse: NW			
Start Time: —	Initial Leak Check: — cfm@ — "Hg		
Finish Time: 1146	Final Leak Check: .005 cfm@ 15 "Hg		

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/20/16	Plant: Clean Harbors	Test No.: 3-Particulate & Metals	Page 4 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm .58	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/~~Trap~~ °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	121.61	1.1	.72	378	247	241	54	198	68	67	1.0	3.0
	3	123.44	.98	.54	379	248	243	44	202	67	67	.90	3.0
	6	125.10	.90	.52	380	249	243	43	206	67	67	.77	2.5
	9	126.63	.90	.52	383	249	241	43	208	66	67	.80	3.0
2	12	128.20	.95	.53	382	249	242	43	211	67	67	.90	3.0
	15	129.82	.74	.47	381	250	241	44	212	67	67	.60	2.5
	18	131.28	0.74	.47	381	252	245	45	216	68	67	.60	2.5
	21	132.64	1.4	.65	382	249	244	45	219	68	67	1.4	3.5
3	24	134.60	1.7	.71	384	250	243	46	221	68	67	1.7	3.5
	27	136.77	1.5	.67	381	251	241	47	230	68	67	1.5	3.5
	30	138.87	1.5	.67	381	251	244	50	229	69	67	1.4	3.5
	33	140.90	1.5	.67	384	251	242	52	223	69	67	1.5	3.5
4	36	142.91	1.6	.69	382	251	243	50	221	70	68	1.6	3.5
	39	145.03	1.6	.69	381	251	243	50	220	70	68	1.6	3.5
	42	147.17	1.6	.70	380	261	244	50	220	71	68	1.6	3.5
	45	149.31	1.6	.70	381	251	245	51	219	71	68	1.6	3.5
5	48	151.43	1.7	.72	383	251	242	51	222	71	68	1.7	3.5
	51	153.61	1.7	.72	381	251	242	50	223	71	68	1.7	3.5
	54	155.82	1.7	.72	381	251	242	49	222	71	68	1.6	3.5
	57	157.99	1.6	.70	381	252	243	49	225	71	68	1.5	3.5
6	60	160.09	1.8	.74	384	252	242	48	223	71	68	1.8	3.5

Traverse: NE			
Start Time: 12:37	Initial Leak Check: .006	cfm@ 15	"Hg
Finish Time: —	Final Leak Check: —	cfm@ —	"Hg

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

Project No.: 21713

Operator : AN

Field Data Sheet

Date: 10/20/16	Plant: Clean Harbors	Test No.: 3-Particulate & Metals	
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft³	* Pitot Δ P "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/~~Trap~~ °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure Δ H "H_2O	* Pump Vacuum "Hg Gauge
	63	162.31	1.8	.74	385	252	243	53	222	71	68	1.8	3.5
	66	164.58	1.9	.76	383	253	244	48	220	71	69	1.9	4.0
	69	166.90	1.8	.74	383	253	245	47	220	71	69	1.8	4.0
7	72	169.18	1.9	.76	388	254	246	47	219	71	69	1.8	4.0
	75	171.44	1.9	.76	387	254	243	48	217	71	69	1.9	4.0
	78	173.75	1.9	.76	385	255	242	48	218	73	70	1.9	4.0
	81	176.06	1.9	.76	386	255	247	50	219	71	69	1.9	4.0
8	84	178.37	1.9	.75	390	256	243	52	216	71	69	1.9	4.0
	87	180.68	2.1	.79	390	257	246	52	215	71	69	2.1	4.0
	90	183.06	1.9	.75	389	257	244	50	211	71	69	1.9	4.0
	93	185.43	2.1	.79	389	258	246	50	214	71	69	2.0	4.0
9	96	187.80	1.9	.75	390	258	246	51	216	71	69	2.0	4.0
	99	190.16	2.0	.77	389	257	253	51	218	71	69	2.0	4.0
	102	192.53	2.0	.78	385	258	242	49	220	71	70	1.9	4.0
	105	194.88	1.9	.76	384	258	245	48	221	72	70	1.9	4.0
10	108	197.24	1.9	.76	384	258	245	46	223	72	69	1.9	4.0
	111	199.57	2.0	.78	385	258	246	46	224	71	70	1.9	4.0
	114	201.94	1.9	.76	382	258	244	46	225	72	70	1.9	4.0
	117	204.26	1.9	.76	381	258	243	47	223	71	70	1.9	4.0
	120	206.59											

Traverse: NE			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 14:37	Final Leak Check: .005	cfm@ 15	"Hg

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

Project No.: 21713

Operator : AN

APPENDIX 5

Semi-Volatile Organics Train
Field Data sheets
(15 pages)

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	1- SVOC
Test Date	OCTOBER 18, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	

Project No.:	21713	
Page	1 of 5	
Probe No.:	6 SERIES	
Meter Box No.:	T1	
Impinger Box No.:	15	

Pitot Factor	~~0.846~~ 0.848	
DGMCF	0.993	
Barometric Pressure	28.97	"Hg
Static Pressure	1.3	"H2O
Nozzle Size	0.2559	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3527.1	g
WCBDA	29.6	g

Combustion Gas Concentration

Oxygen	8.80	%
Carbon Dioxide	8.82	%
Carbon Monoxide	~~44.6~~ 41.7	ppm

Site Diagram

Measuring Device	MII Numbers
Probe / Pitot	SP4
Trendicator	CoE2094
Control Box	CoE2094
Incline Manometer	CoE2094
Comb.Gas.Analyzer	MSM
Micromanometer	
Barometer	ENV.CAN
Calipers	B03906

Nozzle Measurements

1 0.2555
2 0.2560
3 0.2560
4 0.2560
Average: 0.2559

Notes:

Field Data Sheet

Date: Oct 18/16	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 ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	23.27	2.0	.80	388	244	250	76	71	76	75	2.2	7
	3	25.72	2.0	.80	389	250	254	56	56	76	76	2.2	7
	6	28.15	2.2	.84	387	246	254	53	56	76	76	2.2	7
	9	30.76	2.0	.80	385	246	254	52	54	76	76	2.2	7
2	12	33.25	2.0	.80	385	249	252	51	48	77	76	2.2	7
	15	35.85	2.0	.80	388	252	251	51	48	77	76	2.2	7
	18	38.31	2.0	.80	388	246	250	51	47	77	77	2.2	7
	21	40.78	1.9	.78	387	249	252	51	47	77	76	2.1	6
3	24	43.12	1.9	.76	387	248	252	52	40	77	77	2.1	6
	27	45.61	1.9	.78	389	252	252	52	42	77	76	2.1	6
	30	47.94	1.9	.76	386	248	254	53	42	77	76	2.1	6
	33	50.38	2.0	.80	384	252	254	53	452	78	77	2.1	6
4	36	52.75	2.0	.80	382	252	248	53	44	78	77	2.1	6
	39	55.12	2.2	.84	396	252	251	54	46	79	78	2.4	7
	42	57.61	1.9	.78	385	247	249	52	49	78	77	2.1	7
	45	60.04	2.1	.82	382	251	249	49	47	78	77	2.4	7
5	48	62.61	1.8	.76	381	251	255	49	48	78	77	2.0	6
	51	65.01	2.0	.80	381	249	251	48	49	78	77	2.2	7
	54	67.45	1.9	.78	382	252	251	48	42	78	77	2.1	7
	57	69.89	2.1	.82	382	247	251	47	41	78	78	2.4	7
6	60	72.43	1.7	.74	379	352	249	47	43	79	78	1.9	6

Traverse: NE				
Start Time: 11 16	Initial Leak Check:	.004	cfm@	15.5 "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.: 21713

Operator : D D Ue

Field Data Sheet

Date: Oct 18/16	Plant: Clean Harbors	Test No.: 1- SVOC	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	74.76	1.7	.74	378	248	252	47	42	79	78	2.0	6
	66	77.10	1.7	.74	381	249	249	47	44	79	78	2.0	6
	69	79.40	1.7	.74	379	248	249	47	46	79	78	2.0	6
7	72	81.70	1.5	.70	378	248	249	48	42	79	79	1.7	6
	75	83.92	1.6	.72	377	249	252	49	43	79	79	1.7	6
	78	86.12	1.6	.72	379	248	248	49	45	79	78	1.7	6
	81	88.14	1.7	.74	380	244	250	50	68	79	79	2.0	9
8	84	90.50	1.5	.70	377	242	249	50	42	80	79	1.7	6
	87	92.88	1.5	.70	376	243	251	50	36	80	79	1.7	6
	90	95.08	1.5	.70	376	243	251	50	37	80	79	1.7	6
	93	97.27	1.5	.70	378	245	249	51	35	80	79	1.6	6
9	96	99.41	1.3	.65	376	245	251	52	36	79	79	1.5	5
	99	101.45	1.3	.65	376	241	251	52	41	80	79	1.4	5
	102	103.42	1.4	.68	377	241	251	53	40	80	79	1.6	5
	105	105.47	1.35	37	377	241	251	53	41	80	79	1.6	5
10	108	107.54	1.3	.65	379	241	251	53	40	80	79	1.5 1.6	5
	111	109.59	1.3	.65	379	246	249	53	38	80	79	1.5	5
	114	111.65	1.45	.69	379	245	250	53	38	80	79	1.6	5
	117	113.75	1.25	.64	382	245	250	53	39	80	79	1.3	5
	120	115.66											

Traverse: NE		Traverse:	
Start Time:	Initial Leak Check: cfm@ "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time: 1316	Final Leak Check: .002 cfm@ 12 "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21713

Operator : [signature]

Field Data Sheet

Date: Oct 18/16	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 ft³ *	Pitot Δ P "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure Δ H "H_2O *	Pump Vacuum "Hg Gauge *
1	0	116.75	1.8	.76	380	237	242	71	48	81	80	2.0	6
	3	119.05	1.8	.77	380	246	253	51	41	80	80	2.0	6
	6	121.34	1.9	.79	381	248	260	50	42	80	80	2.1	6.5
	9	123.74	1.9	.79	378	246	248	51	45	80	79	2.1	6.5
2	12	126.11	1.8	.77	377	248	247	53	50	79	79	2.1	6.5
	15	128.45	1.8	.77	377	251	250	54	44	80	80	2.1	6.5
	18	130.83	1.8	.77	377	251	250	55	43	80	80	2.1	6.5
	21	133.20	1.8	.77	378	248	254	56	42	80	80	2.1	6.5
3	24	135.54	1.8	.77	378	251	254	56	43	80	80	2.1	6.5
	27	137.88	1.8	.77	380	245	245	57	45	80	80	2.1	6.5
	30	140.23	1.8	.77	381	248	245	58	43	80	80	2.1	6.5
	33	142.58	1.8	.77	378	250	252	59	42	80	80	2.1	6.5
4	36	144.91	1.85	.78	378	250	252	59	44	80	79	2.1	6.5
	39	147.27	1.9	.78	379	250	245	57	45	80	79	2.1	6.5
	42	149.58	1.85	.78	388	250	250	61	52	82	82	2.1	6.5
	45	151.89	1.85	.78	379	250	248	56	50	80	80	2.1	6.5
5	48	154.25	1.85	.78	377	248	251	57	44	80	80	2.1	6.5
	51	156.58	1.95	.80	378	244	246	57	44	80	80	2.1	6.5
	54	158.93	1.9	.79	381	250	257	56	45	80	80	2.1	6.5
	57	161.33	1.95	.80	379	250	245	58	46	80	80	2.1	6.5
6	60	163.71	1.95	.79	381	248	243	59	50	80	80	2.1	6.5

Traverse: NW	
Start Time: ~~1413~~	Initial Leak Check: cfm@ "Hg
Finish Time: 1413	Final Leak Check: .002 cfm@ 15.5 "Hg

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

Project No.: 21713

Operator : [signature]

Field Data Sheet

Date: Oct 18/16	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 ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	166.11	2.0	.80	377	244	243	56	40	80	80	2.1	7
	66	168.47	1.95	.80	377	244	243	56	40	80	80	2.1	7
	69	170.83	2.0	.81	382	249	246	56	40	80	80	2.1	7
7	72	173.22	2.0	.81	382	249	248	56	40	80	80	2.1	7
	75	173.68	1.9	.81	380	246	244	55	45	81	80	2.1	7
	78	178.[illegible]	1.9	.81	380	246	244	55	45	81	80	2.1	7
	81	180.42	1.9	.81	380	247	244	54	45	81	80	2.1	7
8	84	182.78	1.9	.81	380	247	240	54	45	80	80	2.1	7
	87	185.17	1.9	.81	383	243	245	59	46	81	81	2.1	7
	90	187.62	1.8	.7	384	245	250	59	43	81	81	2.0	6
	93	190.00	1.4	.68	379	246	247	61	41	81	81	1.6	6
9	96	192.13	1.6	.72	381	246	247	60	41	81	81	1.8	6
	99	194.28	1.6	.72	382	246	243	60	43	81	81	1.8	6
	102	196.51	1.5	.70	384	243	242	61	45	82	82	1.7	6.5
	105	198.70	1.7	.74	381	243	241	60	43	82	82	1.9	6.5
10	108	201.05	1.5	.70	381	243	241	60	43	82	82	1.7	6.5
	111	203.19	1.6	.72	381	248	241	61	42	82	82	1.8	6.5
	114	205.40	1.5	.70	381	246	243	60	43	82	82	1.8	6.5
	117	207.61	1.6	.72	381	244	243	61	45	82	82	1.8	6.5
	120	209.81											

Traverse:		Traverse:	
Start Time: /	Initial Leak Check: / cfm@ / "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time: 16 20	Final Leak Check: cfm@ "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

OFF 1537 START @ 1544 TO DRAW THE TRAIN.

Project No.: 21713
Operator : [signature]

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	2 - SVOC
Test Date	OCTOBER 19, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	[signature]

Project No.:	21713	
Page	1 of 5	
Probe No.:	6 SERIES	
Meter Box No.:	T1	
Impinger Box No.:	15	

Pitot Factor	0.848	
DGMCF	0.993	
Barometric Pressure	29.44	"Hg
Static Pressure	2.1	"H2O
Nozzle Size	0.2559	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3399.2	g
WCBDA	14.8	g

Combustion Gas Concentration

Oxygen	8.99	%
Carbon Dioxide	8.81	%
Carbon Monoxide	40.4	ppm

Measuring Device	MII Numbers
Probe / Pitot	SEE
Trendicator	
Control Box	TEST
Incline Manometer	
Comb.Gas.Analyzer	~~X~~ 1
Micromanometer	
Barometer	
Calipers	

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Nozzle Measurements

1 SEE
2 TEST
3 |
4
Average:

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None /Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Site Diagram

Notes:

Field Data Sheet

Date: Oct 19/16	Plant: Clean Harbors	Test No.: 2 - SVOC
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack

FAR

Point	Clock Time *	Dry Gas Meter ft^3 *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	13.29	1.7	.70	383	239	251	59	59	64	63	1.7	5.5
	3	15.53	1.95	.75	383	244	249	52	40	65	64	2.0	7
	6	17.73	1.7	.70	382	244	258	51	41	65	64	1.7	7
	9	19.87	1.75	.71	381	247	256	50	41	65	65	1.7	7
2	12	22.00	1.7	.70	383	246	250	49	41	66	65	1.7	7
	15	24.12	1.8	.72	383	244	249	49	42	66	65	1.8	7
	18	26.28	1.7	.70	381	244	247	47	43	66	65	1.7	7
	21	28.41	1.7	.70	379	246	242	47	42	66	65	1.7	7
3	24	30.54	1.7	.70	382	244	250	47	43	66	65	1.7	7
	27	32.67	1.7	.70	386	248	245	48	45	68	67	1.7	7
	30	34.80	1.7	.70	378 ~~386~~	250	247	47	46	67	66	1.7	7
	33	36.92	1.8	.72	377	248	245	47	37	67	66	1.8	7
4	36	39.10	1.7	.70	379	245	247	48	37	67	66	1.8	7
	39	41.27	1.8	.72	379	245	248	47	37	68	67	1.8	7
	42	43.44	1.75	.71	377	248	249	47	37	68	68	1.8	7
	45	~~46~~ 45.62	1.8	.73	375	246	249	46	37	68	68	1.8	7
5	48	47.78	2.0	.77	375	247	245	45	37	68	68	2.0	7
	51	50.06	1.75	.72	375	248	245	45	38	69	68	1.8	7
	54	52.28	2.0	.77	375	248	250	45	38	69	68	1.9	7
	57	54.52	1.9	.73	374	243	250	45	40	69	68	1.9	7
6	60	56.75	1.85	.74	372	244	242	46	41	69	68	1.9	7

Traverse: NW		
Start Time: 1047	Initial Leak Check: .008	cfm@ 15 "Hg
Finish Time:	Final Leak Check:	cfm@ "Hg

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

Project No.: 21713

Operator: [signature]

Field Data Sheet

Date: OCT 19/16	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 ft³	Pitot ΔP "H_2O	Desired cfm	Stack Temp °F	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F	Meter Temp Inlet °F	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
	*	*	*		*			*		*	*	*	*
	63	58.98	1.9	.75	373	246	245	46	38	69	69	1.9	7
	66	61.20	1.95	.76	372	246	241	46	38	70	69	1.9	7
	69	63.42	1.9	.76	370	243	241	47	39	70	69	1.9	7
7	72	65.68	1.9	.75	370	245	249	49	40	70	69	1.9	7
	75	67.91	1.85	.74	371	247	248	49	41	70	69	1.9	7
	78	70.13	1.85	.74	371	246	243	49	50	70	69	1.9	7
	81	72.35	1.9	.75	370	242	242	49	44	71	70	1.85	7
8	84	74.58	1.8	.73	368	244	251	47	42	71	70	1.9	7
	87	76.83	1.8	.73	369	246	252	47	43	71	70	1.9	7
	90	79.10	1.8	.73	369	242	254	47	44	71	70	1.9	7
	93	81.35	1.8	.73	371	245	244	50	47	73	71	1.9	7
9	96	83.62	1.5	.67	363	246	238	50	47	72	71	1.6	7
	99	85.76	1.6	.69	363	246	248	51	49	72	71	1.7	7
	102	87.89	1.6	.69	366	244	250	52	49	72	71	1.7	7
	105	90.03	1.6	.69	365	244	248	52	46	72	71	1.7	7
10	108	92.15	1.5	.67	365	241	243	52	47	72	71	1.6	7
	111	94.16	1.5	.67	365	241	243	52	47	72	71	1.6	7
	114	96.17	1.5	.67	367	240	242	52	47	72	71	1.6	7
	117	98.42	1.5	.67	368	241	243	52	46	72	72	1.6	7
	120	100.150											

Traverse: NW			
Start Time:	Initial Leak Check:	cfm@	"Hg
Finish Time: 1247	Final Leak Check: .004	cfm@ 15	"Hg

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

Project No.: 21713

Operator : D. Ollo

Field Data Sheet

Date: OCT 19/16	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 ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	101.23	1.9	.75	388	244	250	69	44	75	75	2.0	7
	3	103.48	1.7	.71	386	248	251	48	43	75	75	1.8	7.5
	6	105.68	1.7	.71	388	254	250	45	45	75	75	1.8	7.5
	9	107.88	1.7	.71	388	252	252	45	46	75	75	1.8	7.5
2	12	110.05	1.5	.67	387	251	251	45	46	75	75	1.8	7.5
	15	112.20	1.8	.73	385	253	251	47	46	75	75	1.9	7.5
	18	114.41	1.6	.69	389	260	251	46	49	76	76	1.7	7.5
	21	116.61	2.0	.77	388	259	248	47	50	76	76	2.0	8
3	24	118.85	2.0	.77	386	258	251	48	52	76	76	2.0	8
	27	121-15	2.0	.77	386	255	253	48	52	76	76	2.0	8
	30	123.44	1.9	.77	388	259	251	47	49	76	76	2.0	8
	33	125.76	2.0	.77	390	260	250	48	49	76	76	2.0	8
4	36	128.06	1.6	.69	389	258	257	49	49	76	76	1.7	8
	39	130.27	1.6	.69	386	261	251	49	50	76	76	1.7	8
	42	132.40	1.7	.71	388	258	249	50	51	77	77	1.8	7.5
	45	134.56	1.7	.71	389	250	250	50	52	76	76	1.8	7.5
5	48	136.69	1.7	.71	391	260	251	45	52	77	77	1.8	7.5
	51	138.91	1.8	.69	388	260	250	48	41	77	76	1.8	7.5
	54	140.98	1.8	.73	388	261	251	48	40	77	76	1.9	7.5
	57	143.27	1.6	.69	391	259	251	48	42	76	77	1.7	7.5
6	60	145.44	1.6	.69	388	260	252	49	43	77	77	1.7	7.5

Traverse: NE			
Start Time: 1338	Initial Leak Check: .005	cfm@ 15	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

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

Project No.: 21713

Operator : D. [illegible]

AM

Field Data Sheet

Date: Oct 19/16	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 ΔP "H_2O	Desired cfm	Stack Temp °F	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F	Meter Temp Inlet °F	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
*	*	*	*		*			*		*	*	*	*
	63	147.62	1.35	.63	386	260	249	49	45	77	77	1.4	7
	66	149.67	1.5	.67	388	259	252	48	45	77	77	1.6	7
	69	151.76	1.3	.62	390	255	250	47	52	77	77	1.3	6
7	72	153.67	1.35	.63	391	259	247	49	41	77	77	1.3	6
	75	155.59	1.25	.61	388	253	250	48	38	77	77	1.3	6
	78	157.51	1.25	.61	388	254	255	46	37	78	78	1.3	6
	81	159.42	1.3	.62	390	257	252	45	37	78	78	1.3	6
8	84	161.33	1.25	.61	386	253	249	45	38	78	77	1.3	6
	87	163.25	1.25	.61	386	253	249	45	38	78	77	1.3	6
	90	165.18	1.3	.62	384	255	249	43	37	78	78	1.3	6
	93	167.06	1.3	.62	383	255	250	43	37	78	78	1.3	6
9	96	168.96	1.0	.55	385	255	250	44	37	78	78	.95	5
	99	170.62	.95	.53	382	257	250	46	40	78	78	.85	5
	102	172.24	.95	.53	383	254	256	45	41	78	78	.85	5
	105	173.79	1.0	.55	381	253	255	45	42	78	78	.95	5
10	108	175.43	1.1	.58	381	253	255	45	42	78	78	1.1	5.5
	111	177.17	1.4	.65	383	255	250	45	38	78	78	1.5	6
	114	179.15	1.4	.65	382	254	250	44	39	78	78	1.5	6
	117	181.08	1.1	.58	383	253	251	43	39	78	78	1.1	6
	120	182.93											

Traverse: NE			
Start Time: —	Initial Leak Check: —	cfm@ —	"Hg
Finish Time: 1538	Final Leak Check: .005	cfm@ 15	"Hg

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

Project No.: 21713

Operator :

ORTECH Environmental

Plant	Clean Harbors
Plant Location	Corunna, Ontario
Test No.:	3 - SVOC
Test Date	OCTOBER 20, 2016
Test Location	Incinerator Exhaust Stack
Operator Signature	[signature]

Project No.:	21713
Page	1 of 5
Probe No.:	6
Meter Box No.:	T1
Impinger Box No.:	15

Pitot Factor	0.848	
DGMCF	0.993	
Barometric Pressure	29.40	"Hg
Static Pressure	2.5	"H2O
Nozzle Size	0.2559	inches
Stack Diameter	5	
Length	0	feet
Width	0	feet
Port length:	8	inches

Reading Interval	3
Number of Ports	2
Number of Points/Port	10

Probe Liner Glass / Metal /Teflon / Other__________

Nozzle Glass / Metal / Other__________

Union None / Metal / Teflon / Other__________

Pitot Leak Checked? Yes No

Particulate Gain

Filter		mg
Probe		mg

Moisture Gain

CWTR	3359.4	g
WCBDA	16.4	g

Combustion Gas Concentration

Oxygen	8.70	%
Carbon Dioxide	9.04	%
Carbon Monoxide	34.6	ppm

Site Diagram

Measuring Device	MII Numbers
Probe / Pitot	SEE
Trendicator	
Control Box	TEST
Incline Manometer	
Comb.Gas.Analyzer	1
Micromanometer	
Barometer	
Calipers	

Nozzle Measurements

1 SEE
2 TEST
3
4 /
Average:

Notes:

Field Data Sheet

Date: Oct 20/16	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 ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F *	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	85.3	1.8	.71	384	245	232	55	54	62	62	1.8	4
	3	87.41	1.8	.71	385	252	244	48	43	64	63	1.8	5
	6	89.53	1.8	.72	388	255	244	48	44	64	63	1.8	5
	9	91.67	1.8	.72	389	252	244	48	43	64	63	1.8	5
2	12	93.82	1.8	.72	387	256	246	46	41	63	63	1.8	5
	15	95.96	1.85	.72	387	255	245	46	41	63	63	1.8	5.5
	18	98.15	1.95	.74	389	255	246	46	44	64	63	1.9	6
	21	100.37	1.85	.72	392	253	247	46	47	63	63	1.8	6
3	24	102.56	2.0	.75	392	253	247	46	47	63	63	~~2.0~~ 1.8	6
	27	104.83	1.8	.71	392	254	247	47	44	63	63	1.8	6
	30	107.02	2.1	.77	391	255	246	45	42	63	63	2.1	6
	33	109.31	1.8	.71	393	251	246	45	42	63	63	1.8	6
4	36	111.55	2.05	.76	393	252	246	44	42	63	63	2.0	6
	39	113.83	1.85	.72	393	255	246	44	43	63	63	1.8	6
	42	116.05	1.8	.71	392	256	246	45	44	63	63	1.8	6
	45	118.28	1.85	.72	394	256	246	45	46	63	63	1.8	6
5	48	120.48	1.85	.72	393	255	246	44	39	63	63	1.8	6
	51	122.69	1.8	.71	391	255	246	45	39	63	63	1.8	6
	54	124.92	1.85	.72	391	253	245	44	39	63	63	1.8	6
	57	127.09	1.8	.71	394	255	245	44	39	63	64	1.8	6
6	60	129.29	1.7	.69	395	252	245	44	38	63	63	1.7	6

Traverse: NE		Traverse:	
Start Time: 946	Initial Leak Check: .006 cfm@ 15 "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time:	Final Leak Check: cfm@ "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21713

Operator : D [signature]

Field Data Sheet

Date: Oct 20/16	Plant: Clean Harbors	Test No.: 3-SVOC	Page 3 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	Clock Time *	Dry Gas Meter ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
	63	131.46	1.7	.69	394	263	254	44	39	63	63	1.7	6
	66	133.58	1.7	.69	394	254	245	44	40	64	64	1.7	6
	69	135.71	1.7	.69	399	256	246	43	43	65	65	1.7	6
7	72	137.85	1.6	.67	396	251	245	44	42	63	64	1.6	6
	75	139.92	1.8	.71	398	251	244	44	42	63	63	1.8	6
	78	142.05	1.6	.67	394	249	245	44	41	64	64	1.6	6
	81	144.15	1.7	.69	399	257	248	46	42	65	65	1.6	6
8	84	146.23	1.7	.68	397	251	250	46	42	65	65	1.6	6
	87	148.29	1.75	.70	395	251	250	46	42	64	64	1.6	6.
	90	150.36	1.4	.63	392	252	244	44	40	64	64	1.4	5
	93	152.36	1.45	.64	392	251	245	45	39	64	64	1.4	5
9	96	154.26	1.2	.58	388	249	243	45	41	63	63	1.4	5
	99	156.01	1.2	.58	388	248	244	46	41	64	64	1.2	5
	102	158.04	1.2	.58	386	248	249	47	42	64	64	1.2	5
	105	159.80	1.2	.59	386	248	249	47	43	64	64	1.2	5
10	108	161.65	1.2	.59	386	249	248	46	40	64	64	1.2	5
	111	163.44	1.2	.59	385	248	245	47	38	64	64	1.2	5
	114	165.26	1.2	.58	384	252	243	46	38	64	64	1.2	5
	117	167.05	1.2	.58	383	252	242	46	40	64	64	1.2	5
	120	168.81											

Traverse: NE		Traverse:	
Start Time:	Initial Leak Check: — cfm@ — "Hg	Start Time:	Initial Leak Check: cfm @ "Hg
Finish Time: 11 46	Final Leak Check: .004 cfm@ 15 "Hg	Finish Time:	Final Leak Check: cfm @ "Hg

Project No.: 21713

Operator : D. Ul...

MY NECK, MY BACK

Rev: April 28, 2005

ORTECH Environmental

Field Data Sheet

Date: Oct 20/16	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 ft³ *	Pitot ΔP "H_2O *	Desired cfm	Stack Temp °F *	Probe Temp °F	Oven Temp °F	Impinger Temp Outlet °F *	Impinger Temp Inlet/Trap °F	Meter Temp Outlet °F *	Meter Temp Inlet °F *	Meter Pressure ΔH "H_2O *	Pump Vacuum "Hg Gauge *
1	0	169.45	1.4	.63	381	245	240	55	39	65	65	1.4	4
*	3	171.30	1.1	.56	382	245	240	55	38	65	65	1.0	4
	6	173.00	1.1	.56	382	253	247	45	38	64	65	1.0	4
	9	174.65	1.15	.57	381	251	245	45	40	65	65	1.1	4
2	12	176.38	1.1	.56	383	251	246	45	39	64	64	1.1	4
*	15	178.13	1.1	.56	385	256	248	39	39	64	64	1.1	4
	18	179.85	1.8	.72	384	256	248	45	40	64	64	1.8	6
	21	181.92	1.7	.70	382	253	246	45	40	65	65	1.8	6
3	24	184.04	1.9	.74	382	257	246	45	41	65	65	1.9	6
	27	186.25	1.6	.68	383	256	245	45	43	64	64	1.6	6
	30	188.28	1.8	.72	383	257	245	45	42	64	64	1.8	6
	33	190.48	1.7	.70	380	254	243	45	43	64	64	1.7	6
4	36	192.57	1.8	.72	381	256	241	44	41	64	64	1.8	6
	39	194.72	1.7	.70	384	256	245	43	41	65	65	1.8	6
	42	196.89	1.7	.70	381	257	243	44	42	65	65	1.8	6
	45	199.04	1.7	.70	380	255	243	44	45	65	65	1.7	6
5	48	201.18	1.75	.71	380	254	244	42	45	65	65	1.7	6
	51	203.34	1.7	.70	383	252	237	42	42	65	65	1.7	6
	54	205.52	1.75	.71	384	254	244	42	42	65	65	1.7	6
	57	207.66	1.75	.71	382	254	241	41	43	65	65	1.7	6
6	60	209.83	1.85	.73	383	255	241	42	44	65	65	1.9	6

Traverse: NW			
Start Time: 1237	Initial Leak Check: .004	cfm@ 15	"Hg
Finish Time:	Final Leak Check:	cfm@	"Hg

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

* SUSPECT MOISTURE IN PITOT LINES

Project No.: 21713

Operator : [signature]

Field Data Sheet

Date: OCT 20/16	Plant: Clean Harbors	Test No.: 3-SVOC	Page 5 of 5
	Plant Location: Corunna, Ontario	Test Location: Incinerator Exhaust Stack	

Point	* Clock Time	* Dry Gas Meter ft^3	* Pitot ΔP "H_2O	Desired cfm	* Stack Temp °F	Probe Temp °F	Oven Temp °F	* Impinger Temp Outlet °F	Impinger Temp Inlet/Trap °F	* Meter Temp Outlet °F	* Meter Temp Inlet °F	* Meter Pressure ΔH "H_2O	* Pump Vacuum "Hg Gauge
	63	212.02	1.85	.73	386	254	240	42	45	65	65	1.8	6
	66	214.24	1.85	.73	385	254	242	43	45	65	65	1.8	6
	69	216.43	1.8	.72	383	252	240	41	43	65	65	1.8	6
7	72	218.66	1.8	.72	384	254	240	41	43	65	65	1.8	6
	75	220.87	1.8	.72	386	251	233	41	45	65	65	1.8	6
	78	223.06	1.8	.72	386	251	247	41	45	65	65	1.8	6
	81	225.29	1.8	.72	387	252	249	42	47	65	65	1.8	6
8	84	227.53	1.8	.72	387	252	249	42	47	65	65	1.8	6
	87	229.79	1.9	.74	388	252	249	42	46	65	65	1.9	6
	90	231.93	1.8	.72	389	252	249	42	46	65	65	1.9	6
	93	234.18	1.95	.75	388	249	249	42	39	65	65	1.9	6
9	96	236.43	1.7	.70	385	249	248	42	41	65	65	1.7	6
	99	238.61	1.7	.70	384	249	249	42	39	65	65	1.7	6
	102	240.77	1.55	.67	385	250	260	42	39	65	65	1.6	6
	105	242.85	1.6	.68	383	251	256	42	37	65	65	1.6	6
10	108	244.93	1.5	.66	381	251	250	43	39	65	65	1.6	6
	111	247.00	1.6	.68	380	251	249	45	40	65	65	1.6	6
	114	249.03	1.55	.67	381	251	250	45	40	65	65	1.6	6
	117	251.04	1.6	.68	381	252	251	46	41	65	65	1.6	6
	120	253.13											

Traverse: NW			
Start Time: —	Initial Leak Check: —	cfm@	"Hg
Finish Time: 1437	Final Leak Check: .003	cfm@ 15	"Hg

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

Project No.: 21713

Operator : [signature]

APPENDIX 6

Acid Gases Train Field Data Sheets
and Gas Volumes Sampled
(4 pages)

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	1
Test location:	Incinerator Exhaust Stack
Date:	OCT 18, 16
Project No.:	21713

Measuring Device	MII Number
Control Module	A10117 VOST2
Barometer	ENV CAN

P_{Bar}	28.97

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature ~~Outlet~~ Average °C	Meter Temperature Inlet °C	Meter Pressure Δ H "H_2O	Pump Vacuum "Hg Gauge
0	3589.86	154	193	145	24	25		5.5	1
5	3599.80	150	192	149	22	27		5.5	1
10	3610.01	156	194	119	22	28		5.5	1
15	3620.18	162	193	125	22	28		5.5	1
20	3630.32	164	194	121	22	28		5.5	2
25	3640.41	164	195	130	23	28		5.5	4
30	3650.55	164	194	141	23	28		5.5	4
35	3660.68	152	195	145	23	28		5.5	4
40	~~3670.~~ 3671.12	147	195	144	24	28		5.5	4
45	3681.20	153	196	140	23	28		5.4	5
50	3691.35	154	198	140	23	28		5.5	5
55	3701.55	161	196	144	23	29		5.4	5
60	3711.68	150	196	142	25	28		5.4	6

Start Time:	~~15:10~~ 15:05		
Finish Time:	16:05		
Initial Leak Check:	0.005	Lpm @ 15	" Hg
Final Leak Check:	0.002	Lpm @ 12	" Hg

DGMCF:	.991
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	

Comments:

Probe Purge On: @ 14:55

Off: @ 15:00

~2 LPM for 60 min

Operator : AS/DT

Rev: May 13, 2005

ORTECH Environmental

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	2
Test location:	Incinerator Exhaust Stack
Date:	Oct 19, 2016
Project No.:	21713

Measuring Device	MII Number
Control Module	A10117 VOST 2
Barometer	

P_{Bar}	29.44

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature ~~Outlet~~ Average °C	Meter Temperature Inlet °C	Meter Pressure Δ H "H_2O	Pump Vacuum "Hg Gauge
0	3716.32	165	195	138	19	20		5.5	0
5	3726.51	178	193	137	15	22		5.5	0
10	3736.45	179	193	136	13	22		5.4	0
15	3746.55	179	194	137	14	23		5.5	0
20	3756.76	178	193	137	14	23		5.5	0
25	3766.81	180	192	141	~~22~~ 15	24		5.4	0
30	3776.75	172	190	144	14	23		5.4	0
35	3786.93	162	192	144	14	24		5.5	0
40	3797.00	159	190	143	14	24		5.5	0
45	3807.01	158	189	144	14	24		5.5	0
50	3817.17	157	189	145	14	24		5.4	0
55	3827.41	157	190	143	15	23		5.5	0
60	3837.54	157	188	143	16	23		5.4	0

Start Time:	11:03		
Finish Time:	12:03		
Initial Leak Check:	0.02	Lpm @ 10	" Hg
Final Leak Check:	0.02	Lpm @ 13	" Hg

DGMCF:	0.991
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	

Comments:

Probe Purge On: 10:53 @

Off: 11:00 @

~2 LPM for 60 min

Operator : AS/DT

ORTECH Environmental
Method 26 Data Sheet

Plant:	Clean Harbors
Plant Location:	Corunna, On
Test No.:	3
Test location:	Incinerator Exhaust Stack
Date:	Oct 20/16
Project No.:	21713

Measuring Device	MII Number
Control Module	A10117 ~~8~~ VOST 2
Barometer	ENV CAN
P_{Bar}	29.40

Clock Time	Dry Gas Meter L	Probe Temp °C	Stack Temp °C	Oven Temp °C	Impinger Outlet °C	Meter Temperature ~~Outlet~~ Avg °C	Meter Temperature Inlet °C	Meter Pressure ΔH "H_2O	Pump Vacuum "Hg Gauge
0	3995.03	148	191	135	13	13		5.5	~~8~~ 0
5	4004.88	151	192	137	9	15		5.5	0
10	4014.90	152	193	137	9	16		5.5	~~8~~ 0
15	4024.74	154	195	137	9	16		5.4	0
20	4034.70	156	195	~~10~~ 136	9	16		5.5	0
25	4044.68	158	194	136	9	15		5.4	0
30	4054.65	156	197	139	10	16		5.5	0
35	4064.59	156	198	138	10	15		5.5	0
40	4074.38	157	197	139	10	15		5.5	0
45	4084.40	158	195	139	10	15		5.5	0
50	4094.7	160	193	137	10	16		5.5	0
55	4104.3	162	193	138	10	16		5.5	0
60	4114.3	164	193	139	11	16		5.5	0

Start Time:	13:32
Finish Time:	14:32
Initial Leak Check:	0.01 Lpm @ 11 " Hg
Final Leak Check:	0.025 Lpm @ 10 " Hg

DGMCF:	0.991
Sample Volume:	
Average DGM Temp:	
Average DGM Δ H:	

Comments: ~~13:3~~ 13:23

Probe Purge On: ~~1:25 pm~~ @

Off: ~~1:30 pm~~ @ 13:28

~2 LPM for 60 min

Operator : AS/DT

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	0.991	89.86	211.68	121.8	28.97	5.5	27.8	0.1174
	2	0.991	16.32	137.54	121.2	29.44	5.5	23.0	0.1206
	3	0.991	95.03	214.30	119.3	29.40	5.5	15.4	0.1217

* Dry at 25°C and 1 atmosphere

APPENDIX 7

Volatile Organics Train Field Data Sheets and Gas Volumes Sampled (4 pages)

ORTECH Environmental
Vost Data Sheet

VOST 2

Plant: Clean Harbors	Test Condition: Compliance		
Plant Location: Corunna, ON	Test No: 1	Control Box ID: A10117	
Test location: Incinerator Exhuast Stack	DGMCF: 1.001	Operator: DT/AS	
Date: Oct 18, 16	Barometric: 28.97	Project No: 21713	
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak	Field Blank Pair ID: 5A, B	

Tube Pair 1 Start Time: 11:26	Initial Leak Check NDL @ 19 "Hg	Sample ID: 1A, B
Tube Pair 1 End Time: 11:46	Final Leak Check NDL @ 18 "Hg	Lab ID: 1A, B

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	499.77	143	188	13	22	2	0
5	504.85	150	197	23	28	2	0
10	509.90	150	199	22	30	2	0
15	515.0	150	196	22	30	2	0
20	521.08	149	196	23	30	2	0

Tube Pair 2 Start Time: 12:00	Initial Leak Check NDL @ 20 "Hg	Sample ID: 2A, B
Tube Pair 2 End Time: 12:20	Final Leak Check @ "Hg	Lab ID: 2A, B

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	521.52	150	194	22	27	2	1
5	526.6	151	194	23	29	2	1
10	531.15	153	194	23	30	2	1.5
15	536.2	153	195	23	30	2	1.5
20	541.7	152	192	24	31	2	1.5

Tube Pair 3 Start Time: 12:49	Initial Leak Check NDL @ 20 "Hg	Sample ID: 3A, B
Tube Pair 3 End Time: 13:09	Final Leak Check NDL @ 20 "Hg	Lab ID: 3A, B

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	546.5	148	193	23	27	2	1
5	551.8	147	194	23	27	2	1
10	557.4	151	194	23	31	2	1
15	562.7	151	194	23	31	2	1
20	567.9	151	194	23	31	2	1

Tube Pair 4 Start Time: 14:20	Initial Leak Check NDL @ 20 "Hg	Sample ID: 4A, B
Tube Pair 4 End Time: 14:40	Final Leak Check NDL @ 20 "Hg	Lab ID: 4A, B

Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	568.3	138	193	22	24	2	1.5
5	572.6	140	193	23	26	2	5
10	578.2	139	194	23	28	2	5
15	583.7	140	194	23	28	2	5
20	589.1	142	194	23	29	2	5

Rev: Oct 22, 2014

ORTECH Environmental

Vost Data Sheet

~~Box~~ VOST 2

Plant: Clean Harbors	Test Condition: Compliance		
Plant Location: Corunna, ON	Test No: 2	Control Box ID: A10117	
Test location: Incinerator Exhuast Stack	DGMCF: 1.001	Operator: AS/DT	
Date: Oct 19, 2016	Barometric: 29.44	Project No: 21713	
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak	Field Blank Pair ID: 10A, 10B	

Tube Pair 1 Start Time: 12:22	Initial Leak Check NDL @ 21 "Hg	Sample ID: 6A, 6B
Tube Pair 1 End Time: 12:42	Final Leak Check NDL @ 20 "Hg	Lab ID: 6A, 6B

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	38.46	137	186	17	20	2.0	1
5	43.55	146	185	18	22	2	2.5
10	48.92	146	186	18	24	2	2.5
15	53.70	146	186	18	24	2	~~2.4~~ 2.5
20	59.28	146	188	18	25	2	2.5

Tube Pair 2 Start Time: 13:54	Initial Leak Check NDL @ 21 "Hg ~~21~~	Sample ID: 7A, 7B
Tube Pair 2 End Time: 14:14	Final Leak Check NDL @ 20.5 "Hg	Lab ID: 7A, 7B

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	60.09	144	197	18	20	2	1
5	65.21	144	197	13	22	2	2
10	70.40	143	196	12	23	2	2
15	75.69	147	198	12	24	2	2
20	80.90	144	199	11	24	2	2

Tube Pair 3 Start Time:	Initial Leak Check @ 21 "Hg	Sample ID: 8A, 8B
Tube Pair 3 End Time:	Final Leak Check @ "Hg	Lab ID: 8A, 8B

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0							
5							
10							
15							
20							

NO GOOD TUBE BROKE

Tube Pair 4 Start Time: 15:06	Initial Leak Check NDL @ 21 "Hg	Sample ID: 9A, 9B
Tube Pair 4 End Time: 15:26	Final Leak Check NDL @ 20. "Hg	Lab ID: 9A, 9B

Clock Time	Dry Gas Meter L	Temperatures Probe °C	Stack °C	Condensor °C	Meter Avg °C	Meter Pressure "H_2O	Pump Vacuum "Hg
0	87.26	145	196	21	21	2	1
5	92.54	147	196	13	24	2	1
10	97.90	147	195	13	25	2	1
15	103.3	147	195	12	26	2	1
20	108.33	145	194	12	26	2	1

Rev: Oct 22, 2014

ORTECH Environmental
Vost Data Sheet

VOST 2

Plant:	Clean Harbors	Test Condition:	Compliance		
Plant Location:	Corunna, ON	Test No:	3	Control Box ID:	A/01/7
Test location:	Incinerator Exhuast Stack	DGMCF:	1.001	Operator:	BT/AS
Date:	OCT 20, 16	Barometric:	29.40	Project No:	21713
~ 1 LPM for 20 minutes	NDL - No Dectectable Leak			Field Blank Pair ID:	15A, 15B

Tube Pair 1 Start Time:	10:13	Initial Leak Check NDL @ 21 "Hg				Sample ID:	11A, 11B
Tube Pair 1 End Time:	10:33	Final Leak Check @ "Hg				Lab ID:	11A, 11B
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	12.10	140	193	8	16	2	1
5	16.6	141	196	8	18	2	1
10	21.92	142	194	9	20	2	1
15	27.2	143	198	9	18	2	2
20	32.54	142	194	9	19	2	2

Tube Pair 2 Start Time:	10:48	Initial Leak Check NDL @ 20.5 "Hg				Sample ID:	12A, 12B
Tube Pair 2 End Time:	11:08	Final Leak Check NDL @ 21 "Hg				Lab ID:	12A, 12B
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	33.04	143	199	8	14	2	5
5	38.88	143	195	8	17	2	5
10	42.7	142	198	8	17	2	5.5
15	47.9	144	198	9	17	2	5.5
20	53.13	143	198	9	17	2	5.5

Tube Pair 3 Start Time:	11:18	Initial Leak Check NDL @ 21 "Hg				Sample ID:	13A, 13B
Tube Pair 3 End Time:	11:38	Final Leak Check NDL @ 20 "Hg				Lab ID:	13A, 13B
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	54.24	144	198	10	16	2	1
5	59.1	142	199	10	17	2	1
10	64.3	142	195	10	18	2	1
15	69.5	142	196	10	18	2	1
20	74.68	143	195	10	18	2	1

Tube Pair 4 Start Time:	12:43	Initial Leak Check NDL @ 21 "Hg				Sample ID:	14A, 14B
Tube Pair 4 End Time:	13:03	Final Leak Check NDL @ 21 "Hg				Lab ID:	14A, 14B
Clock Time	Dry Gas Meter L	Temperatures				Meter Pressure "H_2O	Pump Vacuum "Hg
		Probe °C	Stack °C	Condensor °C	Meter Avg °C		
0	3975.06	134	188	13	15	2.0	1
5	3979.69	137	192	13	16	2.0	1
10	3984.21	139	189	13	17	2.2	3
15	3988.83	141	192	14	16	1.9	3
20	3993.66	142	191	14	16	2.0	3

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	1.001	499.77	521.08	21.3	28.97	2.0	28.0	0.0206
	2	2A/2B	1.001	521.52	541.70	20.2	28.97	2.0	29.4	0.0194
	3	3A/3B	1.001	546.50	567.90	21.4	28.97	2.0	29.4	0.0205
	4	4A/4B	1.001	568.30	589.10	20.8	28.97	2.0	27.0	0.0201
2	1	6A/6B	1.001	38.46	59.28	20.82	29.44	2.0	23.0	0.0207
	2	7A/7B	1.001	60.09	80.90	20.81	29.44	2.0	22.6	0.0208
	4	9A/9B	1.001	87.26	108.33	21.07	29.44	2.0	24.4	0.0209
3	1	10A/10B	1.001	12.10	32.54	20.44	29.40	2.0	18.2	0.0207
	2	11A/11B	1.001	33.04	53.13	20.09	29.40	2.0	16.4	0.0204
	3	12A/12B	1.001	54.24	74.68	20.44	29.40	2.0	17.4	0.0207
	4	13A/13B	1.001	75.06	93.66	18.60	29.40	2.0	16.0	0.0190

* Dry at 25°C and 1 atmosphere

APPENDIX 8

Metals Train Recovery Data Sheets
(4 pages)

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21713
Date: Oct 18/16

Test No. 1
Test Location: Incinerator Exhaust

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

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	413.9
After Act. Rinse:	563.3
Total TS1:	149.4

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	411.4
with Nitric rinse	654.0
Total TS2:	242.6

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: 16-Q 39

CONTAINER TS3

Initial Wt:	0.7014
Final Wt:	0.7327
Gain:	31.3
Colour:	BEIGE

SEAL AND LABEL TS3

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

	Impinger #1 (100 ml H_2O)	
	Empty Wt:	686.3
	Initial Wt:	786.1
	Final Wt:	964.5
1	Gain:	178.4
	Colour:	GINGER

	Impinger #2 Empty (Knock-out)	
	Empty Wt:	708.1
	Final Wt:	3137.1 ~~3137.1~~ ~~4075.1~~
2	Gain:	2429.0
	Colour:	CLEAR

	Impinger #3 HNO_3/H_2O_2	
	Empty Wt:	685.8
	Initial Wt:	815.7
	Final Wt:	989.4
3	Gain:	173.7
	Colour:	CLEAR

	Impinger #4 HNO_3/H_2O_2	
	Empty Wt:	663.5
	Initial Wt:	751.2
	Final Wt:	~~959.5~~ 967.0
4	Gain:	215.8
	Colour:	CLEAR

	Impinger #5 Empty	
	Empty Wt:	605.1
	Final Wt:	1083.9
5	Gain:	478.8
	Colour:	CLEAR

CONTAINER TS4 WEIGHTS	
Empty Wt:	1359.0
With Imp. 1 to 5 Soln:	5135.6
Imp. 1 to 5 Volume:	3776.6
After HNO_3 Rinse:	5357.8
Total TS4:	3998.8

Box ID: 15

Impinger 6 & 7

CONTAINER TS5-A

	Impinger #6 $KMnO_4/H_2SO_4$	
	Empty Wt:	672.3
	Initial Wt:	797.2
	Final Wt:	825.1
6	Gain:	27.9
	Colour:	BROWN

	Impinger #7 $KMnO_4/H_2SO_4$	
	Empty Wt:	671.0
	Initial Wt:	775.5
	Final Wt:	792.6
7	Gain:	17.1 ~~12.6~~
	Colour:	~~BROWN~~ PURPLE

CONTAINER TS5-A	
Empty Wt:	412.2
With Imp. Soln:	674.4
Imp. 6&7 Volume:	262.2
After $KMnO_4$ Rinse:	797.3
After D.I. Water Rinse:	929.8
Total TS5-A:	517.6

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	412.4
With 150 mL DI Water:	562.0
After HCl Rinse:	612.0
After D.I. Water Rinse:	793.0
Total TS5-B:	380.6

MARK FLUID LEVEL

SEAL & LABEL TS5-B

	Impinger #8 Silica Gel	
	Initial Wt:	949.3
	Final Wt:	984.6
8	Gain:	35.3
	% spent :	10

Sample Batch Number	16-21713-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:	~~3625.7~~ 3520.7 ✓
WCBDA= 8:	35.3

Train Loaded By: D W
Train Recovered By: D W
Recovery Witnessed By:
Date: Oct 18/16

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21713

Date: ~~Oct 19/16~~ OCT 19/16

Test No. 2

Test Location: Incinerator Exhaust

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

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	412.2
After Act. Rinse:	595.2
Total TS1:	183.0

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	411.8
with Nitric rinse	690.7
Total TS2:	278.9

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: 16 - Q41

CONTAINER TS3

Initial Wt:	0.7121
Final Wt:	0.7321
Gain:	20.0
Colour:	BEIGE

SEAL AND LABEL TS3

412.0
1316.1
2 GAIN 904.1

904.1 + 1833.5
= 2737.6

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

	Impinger #1 (100 ml H_2O)	
	Empty Wt:	687.7
	Initial Wt:	781.0
	Final Wt:	936.0
1	Gain:	155.0
	Colour:	GINGER

	Impinger #2 Empty (Knock-out)	
	Empty Wt:	708.6
	Final Wt:	2542.1
2	Gain:	1833.5
	Colour:	CLEAR

	Impinger #3 HNO_3/H_2O_2	
	Empty Wt:	688.3
	Initial Wt:	795.7
	Final Wt:	975.8
3	Gain:	180.1
	Colour:	CLEAR

	Impinger #4 HNO_3/H_2O_2	
	Empty Wt:	666.7
	Initial Wt:	766.7
	Final Wt:	959.7
4	Gain:	193.0
	Colour:	CLEAR

	Impinger #5 Empty	
	Empty Wt:	606.1
	Final Wt:	635.3
5	Gain:	29.2
	Colour:	CLEAR

CONTAINER TS4 WEIGHTS	
Empty Wt:	1347.7
With Imp. 1 to 5 Soln:	4938.5
Imp. 1 to 5 Volume:	~~2390.8~~ 3590.8
After HNO_3 Rinse:	5170.9
Total TS4:	

Impinger 6 & 7

CONTAINER TS5-A

	Impinger #6 $KMnO_4/H_2SO_4$	
	Empty Wt:	673.3
	Initial Wt:	791.7
	Final Wt:	795.0
6	Gain:	3.3
	Colour:	PURPLE

	Impinger #7 $KMnO_4/H_2SO_4$	
	Empty Wt:	672.3
	Initial Wt:	773.0
	Final Wt:	776.0
7	Gain:	3.0
	Colour:	PURPLE

CONTAINER TS5-A	
Empty Wt:	416.5
With Imp. Soln:	636.9
Imp. 6&7 Volume:	~~6.3~~ 220.4
After $KMnO_4$ Rinse:	760.4
After D.I. Water Rinse:	902.5
Total TS5-A:	486.0

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	413.0
With 150 mL DI Water:	575.0
After HCl Rinse:	631.5
After D.I. Water Rinse:	757.9
Total TS5-B:	344.9

MARK FLUID LEVEL

SEAL & LABEL TS5-B

	Impinger #8 Silica Gel	
	Initial Wt:	960.7
	Final Wt:	995.4
8	Gain:	34.7
	% spent :	43

Sample Batch Number	16-21713-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:	3301.2 ✓
WCBDA= 8:	34.7

Train Loaded By: DM

Train Recovered By: DM

Recovery Witnessed By: /

Date: Oct 19/16

Box ID: 15

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21713

Date: OCT 20/16

Test No. 3

Test Location: Incinerator Exhaust

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

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	418.2
After Act. Rinse:	610.0
Total TS1:	191.8

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	217.3
with Nitric rinse	589.3
Total TS2:	372.0

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: 16-034

CONTAINER TS3

Initial Wt:	0.7060
Final Wt:	0.7275
Gain:	21.5
Colour:	BEIGE

SEAL AND LABEL TS3

417.3
1338.7
2 GAIN 921.4

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

	Impinger #1 (100 ml H_2O)	
	Empty Wt:	686.8
	Initial Wt:	788.7
	Final Wt:	958.6
1	Gain:	169.9
	Colour:	GINGER

	Impinger #2 Empty (Knock-out)	
	Empty Wt:	708.1
	Final Wt:	2549.1
2	Gain:	1841.0
	Colour:	CLEAR

	Impinger #3 HNO_3/H_2O_2	
	Empty Wt:	688.0
	Initial Wt:	775.5
	Final Wt:	972.3
3	Gain:	196.8
	Colour:	CLEAR

	Impinger #4 HNO_3/H_2O_2	
	Empty Wt:	663.8
	Initial Wt:	780.8
	Final Wt:	982.2
4	Gain:	201.4
	Colour:	CLEAR

	Impinger #5 Empty	
	Empty Wt:	606.0
	Final Wt:	632.5
5	Gain:	26.5
	Colour:	CLEAR

CONTAINER TS4 WEIGHTS	
Empty Wt:	1350.0
With Imp. 1 to 5 Soln:	5007.0
Imp. 1 to 5 Volume:	3657
After HNO_3 Rinse:	5215.2
Total TS4:	3865.2

Impinger 6 & 7

CONTAINER TS5-A

	Impinger #6 $KMnO_4/H_2SO_4$	
	Empty Wt:	673.8
	Initial Wt:	792.7
	Final Wt:	792.3
6	Gain:	-0.4
	Colour:	PURPLE

	Impinger #7 $KMnO_4/H_2SO_4$	
	Empty Wt:	673.2
	Initial Wt:	773.5
	Final Wt:	~~773.9~~ ~~77~~ 77
7	Gain:	0.4
	Colour:	PURPLE

CONTAINER TS5-A	
Empty Wt:	413.0
With Imp. Soln:	630.5
Imp. 6&7 Volume:	217.5
After $KMnO_4$ Rinse:	743.2
After D.I. Water Rinse:	895.8
Total TS5-A:	482.8

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	414.9
With 150 mL DI Water:	563.8
After HCl Rinse:	612.0
After D.I. Water Rinse:	714.8
Total TS5-B:	299.9

MARK FLUID LEVEL

SEAL & LABEL TS5-B

	Impinger #8 Silica Gel	
	Initial Wt:	860.1
	Final Wt:	899.4
8	Gain:	39.3
	% spent :	44

Sample Batch Number	16-21713-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:	3357.0 ✓
WCBDA= 8:	39.3

Train Loaded By: RW

Train Recovered By: RW

Recovery Witnessed By: —

Date: OCT 20/16

Box ID: 15

ORTECH

Particulate and Metals Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. 21713
Date: Oct 20/16

Test No. BLANK
Test Location: Incinerator Exhaust

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

CONTAINER TS1

Container TS1 Weights	
Empty Wt:	295.5
After Act. Rinse:	495.8
Total TS1:	200.3

MARK FLUID LEVEL

SEAL AND LABEL TS1

CONTAINER TS2

Container TS2 Weights	
Empty Wt:	292.2
with Nitric rinse	491.6
Total TS2:	199.4

MARK FLUID LEVEL

SEAL AND LABEL TS2

Filter

Filter ID: 16-Q38

CONTAINER TS3

Initial Wt:	0.6976
Final Wt:	0.6973
Gain:	-0.3
Colour:	WHITE

SEAL AND LABEL TS3

Impingers 1, 2, 3, 4 & 5

CONTAINER TS4

	Impinger #1 (100 ml H_2O)	
	Empty Wt:	666.4
	Initial Wt:	765.5
	Final Wt:	765.3
1	Gain:	-0.2
	Colour:	CLEAR

	Impinger #2 Empty (Knock-out)	
	Empty Wt:	715.4
	Final Wt:	715.4
2	Gain:	—
	Colour:	—

	Impinger #3 HNO_3/H_2O_2	
	Empty Wt:	674.9
	Initial Wt:	788.0
	Final Wt:	788.0
3	Gain:	—
	Colour:	CLEAR

	Impinger #4 HNO_3/H_2O_2	
	Empty Wt:	662.6
	Initial Wt:	760.5
	Final Wt:	760.5
4	Gain:	—
	Colour:	CLEAR

	Impinger #5 Empty	
	Empty Wt:	618.1
	Final Wt:	618.1
5	Gain:	—
	Colour:	—

CONTAINER TS4 WEIGHTS	
Empty Wt:	415.5
With Imp. 1 to 5 Soln:	726.2
Imp. 1 to 5 Volume:	310.7
After HNO_3 Rinse:	893.0
Total TS4:	477.5

Impinger 6 & 7

CONTAINER TS5-A

	Impinger #6 $KMnO_4/H_2SO_4$	
	Empty Wt:	672.7
	Initial Wt:	778.5
	Final Wt:	778.3
6	Gain:	-0.2
	Colour:	PURPLE

	Impinger #7 $KMnO_4/H_2SO_4$	
	Empty Wt:	663.4
	Initial Wt:	782.6
	Final Wt:	782.3
7	Gain:	-0.3
	Colour:	PURPLE

CONTAINER TS5-A	
Empty Wt:	415.0
With Imp. Soln:	637.8
Imp. 6&7 Volume:	222.8
After $KMnO_4$ Rinse:	751.9
After D.I. Water Rinse:	925.6
Total TS5-A:	510.6

MARK FLUID LEVEL

SEAL & LABEL TS5-A

CONTAINER TS5-B	
Empty Wt:	415.5
With 150 mL DI Water:	563.7
After HCl Rinse:	631.9
After D.I. Water Rinse:	790.3
Total TS5-B:	374.8

MARK FLUID LEVEL

SEAL & LABEL TS5-B

	Impinger #8 Silica Gel	
	Initial Wt:	885.2
	Final Wt:	885.7
8	Gain:	0.5
	% spent :	0

Sample Batch Number	16-21713-PM-
TS1 (Probe Rinse-Acetone)	21
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:	—
WCBDA= 8:	—

Train Loaded By: RW
Train Recovered By: RW
Recovery Witnessed By:
Date: OCT 20/16

Box ID: 5

ORTECH

APPENDIX 9

Particulate and Metals Analytical Reports
(16 pages)

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L1847083		
Date of Report	3-Nov-16		
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 Clean Harbors

COMMENTS:

Sample Particulate Analysis via Gravimetric USEPA Method 5 (SA 01-Nov-2016)

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

R. Stolys

Certified by: ______________________

Rachael Stolys
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(8 THRU 13) TEST#2**	**16-21713-PM-(15 THRU 20) TEST#3**	**16-21713-PM-(22 THRU 27) BLANK**	**MB**
ALS Sample ID		L1847083-1	L1847083-2	L1847083-3	L1847083-4	L1847083-LCB
Matrix		Stack	Stack	Stack	Stack	n/a
Analysis type		Sample	Sample	Sample	Sample	Sample
Sampling Date/Time		18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16	n/a
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	n/a
PM via Gravimetric Analysis	LOR					
Method 5	mg	mg	mg	mg	mg	mg
Acetone Particulate Matter	0.4	9.5	10.5	9.2	0.1 J	0.2 J
	g	g	g	g	g	g
Acetone Mass	0.02	146	181	191	200	31.2

ALS Environmental
1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1847083		Mississauga, ON L5J 2Y4
Date of Report	14-Nov-16		CANADA
Date of Sample Receipt	26-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS:

Mercury Analysis via CVAA using Method USEPA 7470A (NOB 2016-11-08)

ANALYST COMMENTS:

Low recoveries for LCS & LCSD fraction 3C. (85%, 86%). This may be due to a spiking error. All other QC are within ALS DQOs. This is not expected to significantly impact data quality. **PE 10-Nov-16**

LOR = Limit of Reporting
LCB = Laboratory Control Blank (limits: <LOR)
LCS = Laboratory Control Sample (limits: 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: R. Stolys

Rachael Stolys
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(8 THRU 13) TEST#2**	**16-21713-PM-(15 THRU 20) TEST#3**	**16-21713-PM-(22 THRU 27) BLANK**
ALS Sample ID		L1847083-1	L1847083-2	L1847083-3	L1847083-4
Matrix		Stack	Stack	Stack	Stack
Analysis type		Sample	Sample	Sample	Sample
Sampling Date/Time		18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Mercury via FIMS CVAA	**LOR**				
Method 29	**ug**	**ug**	**ug**	**ug**	**ug**
Analytical Fraction 1B HNO3	0.015	0.864	0.867	1.14	<
Analytical Fraction 1B HF	0.015	0.124	0.348	0.312	0.0681
Analytical Fraction 2B	0.050	1.080	0.843	1.99	<
Analytical Fraction 3B	0.025	0.0430	0.0525	0.0935	<
Analytical Fraction 3C	0.025	3.70	4.40	7.50	0.545

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 FIMS CVAA	**LOR**					
Method 29	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Analytical Fraction 1B HNO3	0.015	<	0.288	98%	0.288	98%
Analytical Fraction 1B HF	0.015	<	0.288	98%	0.288	98%
Analytical Fraction 2B	0.050	<	0.981	98%	0.936	93%
Analytical Fraction 3B	0.025	<	0.454	93%	0.454	93%
Analytical Fraction 3C	0.025	<	0.441	85%	0.446	86%

ALS Environmental

Sample QC Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**
ALS Sample ID		L1847083-1	L1847083-1DUP	L1847083-1MS	L1847083-1MS	L1847083-1MSD	L1847083-1MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date/Time		18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Mercury via FIMS CVAA	**LOR**						
Method 29	**ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Analytical Fraction 1B HNO3	0.015	0.864	0.825	1.12	84%	1.19	107%
Analytical Fraction 1B HF	0.015	0.124	0.166	0.423	100%	0.414	97%
Analytical Fraction 2B	0.050	1.08	1.16	34.2	83%	36.1	88%
Analytical Fraction 3B	0.025	0.0430	0.0420	0.964	92%	0.977	93%
Analytical Fraction 3C	0.025	3.70	3.37	7.90	84%	8.10	88%

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:	Ron McLeod	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1847083		Mississauga, ON L5J 2Y4
Date of Report	15-Nov-16		(905)822-4120
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS:
Metals analysed via ICP-MS Method USEPA 6020A (FE 10-Nov-2016)
Sample Preparation via USEPA Method 29 (SA 7-Nov-2016)

ANALYST COMMENTS:

1A HNO3
Recoveries in LCS/LCSD show a low bias (Limit 85%-115%). All other spiked samples are within limits. This is likely due to mis-spiking and is not expected to significantly impact data quality.
Recoveries for Al, Ba, Na cannot be determined in MS/MSD due to high background in sample. No impact on data quality.
Low recoveries for Mg, Ti, K in MSD. Limit 80%-120%. MS is within acceptable limits. No impact on data quality.
Low recoveries for Be, B, Li in MS/MSD. Limit 80-120%. This may point to a matrix interference. Data may be biased low.
High recoveries for S in MS/MSD. Limit 80%-120%. Data may be biased high.

1A HF
Recoveries in LCS/LCSD show a low bias (Limit 85%-115%). All other spiked samples are within limits. This is likely due to mis-spiking and is not expected to significantly impact data quality.
Low recoveries for Be, Ba in MS/MSD. Limit 80%-120%. Data may be biased low.
High recoveries for S in MS. Limit 80%-120%. MSD within acceptable limits. Data may still be biased high.

2A
Low recovery for As in LCS. And B in LCSD (Limit 85-115%). The analogous LCSD and LCS show good recoveries. This is unlikely to impact data quality.
Low recoveries for Be, Li, Na in LCS/LCSD. Limit 85%-115%. Data may be biased low.
Recoveries for B, Se, S cannot be determined in MS/MSD due to high background in sample. No impact to data quality.
Low recoveries for Be, Ba in MS/MSD. Limit 80%-120%. Data may be biased low.
High recoveries for P and As in MS/MSD. Limit 80%-120%. Data may be biased high.

LCB = Laboratory Control Blank
LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
LOR = Limit of Reporting

R. Stolys

Certified by: ______________________
Rachael Stolys
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(8 THRU 13) TEST#2**	**16-21713-PM-(15 THRU 20) TEST#3**	**16-21713-PM-(22 THRU 27) BLANK**
ALS Sample ID		L1847083-1	L1847083-2	L1847083-3	L1847083-4
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample
Sampling Date		18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR**				
	ug	**ug**	**ug**	**ug**	**ug**
Front Half HNO3 Fraction 1A					
Aluminum	20	518	390	338	<
Antimony	0.2	0.661	0.388	0.400	<
Arsenic	1	106	84.6	76.1	<
Barium	5	67.9	46.5	40.7	<
Beryllium	0.2	<	<	<	<
Boron	30	<	<	<	<
Cadmium	0.1	1.10	0.585	0.572	<
Calcium	500	1700	1780	1290	<
Chromium	1	19.1	7.45	6.00	12.2
Cobalt	0.2	1.25	0.730	0.646	<
Copper	1	29.6	19.9	20.2	1.00
Iron	200	1000	349	233	<
Lead	0.5	4.39	3.06	2.60	<
Lithium	0.5	1.43	0.916	0.880	<
Magnesium	10	181	142	133	<
Manganese	0.5	95.0	21.4	15.1	0.922
Molybdenum	0.2	9.21	6.61	6.20	<
Nickel	0.2	7.41	5.62	4.34	7.59
Phosphorus	100	948	777	682	<
Potassium	100	2020	1460	1490	<
Selenium	2	37.3	29.8	26.9	<
Silver	0.2	<	<	<	<
Sodium	30	3420	2550	2470	179
Strontium	0.2	5.76	4.77	4.37	0.231
Tin	0.3	1.37	0.987	0.506	5.87
Titanium	10	63.2	37.3	38.7	<
Vanadium	1	6.32	4.88	4.26	<
Zinc	6	40.3	24.6	21.7	8.86
Sulphur	10000	<	<	<	<
Silicon	150	735	395	478	177

ALS Environmental

Sample QC Summary Report

Sample Name		LCB	LCS	LCS	LCSD	LCSD
ALS Sample ID		LCB	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	<	104	87	102	86
Antimony	0.2	<	10.2	85	9.81	82
Arsenic	1	<	49.7	83	49.3	82
Barium	5	<	51.2	85	49.0	82
Beryllium	0.2	<	46.2	77	43.0	72
Boron	30	<	50.8	86	48.2	81
Cadmium	0.1	<	25.2	84	24.8	83
Calcium	500	<	1230	71	1260	73
Chromium	1	<	49.4	82	49.2	82
Cobalt	0.2	<	50.9	85	49.8	83
Copper	1	<	50.8	85	49.3	82
Iron	200	<	243	80	236	78
Lead	0.5	<	52.6	88	51.8	86
Lithium	0.5	<	9.44	79	8.93	74
Magnesium	10	<	260	83	260	84
Manganese	0.5	<	50.9	85	50.1	84
Molybdenum	0.2	<	23.7	81	23.1	79
Nickel	0.2	<	49.2	83	48.1	81
Phosphorus	100	<	1280	86	1260	84
Potassium	100	<	1180	79	1140	76
Selenium	2	<	50.6	84	48.8	81
Silver	0.2	<	22.8	76	19.3	64
Sodium	30	<	1150	77	1130	75
Strontium	0.2	0.480	51.1	84	49.9	82
Tin	0.3	0.388	25.2	83	24.2	80
Titanium	10	<	47.4	79	45.8	76
Vanadium	1	<	48.9	81	48.4	81
Zinc	6	<	99.7	84	97.1	82
Sulphur	10000	<	<	71	<	67
Silicon	150	235	2785	85	2864	88

ALS Environmental

Sample QC Summary Report

Sample Name		16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1
ALS Sample ID		L1847083-1	L1847083-1	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		18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HNO3 Fraction 1A							
Aluminum	20	518	526	647	nq	633	nq
Antimony	0.2	0.661	0.656	20.9	84	20.7	83
Arsenic	1	106	108	210	87	208	85
Barium	5	67.9	68.6	142	nq	146	nq
Beryllium	0.2	<	<	83.9	70	80.9	67
Boron	30	<	<	117	77	112	73
Cadmium	0.1	1.10	1.17	52.3	85	51.7	84
Calcium	500	1700	1730	4150	82	4120	81
Chromium	1	19.1	19.3	120	84	116	81
Cobalt	0.2	1.25	1.29	104	86	103	84
Copper	1	29.6	30.1	132	86	132	85
Iron	200	1000	1030	1510	85	1490	82
Lead	0.5	4.39	4.52	107	86	109	87
Lithium	0.5	1.43	1.35	19.1	74	18.3	70
Magnesium	10	181	184	677	83	655	79
Manganese	0.5	95.0	98.0	195	84	192	81
Molybdenum	0.2	9.21	9.51	59.8	84	59.7	84
Nickel	0.2	7.41	7.63	109	84	107	83
Phosphorus	100	948	955	3530	86	3430	83
Potassium	100	2020	2050	4420	80	4350	78
Selenium	2	37.3	39.6	142	88	142	88
Silver	0.2	<	<	54.8	91	54.3	90
Sodium	30	3420	3420	5580	nq	5360	nq
Strontium	0.2	5.76	5.94	110	87	108	85
Tin	0.3	1.37	1.41	52.2	85	51.4	83
Titanium	10	63.2	63.7	164	84	157	78
Vanadium	1	6.32	6.22	105	83	103	81
Zinc	6	40.3	40.3	245	85	241	84
Sulphur	10000	<	<	37800	127	36300	122
Silicon	150	735	684	8357	102	7776	94

ALS Environmental

Sample Analysis Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(8 THRU 13) TEST#2**	**16-21713-PM-(15 THRU 20) TEST#3**	**16-21713-PM-(22 THRU 27) BLANK**
ALS Sample ID		L1847083-1	L1847083-2	L1847083-3	L1847083-4
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample
Sampling Date		18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR**				
	ug	**ug**	**ug**	**ug**	**ug**
Front Half HF Fraction 1A					
Aluminum	20	117	232	186	31.0
Antimony	0.2	0.772	0.902	0.795	<
Arsenic	1	16.2	29.5	22.7	<
Barium	5	18.9	27.4	22.7	<
Beryllium	0.2	<	<	<	<
Boron	30	<	<	<	<
Cadmium	0.1	0.357	0.398	0.313	<
Calcium	500	<	530	<	<
Chromium	1	12.0	9.44	7.97	6.13
Cobalt	0.2	0.813	0.732	0.716	<
Copper	1	7.06	9.83	7.92	<
Iron	200	1550	392	276	<
Lead	0.5	3.22	4.09	3.94	<
Lithium	0.5	<	<	<	<
Magnesium	10	34.9	72.3	61.6	18.3
Manganese	0.5	22.9	13.1	10.1	0.691
Molybdenum	0.2	18.2	21.9	20.7	18.9
Nickel	0.2	6.13	7.50	7.33	3.09
Phosphorus	100	<	237	178	<
Potassium	100	145	426	338	<
Selenium	2	5.49	9.03	7.04	<
Silver	0.2	<	<	<	<
Sodium	30	232	713	543	75.5
Strontium	0.2	0.715	1.60	1.24	<
Tin	0.3	2.10	1.83	1.78	3.57
Titanium	10	31.1	30.4	28.8	<
Vanadium	1	1.09	2.31	1.85	<
Zinc	6	29.9	38.9	38.8	<
Sulphur	10000	<	<	<	<
Silicon	n/a	n/a	n/a	n/a	n/a

ALS Environmental

Sample QC Summary Report

Sample Name		LCB	LCS	LCS	LCSD	LCSD
ALS Sample ID		LCB	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	<	81.0	69	81.2	69
Antimony	0.2	0.661	8.91	69	9.04	70
Arsenic	1	<	44.4	74	45.6	76
Barium	5	<	43.5	72	44.5	74
Beryllium	0.2	<	34.5	58	34.4	57
Boron	30	<	35.8	62	34.1	59
Cadmium	0.1	<	21.7	72	21.8	73
Calcium	500	<	1010	68	1030	69
Chromium	1	<	41.7	70	42.1	70
Cobalt	0.2	<	43.1	72	44.4	74
Copper	1	<	43.4	72	45.2	75
Iron	200	<	201	68	208	70
Lead	0.5	<	49.0	82	50.2	84
Lithium	0.5	<	7.24	61	7.19	61
Magnesium	10	<	203	68	204	69
Manganese	0.5	<	43.0	72	43.8	73
Molybdenum	0.2	<	21.3	71	22.1	74
Nickel	0.2	<	41.5	70	43.0	73
Phosphorus	100	<	1030	69	1050	70
Potassium	100	<	926	63	944	64
Selenium	2	<	44.0	73	45.8	76
Silver	0.2	<	24.9	83	20.9	70
Sodium	30	<	846	57	842	57
Strontium	0.2	<	44.0	73	46.5	78
Tin	0.3	0.770	22.3	72	22.4	72
Titanium	10	<	39.6	66	41.6	69
Vanadium	1	<	41.2	69	42.3	71
Zinc	6	<	85.5	72	88.8	75
Sulphur	10000	<	<	57	<	55
Silicon	150	505	3224	91	3198	90

ALS Environmental

Sample QC Summary Report

Sample Name		16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(1 THRU 6) TEST#1
ALS Sample ID		L1847083-1	L1847083-1	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		18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR ug**	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Front Half HF Fraction 1A							
Aluminum	20	117	128	365	103	302	77
Antimony	0.2	0.772	0.884	24.4	98	18.9	76
Arsenic	1	16.2	17.4	124	90	97.8	68
Barium	5	18.9	21.3	111	76	86.8	57
Beryllium	0.2	<	<	90.6	75	69.5	58
Boron	30	<	<	104	83	80.8	64
Cadmium	0.1	0.357	0.401	57.8	96	44.1	73
Calcium	500	<	<	2750	87	2290	71
Chromium	1	12.0	13.0	121	91	95.3	69
Cobalt	0.2	0.813	0.872	106	88	87.0	72
Copper	1	7.06	7.82	116	91	92.5	71
Iron	200	1550	1660	2180	105	1780	38
Lead	0.5	3.22	3.36	113	91	88.7	71
Lithium	0.5	<	<	20.1	84	15.8	66
Magnesium	10	34.9	38.7	600	94	486	75
Manganese	0.5	22.9	24.3	131	90	107	70
Molybdenum	0.2	18.2	20.0	72.1	90	57.6	66
Nickel	0.2	6.13	6.81	112	88	88.9	69
Phosphorus	100	<	<	2690	87	2250	73
Potassium	100	145	156	2540	80	2140	67
Selenium	2	5.49	5.86	111	88	90.9	71
Silver	0.2	<	<	55.0	92	43.3	72
Sodium	30	232	257	2630	80	2130	63
Strontium	0.2	0.715	0.786	106	87	85.2	70
Tin	0.3	2.10	2.39	60.6	98	46.8	75
Titanium	10	31.1	35.3	140	91	112	67
Vanadium	1	1.09	1.13	107	89	85.3	70
Zinc	6	29.9	33.3	253	93	199	70
Sulphur	10000	<	<	34100	133	27100	110
Silicon	n/a	n/a	n/a	n/a	n/a	n/a	n/a

ALS Environmental

Sample Analysis Summary Report

Sample Name		16-21713-PM-(1 THRU 6) TEST#1	16-21713-PM-(8 THRU 13) TEST#2	16-21713-PM-(15 THRU 20) TEST#3	16-21713-PM-(22 THRU 27) BLANK
ALS Sample ID		L1847083-1	L1847083-2	L1847083-3	L1847083-4
Matrix		Stack	Stack	Stack	Stack
Analysis Type		Sample	Sample	Sample	Sample
Sampling Date		18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR**				
	ug	**ug**	**ug**	**ug**	**ug**
Back Half (HNO3 / H2O2) Fraction 2A					
Aluminum	5	78.4	41.0	39.2	11.7
Antimony	0.1	0.285	0.198	0.276	<
Arsenic	0.2	13.1	2.39	3.75	<
Barium	0.5	4.55	3.55	4.20	1.14
Beryllium	0.1	<	<	<	<
Boron	10	2660	1890	2580	21.8
Cadmium	0.05	0.200	0.312	0.231	0.174
Calcium	100	738	555	751	124
Chromium	0.15	84.9	4.21	2.46	5.13
Cobalt	0.1	0.215	0.273	0.104	0.630
Copper	0.3	31.8	17.9	24.4	4.34
Iron	15	248	170	144	<
Lead	0.05	1.55	0.804	0.855	0.450
Lithium	0.25	<	<	<	<
Magnesium	5	98.7	73.9	87.8	15.2
Manganese	0.15	19.6	18.3	33.1	2.27
Molybdenum	0.1	<	<	<	<
Nickel	0.1	4.73	4.04	3.54	120
Phosphorus	25	95.6	46.4	46.3	26.7
Potassium	100	115	<	<	<
Selenium	1	119	31.5	72.7	<
Silver	0.1	0.115	<	<	<
Sodium	20	1640	1200	2040	200
Strontium	0.1	1.32	0.770	0.881	0.264
Tin	0.1	34.5	22.6	27.3	15.9
Titanium	1	78.3	113	134	<
Vanadium	0.1	22.5	0.192	0.182	<
Zinc	3	24.4	16.0	16.7	<
Sulphur	50000	2300000	1840000	2100000	<
Silicon	75	2123	394	396	366

ALS Environmental

Sample QC Summary Report

Sample Name		**LCB**	**LCS**	**LCS**	**LCSD**	**LCSD**
ALS Sample ID		LCB	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	<	31.3	105	34.6	115
Antimony	0.1	<	2.60	87	2.69	90
Arsenic	0.2	<	12.5	83	13.0	87
Barium	0.5	<	13.7	91	13.9	93
Beryllium	0.1	<	10.3	68	10.6	70
Boron	10	<	15.2	103	21.8	147
Cadmium	0.05	<	6.56	87	6.78	90
Calcium	100	<	348	93	358	96
Chromium	0.15	<	13.2	88	13.8	92
Cobalt	0.1	<	13.3	89	13.7	91
Copper	0.3	<	13.2	88	13.6	91
Iron	15	<	64.0	87	67.1	91
Lead	0.05	<	13.3	88	13.6	91
Lithium	0.25	<	2.27	76	2.38	80
Magnesium	5	<	68.5	91	72.7	97
Manganese	0.15	<	13.6	91	14.3	95
Molybdenum	0.1	<	6.23	84	6.44	87
Nickel	0.1	<	12.8	87	13.1	88
Phosphorus	25	<	345	92	360	96
Potassium	100	<	312	85	321	87
Selenium	1	<	12.6	84	13.0	87
Silver	0.1	<	6.44	86	6.78	90
Sodium	20	<	286	77	303	82
Strontium	0.1	<	13.3	89	13.8	92
Tin	0.1	0.123	6.46	85	6.71	89
Titanium	1	<	12.6	84	13.3	89
Vanadium	0.1	<	13.1	88	13.8	92
Zinc	3	<	26.1	88	27.0	91
Sulphur	3000	<	<	97	<	103
Silicon	75	<	1479	99	1584	106

ALS Environmental

Sample QC Summary Report

Sample Name		**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**	**16-21713-PM-(1 THRU 6) TEST#1**
ALS Sample ID		L1847083-1	L1847083-1	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		18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16
Date of Receipt		21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Multi-Metals via ICP-MS	**LOR**						
	ug	**ug**	**ug**	**ug**	**% Rec**	**ug**	**% Rec**
Back Half (HNO3 / H2O2) Fraction 2A							
Aluminum	5	78.4	79.3	212	111	202	103
Antimony	0.1	0.285	0.300	14.0	114	13.0	106
Arsenic	0.2	13.1	13.1	143	216	134	202
Barium	0.5	4.55	4.59	50.2	76	46.8	70
Beryllium	0.1	<	<	46.0	77	43.3	72
Boron	10	2660	2690	2770	nq	2640	nq
Cadmium	0.05	0.200	0.191	28.7	95	27.0	89
Calcium	100	738	767	2400	111	2230	99
Chromium	0.15	84.9	86.1	149	106	141	94
Cobalt	0.1	0.215	0.215	61.7	102	57.8	96
Copper	0.3	31.8	32.1	96.0	107	89.1	95
Iron	15	248	255	571	108	534	95
Lead	0.05	1.55	1.53	54.5	88	51.2	83
Lithium	0.25	<	<	10.2	84	9.77	80
Magnesium	5	98.7	98.9	386	96	367	89
Manganese	0.15	19.6	19.9	83.4	106	78.8	99
Molybdenum	0.1	<	<	28.3	94	26.5	88
Nickel	0.1	4.73	4.85	65.7	102	61.4	94
Phosphorus	25	95.6	96.9	2520	162	2400	153
Potassium	100	115	104	1530	95	1450	89
Selenium	1	119	118	253	nq	239	nq
Silver	0.1	0.115	0.104	28.8	96	27.3	91
Sodium	20	1640	1650	3130	99	2970	88
Strontium	0.1	1.32	1.34	57.0	93	54.1	88
Tin	0.1	34.5	35.6	66.9	108	62.4	93
Titanium	1	78.3	72.5	143	107	136	97
Vanadium	0.1	22.5	22.8	85.9	106	81.5	98
Zinc	3	24.4	24.8	147	102	140	96
Sulphur	50000	2300000	2360000	3010000	nq	3030000	nq
Silicon	75	2123	2205	6617	120	6457	116

APPENDIX 10

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

Semi-Volatile Organics Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. : 21713
Test No.: 1
Test Date: Oct 18/16

Test Location: Incinerator Exhaust Stack
Sample Batch: 16-21713-SVOC-

Sample ID 1

Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	414.3
After Acetone/ Hexane Rinse:	680.7
Total TS1:	266.4

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID 2

Filter

CONTAINER TS2

Colour: light purple/grey

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID 3

XAD-2 Trap

CONTAINER TS3

Initial Wt:	679.6
Final Wt:	687.5
Gain:	7.9
Colour:	white

1

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID 4

Impingers 1, 2 & 3

CONTAINER TS4

Impinger #1 Empty (knock-out)	
Empty Wt:	709.1
Final Wt:	3050.4
Gain:	2341.3
Colour:	clear

2

Impinger #2 Ethylene Glycol	
Empty Wt:	665.8
Initial Wt:	762.1
Final Wt:	972.3
Gain:	210.2
Colour:	Clear

3

Impinger #3 Empty	
Empty Wt:	533.4
Final Wt:	563.1
Gain:	29.7
Colour:	Clear

4

Container TS4 Weights	
Empty Wt:	1353.3
With Imp Soln:	4958.5
Imp Volume:	~~3605.2~~
After ~100g H_2O Rinse:	4958.5
Total TS4:	~~3605.2~~ 3605.2

Sample ID 5

Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	415.4
After Acetone Rinse:	501.9
After Hexane Rinse:	635.1
Total TS5:	219.7

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Box ID: 10

Impinger 4 Silica Gel

CONTAINER TS6 (Impinger)

Initial Wt:	913.9
Final Wt:	943.5
Gain:	29.6
% Spent:	80

5

Train & Proofing Identification	
Proofing provided by:	ALS
Train No:	A
XAD-2 Trap ID:	3
Ethylene Glycol Lot:	159109
HPLC Lot:	ALS H2O
Hexane Lot:	100578
Acetone Lot:	100993

Train Loaded By: AN
Train Recovered By: AS
Recovery Witnessed By:
Date: Oct 18/16

CWTR = 1 - 4: 2589.1 + 938.0 ? = 3527.1

WCBDA=5: 29.6

- TS1, TS5 - 1L Amber Glass Bottle
- ✓ TS4 - 4L Amber Glass Bottle
- TS2 - Glass Petri Dish
- TS3 - Glass Trap

ORTECH

Semi-Volatile Organics Train Recovery Data Sheet
Clean Harbors Sarnia

Project No.: 21713
Test No.: 2
Test Date: Oct 19/16

Test Location: Incinerator Exhaust Stack
Sample Batch: 16-21713-SVOC-

Sample ID 6 — Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	417.5
After Acetone/ Hexane Rinse:	703.0
Total TS1:	285.5

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID 7 — Filter

CONTAINER TS2

Colour: light purple/grey

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID 8 — XAD-2 Trap

CONTAINER TS3

Initial Wt:	684.1
Final Wt:	692.0
1 Gain:	~~white~~ 7.9
Colour:	white

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID 9 — Impingers 1, 2 & 3

CONTAINER TS4

Impinger #1 Empty (knock-out)	
Empty Wt:	715.9
Final Wt:	3071.9
2 Gain:	2356.0 + 992.9
Colour:	clear

Impinger #2 Ethylene Glycol	
Empty Wt:	557.2
Initial Wt:	679.3
Final Wt:	721.2
3 Gain:	41.9
Colour:	clear

Impinger #3 Empty	
Empty Wt:	657.0
Final Wt:	657.5
4 Gain:	0.5
Colour:	clear

Container TS4 Weights	
Empty Wt:	1358.8
With Imp Soln:	4750.1
Imp Volume:	3391.3
After ~100g H_2O Rinse:	4936.2
Total TS4:	3577.4

Sample ID 10 — Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	414.7
After Acetone Rinse:	536.7
After Hexane Rinse:	~~644.7~~ 702.3
Total TS5:	287.6

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Impinger 4 — Silica Gel

CONTAINER TS6 (Impinger)

Initial Wt:	966.2
Final Wt:	981.0
5 Gain:	14.8
% Spent:	40

Box ID: 4

Train & Proofing Identification	
Proofing provided by:	ALS
Train No:	C
XAD-2 Trap ID:	4
Ethylene Glycol Lot:	159109
HPLC Lot:	ALS H2O
Hexane Lot:	100572
Acetone Lot:	100993

CWTR = 1 - 4: ~~2406.3~~ 3399.2

WCBDA=5: 14.8

Train Loaded By: AN
Train Recovered By: AS
Recovery Witnessed By: —
Date: Oct 19/16

- TS1, TS5 - 1L Amber Glass Bottle
- TS4 - 4L Amber Glass Bottle
- TS2 - Glass Petri Dish
- TS3 - Glass Trap

ORTECH

Semi-Volatile Organics Train Recovery Data Sheet
Clean Harbors Sarnia

Project No.: 21713
Test No.: 3
Test Date: Oct 20/16

Test Location: Incinerator Exhaust Stack
Sample Batch: 16-21713-SVOC-

Sample ID 11 — Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser — CONTAINER TS1

Empty Wt:	417.9
After Acetone/ Hexane Rinse:	~~726.8~~ 739.7
Total TS1:	321.8

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID 12 — Filter — CONTAINER TS2

Colour: light grey/purple

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID 13 — XAD-2 Trap — CONTAINER TS3

	Initial Wt:	675.8
	Final Wt:	683.4
1	Gain:	7.6
	Colour:	clear

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID 14 — Impingers 1, 2 & 3 — CONTAINER TS4

	Impinger #1 Empty (knock-out)	
	Empty Wt:	699.2
	Final Wt:	3050.3
2	Gain:	2351.1 + 964.3
	Colour:	clear

	Impinger #2 Ethylene Glycol	
	Empty Wt:	663.1
	Initial Wt:	762.2
	Final Wt:	797.9
3	Gain:	35.7
	Colour:	clear

	Impinger #3 Empty	
	Empty Wt:	670.2
	Final Wt:	670.9
4	Gain:	0.7
	Colour:	clear

Container TS4 Weights	
Empty Wt:	1347.3
With Imp Soln:	4778.2
Imp Volume:	~~4894.6~~ 3430.9
After ~100g H_2O Rinse:	~~4894.6~~ 4893.1
Total TS4:	3545.8

Sample ID 15 — Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers — CONTAINER TS5

Empty Wt:	413.5
After Acetone Rinse:	506.4
After Hexane Rinse:	590.9
Total TS5:	177.4

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Box ID: 2

Knock out Dump
↳ empty: 416.9
total: 1381.2
= 964.3

Impinger 4 Silica Gel — CONTAINER TS6 (Impinger)

	Initial Wt:	798.3
	Final Wt:	814.7
5	Gain:	16.4
	% Spent:	30

Train & Proofing Identification	
Proofing provided by:	ALS
Train No:	D
XAD-2 Trap ID:	5
Ethylene Glycol Lot:	159109
HPLC Lot:	ALS H2O
Hexane Lot:	1008572
Acetone Lot:	108993

CWTR = 1 - 4: 3359.4 ✓

WCBDA=5: 16.4

Train Loaded By: AN
Train Recovered By: AS
Recovery Witnessed By: —
Date: Oct 20/16

- TS1, TS5 - 1L Amber Glass Bottle
- TS4 - 4L Amber Glass Bottle
- TS2 - Glass Petri Dish
- TS3 - Glass Trap

ORTECH

Semi-Volatile Organics Train Recovery Data Sheet
Clean Harbors Sarnia

Project No. : 21713
Test No.: Blank
Test Date: Oct 20/16

Test Location: Incinerator Exhaust Stack
Sample Batch: 16-21713-SVOC-

Sample ID 16 — Nozzle, Probe Liner, Cyclone Bypass, F.H. & B.H. Filter Housing, Frit & Connecting Glassware to Top of Condenser

CONTAINER TS1

Empty Wt:	291.3
After Acetone/ Hexane Rinse:	427.0
Total TS1:	135.7

MARK FLUID LEVEL

SEAL AND LABEL CONTAINER TS1

Sample ID 17 — Filter

CONTAINER TS2

Colour: White

FOLD IN FOIL

SEAL AND LABEL CONTAINER TS2

Sample ID 18 — XAD-2 Trap

CONTAINER TS3

Initial Wt:	673.7
Final Wt:	673.6
Gain:	~0.1
Colour:	clear

1

SEAL TRAP

WRAP IN FOIL

LABEL AS CONTAINER TS3

Sample ID 19 — Impingers 1, 2 & 3

CONTAINER TS4

Impinger #1 Empty (knock-out)	
Empty Wt:	713.0
Final Wt:	712.7
Gain:	~0.3
Colour:	clear

2

Impinger #2 Ethylene Glycol	
Empty Wt:	653.3
Initial Wt:	767.8
Final Wt:	769.1
Gain:	1.3
Colour:	clear

3

Impinger #3 Empty	
Empty Wt:	648.8
Final Wt:	648.7
Gain:	~0.1
Colour:	clear

4

Container TS4 Weights	
Empty Wt:	293.2
With Imp Soln:	409.0
Imp Volume:	115.8
After ~100g H_2O Rinse:	554.6
Total TS4:	261.4

Sample ID 20 — Back-Half Rinses Trap Bottom U-Tube, Imp. Inlet Stem, U-Tubes and Impingers

CONTAINER TS5

Empty Wt:	294.6
After Acetone Rinse:	427.2
After Hexane Rinse:	515.0
Total TS5:	220.4

Use 100 - 150g acetone total & 100- 150g of hexane total for rinses

Box ID: 11

Impinger 4 Silica Gel

CONTAINER TS6 (Impinger)

Initial Wt:	794.5
Final Wt:	798.9
Gain:	4.4
% Spent:	0

5

Train & Proofing Identification	
Proofing provided by:	ALS
Train No:	B
XAD-2 Trap ID:	6
Ethylene Glycol Lot:	159109
HPLC Lot:	ALS H2O
Hexane Lot:	100572
Acetone Lot:	100993

CWTR = 1 - 4: 0.9

WCBDA=5: 4.4

Train Loaded By: AN
Train Recovered By: AS
Recovery Witnessed By: —
Date: Oct 4 20/16

- TS1, TS5 - 1L Amber Glass Bottle
- TS4 - 4L Amber Glass Bottle
- TS2 - Glass Petri Dish
- TS3 - Glass Trap

APPENDIX 11

Semi-Volatile Organics Analytical Reports
(91 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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Rd.
ALS WO#:	L1847086		Mississauga, ON
Date of Report	16-Nov-16		L5J 2Y4
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS: **PCDD/F by EPA M23A**

Steve Kennedy
Technical Supervisor

ALS Life sciences

Sample Analysis summary Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	**16-21713-SVOC-(6 THRU 10) TEST#2**	**16-21713-SVOC-(11 THRU 15) TEST#3**	**16-21713-SVOC-(16 THRU 20) BLANK**
ALS Sample ID	L1847086-1	L1847086-2	L1847086-3	L1847086-4
Sample Size	1	1	1	1
Sample size units	Train	Train	Train	Train
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Extraction Date	8-Nov-16	8-Nov-16	8-Nov-16	8-Nov-16
Target Analytes	**pg**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	<10	<10	<17	<9.2
1,2,3,7,8-PeCDD	10.0	<7.4	<10	<7.4
1,2,3,4,7,8-HxCDD	<11	<13	<9.9	<8.1
1,2,3,6,7,8-HxCDD	16.2	<12	<8.8	<7.3
1,2,3,7,8,9-HxCDD	16.2	<13	<9.8	<8.1
1,2,3,4,6,7,8-HpCDD	81.9	59.0	36.3	<6.4
OCDD	143	<120	69.9	<36
2,3,7,8-TCDF	<9.0	<8.6	<11	<7.6
1,2,3,7,8-PeCDF	<18	<14	<9.9	<5.7
2,3,4,7,8-PeCDF	20.3	<14	<9.7	<5.6
1,2,3,4,7,8-HxCDF	<21	<15	<10	<7.5
1,2,3,6,7,8-HxCDF	26.3	<14	<9.1	<6.8
2,3,4,6,7,8-HxCDF	<20	<10	<9.9	<7.3
1,2,3,7,8,9-HxCDF	<11	<11	<12	<8.9
1,2,3,4,6,7,8-HpCDF	84.9	70.4	<33	11.6
1,2,3,4,7,8,9-HpCDF	<14	<8.1	<11	<9.4
OCDF	69.1	<33	<31	20.7
Field Spike Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
37Cl4-2,3,7,8-TCDD	99	105	99	102
13C12-1,2,3,4,7,8-HxCDD	86	85	76	82
13C12-2,3,4,7,8-PeCDF	98	109	102	102
13C12-1,2,3,4,7,8-HxCDF	79	92	83	80
13C12-1,2,3,4,7,8,9-HpCDF	99	107	96	99
Extraction Standards				
13C12-2,3,7,8-TCDD	92	76	66	74
13C12-1,2,3,7,8-PeCDD	98	84	69	73
13C12-1,2,3,6,7,8-HxCDD	99	85	79	84
13C12-1,2,3,4,6,7,8-HpCDD	94	80	73	78
13C12-OCDD	95	78	74	74
13C12-2,3,7,8-TCDF	103	83	74	81
13C12-1,2,3,7,8-PeCDF	98	82	67	74
13C12-1,2,3,6,7,8-HxCDF	103	81	76	85
13C12-1,2,3,4,6,7,8-HpCDF	86	71	68	70
Cleanup Standard				
13C12-1,2,3,7,8,9-HxCDF	80	66	58	65
Homologue Group Totals	**pg**	**pg**	**pg**	**pg**
Total-TCDD	87.1	24.2	<17	<9.2
Total-PeCDD	71.9	<7.4	<10	<7.4
Total-HxCDD	48.5	43.4	42.2	<8.1
Total-HpCDD	158	59.0	36.3	<6.4
Total-TCDF	32.3	95.8	<11	<7.6
Total-PeCDF	179	93.1	<9.9	<5.7
Total-HxCDF	67.2	35.9	<12	<8.9
Total-HpCDF	84.9	77.8	<11	11.6
Toxic Equivalency - (WHO 2005)				
Lower Bound PCDD/F TEQ (WHO 2005)	23.7	1.29	0.384	0.122
Mid Point PCDD/F TEQ (WHO 2005)	35.0	21.5	19.9	12.5
Upper Bound PCDD/F TEQ (WHO 2005)	41.6	33.1	39.1	24.9

ALS Life sciences

Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2417482-1	WG2417482-2
Sample Size	1.00	1.00
Sample size units	Train	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	8-Nov-16	8-Nov-16
Target Analytes	**pg**	**% Rec**
2,3,7,8-TCDD	<8.8	106
1,2,3,7,8-PeCDD	<7.7	104
1,2,3,4,7,8-HxCDD	<6.1	94
1,2,3,6,7,8-HxCDD	<5.5	107
1,2,3,7,8,9-HxCDD	<6.1	116
1,2,3,4,6,7,8-HpCDD	<7.1	92
OCDD	<34	94
2,3,7,8-TCDF	<5.5	92
1,2,3,7,8-PeCDF	<5.1	92
2,3,4,7,8-PeCDF	<5.0	88
1,2,3,4,7,8-HxCDF	<5.9	87
1,2,3,6,7,8-HxCDF	<5.3	113
2,3,4,6,7,8-HxCDF	<5.7	93
1,2,3,7,8,9-HxCDF	<6.9	91
1,2,3,4,6,7,8-HpCDF	<9.2	100
1,2,3,4,7,8,9-HpCDF	<5.4	93
OCDF	<14	92
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	87	65
13C12-1,2,3,7,8-PeCDD	87	67
13C12-1,2,3,6,7,8-HxCDD	89	71
13C12-1,2,3,4,6,7,8-HpCDD	95	76
13C12-OCDD	100	76
13C12-2,3,7,8-TCDF	96	73
13C12-1,2,3,7,8-PeCDF	87	66
13C12-1,2,3,6,7,8-HxCDF	94	73
13C12-1,2,3,4,6,7,8-HpCDF	93	70
Cleanup Standard		
13C12-1,2,3,7,8,9-HxCDF	62	52
Homologue Group Totals	**pg**	
Total-TCDD	<8.8	
Total-PeCDD	<7.7	
Total-HxCDD	<6.1	
Total-HpCDD	<7.1	
Total-TCDF	<5.5	
Total-PeCDF	<5.1	
Total-HxCDF	<6.9	
Total-HpCDF	<5.4	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.00	
Mid Point PCDD/F TEQ (WHO 2005)	11.6	
Upper Bound PCDD/F TEQ (WHO 2005)	23.1	

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16	
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16	Approved:
Analysis Method	EPA M23A	Sample Size	1 Train	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a	--e-signature--
Sample Matrix	Stack	Split Ratio	7	16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A11
Run Date	15-Nov-16 18:36
Final Volume	45 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<10	10	U		160
1,2,3,7,8-PeCDD	1	31.93	10.0	7.7	M,J		790
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<11	11	U		790
1,2,3,6,7,8-HxCDD	0.1	34.05	16.2	10	M,J		790
1,2,3,7,8,9-HxCDD	0.1	34.19	16.2	11	M,J		790
1,2,3,4,6,7,8-HpCDD	0.01	35.69	81.9	8.1	M,J		790
OCDD	0.0003	37.19	143	8.7	J		1600
2,3,7,8-TCDF	0.1	NotFnd	<9.0	9.0	U		160
1,2,3,7,8-PeCDF	0.03	30.97	<18	5.6	M,J,R	18	790
2,3,4,7,8-PeCDF	0.3	31.72	20.3	5.5	M,J		790
1,2,3,4,7,8-HxCDF	0.1	33.51	<21	9.6	M,J,R	21	790
1,2,3,6,7,8-HxCDF	0.1	33.58	26.3	8.7	M,J		790
2,3,4,6,7,8-HxCDF	0.1	33.92	<20	9.4	M,J,R	20	790
1,2,3,7,8,9-HxCDF	0.1	34.36	<11	11	M,U	6.2	790
1,2,3,4,6,7,8-HpCDF	0.01	35.12	84.9	6.2	J		790
1,2,3,4,7,8,9-HpCDF	0.01	35.94	<14	8.1	M,J,R	14	790
OCDF	0.0003	37.29	69.1	7.4	J		1600

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.65	99	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.00	86	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.70	98	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.51	79	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.93	99	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.63	92	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.92	98	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.05	99	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.67	94	25-130
13C12-OCDD	28000	37.19	95	25-130
13C12-2,3,7,8-TCDF	14000	26.71	103	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.96	98	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.58	103	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.12	86	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	7000	34.33	80	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**	**LQL**
Total-TCDD	2	87.1	10	160
Total-PeCDD	2	71.9	7.7	790
Total-HxCDD	3	48.5	11	790
Total-HpCDD	2	158	8.1	790
Total-TCDF	1	32.3	9.0	160
Total-PeCDF	7	179	5.6	790
Total-HxCDF	2	67.2	11	790
Total-HpCDF	2	84.9	8.1	790

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	23.7
Mid Point PCDD/F TEQ (WHO 2005)	35.0
Upper Bound PCDD/F TEQ (WHO 2005)	41.6

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalenc)
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16		
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16		Approved:
Analysis Method	EPA M23A	Sample Size	1	Train	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a		--e-signature--
Sample Matrix	Stack	Split Ratio	7		16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A12
Run Date	15-Nov-16 19:18
Final Volume	45 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<10	10	U		160
1,2,3,7,8-PeCDD	1	NotFnd	<7.4	7.4	U		790
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<13	13	U		790
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<12	12	U		790
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<13	13	U		790
1,2,3,4,6,7,8-HpCDD	0.01	35.67	59.0	6.2	M,J		790
OCDD	0.0003	37.19	<120	9.3	M,J,R	120	1600
2,3,7,8-TCDF	0.1	NotFnd	<8.6	8.6	U		160
1,2,3,7,8-PeCDF	0.03	30.96	<14	9.7	M,J,R	14	790
2,3,4,7,8-PeCDF	0.3	31.70	<14	9.5	M,J,R	14	790
1,2,3,4,7,8-HxCDF	0.1	33.51	<15	9.3	M,J,R	15	790
1,2,3,6,7,8-HxCDF	0.1	33.58	<14	8.3	M,J,R	14	790
2,3,4,6,7,8-HxCDF	0.1	33.91	<10	9.0	M,J,R	10	790
1,2,3,7,8,9-HxCDF	0.1	34.35	<11	11	U	4.5	790
1,2,3,4,6,7,8-HpCDF	0.01	35.11	70.4	6.2	M,J		790
1,2,3,4,7,8,9-HpCDF	0.01	35.93	<8.1	8.1	M,U		790
OCDF	0.0003	37.27	<33	7.9	M,J,R	33	1600

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.65	105	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.00	85	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.69	109	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.49	92	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.92	107	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.62	76	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.92	84	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.04	85	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.67	80	25-130
13C12-OCDD	28000	37.18	78	25-130
13C12-2,3,7,8-TCDF	14000	26.71	83	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.95	82	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.56	81	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.11	71	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	7000	34.32	66	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	1	24.2	10		160
Total-PeCDD	0	<7.4	7.4	U	790
Total-HxCDD	1	43.4	13		790
Total-HpCDD	1	59.0	6.2		790
Total-TCDF	4	95.8	8.6		160
Total-PeCDF	4	93.1	9.7		790
Total-HxCDF	1	35.9	11		790
Total-HpCDF	2	77.8	8.1		790

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	1.29
Mid Point PCDD/F TEQ (WHO 2005)	21.5
Upper Bound PCDD/F TEQ (WHO 2005)	33.1

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalenc
M Indicates that a peak has been manually integrated.
U Indicates that this compound was not detected above the EDL.

J indicates that a target analyte was detected below the calibrated range.
R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(11 THRU 15) TEST#3**	Sampling Date	20-Oct-16	
ALS Sample ID	L1847086-3	Extraction Date	8-Nov-16	
Analysis Method	EPA M23A	Sample Size	1	Train
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	7	

Approved:
T.Patterson
--e-signature--
16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A13
Run Date	15-Nov-16 19:59
Final Volume	45 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<17	17	U		160
1,2,3,7,8-PeCDD	1	NotFnd	<10	10	U		790
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<9.9	9.9	U		790
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<8.8	8.8	U		790
1,2,3,7,8,9-HxCDD	0.1	34.18	<9.8	9.8	M,U	5.9	790
1,2,3,4,6,7,8-HpCDD	0.01	35.69	36.3	11	M,J		790
OCDD	0.0003	37.19	69.9	14	M,J		1600
2,3,7,8-TCDF	0.1	NotFnd	<11	11	U		160
1,2,3,7,8-PeCDF	0.03	30.97	<9.9	9.9	M,U		790
2,3,4,7,8-PeCDF	0.3	NotFnd	<9.7	9.7	U		790
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<10	10	U		790
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<9.1	9.1	U		790
2,3,4,6,7,8-HxCDF	0.1	33.90	<9.9	9.9	M,U	3.3	790
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<12	12	U		790
1,2,3,4,6,7,8-HpCDF	0.01	35.12	<33	8.2	M,J,R	33	790
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<11	11	U		790
OCDF	0.0003	37.29	<31	14	M,J,R	31	1600

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.66	99	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	34.00	76	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.69	102	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.50	83	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.92	96	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.63	66	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.92	69	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.05	79	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.67	73	25-130
13C12-OCDD	28000	37.19	74	25-130
13C12-2,3,7,8-TCDF	14000	26.72	74	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.96	67	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.56	76	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.11	68	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	7000	34.33	58	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<17	17	U	160
Total-PeCDD	0	<10	10	U	790
Total-HxCDD	1	42.2	9.9		790
Total-HpCDD	1	36.3	11		790
Total-TCDF	0	<11	11	U	160
Total-PeCDF	0	<9.9	9.9	U	790
Total-HxCDF	0	<12	12	U	790
Total-HpCDF	0	<11	11	U	790

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.384
Mid Point PCDD/F TEQ (WHO 2005)	19.9
Upper Bound PCDD/F TEQ (WHO 2005)	39.1

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16	
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16	Approved:
Analysis Method	EPA M23A	Sample Size	1 Train	*T.Patterson*
Analysis Type	Sample	Percent Moisture	n/a	--e-signature--
Sample Matrix	Stack	Split Ratio	7	16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A10
Run Date	15-Nov-16 17:54
Final Volume	45 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<9.2	9.2	U		160
1,2,3,7,8-PeCDD	1	NotFnd	<7.4	7.4	U		790
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<8.1	8.1	U		790
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<7.3	7.3	U		790
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<8.1	8.1	U		790
1,2,3,4,6,7,8-HpCDD	0.01	35.66	<6.4	6.4	M,U	5.6	790
OCDD	0.0003	37.19	<36	11	M,J,R	36	1600
2,3,7,8-TCDF	0.1	NotFnd	<7.6	7.6	U		160
1,2,3,7,8-PeCDF	0.03	NotFnd	<5.7	5.7	U		790
2,3,4,7,8-PeCDF	0.3	NotFnd	<5.6	5.6	U		790
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<7.5	7.5	U		790
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<6.8	6.8	U		790
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<7.3	7.3	U		790
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<8.9	8.9	U		790
1,2,3,4,6,7,8-HpCDF	0.01	35.12	11.6	7.2	M,J		790
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<9.4	9.4	U		790
OCDF	0.0003	37.26	20.7	8.3	M,J		1600

Field Spike Standards	**pg**		**% Rec**	**Limits**
37Cl4-2,3,7,8-TCDD	1000	27.63	102	70-130
13C12-1,2,3,4,7,8-HxCDD	10000	33.98	82	70-130
13C12-2,3,4,7,8-PeCDF	10000	31.68	102	70-130
13C12-1,2,3,4,7,8-HxCDF	10000	33.49	80	70-130
13C12-1,2,3,4,7,8,9-HpCDF	10000	35.92	99	70-130
Extraction Standards				
13C12-2,3,7,8-TCDD	14000	27.60	74	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.90	73	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.03	84	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.66	78	25-130
13C12-OCDD	28000	37.17	74	25-130
13C12-2,3,7,8-TCDF	14000	26.69	81	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.95	74	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.56	85	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.09	70	25-130
Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	7000	34.31	65	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<9.2	9.2	U	160
Total-PeCDD	0	<7.4	7.4	U	790
Total-HxCDD	0	<8.1	8.1	U	790
Total-HpCDD	0	<6.4	6.4	U	790
Total-TCDF	0	<7.6	7.6	U	160
Total-PeCDF	0	<5.7	5.7	U	790
Total-HxCDF	0	<8.9	8.9	U	790
Total-HpCDF	1	11.6	9.4		790

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.122
Mid Point PCDD/F TEQ (WHO 2005)	12.5
Upper Bound PCDD/F TEQ (WHO 2005)	24.9

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	WG2417482-1	Extraction Date	8-Nov-16
Analysis Method	EPA M23A	Sample Size	1 Train
Analysis Type	Blank	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	7

Approved:
T.Patterson
--e-signature--
16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A09
Run Date	15-Nov-16 17:12
Final Volume	45 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
2,3,7,8-TCDD	1	NotFnd	<8.8	8.8	U		160
1,2,3,7,8-PeCDD	1	NotFnd	<7.7	7.7	U		790
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<6.1	6.1	U		790
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<5.5	5.5	U		790
1,2,3,7,8,9-HxCDD	0.1	34.17	<6.1	6.1	U	4.8	790
1,2,3,4,6,7,8-HpCDD	0.01	NotFnd	<7.1	7.1	U		790
OCDD	0.0003	37.18	<34	7.2	M,J,R	34	1600
2,3,7,8-TCDF	0.1	NotFnd	<5.5	5.5	U		160
1,2,3,7,8-PeCDF	0.03	NotFnd	<5.1	5.1	U		790
2,3,4,7,8-PeCDF	0.3	NotFnd	<5.0	5.0	U		790
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<5.9	5.9	U		790
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<5.3	5.3	U		790
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<5.7	5.7	U		790
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<6.9	6.9	U		790
1,2,3,4,6,7,8-HpCDF	0.01	35.13	<9.2	4.1	M,J,R	9.2	790
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<5.4	5.4	U		790
OCDF	0.0003	37.27	<14	7.9	M,J,R	14	1600

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	14000	27.60	87	40-130
13C12-1,2,3,7,8-PeCDD	14000	31.90	87	40-130
13C12-1,2,3,6,7,8-HxCDD	14000	34.04	89	40-130
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.66	95	25-130
13C12-OCDD	28000	37.18	100	25-130
13C12-2,3,7,8-TCDF	14000	26.69	96	40-130
13C12-1,2,3,7,8-PeCDF	14000	30.95	87	40-130
13C12-1,2,3,6,7,8-HxCDF	14000	33.56	94	40-130
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.09	93	25-130

Cleanup Standard	**pg**			
13C12-1,2,3,7,8,9-HxCDF	7000	34.31	62	40-130

Homologue Group Totals	**# peaks**	**Conc. pg**	**EDL pg**		
Total-TCDD	0	<8.8	8.8	U	160
Total-PeCDD	0	<7.7	7.7	U	790
Total-HxCDD	0	<6.1	6.1	U	790
Total-HpCDD	0	<7.1	7.1	U	790
Total-TCDF	0	<5.5	5.5	U	160
Total-PeCDF	0	<5.1	5.1	U	790
Total-HxCDF	0	<6.9	6.9	U	790
Total-HpCDF	0	<5.4	5.4	U	790

Toxic Equivalency - (WHO 2005)	**pg**
Lower Bound PCDD/F TEQ (WHO 2005)	0.00
Mid Point PCDD/F TEQ (WHO 2005)	11.6
Upper Bound PCDD/F TEQ (WHO 2005)	23.1

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalenc
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 into the sample

ALS Life sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a	
ALS Sample ID	WG2417482-2	Extraction Date	8-Nov-16	
Analysis Method	EPA M23A	Sample Size	1	n/a
Analysis Type	LCS	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	7	

Approved:
T.Patterson
--e-signature--
16-Nov-2016

Run Information	**Run 1**
Filename	7-161115A06
Run Date	15-Nov-16 15:07
Final Volume	45 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUSN308327H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	1400	27.65	106	70-130	
1,2,3,7,8-PeCDD	7000	31.92	104	70-130	
1,2,3,4,7,8-HxCDD	7000	34.00	94	70-130	
1,2,3,6,7,8-HxCDD	7000	34.05	107	70-130	
1,2,3,7,8,9-HxCDD	7000	34.17	116	70-130	
1,2,3,4,6,7,8-HpCDD	7000	35.66	92	70-130	
OCDD	14000	37.18	94	70-130	
2,3,7,8-TCDF	1400	26.72	92	70-130	
1,2,3,7,8-PeCDF	7000	30.96	92	70-130	
2,3,4,7,8-PeCDF	7000	31.70	88	70-130	
1,2,3,4,7,8-HxCDF	7000	33.50	87	70-130	
1,2,3,6,7,8-HxCDF	7000	33.56	113	70-130	
2,3,4,6,7,8-HxCDF	7000	33.90	93	70-130	
1,2,3,7,8,9-HxCDF	7000	34.32	91	70-130	
1,2,3,4,6,7,8-HpCDF	7000	35.11	100	70-130	
1,2,3,4,7,8,9-HpCDF	7000	35.92	93	70-130	
OCDF	14000	37.26	92	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	14000	27.62	65	40-130	
13C12-1,2,3,7,8-PeCDD	14000	31.90	67	40-130	
13C12-1,2,3,6,7,8-HxCDD	14000	34.04	71	40-130	
13C12-1,2,3,4,6,7,8-HpCDD	14000	35.66	76	25-130	
13C12-OCDD	28000	37.17	76	25-130	
13C12-2,3,7,8-TCDF	14000	26.71	73	40-130	
13C12-1,2,3,7,8-PeCDF	14000	30.95	66	40-130	
13C12-1,2,3,6,7,8-HxCDF	14000	33.56	73	40-130	
13C12-1,2,3,4,6,7,8-HpCDF	14000	35.10	70	25-130	
Cleanup Standard	**pg**				
13C12-1,2,3,7,8,9-HxCDF	7000	34.31	52	40-130	

NS Indicates that this standard was not spiked into the sample

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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	L1847086	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4
ALS WO#:	ORT100		
Date of Report	22-Nov-16		
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS: **PCB Congeners by EPA 1668A**

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

Steve Kennedy
Technical Supervisor

ALS Life sciences

Sample Analysis summary Report

Sample Name	16-21713-SVOC-(1 THRU 5) TEST#1	16-21713-SVOC-(6 THRU 10) TEST#2	16-21713-SVOC-(11 THRU 15) TEST#3	16-21713-SVOC-(16 THRU 20) BLANK
ALS Sample ID	L1847086-1	L1847086-2	L1847086-3	L1847086-4
Sample Size	1	1	1	1
Sample size units	sample	sample	sample	sample
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Extraction Date	8-Nov-16	8-Nov-16	8-Nov-16	8-Nov-16
Target Analytes	pg	pg	pg	pg
PCB-081	14.6	17.1	12.3	<11
PCB-077	5820	101	87.0	58.8
PCB-123	22.0	27.3	<22	<4.5
PCB-118	1340	1930	1690	1100
PCB-114	<32	<40	42.8	36.0
PCB-105	418	582	522	405
PCB-126	53.4	13.2	<22	<17
PCB-167	19.2	25.0	25.6	21.3
PCB-156/157	52.1	68.8	65.4	<49
PCB-169	<11	<7.4	13.6	11.0
PCB-189	<7.4	<9.1	<5.1	<3.9
Extraction Standards	% Rec	% Rec	% Rec	% Rec
13C12-PCB-001	76	63	53	46
13C12-PCB-003	69	54	52	41
13C12-PCB-004	78	65	55	45
13C12-PCB-015	87	66	68	50
13C12-PCB-019	82	69	60	48
13C12-PCB-037	84	67	70	59
13C12-PCB-054	80	69	61	48
13C12-PCB-081	90	74	72	69
13C12-PCB-077	88	72	72	69
13C12-PCB-104	85	75	65	57
13C12-PCB-123	92	81	72	71
13C12-PCB-118	92	80	72	71
13C12-PCB-114	92	80	73	72
13C12-PCB-105	91	75	73	72
13C12-PCB-126	91	74	73	74
13C12-PCB-155	94	81	70	67
13C12-PCB-167	94	84	73	76
13C12-PCB-156/157	93	79	71	75
13C12-PCB-169	99	78	76	81
13C12-PCB-188	97	85	72	74
13C12-PCB-189	89	76	71	75
13C12-PCB-202	99	86	73	78
13C12-PCB-205	72	63	60	71
13C12-PCB-208	108	94	79	81
13C12-PCB-206	106	91	82	80
13C12-PCB-209	108	90	83	81
Field Spike Standards				
13C12-PCB-031	94	105	97	112
13C12-PCB-095	95	102	95	105
13C12-PCB-153	95	106	99	109
Cleanup Standards				
13C12-PCB-028	70	60	56	58
13C12-PCB-111	80	72	62	74
13C12-PCB-178	60	58	54	80
Homologue Group Totals				
Total MonoCB	1090	2110	860	109
Total DiCB	9810	2850	2200	1070
Total TriCB	12600	3050	2390	1300
Total TetraCB	20700	18300	11300	6670
Total PentaCB	20700	25300	16400	13100
Total HexaCB	3200	4770	3350	3000
Total HeptaCB	308	382	389	245
Total OctaCB	118	70.7	80.8	39.9
Total NonaCB	18.0	<8.6	<13	<7.1
DecaCB	13.9	9.82	8.90	6.70
Total PCB	68500	56900	37000	25500
Toxic Equivalency - (WHO 2005)				
Lower Bound PCB TEQ	5.98	1.41	0.491	0.383
Mid Point PCB TEQ	6.31	1.64	2.69	2.09
Upper Bound PCB TEQ	6.31	1.64	2.69	2.09

ALS Life sciences

Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG2417482-1
Sample Size	1
Sample size units	blank
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	8-Nov-16

Target Analytes	**pg**
PCB-081	12.5
PCB-077	<17
PCB-123	11.8
PCB-118	14.2
PCB-114	<10
PCB-105	<9.4
PCB-126	<10
PCB-167	<7.8
PCB-156/157	18.3
PCB-169	9.23
PCB-189	<6.7
Extraction Standards	**% Rec**
13C12-PCB-001	81
13C12-PCB-003	76
13C12-PCB-004	81
13C12-PCB-015	83
13C12-PCB-019	83
13C12-PCB-037	91
13C12-PCB-054	81
13C12-PCB-081	102
13C12-PCB-077	102
13C12-PCB-104	87
13C12-PCB-123	104
13C12-PCB-118	103
13C12-PCB-114	104
13C12-PCB-105	106
13C12-PCB-126	108
13C12-PCB-155	95
13C12-PCB-167	109
13C12-PCB-156/157	110
13C12-PCB-169	119
13C12-PCB-188	105
13C12-PCB-189	111
13C12-PCB-202	108
13C12-PCB-205	116
13C12-PCB-208	117
13C12-PCB-206	117
13C12-PCB-209	117
Field Spike Standards	
13C12-PCB-031	N/A
13C12-PCB-095	N/A
13C12-PCB-153	N/A
Cleanup Standards	
13C12-PCB-028	60
13C12-PCB-111	72
13C12-PCB-178	76

Homologue Group Totals	
Total MonoCB	24.9
Total DiCB	380
Total TriCB	80.9
Total TetraCB	68.4
Total PentaCB	73.9
Total HexaCB	46.5
Total HeptaCB	13.8
Total OctaCB	1.60
Total NonaCB	<5.3
DecaCB	8.94
Total PCB	699
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.282
Mid Point PCB TEQ	1.28
Upper Bound PCB TEQ	1.28

ALS Life sciences

Sample Analysis summary Report

Sample Name	**Laboratory Control Sample**
ALS Sample ID	WG2417482-2
Sample Size	1
Sample size units	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	8-Nov-16

Target Analytes	**% Rec**
PCB-001	100
PCB-003	99
PCB-004	106
PCB-015	101
PCB-019	103
PCB-037	90
PCB-054	104
PCB-081	98
PCB-077	98
PCB-104	97
PCB-123	103
PCB-118	102
PCB-114	103
PCB-105	100
PCB-126	101
PCB-155	99
PCB-167	101
PCB-156/157	101
PCB-169	98
PCB-188	101
PCB-189	107
PCB-202	102
PCB-205	101
PCB-208	97
PCB-206	108
PCB-209	109

Extraction Standards	**% Rec**
13C12-PCB-001	75
13C12-PCB-003	69
13C12-PCB-004	74
13C12-PCB-015	65
13C12-PCB-019	74
13C12-PCB-037	69
13C12-PCB-054	71
13C12-PCB-081	75
13C12-PCB-077	73
13C12-PCB-104	72
13C12-PCB-123	76
13C12-PCB-118	75
13C12-PCB-114	75
13C12-PCB-105	75
13C12-PCB-126	75
13C12-PCB-155	73
13C12-PCB-167	79
13C12-PCB-156/157	79
13C12-PCB-169	85
13C12-PCB-188	76
13C12-PCB-189	81
13C12-PCB-202	78
13C12-PCB-205	83
13C12-PCB-208	86
13C12-PCB-206	83
13C12-PCB-209	84

Field Spike Standards	
13C12-PCB-031	N/A
13C12-PCB-095	N/A
13C12-PCB-153	N/A

Cleanup Standards	
13C12-PCB-028	56
13C12-PCB-111	58
13C12-PCB-178	60

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16	
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16	
Analysis Method	EPA 1668A	Sample Size	1	sample
Analysis Type	Sample			
Sample Matrix	Stack	Split Ratio	1	

Approved:
E. Sabljic
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B14
Run Date	17-Nov-16 01:27
Final Volume	45 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.77	14.6	3.9	J,B		45
PCB-077	0.0001	22.08	5820	3.9			45
PCB-123	0.00003	23.05	22.0	3.0	M,J,B		45
PCB-118	0.00003	23.23	1340	2.8	M		45
PCB-114	0.00003	23.52	<32	3.1	J,R	32	45
PCB-105	0.00003	23.89	418	3.0			45
PCB-126	0.1	25.46	53.4	3.1	M		45
PCB-167	0.00003	26.35	19.2	3.2	J		45
PCB-156/157	0.00003	26.98	52.1	4.3	J,B		90
PCB-169	0.03	28.63	<11	3.3	M,J,R	11	45
PCB-189	0.00003	29.90	<7.4	2.3	M,J,R	7.4	45

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.86	76	25-150
13C12-PCB-003	14000	10.39	69	25-150
13C12-PCB-004	14000	10.57	78	25-150
13C12-PCB-015	14000	14.24	87	25-150
13C12-PCB-019	14000	12.56	82	25-150
13C12-PCB-037	14000	18.18	84	25-150
13C12-PCB-054	14000	14.44	80	25-150
13C12-PCB-081	14000	21.75	90	25-150
13C12-PCB-077	14000	22.06	88	25-150
13C12-PCB-104	14000	17.47	85	25-150
13C12-PCB-123	14000	23.05	92	25-150
13C12-PCB-118	14000	23.21	92	25-150
13C12-PCB-114	14000	23.51	92	25-150
13C12-PCB-105	14000	23.87	91	25-150
13C12-PCB-126	14000	25.45	91	25-150
13C12-PCB-155	14000	20.46	94	25-150
13C12-PCB-167	14000	26.35	94	25-150
13C12-PCB-156/157	28000	26.99	93	25-150
13C12-PCB-169	14000	28.63	99	25-150
13C12-PCB-188	14000	23.44	97	25-150
13C12-PCB-189	14000	29.90	89	25-150
13C12-PCB-202	14000	26.22	99	25-150
13C12-PCB-205	14000	31.29	72	25-150
13C12-PCB-208	14000	29.62	108	25-150
13C12-PCB-206	14000	32.35	106	25-150
13C12-PCB-209	14000	33.45	108	25-150
Field Spike Standards				
13C12-PCB-031	14000	15.78	94	70-130
13C12-PCB-095	14000	19.09	95	70-130
13C12-PCB-153	14000	24.13	95	70-130
Cleanup Standards				
13C12-PCB-028	14000	15.94	70	30-135
13C12-PCB-111	14000	21.98	80	30-135
13C12-PCB-178	14000	25.02	60	30-135

Homologue Group Totals				
Total MonoCB	1090	2.2	J	45
Total DiCB	9810	2.8	J	45
Total TriCB	12600	1.7	J	45
Total TetraCB	20700	1.6	J	45
Total PentaCB	20700	1.9	J	45
Total HexaCB	3200	2.0	J	45
Total HeptaCB	308	2.0	J	45
Total OctaCB	118	2.3	J	45
Total NonaCB	18.0	6.7	J	45
DecaCB	13.9	1.6	J	45
Total PCB	68500		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	5.98
Mid Point PCB TEQ	6.31
Upper Bound PCB TEQ	6.31

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	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16	
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16	Approved:
Analysis Method	EPA 1668A	Sample Size	1 sample	*E. Sabljic*
Analysis Type	Sample			--e-signature--
Sample Matrix	Stack	Split Ratio	1	21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B15
Run Date	17-Nov-16 02:07
Final Volume	45 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.77	17.1	3.3	J,B		45
PCB-077	0.0001	22.08	101	3.5			45
PCB-123	0.00003	23.05	27.3	5.7	M,J,B		45
PCB-118	0.00003	23.23	1930	5.5	M		45
PCB-114	0.00003	23.52	<40	5.7	J,R	40	45
PCB-105	0.00003	23.89	582	6.2			45
PCB-126	0.1	25.48	13.2	6.3	M,J		45
PCB-167	0.00003	26.37	25.0	3.7	J		45
PCB-156/157	0.00003	26.97	68.8	5.3	J,B		90
PCB-169	0.03	28.65	<7.4	4.5	J,R	7.4	45
PCB-189	0.00003	29.92	<9.1	3.0	J,R	9.1	45

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.86	63	25-150
13C12-PCB-003	14000	10.39	54	25-150
13C12-PCB-004	14000	10.57	65	25-150
13C12-PCB-015	14000	14.24	66	25-150
13C12-PCB-019	14000	12.58	69	25-150
13C12-PCB-037	14000	18.20	67	25-150
13C12-PCB-054	14000	14.44	69	25-150
13C12-PCB-081	14000	21.77	74	25-150
13C12-PCB-077	14000	22.06	72	25-150
13C12-PCB-104	14000	17.47	75	25-150
13C12-PCB-123	14000	23.05	81	25-150
13C12-PCB-118	14000	23.21	80	25-150
13C12-PCB-114	14000	23.52	80	25-150
13C12-PCB-105	14000	23.87	75	25-150
13C12-PCB-126	14000	25.46	74	25-150
13C12-PCB-155	14000	20.46	81	25-150
13C12-PCB-167	14000	26.35	84	25-150
13C12-PCB-156/157	28000	26.99	79	25-150
13C12-PCB-169	14000	28.63	78	25-150
13C12-PCB-188	14000	23.46	85	25-150
13C12-PCB-189	14000	29.90	76	25-150
13C12-PCB-202	14000	26.22	86	25-150
13C12-PCB-205	14000	31.29	63	25-150
13C12-PCB-208	14000	29.62	94	25-150
13C12-PCB-206	14000	32.35	91	25-150
13C12-PCB-209	14000	33.45	90	25-150
Field Spike Standards				
13C12-PCB-031	14000	15.77	105	70-130
13C12-PCB-095	14000	19.09	102	70-130
13C12-PCB-153	14000	24.15	106	70-130
Cleanup Standards				
13C12-PCB-028	14000	15.94	60	30-135
13C12-PCB-111	14000	21.98	72	30-135
13C12-PCB-178	14000	25.02	58	30-135

Homologue Group Totals				
Total MonoCB	2110	2.7	J	45
Total DiCB	2850	2.8	J	45
Total TriCB	3050	2.2	J	45
Total TetraCB	18300	2.1	J	45
Total PentaCB	25300	1.4	J	45
Total HexaCB	4770	3.4	J	45
Total HeptaCB	382	2.2	J	45
Total OctaCB	70.7	1.7	J	45
Total NonaCB	<8.6	8.6	U	45
DecaCB	9.82	1.8	J	45
Total PCB	56900		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	1.41
Mid Point PCB TEQ	1.64
Upper Bound PCB TEQ	1.64

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	**16-21713-SVOC-(11 THRU 15) TEST#3**	Sampling Date	20-Oct-16
ALS Sample ID	L1847086-3	Extraction Date	8-Nov-16
Analysis Method	EPA 1668A	Sample Size	1 sample
Analysis Type	Sample		
Sample Matrix	Stack	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B16
Run Date	17-Nov-16 02:46
Final Volume	45 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.77	12.3	9.1	J,B		45
PCB-077	0.0001	22.08	87.0	9.4			45
PCB-123	0.00003	23.05	< 22	6.2	M,J,R	22	45
PCB-118	0.00003	23.23	1690	5.8	M		45
PCB-114	0.00003	23.54	42.8	6.1	J		45
PCB-105	0.00003	23.89	522	6.1			45
PCB-126	0.1	25.46	< 22	6.2	M,J,R	22	45
PCB-167	0.00003	26.35	25.6	4.4	J		45
PCB-156/157	0.00003	26.99	65.4	6.3	J,B		90
PCB-169	0.03	28.65	13.6	4.8	J,B		45
PCB-189	0.00003	NotFnd	< 5.1	5.1	U		45

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.86	53	25-150
13C12-PCB-003	14000	10.39	52	25-150
13C12-PCB-004	14000	10.57	55	25-150
13C12-PCB-015	14000	14.24	68	25-150
13C12-PCB-019	14000	12.58	60	25-150
13C12-PCB-037	14000	18.20	70	25-150
13C12-PCB-054	14000	14.44	61	25-150
13C12-PCB-081	14000	21.77	72	25-150
13C12-PCB-077	14000	22.06	72	25-150
13C12-PCB-104	14000	17.47	65	25-150
13C12-PCB-123	14000	23.05	72	25-150
13C12-PCB-118	14000	23.21	72	25-150
13C12-PCB-114	14000	23.52	73	25-150
13C12-PCB-105	14000	23.87	73	25-150
13C12-PCB-126	14000	25.46	73	25-150
13C12-PCB-155	14000	20.46	70	25-150
13C12-PCB-167	14000	26.35	73	25-150
13C12-PCB-156/157	28000	26.99	71	25-150
13C12-PCB-169	14000	28.63	76	25-150
13C12-PCB-188	14000	23.44	72	25-150
13C12-PCB-189	14000	29.90	71	25-150
13C12-PCB-202	14000	26.22	73	25-150
13C12-PCB-205	14000	31.29	60	25-150
13C12-PCB-208	14000	29.62	79	25-150
13C12-PCB-206	14000	32.35	82	25-150
13C12-PCB-209	14000	33.45	83	25-150
Field Spike Standards				
13C12-PCB-031	14000	15.78	97	70-130
13C12-PCB-095	14000	19.09	95	70-130
13C12-PCB-153	14000	24.15	99	70-130
Cleanup Standards				
13C12-PCB-028	14000	15.94	56	30-135
13C12-PCB-111	14000	21.98	62	30-135
13C12-PCB-178	14000	25.02	54	30-135

Homologue Group Totals				
Total MonoCB	860	9.4	J	45
Total DiCB	2200	7.6	J	45
Total TriCB	2390	7.9	J	45
Total TetraCB	11300	5.5	J	45
Total PentaCB	16400	4.4	J	45
Total HexaCB	3350	4.2	J	45
Total HeptaCB	389	3.5	J	45
Total OctaCB	80.8	4.8	J	45
Total NonaCB	<13	13	U	45
DecaCB	8.90	3.0	J	45
Total PCB	37000		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.491
Mid Point PCB TEQ	2.69
Upper Bound PCB TEQ	2.69

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

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Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16	
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16	
Analysis Method	EPA 1668A	Sample Size	1	sample
Analysis Type	Sample			
Sample Matrix	Stack	Split Ratio	1	

Approved:
E. Sabljic
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B13
Run Date	17-Nov-16 00:47
Final Volume	45 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.77	<11	3.9	J,R	11	45
PCB-077	0.0001	22.08	58.8	3.9	M		45
PCB-123	0.00003	NotFnd	<4.5	4.5	U		45
PCB-118	0.00003	23.23	1100	4.1	M		45
PCB-114	0.00003	23.52	36.0	4.3	M,J		45
PCB-105	0.00003	23.89	405	4.2			45
PCB-126	0.1	25.46	<17	4.1	J,R	17	45
PCB-167	0.00003	26.37	21.3	2.1	J		45
PCB-156/157	0.00003	26.99	<49	2.8	J,R	49	90
PCB-169	0.03	28.63	11.0	2.2	J,B		45
PCB-189	0.00003	29.90	<3.9	3.0	J,R	3.9	45

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.86	46	25-150
13C12-PCB-003	14000	10.39	41	25-150
13C12-PCB-004	14000	10.57	45	25-150
13C12-PCB-015	14000	14.24	50	25-150
13C12-PCB-019	14000	12.56	48	25-150
13C12-PCB-037	14000	18.18	59	25-150
13C12-PCB-054	14000	14.44	48	25-150
13C12-PCB-081	14000	21.75	69	25-150
13C12-PCB-077	14000	22.06	69	25-150
13C12-PCB-104	14000	17.47	57	25-150
13C12-PCB-123	14000	23.05	71	25-150
13C12-PCB-118	14000	23.21	71	25-150
13C12-PCB-114	14000	23.51	72	25-150
13C12-PCB-105	14000	23.87	72	25-150
13C12-PCB-126	14000	25.45	74	25-150
13C12-PCB-155	14000	20.44	67	25-150
13C12-PCB-167	14000	26.33	76	25-150
13C12-PCB-156/157	28000	26.98	75	25-150
13C12-PCB-169	14000	28.63	81	25-150
13C12-PCB-188	14000	23.44	74	25-150
13C12-PCB-189	14000	29.90	75	25-150
13C12-PCB-202	14000	26.22	78	25-150
13C12-PCB-205	14000	31.27	71	25-150
13C12-PCB-208	14000	29.62	81	25-150
13C12-PCB-206	14000	32.35	80	25-150
13C12-PCB-209	14000	33.45	81	25-150
Field Spike Standards				
13C12-PCB-031	14000	15.78	112	70-130
13C12-PCB-095	14000	19.09	105	70-130
13C12-PCB-153	14000	24.13	109	70-130
Cleanup Standards				
13C12-PCB-028	14000	15.94	58	30-135
13C12-PCB-111	14000	21.98	74	30-135
13C12-PCB-178	14000	25.02	80	30-135

Homologue Group Totals				
Total MonoCB	109	5.4	J	45
Total DiCB	1070	3.2	J	45
Total TriCB	1300	2.8	J	45
Total TetraCB	6670	2.3	J	45
Total PentaCB	13100	1.8	J	45
Total HexaCB	3000	1.5	J	45
Total HeptaCB	245	2.2	J	45
Total OctaCB	39.9	2.5	J	45
Total NonaCB	<7.1	7.1	U	45
DecaCB	6.70	1.7	J	45
Total PCB	25500		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.383
Mid Point PCB TEQ	2.09
Upper Bound PCB TEQ	2.09

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

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a	
ALS Sample ID	WG2417482-1	Extraction Date	8-Nov-16	
Analysis Method	EPA 1668A	Sample Size	1	blank
Analysis Type	Blank			
Sample Matrix	QC	Split Ratio	1	

Approved:
E. Sabljic
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B12
Run Date	17-Nov-16 00:08
Final Volume	45 ul
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg**	**EDL pg**	**Flags**	**EMPC pg**	**LQL**
PCB-081	0.0003	21.77	12.5	2.2	J		45
PCB-077	0.0001	22.08	<17	2.3	J,R	17	45
PCB-123	0.00003	23.07	11.8	2.3	M,J		45
PCB-118	0.00003	23.23	14.2	2.2	J		45
PCB-114	0.00003	23.54	<10	2.2	M,J,R	10	45
PCB-105	0.00003	23.89	<9.4	2.2	J,R	9.4	45
PCB-126	0.1	25.46	<10	2.2	J,R	10	45
PCB-167	0.00003	26.37	<7.8	1.8	J,R	7.8	45
PCB-156/157	0.00003	27.01	18.3	2.5	J		90
PCB-169	0.03	28.65	9.23	1.9	J		45
PCB-189	0.00003	29.92	<6.7	2.0	J,R	6.7	45

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.88	81	25-150
13C12-PCB-003	14000	10.41	76	25-150
13C12-PCB-004	14000	10.57	81	25-150
13C12-PCB-015	14000	14.24	83	25-150
13C12-PCB-019	14000	12.58	83	25-150
13C12-PCB-037	14000	18.20	91	25-150
13C12-PCB-054	14000	14.44	81	25-150
13C12-PCB-081	14000	21.77	102	25-150
13C12-PCB-077	14000	22.06	102	25-150
13C12-PCB-104	14000	17.47	87	25-150
13C12-PCB-123	14000	23.05	104	25-150
13C12-PCB-118	14000	23.21	103	25-150
13C12-PCB-114	14000	23.52	104	25-150
13C12-PCB-105	14000	23.87	106	25-150
13C12-PCB-126	14000	25.46	108	25-150
13C12-PCB-155	14000	20.46	95	25-150
13C12-PCB-167	14000	26.35	109	25-150
13C12-PCB-156/157	28000	26.99	110	25-150
13C12-PCB-169	14000	28.63	119	25-150
13C12-PCB-188	14000	23.46	105	25-150
13C12-PCB-189	14000	29.90	111	25-150
13C12-PCB-202	14000	26.22	106	25-150
13C12-PCB-205	14000	31.29	116	25-150
13C12-PCB-208	14000	29.64	117	25-150
13C12-PCB-206	14000	32.35	117	25-150
13C12-PCB-209	14000	33.45	117	25-150
Field Spike Standards				
13C12-PCB-031			N/A	
13C12-PCB-095			N/A	
13C12-PCB-153			N/A	
Cleanup Standards				
13C12-PCB-028	14000	15.94	60	30-135
13C12-PCB-111	14000	21.98	72	30-135
13C12-PCB-178	14000	25.02	76	30-135

Homologue Group Totals	Conc. pg	EDL pg	Flags	LQL
Total MonoCB	24.9	2.5	J	45
Total DiCB	380	2.7	J	45
Total TriCB	80.9	1.6	J	45
Total TetraCB	68.4	1.6	J	45
Total PentaCB	73.9	1.3	J	45
Total HexaCB	46.5	0.95	J	45
Total HeptaCB	13.8	1.6	J	45
Total OctaCB	1.60	1.2	J	45
Total NonaCB	<5.3	5.3	U	45
DecaCB	8.94	1.3	J	45
Total PCB	699		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.282
Mid Point PCB TEQ	1.28
Upper Bound PCB TEQ	1.28

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
TEQ	Indicates the Toxic Equivalency
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
M	Indicates that a peak has been manually integrated.
J	indicates that the analyte was positively identifed. The associated numerical result is an estimate.
R	Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a	
ALS Sample ID	WG2417482-2	Extraction Date	8-Nov-16	Approved:
Analysis Method	EPA 1668A	Sample Size	1 n/a	*E. Sabljic*
Analysis Type	LCS			--e-signature--
Sample Matrix	QC	Split Ratio	1	21-Nov-2016

Run Information	**Run 1**
Filename	5-161116B10
Run Date	16-Nov-16 22:48
Final Volume	45 ul
Dilution Factor	1
Analysis Units	% Rec
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
PCB-001	7000	8.88	100	50-150	
PCB-003	7000	10.41	99	50-150	
PCB-004	7000	10.59	106	50-150	
PCB-015	7000	14.26	101	50-150	
PCB-019	7000	12.58	103	50-150	
PCB-037	7000	18.20	90	50-150	
PCB-054	7000	14.45	104	50-150	
PCB-081	7000	21.77	98	50-150	
PCB-077	7000	22.08	98	50-150	
PCB-104	7000	17.49	97	50-150	
PCB-123	7000	23.06	103	50-150	
PCB-118	7000	23.23	102	50-150	
PCB-114	7000	23.52	103	50-150	
PCB-105	7000	23.89	100	50-150	
PCB-126	7000	25.46	101	50-150	
PCB-155	7000	20.46	99	50-150	
PCB-167	7000	26.37	101	50-150	
PCB-156/157	14000	26.99	101	50-150	
PCB-169	7000	28.65	98	50-150	
PCB-188	7000	23.46	101	50-150	
PCB-189	7000	29.92	107	50-150	
PCB-202	7000	26.24	102	50-150	
PCB-205	7000	31.30	101	50-150	
PCB-208	7000	29.64	97	50-150	
PCB-206	7000	32.36	108	50-150	
PCB-209	7000	33.49	109	50-150	

Extraction Standards		**Time**	**% Rec**	**Limits**
13C12-PCB-001	14000	8.86	75	30-140
13C12-PCB-003	14000	10.39	69	30-140
13C12-PCB-004	14000	10.57	74	30-140
13C12-PCB-015	14000	14.24	65	30-140
13C12-PCB-019	14000	12.56	74	30-140
13C12-PCB-037	14000	18.18	69	30-140
13C12-PCB-054	14000	14.44	71	30-140
13C12-PCB-081	14000	21.75	75	30-140
13C12-PCB-077	14000	22.06	73	30-140
13C12-PCB-104	14000	17.47	72	30-140
13C12-PCB-123	14000	23.05	76	30-140
13C12-PCB-118	14000	23.21	75	30-140
13C12-PCB-114	14000	23.51	75	30-140
13C12-PCB-105	14000	23.87	75	30-140
13C12-PCB-126	14000	25.46	75	30-140
13C12-PCB-155	14000	20.44	73	30-140
13C12-PCB-167	14000	26.35	79	30-140
13C12-PCB-156/157	28000	26.99	79	30-140
13C12-PCB-169	14000	28.63	85	30-140
13C12-PCB-188	14000	23.44	76	30-140
13C12-PCB-189	14000	29.90	81	30-140
13C12-PCB-202	14000	26.22	78	30-140
13C12-PCB-205	14000	31.29	83	30-140
13C12-PCB-208	14000	29.62	86	30-140
13C12-PCB-206	14000	32.35	83	30-140
13C12-PCB-209	14000	33.45	84	30-140

Field Spike Standards				
13C12-PCB-031			N/A	
13C12-PCB-095			N/A	
13C12-PCB-153			N/A	

Cleanup Standards				
13C12-PCB-028	14000	15.94	56	40-125
13C12-PCB-111	14000	21.98	58	40-125
13C12-PCB-178	14000	25.02	60	40-125

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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1847086		Mississauga, ON L5J 2Y4
Date of Report	18-Nov-16		Canada
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS: **CB by Low Res SIM GCMS**

Certified by:

Steve Kennedy
Technical Supervisor

Results in this certificate relate only to the samples as submitted to the laboratory.

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		16-21713-SVOC-(1 THRU 5) TEST#1		16-21713-SVOC-(6 THRU 10) TEST#2		16-21713-SVOC-(11 THRU 15) TEST#3		16-21713-SVOC-(16 THRU 20) BLANK		Laboratory Control Sample
ALS Sample ID	WG2417482-1		L1847086-1		L1847086-2		L1847086-3		L1847086-4		WG2417482-2
Sample Size	1		1		1		1		1		1
Sample units	sample		sample		sample		sample		sample		n/a
Moisture Content	n/a		n/a		n/a		n/a		n/a		n/a
Matrix	QC		Stack		Stack		Stack		Stack		QC
Sampling Date	n/a		18-Oct-16		19-Oct-16		20-Oct-16		20-Oct-16		n/a
Extraction Date	8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**% Recovery**
1,3-Dichlorobenzene	<35	U	499		302		374		<35	U	68
1,4-Dichlorobenzene	<35	U	310	M	201	M	209	M	<35	U	62
1,2-Dichlorobenzene	<35	U	382		228		345		<35	U	70
1,3,5-Trichlorobenzene	<35	U	102		46.8		64.8		<35	U	87
1,2,4-Trichlorobenzene	<35	U	470		252		203		<35	U	142
1,2,3-Trichlorobenzene	<35	U	179		113		118		<35	U	90
1,2,3,5/1,2,4,5-Tetrachlorobenzene	<35	U	90.4		44.9		68.3		<35	U	96
1,2,3,4-Tetrachlorobenzene	<35	U	<35	U	<35	U	<35	U	<35	U	101
Pentachlorobenzene	<35	U	<35	U	<35	U	<35	U	<35	U	103
Hexachlorobenzene	<35	U	<35	U	<35	U	<35	U	<35	U	103
Hexachloroethane	<35	U	<35	U	<35	U	<35	U	<35	U	NS
a,2,6-Trichlorotoluene	<35	U	<35	U	<35	U	<35	U	<35	U	NS
Field Sampling Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**
1-Bromo-2,3-dichlorobenzene	NS		85		96		111		78		NS
Extraction Standards	**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**		**%Rec**
1,3-Dichloro-4-Fluorobenzene	138		86		93		85		91		117
1,2-Dichlorobenzene-d4	77		49		52		48		51		65
Hexachlorobenzene-13C6	118		81		98		114		79		107

U Indicates that this compound was not detected above the LOD.
M Indicates that a peak has been manually integrated.
NS Indicates that this compound was not spiked in.

ALS Environmental

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**		Sampling Date	n/a
ALS Sample ID	WG2417482-1		Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS			
Analysis Type	Blank			
Sample Matrix	QC			
Sample Size	1	sample		
Percent Moisture	n/a			
Split Ratio	7			

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111707.D
Run Date	11/17/2016 10:47
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		5.78	<35	U
1,4-Dichlorobenzene		5.86	<35	U
1,2-Dichlorobenzene		6.15	<35	U
1,3,5-Trichlorobenzene		NotFnd	<35	U
1,2,4-Trichlorobenzene		7.87	<35	U
1,2,3-Trichlorobenzene		NotFnd	<35	U
1,2,3,5/1,2,4,5-Tetrachlorobenzen		9.47	<35	U
1,2,3,4-Tetrachlorobenzene		9.96	<35	U
Pentachlorobenzene		11.28	<35	U
Hexachlorobenzene		NotFnd	<35	U
Hexachloroethane		NotFnd	<35	U
Hexachloroethane		NotFnd	<35	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	NS			
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	138	
1,2-Dichlorobenzene-d4	1400	6.14	77	
Hexachlorobenzene-13C6	1837.5	12.89	118	

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111709.D
Run Date	11/17/2016 11:28
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		5.78	499	
1,4-Dichlorobenzene		5.86	310	M
1,2-Dichlorobenzene		6.15	382	
1,3,5-Trichlorobenzene		7.35	102	
1,2,4-Trichlorobenzene		7.87	470	
1,2,3-Trichlorobenzene		8.27	179	
1,2,3,5/1,2,4,5-Tetrachlorobenzen		9.47	90.4	
1,2,3,4-Tetrachlorobenzene		9.97	<35	U
Pentachlorobenzene		11.28	<35	U
Hexachlorobenzene		12.89	<35	U
Hexachloroethane		NotFnd	<35	U
a,2,6-Trichlorotoluene		NotFnd	<35	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	500	9.26	85	
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	86	
1,2-Dichlorobenzene-d4	1400	6.13	49	
Hexachlorobenzene-13C6	1837.5	12.89	81	

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111710.D
Run Date	11/17/2016 11:49
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		5.78	302	
1,4-Dichlorobenzene		5.86	201	M
1,2-Dichlorobenzene		6.15	228	
1,3,5-Trichlorobenzene		7.35	46.8	
1,2,4-Trichlorobenzene		7.87	252	
1,2,3-Trichlorobenzene		8.27	113	
1,2,3,5/1,2,4,5-Tetrachlorobenzen		9.47	44.9	
1,2,3,4-Tetrachlorobenzene		9.97	<35	U
Pentachlorobenzene		11.28	<35	U
Hexachlorobenzene		12.89	<35	U
Hexachloroethane		NotFnd	<35	U
a,2,6-Trichlorotoluene		NotFnd	<35	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	500	9.26	96	
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	93	
1,2-Dichlorobenzene-d4	1400	6.14	52	
Hexachlorobenzene-13C6	1837.5	12.89	98	

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(11 THRU 15) TEST#3**		Sampling Date	20-Oct-16
ALS Sample ID	L1847086-3		Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS			
Analysis Type	Sample			
Sample Matrix	Stack			
Sample Size	1	sample		
Percent Moisture	n/a			
Split Ratio	7			

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111711.D
Run Date	11/17/2016 12:10
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		5.78	374	
1,4-Dichlorobenzene		5.86	209	M
1,2-Dichlorobenzene		6.16	345	
1,3,5-Trichlorobenzene		7.35	64.8	
1,2,4-Trichlorobenzene		7.87	203	
1,2,3-Trichlorobenzene		8.27	118	
1,2,3,5/1,2,4,5-Tetrachlorobenzen		9.48	68.3	
1,2,3,4-Tetrachlorobenzene		9.97	<35	U
Pentachlorobenzene		11.28	<35	U
Hexachlorobenzene		12.89	<35	U
Hexachloroethane		NotFnd	<35	U
a,2,6-Trichlorotoluene		NotFnd	<35	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	500	9.26	111	
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	85	
1,2-Dichlorobenzene-d4	1400	6.14	48	
Hexachlorobenzene-13C6	1837.5	12.89	114	

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111708.D
Run Date	11/17/2016 11:07
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
1,3-Dichlorobenzene		5.78	<35	U
1,4-Dichlorobenzene		5.86	<35	U
1,2-Dichlorobenzene		6.15	<35	U
1,3,5-Trichlorobenzene		NotFnd	<35	U
1,2,4-Trichlorobenzene		7.87	<35	U
1,2,3-Trichlorobenzene		NotFnd	<35	U
1,2,3,5/1,2,4,5-Tetrachlorobenzen		9.47	<35	U
1,2,3,4-Tetrachlorobenzene		9.96	<35	U
Pentachlorobenzene		NotFnd	<35	U
Hexachlorobenzene		NotFnd	<35	U
Hexachloroethane		NotFnd	<35	U
a,2,6-Trichlorotoluene		NotFnd	<35	U
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	500	9.26	78	
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	91	
1,2-Dichlorobenzene-d4	1400	6.14	51	
Hexachlorobenzene-13C6	1837.5	12.89	79	

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

ALS Environmental

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2417482-2	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 n/a		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
18-Nov-2016

Run Information	**Run 1**
Filename	16111703.D
Run Date	11/17/2016 9:03
Final Volume	0.5 mL
Dilution Factor	1
Analysis Units	%
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes	**ug spiked**	**Ret. Time**	**% Recovery**	**Flags**
1,3-Dichlorobenzene	350	5.78	68	
1,4-Dichlorobenzene	350	5.86	62	
1,2-Dichlorobenzene	350	6.15	70	
1,3,5-Trichlorobenzene	350	7.35	87	
1,2,4-Trichlorobenzene	350	7.87	142	
1,2,3-Trichlorobenzene	350	8.27	90	
1,2,3,5/1,2,4,5-Tetrachlorobenzen	875	9.48	96	
1,2,3,4-Tetrachlorobenzene	525	9.97	101	
Pentachlorobenzene	525	11.28	103	
Hexachlorobenzene	525	12.89	103	
Hexachloroethane	NS			
a,2,6-Trichlorotoluene	NS			
Field Sampling Standards	**ng spiked**		**%Rec**	
1-Bromo-2,3-dichlorobenzene	NS			
Extraction Standards			**%Rec**	
1,3-Dichloro-4-Fluorobenzene	1400	5.79	117	
1,2-Dichlorobenzene-d4	1400	6.14	65	
Hexachlorobenzene-13C6	1837.5	12.89	107	

NS Indicates that this compound was not spiked in.

1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1847086		Mississauga, ON L5J 2Y4
Date of Report	18-Nov-16		
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

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

The recovery of the extraction standard 2,4,6-Tribromophenol was below the method control limit for the method blank.

The recovery of the extraction standard 2,4,6-Tribromophenol was above the method control limit for the sample trains, suggesting that it was present in the samples prior to extraction.

Certified by: Kennedy

Steve Kennedy
Technical Supervisor

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		16-21713-SVOC- (1 THRU 5) TEST#1		16-21713-SVOC- (6 THRU 10) TEST#2		16-21713-SVOC- (11 THRU 15) TEST#3		16-21713-SVOC- (16 THRU 20) BLANK		Laboratory Control Sample
ALS Sample ID	WG2417482-1		L1847086-1		L1847086-2		L1847086-3		L1847086-4		WG2417482-2
Sample Size	1		1		1		1		1		1
Sample units	sample		sample		sample		sample		sample		n/a
Moisture Content	n/a		n/a		n/a		n/a		n/a		n/a
Matrix	QC		Stack		Stack		Stack		Stack		QC
Sampling Date	n/a		18-Oct-16		19-Oct-16		20-Oct-16		20-Oct-16		n/a
Extraction Date	8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**% Recovery**
2,6-Dichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	88
2,4/2,5-Dichlorophenol	<70	U	107	M	84.1	M	90	M	<70	U	80
3,5-Dichlorophenol	<70	U	<131	M,R	<117	M,R	<124	R	<70	U	92
2,3-Dichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	92
3,4-Dichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	88
2,4,6-Trichlorophenol	<70	U	248		198		333		<70	U	86
2,3,6-Trichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	88
2,3,5-Trichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	83
2,4,5-Trichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	81
2,3,4-Trichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	86
3,4,5-Trichlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	86
2,3,5,6/2,3,4,6-Tetrachlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	74
2,3,4,5-Tetrachlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	85
Pentachlorophenol	<70	U	<70	U	<70	U	<70	U	<70	U	82
Hexachlorophene	<70	U	<70	U	<70	U	<70	U	<70	U	44
Extraction Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**
2-Fluorophenol	50		88		83		68	M	64	M	61
d5-Phenol	61		91		87	M	85	M	89	M	83
d4-2-Chlorophenol	55		89	M	75	M	84	M	84	M	83
2,4,6-Tribromophenol	29		227		184		226	M	72		86
13C-Pentachlorophenol	63		98		113		119	M	60		87
Field Spike	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**
2,6-Dichloro-4-Fluorophenol(FS)	NS		91		90		94		80		NS

U	Indicates that this compound was not detected above the LOD.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion. Value represents an estimated maximum.
NS	Indicates that this compound was not spiked in.

ALS Environmental

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**		Sampling Date	n/a
ALS Sample ID	WG2417482-1		Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS			
Analysis Type	Blank			
Sample Matrix	QC			
Sample Size	1	sample		
Percent Moisture	n/a			
Split Ratio	7			

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111511.D
Run Date	11/15/2016 19:02
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN267447H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
2,6-Dichlorophenol		NotFnd	<70	U
2,4/2,5-Dichlorophenol		9.48	<70	U
3,5-Dichlorophenol		NotFnd	<70	U
2,3-Dichlorophenol		NotFnd	<70	U
3,4-Dichlorophenol		NotFnd	<70	U
2,4,6-Trichlorophenol		10.40	<70	U
2,3,6-Trichlorophenol		NotFnd	<70	U
2,3,5-Trichlorophenol		NotFnd	<70	U
2,4,5-Trichlorophenol		NotFnd	<70	U
2,3,4-Trichlorophenol		NotFnd	<70	U
3,4,5-Trichlorophenol		11.44	<70	U
2,3,5,6/2,3,4,6-Tetrachlorophenol		NotFnd	<70	U
2,3,4,5-Tetrachlorophenol		NotFnd	<70	U
Pentachlorophenol		13.50	<70	U
Hexachlorophene		NotFnd	<70	U
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.22	50	
d5-Phenol	1400	6.34	61	
d4-2-Chlorophenol	1400	7.94	55	
2,4,6-Tribromophenol	1400	12.85	29	
13C-Pentachlorophenol	1400	13.50	63	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	NS			

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111513.D
Run Date	11/15/2016 19:50
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN127357H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
2,6-Dichlorophenol		9.27	<70	U
2,4/2,5-Dichlorophenol		9.47	107 M	
3,5-Dichlorophenol		9.59	<131 M	,R
2,3-Dichlorophenol		9.80	<70	U
3,4-Dichlorophenol		NotFnd	<70	U
2,4,6-Trichlorophenol		10.39	248	
2,3,6-Trichlorophenol		10.83	<70	U
2,3,5-Trichlorophenol		10.86	<70	U
2,4,5-Trichlorophenol		10.94	<70	U
2,3,4-Trichlorophenol		NotFnd	<70	U
3,4,5-Trichlorophenol		11.44	<70	U
2,3,5,6/2,3,4,6-Tetrachlorophenol		12.04	<70	U
2,3,4,5-Tetrachlorophenol		NotFnd	<70	U
Pentachlorophenol		NotFnd	<70	U
Hexachlorophene		NotFnd	<70	U
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.25	88	
d5-Phenol	1400	6.36	91	
d4-2-Chlorophenol	1400	7.95	89 M	
2,4,6-Tribromophenol	1400	12.85	227	
13C-Pentachlorophenol	1400	13.50	98	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.58	91	

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. Value represents an estimated maximum.
NS	Indicates that this compound was not spiked in.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111514.D
Run Date	11/15/2016 20:14
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN127357H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
2,6-Dichlorophenol		9.25	<70	U
2,4/2,5-Dichlorophenol		9.47	84.1	M
3,5-Dichlorophenol		9.59	<117	M ,R
2,3-Dichlorophenol		9.79	<70	U
3,4-Dichlorophenol		NotFnd	<70	U
2,4,6-Trichlorophenol		10.39	198	
2,3,6-Trichlorophenol		10.83	<70	U
2,3,5-Trichlorophenol		10.86	<70	U
2,4,5-Trichlorophenol		NotFnd	<70	U
2,3,4-Trichlorophenol		NotFnd	<70	U
3,4,5-Trichlorophenol		11.44	<70	U
2,3,5,6/2,3,4,6-Tetrachlorophenol		12.04	<70	U
2,3,4,5-Tetrachlorophenol		NotFnd	<70	U
Pentachlorophenol		13.50	<70	U
Hexachlorophene		NotFnd	<70	U
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.24	83	
d5-Phenol	1400	6.35	87	M
d4-2-Chlorophenol	1400	7.95	75	M
2,4,6-Tribromophenol	1400	12.85	184	
13C-Pentachlorophenol	1400	13.50	113	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.57	90	

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. Value represents an estimated maximum.
NS	Indicates that this compound was not spiked in.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(11 THRU 15) TEST#3**	Sampling Date	20-Oct-16
ALS Sample ID	L1847086-3	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111515.D
Run Date	11/15/2016 20:38
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN127357H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
2,6-Dichlorophenol		NotFnd	<70	U
2,4/2,5-Dichlorophenol		9.48	90	M
3,5-Dichlorophenol		9.59	<124	R
2,3-Dichlorophenol		9.79	<70	U
3,4-Dichlorophenol		NotFnd	<70	U
2,4,6-Trichlorophenol		10.39	333	
2,3,6-Trichlorophenol		10.82	<70	U
2,3,5-Trichlorophenol		10.86	<70	U
2,4,5-Trichlorophenol		NotFnd	<70	U
2,3,4-Trichlorophenol		NotFnd	<70	U
3,4,5-Trichlorophenol		11.44	<70	U
2,3,5,6/2,3,4,6-Tetrachlorophenol		12.04	<70	U
2,3,4,5-Tetrachlorophenol		NotFnd	<70	U
Pentachlorophenol		13.50	<70	U
Hexachlorophene		NotFnd	<70	U
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.25	68	M
d5-Phenol	1400	6.36	85	M
d4-2-Chlorophenol	1400	7.95	84	M
2,4,6-Tribromophenol	1400	12.85	226	M
13C-Pentachlorophenol	1400	13.50	119	M
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.58	94	

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. Value represents an estimated maximum.
NS	Indicates that this compound was not spiked in.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	Sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111512.D
Run Date	11/15/2016 19:26
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng/sample
Instrument	MSD-2
Column	HP-5MS USN127357H

Target Analytes		**Ret. Time**	**Concentration ng/sample**	**Flags**
2,6-Dichlorophenol		9.32	<70	U
2,4/2,5-Dichlorophenol		9.47	<70	U
3,5-Dichlorophenol		9.60	<70	U
2,3-Dichlorophenol		9.81	<70	U
3,4-Dichlorophenol		NotFnd	<70	U
2,4,6-Trichlorophenol		10.39	<70	U
2,3,6-Trichlorophenol		NotFnd	<70	U
2,3,5-Trichlorophenol		NotFnd	<70	U
2,4,5-Trichlorophenol		NotFnd	<70	U
2,3,4-Trichlorophenol		11.33	<70	U
3,4,5-Trichlorophenol		11.44	<70	U
2,3,5,6/2,3,4,6-Tetrachlorophenol		NotFnd	<70	U
2,3,4,5-Tetrachlorophenol		NotFnd	<70	U
Pentachlorophenol		13.50	<70	U
Hexachlorophene		NotFnd	<70	U
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.45	64	M
d5-Phenol	1400	6.54	89	M
d4-2-Chlorophenol	1400	8.00	84	M
2,4,6-Tribromophenol	1400	12.85	72	
13C-Pentachlorophenol	1400	13.50	60	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	1000	8.61	80	

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

NS Indicates that this compound was not spiked in.

ALS Environmental

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2417482-2	Extraction Date	8-Nov-16
Analysis Method	SIM GC/MS		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 n/a		
Percent Moisture	n/a		
Split Ratio	7		

Approved:
S. Jin
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	16111509.D
Run Date	11/15/2016 18:14
Final Volume	1 mL
Dilution Factor	1
Analysis Units	%
Instrument	MSD-2
Column	HP-5MS USN127357H

Target Analytes	**ug spiked**	**Ret. Time**	**% Recovery**	**Flags**
2,6-Dichlorophenol	1400	9.27	88	
2,4/2,5-Dichlorophenol	2800	9.48	80	
3,5-Dichlorophenol	1400	9.60	92	
2,3-Dichlorophenol	1400	9.79	92	
3,4-Dichlorophenol	1400	10.03	88	
2,4,6-Trichlorophenol	1400	10.40	86	
2,3,6-Trichlorophenol	1400	10.81	88	
2,3,5-Trichlorophenol	1400	10.88	83	
2,4,5-Trichlorophenol	1400	10.94	81	
2,3,4-Trichlorophenol	1400	11.34	86	
3,4,5-Trichlorophenol	1400	11.45	86	
2,3,5,6/2,3,4,6-Tetrachlorophenol	2800	12.04	74	M
2,3,4,5-Tetrachlorophenol	1400	12.53	85	
Pentachlorophenol	1400	13.50	82	
Hexachlorophene	1400	18.70	44	
Extraction Standards			**% Rec**	
2-Fluorophenol	1400	6.26	61	
d5-Phenol	1400	6.37	83	M
d4-2-Chlorophenol	1400	7.95	83	
2,4,6-Tribromophenol	1400	12.85	86	
13C-Pentachlorophenol	1400	13.50	87	
Field Spike			**% Rec**	
2,6-Dichloro-4-Fluorophenol(FS)	NS			

M Indicates that a peak has been manually integrated.

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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1847086		Mississauga, ON L5J 2Y4
Date of Report	29-Nov-16		
Date of Sample Receipt	26-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

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

*** REVISED REPORT ***

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

Results for oxychlordane have been included.

Certified by: Kennedy

Steve Kennedy
Technical Supervisor

ALS Life Sciences

Sample Analysis Summary Report

Sample Name	16-21713-SVOC-(16 THRU 20) BLANK	16-21713-SVOC-(1 THRU 5) TEST#1	16-21713-SVOC-(6 THRU 10) TEST#2	16-21713-SVOC-(11 THRU 15) TEST#3
ALS Sample ID	L1847086-4	L1847086-1	L1847086-2	L1847086-3
Sample Size	1	1	1	1
Sample size units	sample	sample	sample	sample
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	20-Oct-16	18-Oct-16	19-Oct-16	20-Oct-16
Extraction Date	8-Nov-16	8-Nov-16	8-Nov-16	8-Nov-16
Target Analytes	**ng**	**ng**	**ng**	**ng**
Hexachlorobutadiene	<0.023	2.84	3.58	7.86
Heptachlor	<0.040	<0.024	<0.022	<0.018
Octachlorostyrene	<0.030	<0.029	<0.022	<0.014
Oxychlordane	<0.30	<0.17	<0.15	<0.13
Heptachlor Epoxide B	<0.093	<0.060	<0.039	<0.052
Heptachlor Epoxide A	<0.52	<0.33	<0.22	<0.29
trans-Chlordane	<0.44	<0.55	<0.56	<0.47
cis-Chlordane	<0.37	<0.46	<0.48	<0.40
Parlar 26	<0.83	<0.76	<0.70	<0.32
Parlar 50	<1.1	<1.5	<1.4	<0.91
Parlar 62	<2.1	<2.9	<2.7	<1.8
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
Pentachlorobenzene, 13C6-	104	103	95	83
Heptachlor, 13C10-	82	84	81	80
Oxychlordane, 13C10-	79	78	83	90
trans-Nonachlor, 13C10-	76	80	77	80
Mirex, 13C10-	94	83	83	85

ALS Life Sciences

Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2417482-1	WG2417482-2
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	8-Nov-16	8-Nov-16
Target Analytes	**ng**	**%**
Hexachlorobutadiene	<0.019	77
Heptachlor	<0.040	96
Octachlorostyrene	<0.045	99
Oxychlordane	<0.31	86
Heptachlor Epoxide B	<0.082	106
Heptachlor Epoxide A	<0.46	98
trans-Chlordane	<0.72	96
cis-Chlordane	<0.61	91
Parlar 26	<1.4	101
Parlar 50	<2.8	62
Parlar 62	<5.5	101
Extraction Standards	**% Rec**	**% Rec**
Pentachlorobenzene, 13C6-	110	98
Heptachlor, 13C10-	92	95
Oxychlordane, 13C10-	83	84
trans-Nonachlor, 13C10-	98	95
Mirex, 13C10-	96	102

ALS Life Sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16	
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16	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	7	17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A06
Run Date	15-Nov-16 11:52
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**
Hexachlorobutadiene	NotFnd	<0.023	0.023	U
Heptachlor	NotFnd	<0.040	0.040	U
Octachlorostyrene	NotFnd	<0.030	0.030	U
Oxychlordane	NotFnd	<0.30	0.30	U
Heptachlor Epoxide B	NotFnd	<0.093	0.093	U
Heptachlor Epoxide A	NotFnd	<0.52	0.52	U
trans-Chlordane	NotFnd	<0.44	0.44	U
cis-Chlordane	NotFnd	<0.37	0.37	U
Parlar 26	NotFnd	<0.83	0.83	U
Parlar 50	NotFnd	<1.1	1.1	U
Parlar 62	NotFnd	<2.1	2.1	U

Extraction Standards	**ng**		**% Rec**	**Limits**
Pentachlorobenzene, 13C6-	437.5	10:40	104	5-120
Heptachlor, 13C10-	437.5	17:08	82	5-120
Oxychlordane, 13C10-	437.5	19:34	79	23-135
trans-Nonachlor, 13C10-	437.5	20:54	76	36-139
Mirex, 13C10-	437.5	26:40	94	5-120

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the LQL.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.

ALS Life Sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16	
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16	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	7	17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A07
Run Date	15-Nov-16 12:26
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**
Hexachlorobutadiene	6:01	2.84	0.046	J
Heptachlor	NotFnd	<0.024	0.024	U
Octachlorostyrene	NotFnd	<0.029	0.029	U
Oxychlordane	NotFnd	<0.17	0.17	U
Heptachlor Epoxide B	NotFnd	<0.060	0.060	U
Heptachlor Epoxide A	NotFnd	<0.33	0.33	U
trans-Chlordane	NotFnd	<0.55	0.55	U
cis-Chlordane	NotFnd	<0.46	0.46	U
Parlar 26	NotFnd	<0.76	0.76	U
Parlar 50	NotFnd	<1.5	1.5	U
Parlar 62	NotFnd	<2.9	2.9	U

Extraction Standards	**ng**		**% Rec**	**Limits**
Pentachlorobenzene, 13C6-	437.5	10:40	103	5-120
Heptachlor, 13C10-	437.5	17:09	84	5-120
Oxychlordane, 13C10-	437.5	19:34	78	23-135
trans-Nonachlor, 13C10-	437.5	20:55	80	36-139
Mirex, 13C10-	437.5	26:40	83	5-120

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the LQL.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16	
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16	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	7	17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A08
Run Date	15-Nov-16 13:00
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**
Hexachlorobutadiene	5:58	3.58	0.063	J
Heptachlor	NotFnd	<0.022	0.022	U
Octachlorostyrene	NotFnd	<0.022	0.022	U
Oxychlordane	NotFnd	<0.15	0.15	U
Heptachlor Epoxide B	NotFnd	<0.039	0.039	U
Heptachlor Epoxide A	NotFnd	<0.22	0.22	U
trans-Chlordane	NotFnd	<0.56	0.56	U
cis-Chlordane	NotFnd	<0.48	0.48	U
Parlar 26	NotFnd	<0.70	0.70	U
Parlar 50	NotFnd	<1.4	1.4	U
Parlar 62	NotFnd	<2.7	2.7	U

Extraction Standards	**ng**		**% Rec**	**Limits**
Pentachlorobenzene, 13C6-	437.5	10:40	95	5-120
Heptachlor, 13C10-	437.5	17:08	81	5-120
Oxychlordane, 13C10-	437.5	19:34	83	23-135
trans-Nonachlor, 13C10-	437.5	20:55	77	36-139
Mirex, 13C10-	437.5	26:40	83	5-120

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the LQL.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Sample Analysis Report

Sample Name	**16-21713-SVOC-(11 THRU 15) TEST#3**	Sampling Date	20-Oct-16	
ALS Sample ID	L1847086-3	Extraction Date	8-Nov-16	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	7	17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A09
Run Date	15-Nov-16 13:34
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**
Hexachlorobutadiene	6:01	7.86	0.25	J
Heptachlor	NotFnd	<0.018	0.018	U
Octachlorostyrene	NotFnd	<0.014	0.014	U
Oxychlordane	NotFnd	<0.13	0.13	U
Heptachlor Epoxide B	NotFnd	<0.052	0.052	U
Heptachlor Epoxide A	NotFnd	<0.29	0.29	U
trans-Chlordane	NotFnd	<0.47	0.47	U
cis-Chlordane	NotFnd	<0.40	0.40	U
Parlar 26	NotFnd	<0.32	0.32	U
Parlar 50	NotFnd	<0.91	0.91	U
Parlar 62	NotFnd	<1.8	1.8	U

Extraction Standards	**ng**		**% Rec**	**Limits**
Pentachlorobenzene, 13C6-	437.5	10:42	83	5-120
Heptachlor, 13C10-	437.5	17:10	80	5-120
Oxychlordane, 13C10-	437.5	19:36	90	23-135
trans-Nonachlor, 13C10-	437.5	20:56	80	36-139
Mirex, 13C10-	437.5	26:41	85	5-120

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the LQL.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a
ALS Sample ID	WG2417482-1	Extraction Date	8-Nov-16
Analysis Method	EPA 1699 (mod)	Sample Size	1 sample
Analysis Type	Blank	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	7

Approved:
Ella Gdyczynski
--e-signature--
17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A05
Run Date	15-Nov-16 11:19
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	ng
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**Ret. Time**	**Conc. ng**	**EDL ng**	**Flags**
Hexachlorobutadiene	NotFnd	<0.019	0.019	U
Heptachlor	NotFnd	<0.040	0.040	U
Octachlorostyrene	NotFnd	<0.045	0.045	U
Oxychlordane	NotFnd	<0.31	0.31	U
Heptachlor Epoxide B	NotFnd	<0.082	0.082	U
Heptachlor Epoxide A	NotFnd	<0.46	0.46	U
trans-Chlordane	NotFnd	<0.72	0.72	U
cis-Chlordane	NotFnd	<0.61	0.61	U
Parlar 26	NotFnd	<1.4	1.4	U
Parlar 50	NotFnd	<2.8	2.8	U
Parlar 62	NotFnd	<5.5	5.5	U

Extraction Standards	**ng**		**% Rec**	**Limits**
Pentachlorobenzene, 13C6-	437.5	10:40	110	5-120
Heptachlor, 13C10-	437.5	17:08	92	5-120
Oxychlordane, 13C10-	437.5	19:34	83	23-135
trans-Nonachlor, 13C10-	437.5	20:54	98	36-139
Mirex, 13C10-	437.5	26:40	96	5-120

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the LQL.
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	WG2417482-2	Extraction Date	8-Nov-16	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	7	17-Nov-2016

Run Information	**Run 1**
Filename	4-161115A02
Run Date	15-Nov-16 09:37
Final Volume	1000 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-4 HP5Ms #USN364761H

Target Analytes	**ng**	**Ret. Time**	**%**	**%**	**Flags**
Hexachlorobutadiene	175	5:59	77	5-200	
Heptachlor	175	17:09	96	50-120	
Octachlorostyrene	175	19:27	99	50-175	
Oxychlordane	175	19:34	86	50-120	
Heptachlor Epoxide B	175	19:32	106	20-200	
Heptachlor Epoxide A	175	19:40	98	50-120	
trans-Chlordane	175	20:17	96	50-120	
cis-Chlordane	175	20:45	91	50-120	
Parlar 26	175	22:06	101	20-200	R
Parlar 50	175	24:48	62	20-200	
Parlar 62	175	26:18	101	20-200	R

Extraction Standards	**ng**		**% Rec**	**Limits**	
Pentachlorobenzene, 13C6-	437.5	10:40	98	5-120	
Heptachlor, 13C10-	437.5	17:08	95	5-128	
Oxychlordane, 13C10-	437.5	19:34	84	5-144	R
trans-Nonachlor, 13C10-	437.5	20:54	95	17-154	
Mirex, 13C10-	437.5	26:39	102	5-138	

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental
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December 7, 2016

Analytical Report for Service Request No: K1613894

Rachael Stolys
ALS Environmental - Canada
1435 Norjohn Court
Unit 1
Burlington, ON L7L 0E6

RE: Clean Harbors / 21713

Dear Rachael,

Enclosed are the results of the sample(s) submitted to our laboratory November 11, 2016
For your reference, these analyses have been assigned our service request number **K1613894.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3293. You may also contact me via email at Shar.Samy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Shar Samy, Ph.D.
Project Manager

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Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

ALS Environmental

Case Narrative

ALS Environmental—Kelso Laboratory
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Phone (360)577- 7222 Fax (360)636- 1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	ALS Environmental - Canada	**Service Request No.:**	K1613894
Project:	Clean Harbors/ 21713	**Date Received:**	11/11/13
Sample Matrix:	Misc. Liquid		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt

Six misc. liquid samples were received for analysis at ALS Environmental on 11/11/13. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Butyltins (as cation)

Surrogate Exceptions:
The recovery of Tri-n-propyltin in sample L1847086-3 16-21713-SVOC-(11 THRU 15) TEST#3 was outside the control limits listed in the results summary. The limits are default values temporarily in use until sufficient data points are generated to calculate statistical control limits. Based on the method and historic data, the recoveries observed were in the range expected for this procedure. No further corrective action was taken.

Matrix Spike Recovery Exceptions:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

No other anomalies associated with the analysis of these samples were observed.

Approved by__________________________

ALS Environmental

Chain of Custody

ALS Environmental—Kelso Laboratory
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ALS Environmental

Chain of Custody / Analytical Request Form
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COC # K1613894

Page ____ of ____

Report To		Report Format / Distribution		Service Requested
Company:	ALS Environmental	☑ Standard ☐ Other:		☑ Regular Service
Contact:	Rachael Stolys	☑ PDF ☑ Excel ☐ Digital ☐ Fax		☐ Rush Service - surcharge applies
Address:	1435 Norjohn Court Unit 1	Email 1:	rachael.stolys@alsglobal.com	☐ Other - Please contact ALS
Phone:	905-331-3111 Fax:	Email 2:		
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		
Company:		Job #:	21713	
Contact:		Location:	Clean Harbors	
Address:		PO:	21713-J2289	
Phone:	Fax:	Sampled by:	Client	
Lab Work Order #		ALS Contact:		

Analysis Request

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Tributyl Tin	Hazardous? Provide Details	Highly Contaminated?	Number of Containers
	L1847086-1 16-21713-SVOC-(1 THRU 5) TEST#1	18-Oct-16		Other	X			1
	L1847086-2 16-21713-SVOC-(6 THRU 10) TEST#2	19-Oct-16		Other	X			1
	L1847086-3 16-21713-SVOC-(11 THRU 15) TEST#3	20-Oct-16		Other	X			1
	L1847086-4 16-21713-SVOC-(16 THRU 20) BLANK	20-Oct-16		Other	X			1
	WG2417482-1 Method Blank	n/a		Other	X			1
	WG2417482-2 Laboratory Control Sample	n/a		Other	X			1

Special Instructions / Regulations / Hazardous Details

Please refer to K1511583 (last years samples) SOLVENT USED FOR THESE EXTRACTS is DCM; SAMPLE TYPE: EXTRACTED AIR SAMPLES.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided by ALS

Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Aaron Burton	10-Nov-2016	13:00	[signature]	11-16-[illegible]	4:30	°C				

PC Shar

Cooler Receipt and Preservation Form

Client: ALS Burlington Service Request K16 13894

Received: 11-11-16 Opened: 11-11-16 By: CS Unloaded: 11-11-16 By: CS

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
5.1	5.0	–	—	-0.1	356		7776 8445 5869	

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: ______

7/25/16

Page ____ *of* ____

ALS Environmental

Butyltins (as cation)

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

Analytical Results

Client:	ALS Environmental - Canada		**Service Request:**	K1613894
Project:	Clean Harbors/21713		**Date Collected:**	10/18/2016
Sample Matrix:	Misc. liquid		**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	L1847086-1 16-21713-SVOC-(1 THRU 5) TEST		**Units:**	ug/SAMPLE
Lab Code:	K1613894-001		**Basis:**	NA
Extraction Method:	METHOD		**Level:**	Low
Analysis Method:	Krone			

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/19/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	104	70-130	11/19/16	Acceptable

Comments:

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	10/19/2016
Sample Matrix:	Misc. liquid	**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	L1847086-2 16-21713-SVOC-(6 THRU 10) TES	**Units:**	ug/SAMPLE
Lab Code:	K1613894-002	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/19/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	123	70-130	11/19/16	Acceptable

Comments:

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	10/20/2016
Sample Matrix:	Misc. liquid	**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	L1847086-3 16-21713-SVOC-(11 THRU 15) TE	**Units:**	ug/SAMPLE
Lab Code:	K1613894-003	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/21/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	61	70-130	11/21/16	Outside Control Limits

Comments:

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	10/20/2016
Sample Matrix:	Misc. liquid	**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	L1847086-4 16-21713-SVOC-(16 THRU 20) BL	**Units:**	ug/SAMPLE
Lab Code:	K1613894-004	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/21/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	108	70-130	11/21/16	Acceptable

Comments:

ALS Group USA, Corp. dba ALS Environmental

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	10/18/2016
Sample Matrix:	Misc. liquid	**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	WG2417482-1 METHOD BLANK	**Units:**	ug/SAMPLE
Lab Code:	K1613894-005	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/21/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	125	70-130	11/21/16	Acceptable

Comments:

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	10/18/2016
Sample Matrix:	Misc. liquid	**Date Received:**	11/11/2016

Butyltins (as cation)

Sample Name:	WG2417482-2 LABORATORY CONTROL SAMPLE	**Units:**	ug/SAMPLE
Lab Code:	K1613894-006	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.011	1	11/16/16	11/21/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	126	70-130	11/21/16	Acceptable

Comments:

Analytical Results

Client:	ALS Environmental - Canada	**Service Request:**	K1613894
Project:	Clean Harbors/21713	**Date Collected:**	NA
Sample Matrix:	Misc. liquid	**Date Received:**	NA

Butyltins (as cation)

Sample Name:	Method Blank	**Units:**	ug/SAMPLE
Lab Code:	KWG1610436-3	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin Cation	ND	U	0.010	1	11/16/16	11/21/16	KWG1610436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	130	70-130	11/21/16	Acceptable

Comments:

ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

Client: ALS Environmental - Canada
Project: Clean Harbors/21713
Sample Matrix: Misc. liquid

Service Request: K1613894

Surrogate Recovery Summary
Butyltins (as cation)

Extraction Method: METHOD
Analysis Method: Krone

Units: Percent
Level: Low

Sample Name	Lab Code	Sur1	
L1847086-1 16-21713-SVOC-(1 THR	K1613894-001	104	
L1847086-2 16-21713-SVOC-(6 THR	K1613894-002	123	
L1847086-3 16-21713-SVOC-(11 THI	K1613894-003	61	*
L1847086-4 16-21713-SVOC-(16 THI	K1613894-004	108	
WG2417482-1 METHOD BLANK	K1613894-005	125	
WG2417482-2 LABORATORY CON	K1613894-006	126	
Method Blank	KWG1610436-3	130	
Lab Control Sample	KWG1610436-1	119	
Duplicate Lab Control Sample	KWG1610436-2	113	

Surrogate Recovery Control Limits (%)

Sur1 =	Tri-n-propyltin	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

QA/QC Report

Client: ALS Environmental - Canada
Project: Clean Harbors/21713
Sample Matrix: Misc. liquid

Service Request: K1613894
Date Extracted: 11/16/2016
Date Analyzed: 11/21/2016

Lab Control Spike/Duplicate Lab Control Spike Summary
Butyltins (as cation)

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/SAMPLE
Basis: NA
Level: Low
Extraction Lot: KWG1610436

	Lab Control Sample KWG1610436-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG1610436-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Tri-n-butyltin Cation	0.236	0.223	106	0.210	0.223	94	70-130	12	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 Canada
ALS WO#:	L1847086	**Client Contact:**	Chris Belore
Date of Report	21-Nov-16	**Client Project ID:**	21713 CLEAN HARBORS
Date of Sample Receipt	21-Oct-16		

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

Certified by:

Steve Kennedy
Technical Supervisor

ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank		16-21713-SVOC-(1 THRU 5) TEST#1		16-21713-SVOC-(6 THRU 10) TEST#2		16-21713-SVOC-(11 THRU 15) TEST#3		16-21713-SVOC-(16 THRU 20) BLANK		Laboratory Control Sample	
ALS Sample ID	WG2417482-1		L1847086-1		L1847086-2		L1847086-3		L1847086-4		WG2417482-2	
Sample Size	1		1		1		1		1		1	
Sample units	sample		sample		sample		sample		sample		%	
Moisture Content	n/a		n/a		n/a		n/a		n/a		n/a	
Matrix	QC		Stack		Stack		Stack		Stack		QC	
Sampling Date	n/a		18-Oct-16		19-Oct-16		20-Oct-16		20-Oct-16		n/a	
Extraction Date	8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16		8-Nov-16	
Target Analytes	**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**ng/sample**		**%**	
Naphthalene	<14	U	3070		2170		2750		290		108	
2-Methylnaphthalene	<14	U	517		253		227		41.3		NS	
1-Methylnaphthalene	<14	U	324		213		198		29.2		NS	
Acenaphthylene	<14	U	25.9		21.9		28.7		<14	U	107	
Acenaphthene	<14	U	24.6	M	30.8	M	21.6	M	<14	U	112	
Fluorene	<14	U	45.2	M	57.1		27.2	M	17.6	M	110	
Phenanthrene	<14	U	299		164		117		56.6		112	
Anthracene	<14	U	21.8	M	<14	U	14.4		<14	U	98	
Fluoranthene	<14	U	46.1	M	38.2	R	37.4	R	<14	U	107	
Pyrene	<14	U	77.1	M,R	51.3	M,R	51.7	M,R	23.6	M	104	
Benzo(a)Anthracene	<14	U	<14	U	<14	U	<14	U	<14	U	100	
Benzo(b)anthracene/Chrysene/Triphenylene	<14	U	14.6		<14	U	<14	U	<14	U	105	
Benzo(b)Fluoranthene	<14	U	<14	U	<14	U	<14	U	<14	U	95	
Benzo(j/k)Fluoranthene	<14	U	<14	U	<14	U	18	M,R	<14	U	109	
Benzo(e)Pyrene	<14	U	28.7	M,R	32	M	26.4	M	17.3	M	NS	
Benzo(a)Pyrene	<14	U	<14	U	<14	U	<14	U	<14	U	104	
Perylene	<14	U	<14	U	<14	U	<14	U	<14	U	NS	
Indeno(1,2,3-cd)Pyrene	<14	U	14.5	M	<14	U	<14	U	<14	U	94	
Dibenzo(a,c/a,h)Anthracene	<14	U	<14	U	<14	U	<14	U	<14	U	112	
Benzo(g,h,i)Perylene	<14	U	30.5		66.6		18.4		17.6		100	
Additional Analytes												
Tetralin	<14	U	2260	M,R	1910	M,R	1930	R	523			
Quinoline	<14	U	117	R	27.9	M,R	116	R	<14	U		
2-Chloronaphthalene	<14	U	18.4	M	17.9	M,R	20.7	M	<14	U		
Biphenyl	<14	U	203	M,R	337	M	109	M	16.2			
o-Terphenyl	<14	U	<14	U	<14	U	<14	U	<14	U		
1-Methylphenanthrene	<14	U	33.1	R	67.4	R	24.4	R	<14	U		
9-Methylphenanthrene	<14	U	36.6		19		16.4		<14	U		
2-methylanthracene	<14	U	36.9		<14	U	<14	U	<14	U		
9,10-dimethylanthracene	<14	U	<14	U	<14	U	<14	U	<14	U		
m-terphenyl	<14	U	<14	U	<14	U	<14	U	<14	U		
p-terphenyl	<14	U	<14	U	<14	U	<14	U	<14	U		
Benzo(a)fluorene	<14	U	<14	U	<14	U	<14	U	<14	U		
Benzo(b)fluorene	<14	U	<14	U	<14	U	<14	U	<14	U		
7,12-Dimethylbenzo(a)anthracene	<14	U	<14	U	<14	U	<14	U	<14	U		
3-Methylcholanthrene	<14	U	<14	U	<14	U	<14	U	<14	U		
Picene	<14	U	<14	U	<14	U	<14	U	<14	U		
Dibenzo(a,e)pyrene	<14	U	<14	U	<14	U	<14	U	<14	U		
Coronene	<14	U	17.9		32.8		<14	U	<14	U		
Field Sampling Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
1-Methylnaphthalene-D10	NS		73	M	73.2	M	75.6	M	76.2		NS	
Fluorene D10	NS		74.3		75.3		76.8		82.8		NS	
Terphenyl D14(Surr.)	NS		59.7		66.6		62.4		73.8		NS	
Extraction Standards	**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**		**% Rec**	
Naphthalene D8	88.3		83.3		78.0		71.2		77.0		92.7	
2-Methylnaphthalene-D10	90.5		78.4		73.9		67.9		72.9		93.3	
Acenaphthylene D8	77.2		117.1		113.5		109.0		84.0		81.0	
Phenanthrene D10	86.9		78.0		74.4		74.2		69.8		91.4	
Anthracene-D10	90.2		99.9		99.1		94.4		71.5		96.8	
Fluoranthene D10	84.8		93.1		85.9		86.9		80.4		85.3	
Benz(a)Anthracene-D12	78.6		138.2		139.9		136.7		112.1		69.5	
Chrysene D12	67.3		68.1		67.0		66.2		69.9		66.3	
Benzo(b)Fluoranthene-D12	88.7		121.4		117.8		117.1		105.6		83.6	
Benzo(k)Fluoranthene-D12	66.7		87.8		87.1		89.7		76.2		76.5	
Benzo(a)Pyrene D12	71.2		122.6		123.6		119.9		91.4		72.8	
Perylene D12	73.7		136.8		135.5		136.2		104.3		78.2	
Indeno(1,2,3,cd)Pyrene-D12	77.3		133.9		137.2		132.0		91.4		87.0	
Dibenz(a,h)Anthracene-D14	71.5	M	101.7	M	98.6	M	96.2	M	82.0	M	87.2	M
Benzo(g,h,i)Perylene D12	76.4	M	78.2	M	74.1	M	71.6	M	70.6	M	83.7	M

U	Indicates that this compound was not detected above the LOD.
M	Indicates that a peak has been manually integrated.
NS	Indicates that this compound was not spiked.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion. Value represents an estimated maximum.

ALS Environmental

Laboratory Method Blank Analysis Report

Sample Name	**Method Blank**	Sampling Date	n/a
ALS Sample ID	WG2417482-1	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	Blank		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111823.D
Run Date	11/19/2016 1:47
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**Ret. Time**	**Concentration ng**	**Flags**
Naphthalene	8.70	<14	U
2-Methylnaphthalene	9.88	<14	U
1-Methylnaphthalene	10.05	<14	U
Acenaphthylene	11.40	<14	U
Acenaphthene	11.71	<14	U
Fluorene	12.58	<14	U
Phenanthrene	14.19	<14	U
Anthracene	NotFnd	<14	U
Fluoranthene	16.25	<14	U
Pyrene	16.64	<14	U
Benzo(a)Anthracene	NotFnd	<14	U
Chrysene	NotFnd	<14	U
Benzo(b)Fluoranthene	NotFnd	<14	U
Benzo(k)Fluoranthene	NotFnd	<14	U
Benzo(e)Pyrene	NotFnd	<14	U
Benzo(a)Pyrene	NotFnd	<14	U
Perylene	NotFnd	<14	U
Indeno(1,2,3-cd)Pyrene	NotFnd	<14	U
Dibenzo(a,h)Anthracene	NotFnd	<14	U
Benzo(g,h,i)Perylene	NotFnd	<14	U
Additional Analytes			
Tetralin	8.44	<14	U
Quinoline	NotFnd	<14	U
2-Chloronaphthalene	10.68	<14	U
Biphenyl	10.71	<14	U
o-Terphenyl	NotFnd	<14	U
1-Methylphenanthrene	NotFnd	<14	U
9-Methylphenanthrene	NotFnd	<14	U
2-methylanthracene	NotFnd	<14	U
9,10-dimethylanthracene	NotFnd	<14	U
m-terphenyl	16.84	<14	U
p-terphenyl	17.13	<14	U
Benzo(a)fluorene	NotFnd	<14	U
Benzo(b)fluorene	17.46	<14	U
Benzo(b)anthracene	19.16	<14	U
Benzo(j)fluoranthene	NotFnd	<14	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<14	U
3-Methylcholanthrene	NotFnd	<14	U
Picene	24.22	<14	U
Dibenzo(a,e)pyrene	26.21	<14	U
Coronene	NotFnd	<14	U

Field Sampling Standards	**ng spiked**	**% Rec**
1-Methylnaphthalene-D10	NS	
Fluorene D10	NS	
Terphenyl D14(Surr.)	NS	

Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	8.66	88.3	50-150
2-Methylnaphthalene-D10	700	9.83	90.5	50-150
Acenaphthylene D8	700	11.37	77.2	50-150
Phenanthrene D10	700	14.16	86.9	50-150
Anthracene-D10	700	14.24	90.2	50-150
Fluoranthene D10	700	16.23	84.8	50-150
Benz(a)Anthracene-D12	700	19.03	78.6	50-150
Chrysene D12	700	19.11	67.3	50-150
Benzo(b)Fluoranthene-D12	700	21.25	88.7	50-150
Benzo(k)Fluoranthene-D12	700	21.31	66.7	50-150
Benzo(a)Pyrene D12	700	21.86	71.2	50-150
Perylene D12	700	22.01	73.7	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	77.3	50-150
Dibenz(a,h)Anthracene-D14	700	23.94	71.5 M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	76.4 M	50-150

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

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(1 THRU 5) TEST#1**	Sampling Date	18-Oct-16 00:00
ALS Sample ID	L1847086-1	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111826.D
Run Date	11/19/2016 3:33
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**Ret. Time**	**Concentration ng**	**Flags**
Naphthalene	8.70	3070	
2-Methylnaphthalene	9.88	517	
1-Methylnaphthalene	10.05	324	
Acenaphthylene	11.39	25.9	
Acenaphthene	11.71	24.6	M
Fluorene	12.58	45.2	M
Phenanthrene	14.19	299	
Anthracene	14.27	21.8	M
Fluoranthene	16.25	46.1	M
Pyrene	16.64	77.1	M ,R
Benzo(a)Anthracene	19.07	<14	U
Chrysene	19.15	14.6	
Benzo(b)Fluoranthene	21.29	<14	U
Benzo(k)Fluoranthene	21.35	<14	U
Benzo(e)Pyrene	21.81	28.7	M ,R
Benzo(a)Pyrene	21.90	<14	U
Perylene	NotFnd	<14	U
Indeno(1,2,3-cd)Pyrene	23.92	14.5	M
Dibenzo(a,h)Anthracene	23.97	<14	U
Benzo(g,h,i)Perylene	24.33	30.5	
Additional Analytes			
Tetralin	8.45	2260	M ,R
Quinoline	9.31	117	R
2-Chloronaphthalene	10.67	18.4	M
Biphenyl	10.71	203	M ,R
o-Terphenyl	14.99	<14	U
1-Methylphenanthrene	15.16	33.1	R
9-Methylphenanthrene	15.23	36.6	
2-methylanthracene	15.27	36.9	
9,10-dimethylanthracene	NotFnd	<14	U
m-terphenyl	16.84	<14	U
p-terphenyl	17.14	<14	U
Benzo(a)fluorene	17.33	<14	U
Benzo(b)fluorene	17.46	<14	U
Benzo(b)anthracene	19.15	<14	U
Benzo(j)fluoranthene	NotFnd	<14	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<14	U
3-Methylcholanthrene	NotFnd	<14	U
Picene	NotFnd	<14	U
Dibenzo(a,e)pyrene	NotFnd	<14	U
Coronene	26.80	17.9	

Field Sampling Standards	**ng spiked**		**% Rec**	
1-Methylnaphthalene-D10	700	10.00	73	M
Fluorene D10	700	12.54	74.3	
Terphenyl D14(Surr.)	700	17.10	59.7	

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	700	8.67	83.3		50-150
2-Methylnaphthalene-D10	700	9.83	78.4		50-150
Acenaphthylene D8	700	11.37	117.1		50-150
Phenanthrene D10	700	14.16	78.0		50-150
Anthracene-D10	700	14.24	99.9		50-150
Fluoranthene D10	700	16.22	93.1		50-150
Benz(a)Anthracene-D12	700	19.03	138.2		50-150
Chrysene D12	700	19.11	68.1		50-150
Benzo(b)Fluoranthene-D12	700	21.25	121.4		50-150
Benzo(k)Fluoranthene-D12	700	21.31	87.8		50-150
Benzo(a)Pyrene D12	700	21.85	122.6		50-150
Perylene D12	700	22.01	136.8		50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	133.9		50-150
Dibenz(a,h)Anthracene-D14	700	23.94	101.7	M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	78.2	M	50-150

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

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(6 THRU 10) TEST#2**	Sampling Date	19-Oct-16 00:00
ALS Sample ID	L1847086-2	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111827.D
Run Date	11/19/2016 4:08
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**Ret. Time**	**Concentration ng**	**Flags**
Naphthalene	8.70	2170	
2-Methylnaphthalene	9.88	253	
1-Methylnaphthalene	10.05	213	
Acenaphthylene	11.40	21.9	
Acenaphthene	11.72	30.8 M	
Fluorene	12.58	57.1	
Phenanthrene	14.19	164	
Anthracene	14.27	<14	U
Fluoranthene	16.25	38.2	R
Pyrene	16.64	51.3 M	,R
Benzo(a)Anthracene	NotFnd	<14	U
Chrysene	19.15	<14	U
Benzo(b)Fluoranthene	NotFnd	<14	U
Benzo(k)Fluoranthene	21.35	<14	U
Benzo(e)Pyrene	21.81	32 M	
Benzo(a)Pyrene	21.90	<14	U
Perylene	NotFnd	<14	U
Indeno(1,2,3-cd)Pyrene	23.93	<14	U
Dibenzo(a,h)Anthracene	23.98	<14	U
Benzo(g,h,i)Perylene	24.33	66.6	
Additional Analytes			
Tetralin	8.45	1910 M	,R
Quinoline	9.31	27.9 M	,R
2-Chloronaphthalene	10.67	17.9 M	,R
Biphenyl	10.71	337 M	
o-Terphenyl	14.99	<14	U
1-Methylphenanthrene	15.16	67.4	R
9-Methylphenanthrene	15.23	19	
2-methylanthracene	15.27	<14	U
9,10-dimethylanthracene	NotFnd	<14	U
m-terphenyl	16.84	<14	U
p-terphenyl	17.15	<14	U
Benzo(a)fluorene	17.35	<14	U
Benzo(b)fluorene	17.46	<14	U
Benzo(b)anthracene	NotFnd	<14	U
Benzo(j)fluoranthene	NotFnd	<14	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<14	U
3-Methylcholanthrene	NotFnd	<14	U
Picene	NotFnd	<14	U
Dibenzo(a,e)pyrene	NotFnd	<14	U
Coronene	26.80	32.8	

Field Sampling Standards	**ng spiked**		**% Rec**	
1-Methylnaphthalene-D10	700	10.00	73.2 M	
Fluorene D10	700	12.54	75.3	
Terphenyl D14(Surr.)	700	17.10	66.6	
Extraction Standards			**% Rec**	**Limits**
Naphthalene D8	700	8.67	78.0	50-150
2-Methylnaphthalene-D10	700	9.83	73.9	50-150
Acenaphthylene D8	700	11.38	113.5	50-150
Phenanthrene D10	700	14.16	74.4	50-150
Anthracene-D10	700	14.24	99.1	50-150
Fluoranthene D10	700	16.22	85.9	50-150
Benz(a)Anthracene-D12	700	19.03	139.9	50-150
Chrysene D12	700	19.11	67.0	50-150
Benzo(b)Fluoranthene-D12	700	21.26	117.8	50-150
Benzo(k)Fluoranthene-D12	700	21.31	87.1	50-150
Benzo(a)Pyrene D12	700	21.86	123.6	50-150
Perylene D12	700	22.02	135.5	50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	137.2	50-150
Dibenz(a,h)Anthracene-D14	700	23.94	98.6 M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	74.1 M	50-150

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

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(11 THRU 15) TEST#3**	Sampling Date	20-Oct-16 00:00
ALS Sample ID	L1847086-3	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111828.D
Run Date	11/19/2016 4:43
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**Ret. Time**	**Concentration ng**	**Flags**
Naphthalene	8.70	2750	
2-Methylnaphthalene	9.88	227	
1-Methylnaphthalene	10.05	198	
Acenaphthylene	11.40	28.7	
Acenaphthene	11.72	21.6	M
Fluorene	12.58	27.2	M
Phenanthrene	14.19	117	
Anthracene	14.27	14.4	
Fluoranthene	16.25	37.4	R
Pyrene	16.65	51.7	M ,R
Benzo(a)Anthracene	NotFnd	<14	U
Chrysene	19.16	<14	U
Benzo(b)Fluoranthene	NotFnd	<14	U
Benzo(k)Fluoranthene	21.35	18	M ,R
Benzo(e)Pyrene	21.81	26.4	M
Benzo(a)Pyrene	21.91	<14	U
Perylene	NotFnd	<14	U
Indeno(1,2,3-cd)Pyrene	23.92	<14	U
Dibenzo(a,h)Anthracene	23.98	<14	U
Benzo(g,h,i)Perylene	24.33	18.4	
Additional Analytes			
Tetralin	8.45	1930	R
Quinoline	9.32	116	R
2-Chloronaphthalene	10.68	20.7	M
Biphenyl	10.71	109	M
o-Terphenyl	14.99	<14	U
1-Methylphenanthrene	15.16	24.4	R
9-Methylphenanthrene	15.23	16.4	
2-methylanthracene	15.27	<14	U
9,10-dimethylanthracene	NotFnd	<14	U
m-terphenyl	16.85	<14	U
p-terphenyl	NotFnd	<14	U
Benzo(a)fluorene	17.35	<14	U
Benzo(b)fluorene	17.46	<14	U
Benzo(b)anthracene	NotFnd	<14	U
Benzo(j)fluoranthene	NotFnd	<14	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<14	U
3-Methylcholanthrene	NotFnd	<14	U
Picene	NotFnd	<14	U
Dibenzo(a,e)pyrene	NotFnd	<14	U
Coronene	26.81	<14	U

Field Sampling Standards	**ng spiked**		**% Rec**	
1-Methylnaphthalene-D10	700	10.00	75.6	M
Fluorene D10	700	12.54	76.8	
Terphenyl D14(Surr.)	700	17.10	62.4	

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	700	8.67	71.2		50-150
2-Methylnaphthalene-D10	700	9.83	67.9		50-150
Acenaphthylene D8	700	11.38	109.0		50-150
Phenanthrene D10	700	14.16	74.2		50-150
Anthracene-D10	700	14.24	94.4		50-150
Fluoranthene D10	700	16.23	86.9		50-150
Benz(a)Anthracene-D12	700	19.03	136.7		50-150
Chrysene D12	700	19.11	66.2		50-150
Benzo(b)Fluoranthene-D12	700	21.26	117.1		50-150
Benzo(k)Fluoranthene-D12	700	21.32	89.7		50-150
Benzo(a)Pyrene D12	700	21.86	119.9		50-150
Perylene D12	700	22.02	136.2		50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	132.0		50-150
Dibenz(a,h)Anthracene-D14	700	23.94	96.2	M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	71.6	M	50-150

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

R Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental

Sample Analysis Report

Sample Name	**16-21713-SVOC-(16 THRU 20) BLANK**	Sampling Date	20-Oct-16 00:00
ALS Sample ID	L1847086-4	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	sample		
Sample Matrix	Stack		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111825.D
Run Date	11/19/2016 2:57
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**Ret. Time**	**Concentration ng**	**Flags**
Naphthalene	8.70	290	
2-Methylnaphthalene	9.88	41.3	
1-Methylnaphthalene	10.05	29.2	
Acenaphthylene	11.39	<14	U
Acenaphthene	11.71	<14	U
Fluorene	12.58	17.6	M
Phenanthrene	14.19	56.6	
Anthracene	14.28	<14	U
Fluoranthene	16.25	<14	U
Pyrene	16.64	23.6	M
Benzo(a)Anthracene	19.08	<14	U
Chrysene	19.15	<14	U
Benzo(b)Fluoranthene	NotFnd	<14	U
Benzo(k)Fluoranthene	NotFnd	<14	U
Benzo(e)Pyrene	21.81	17.3	M
Benzo(a)Pyrene	NotFnd	<14	U
Perylene	NotFnd	<14	U
Indeno(1,2,3-cd)Pyrene	NotFnd	<14	U
Dibenzo(a,h)Anthracene	NotFnd	<14	U
Benzo(g,h,i)Perylene	24.33	17.6	
Additional Analytes			
Tetralin	8.45	523	
Quinoline	NotFnd	<14	U
2-Chloronaphthalene	10.67	<14	U
Biphenyl	10.71	16.2	
o-Terphenyl	14.99	<14	U
1-Methylphenanthrene	15.16	<14	U
9-Methylphenanthrene	15.23	<14	U
2-methylanthracene	15.27	<14	U
9,10-dimethylanthracene	NotFnd	<14	U
m-terphenyl	16.84	<14	U
p-terphenyl	17.13	<14	U
Benzo(a)fluorene	17.35	<14	U
Benzo(b)fluorene	17.46	<14	U
Benzo(b)anthracene	19.15	<14	U
Benzo(j)fluoranthene	NotFnd	<14	U
7,12-Dimethylbenzo(a)anthracene	NotFnd	<14	U
3-Methylcholanthrene	NotFnd	<14	U
Picene	NotFnd	<14	U
Dibenzo(a,e)pyrene	NotFnd	<14	U
Coronene	26.81	<14	U

Field Sampling Standards	**ng spiked**		**% Rec**		**Limits**
1-Methylnaphthalene-D10	700	10.00	76.2		
Fluorene D10	700	12.54	82.8		
Terphenyl D14(Surr.)	700	17.10	73.8		
Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	700	8.67	77.0		50-150
2-Methylnaphthalene-D10	700	9.83	72.9		50-150
Acenaphthylene D8	700	11.37	84.0		50-150
Phenanthrene D10	700	14.16	69.8		50-150
Anthracene-D10	700	14.24	71.5		50-150
Fluoranthene D10	700	16.23	80.4		50-150
Benz(a)Anthracene-D12	700	19.03	112.1		50-150
Chrysene D12	700	19.11	69.9		50-150
Benzo(b)Fluoranthene-D12	700	21.25	105.6		50-150
Benzo(k)Fluoranthene-D12	700	21.31	76.2		50-150
Benzo(a)Pyrene D12	700	21.86	91.4		50-150
Perylene D12	700	22.02	104.3		50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	91.4		50-150
Dibenz(a,h)Anthracene-D14	700	23.94	82.0	M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	70.6	M	50-150

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

ALS Environmental

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2417482-2	Extraction Date	8-Nov-16
Analysis Method	PAH by CARB 429		
Analysis Type	LCS		
Sample Matrix	QC		
Sample Size	1 sample		
Percent Moisture	n/a		
Split Ratio	7	Workgroup	WG2417482

Approved:
Andrew Reid
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	16111818.D
Run Date	11/18/2016 22:50
Final Volume	1 mL
Dilution Factor	1
Analysis Units	ng
Instrument	MSD-1
Column	HP-5MS USN359921H

Target Analytes	**ug spiked**	**Ret. Time**	**%**	**Flags**	**Limits**
Naphthalene	700	8.71	108		50-150
2-Methylnaphthalene	700	9.88	NS		50-150
1-Methylnaphthalene	700	10.05	NS		50-150
Acenaphthylene	700	11.39	107		50-150
Acenaphthene	700	11.71	112		50-150
Fluorene	700	12.58	110		50-150
Phenanthrene	700	14.19	112		50-150
Anthracene	700	14.26	98		50-150
Fluoranthene	700	16.25	107		50-150
Pyrene	700	16.64	104		50-150
Benzo(a)Anthracene	700	19.07	100		50-150
Chrysene	700	19.15	105		50-150
Benzo(b)Fluoranthene	700	21.29	95		50-150
Benzo(k)Fluoranthene	700	21.34	109		50-150
Benzo(e)Pyrene	700	NotFnd	NS	M	50-150
Benzo(a)Pyrene	700	21.89	104		50-150
Perylene	700	NotFnd	NS	M	50-150
Indeno(1,2,3-cd)Pyrene	700	23.92	94		50-150
Dibenzo(a,h)Anthracene	700	23.99	112		50-150
Benzo(g,h,i)Perylene	700	24.33	100		50-150

Field Sampling Standards	**ng spiked**	**% Rec**
1-Methylnaphthalene-D10	NS	
Fluorene D10	NS	
Terphenyl D14(Surr.)	NS	

Extraction Standards			**% Rec**		**Limits**
Naphthalene D8	700	8.68	92.7		30-150
2-Methylnaphthalene-D10	700	9.83	93.3		30-150
Acenaphthylene D8	700	11.37	81.0		30-150
Phenanthrene D10	700	14.15	91.4		50-150
Anthracene-D10	700	14.23	96.8		50-150
Fluoranthene D10	700	16.22	85.3		50-150
Benz(a)Anthracene-D12	700	19.03	69.5		50-150
Chrysene D12	700	19.11	66.3		50-150
Benzo(b)Fluoranthene-D12	700	21.25	83.6		50-150
Benzo(k)Fluoranthene-D12	700	21.31	76.5		50-150
Benzo(a)Pyrene D12	700	21.85	72.8		30-150
Perylene D12	700	22.01	78.2		50-150
Indeno(1,2,3,cd)Pyrene-D12	700	23.89	87.0		50-150
Dibenz(a,h)Anthracene-D14	700	23.94	87.2	M	50-150
Benzo(g,h,i)Perylene D12	700	24.29	83.7	M	50-150

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:	Rachael Stolys	**Client Name:**	Ortech Consulting Inc.
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1848479		Mississauga, ON
Date of Report	28-Nov-16		L5J 2Y4
Date of Sample Receipt	24-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS: **PCDD/F by EPA 1613B**

Steve Kennedy
Technical Supervisor

ALS Life sciences

Sample Analysis summary Report

Sample Name	16-21713-RC-4 RICH FEED	16-21713-LC-4 LEAN FEED	16-21713-AC-4 ALKALINE FEED	16-21713-EC-4 EMULSION FEED
ALS Sample ID	L1848479-1	L1848479-2	L1848479-3	L1848479-4
Sample Size	1.05	1.09	1.06	1.35
Sample size units	g	g	g	g
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	n/a	n/a	n/a	n/a
Extraction Date	15-Nov-16	15-Nov-16	15-Nov-16	15-Nov-16
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**
2,3,7,8-TCDD	<1.8	<1.7	<1.7	<0.78
1,2,3,7,8-PeCDD	<1.5	2.70	<0.78	<0.52
1,2,3,4,7,8-HxCDD	<1.0	<0.95	<0.79	<0.63
1,2,3,6,7,8-HxCDD	5.37	<6.1	<0.81	<0.63
1,2,3,7,8,9-HxCDD	<1.6	<5.8	<0.85	<0.89
1,2,3,4,6,7,8-HpCDD	153	69.2	1.35	<14
OCDD	1390	538	4.26	153
2,3,7,8-TCDF	<1.4	<2.4	<1.4	<0.60
1,2,3,7,8-PeCDF	<1.3	1.82	<0.60	<0.51
2,3,4,7,8-PeCDF	1.41	2.91	<0.58	0.595
1,2,3,4,7,8-HxCDF	<2.3	3.26	<0.53	<0.58
1,2,3,6,7,8-HxCDF	<1.4	1.68	<0.51	0.706
2,3,4,6,7,8-HxCDF	1.66	1.33	<0.54	<0.44
1,2,3,7,8,9-HxCDF	<1.7	<1.8	<1.1	<0.61
1,2,3,4,6,7,8-HpCDF	37.3	14.8	<0.55	6.87
1,2,3,4,7,8,9-HpCDF	<1.9	1.91	<0.65	1.33
OCDF	226	75.9	<1.4	36.2
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	65	66	46	79
13C12-1,2,3,7,8-PeCDD	78	70	63	79
13C12-1,2,3,4,7,8-HxCDD	76	73	73	80
13C12-1,2,3,6,7,8-HxCDD	73	66	63	77
13C12-1,2,3,4,6,7,8-HpCDD	65	61	71	66
13C12-OCDD	51	56	79	59
13C12-2,3,7,8-TCDF	66	69	52	82
13C12-1,2,3,7,8-PeCDF	77	69	62	79
13C12-2,3,4,7,8-PeCDF	77	68	60	80
13C12-1,2,3,4,7,8-HxCDF	70	66	66	75
13C12-1,2,3,6,7,8-HxCDF	72	69	65	75
13C12-2,3,4,6,7,8-HxCDF	64	68	63	71
13C12-1,2,3,7,8,9-HxCDF	58	62	64	65
13C12-1,2,3,4,6,7,8-HpCDF	64	58	59	63
13C12-1,2,3,4,7,8,9-HpCDF	56	56	65	61
Cleanup Standard				
37Cl4-2,3,7,8-TCDD (Cleanup)	60	63	44	76
Homologue Group Totals	**pg/g**	**pg/g**	**pg/g**	**pg/g**
Total-TCDD	<1.8	87.9	<1.7	6.10
Total-PeCDD	3.24	22.9	<0.78	<0.47
Total-HxCDD	20.2	38.8	<0.85	4.59
Total-HpCDD	239	128	1.35	15.6
Total-TCDF	<1.4	79.6	<1.4	<0.60
Total-PeCDF	5.61	11.6	<0.60	1.22
Total-HxCDF	19.7	14.0	<0.68	5.39
Total-HpCDF	134	45.2	<0.65	8.20
Toxic Equivalency - (WHO 2005)				
Lower Bound PCDD/F TEQ (WHO 2005)	3.51	5.30	0.0148	0.388
Mid Point PCDD/F TEQ (WHO 2005)	6.71	7.85	1.74	1.76
Upper Bound PCDD/F TEQ (WHO 2005)	7.81	8.70	3.35	2.28

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Quality Control Summary Report

Sample Name	Method Blank	Laboratory Control Sample
ALS Sample ID	WG2422933-1	WG2422933-2
Sample Size	1.00	1.00
Sample size units	g	n/a
Percent Moisture	n/a	n/a
Sample Matrix	QC	QC
Sampling Date	n/a	n/a
Extraction Date	15-Nov-16	15-Nov-16
Target Analytes	**pg/g**	**% Rec**
2,3,7,8-TCDD	<2.0	101
1,2,3,7,8-PeCDD	<1.3	103
1,2,3,4,7,8-HxCDD	<1.0	92
1,2,3,6,7,8-HxCDD	<1.0	94
1,2,3,7,8,9-HxCDD	1.66	106
1,2,3,4,6,7,8-HpCDD	1.62	93
OCDD	7.51	96
2,3,7,8-TCDF	<1.2	89
1,2,3,7,8-PeCDF	<1.0	92
2,3,4,7,8-PeCDF	<0.89	92
1,2,3,4,7,8-HxCDF	<0.99	98
1,2,3,6,7,8-HxCDF	<0.81	103
2,3,4,6,7,8-HxCDF	1.72	95
1,2,3,7,8,9-HxCDF	<1.5	100
1,2,3,4,6,7,8-HpCDF	<1.2	102
1,2,3,4,7,8,9-HpCDF	<1.2	98
OCDF	<3.1	89
Extraction Standards	**% Rec**	**% Rec**
13C12-2,3,7,8-TCDD	47	60
13C12-1,2,3,7,8-PeCDD	64	79
13C12-1,2,3,4,7,8-HxCDD	77	81
13C12-1,2,3,6,7,8-HxCDD	75	88
13C12-1,2,3,4,6,7,8-HpCDD	71	81
13C12-OCDD	75	91
13C12-2,3,7,8-TCDF	56	69
13C12-1,2,3,7,8-PeCDF	61	82
13C12-2,3,4,7,8-PeCDF	63	78
13C12-1,2,3,4,7,8-HxCDF	71	74
13C12-1,2,3,6,7,8-HxCDF	75	85
13C12-2,3,4,6,7,8-HxCDF	70	83
13C12-1,2,3,7,8,9-HxCDF	60	80
13C12-1,2,3,4,6,7,8-HpCDF	65	74
13C12-1,2,3,4,7,8,9-HpCDF	63	77
Cleanup Standard		
37Cl4-2,3,7,8-TCDD (Cleanup)	45	59
Homologue Group Totals	**pg/g**	
Total-TCDD	<2.0	
Total-PeCDD	<1.3	
Total-HxCDD	1.66	
Total-HpCDD	1.62	
Total-TCDF	<1.2	
Total-PeCDF	<1.0	
Total-HxCDF	1.72	
Total-HpCDF	<1.2	
Toxic Equivalency - (WHO 2005)		
Lower Bound PCDD/F TEQ (WHO 2005)	0.356	
Mid Point PCDD/F TEQ (WHO 2005)	2.62	
Upper Bound PCDD/F TEQ (WHO 2005)	4.63	

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-RC-4 RICH FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-1	Extraction Date	15-Nov-16
Analysis Method	EPA 1613B	Sample Size	1.05 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	2

Approved:
R. Saxon
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A06
Run Date	18-Nov-16 16:44
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5ms USN396626H

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	<1.8	1.8	U		19
1,2,3,7,8-PeCDD	1	31.93	<1.5	0.89	M,J,R	1.5	96
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<1.0	1.0	U		96
1,2,3,6,7,8-HxCDD	0.1	34.03	5.37	1.1	M,J		96
1,2,3,7,8,9-HxCDD	0.1	34.16	<1.6	1.1	M,J,R	1.6	96
1,2,3,4,6,7,8-HpCDD	0.01	35.63	153	1.6			96
OCDD	0.0003	37.11	1390	3.2			190
2,3,7,8-TCDF	0.1	NotFnd	<1.4	1.4	U		19
1,2,3,7,8-PeCDF	0.03	30.97	<1.3	1.0	J,R	1.3	96
2,3,4,7,8-PeCDF	0.3	31.70	1.41	0.93	J		96
1,2,3,4,7,8-HxCDF	0.1	33.49	<2.3	1.1	J,R	2.3	96
1,2,3,6,7,8-HxCDF	0.1	33.56	<1.4	1.0	J,R	1.4	96
2,3,4,6,7,8-HxCDF	0.1	33.89	1.66	1.1	M,J,B		96
1,2,3,7,8,9-HxCDF	0.1	NotFnd	<1.7	1.7	U		96
1,2,3,4,6,7,8-HpCDF	0.01	35.08	37.3	0.69	M,J		96
1,2,3,4,7,8,9-HpCDF	0.01	35.88	<1.9	1.1	M,J,R	1.9	96
OCDF	0.0003	37.20	226	2.1			190

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.65	65	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.90	78	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	33.98	76	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.03	73	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.63	65	23-140
13C12-OCDD	8000	37.10	51	17-157
13C12-2,3,7,8-TCDF	4000	26.74	66	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.95	77	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.69	77	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.48	70	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.55	72	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.88	64	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.30	58	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.07	64	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.87	56	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.68	60	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		**LQL**
Total-TCDD	0.00	<1.8	1.8	U	19
Total-PeCDD	2.00	3.24	0.89		96
Total-HxCDD	4.00	20.2	1.1		96
Total-HpCDD	2.00	239	1.6		96
Total-TCDF	0.00	<1.4	1.4	U	19
Total-PeCDF	2.00	5.61	1.0		96
Total-HxCDF	2.00	19.7	1.7		96
Total-HpCDF	2.00	134	1.1		96

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	3.51
Mid Point PCDD/F TEQ (WHO 2005)	6.71
Upper Bound PCDD/F TEQ (WHO 2005)	7.81

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.
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

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Sample Analysis Report

Sample Name	**16-21713-LC-4 LEAN FEED**	Sampling Date	n/a	
ALS Sample ID	L1848479-2	Extraction Date	15-Nov-16	Approved:
Analysis Method	EPA 1613B	Sample Size	1.09 g	*R. Saxon*
Analysis Type	Sample	Percent Moisture	n/a	--e-signature--
Sample Matrix	Stack	Split Ratio	2	21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A07
Run Date	18-Nov-16 17:26
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5ms USN396626H

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	<1.7	1.7	U		18
1,2,3,7,8-PeCDD	1	31.90	2.70	0.81	J		91
1,2,3,4,7,8-HxCDD	0.1	33.98	<0.95	0.57	J,R	0.95	91
1,2,3,6,7,8-HxCDD	0.1	34.03	<6.1	0.56	J,R	6.1	91
1,2,3,7,8,9-HxCDD	0.1	34.16	<5.8	0.59	M,J,R	5.8	91
1,2,3,4,6,7,8-HpCDD	0.01	35.63	69.2	1.1	J		91
OCDD	0.0003	37.11	538	1.1			180
2,3,7,8-TCDF	0.1	26.74	<2.4	0.95	M,J,R	2.4	18
1,2,3,7,8-PeCDF	0.03	30.96	1.82	0.98	J		91
2,3,4,7,8-PeCDF	0.3	31.69	2.91	0.85	J		91
1,2,3,4,7,8-HxCDF	0.1	33.49	3.26	1.2	J		91
1,2,3,6,7,8-HxCDF	0.1	33.55	1.68	1.2	M,J		91
2,3,4,6,7,8-HxCDF	0.1	33.88	1.33	1.2	M,J,B		91
1,2,3,7,8,9-HxCDF	0.1	34.30	<1.8	1.7	M,J,R	1.8	91
1,2,3,4,6,7,8-HpCDF	0.01	35.07	14.8	0.62	M,J		91
1,2,3,4,7,8,9-HpCDF	0.01	35.88	1.91	0.89	J		91
OCDF	0.0003	37.20	75.9	0.85	J		180

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.63	66	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.90	70	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	33.98	73	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.03	66	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.63	61	23-140
13C12-OCDD	8000	37.10	56	17-157
13C12-2,3,7,8-TCDF	4000	26.72	69	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.94	69	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.68	68	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.47	66	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.54	69	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.87	68	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.29	62	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.07	58	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.87	56	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.65	63	35-197

Homologue Group Totals	# peaks	Conc. pg/g	EDL pg/g	LQL
Total-TCDD	5.00	87.9	1.7	18
Total-PeCDD	5.00	22.9	0.81	91
Total-HxCDD	3.00	38.8	0.59	91
Total-HpCDD	2.00	128	1.1	91
Total-TCDF	7.00	79.6	0.95	18
Total-PeCDF	4.00	11.6	0.98	91
Total-HxCDF	5.00	14.0	1.7	91
Total-HpCDF	3.00	45.2	0.89	91

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	5.30
Mid Point PCDD/F TEQ (WHO 2005)	7.85
Upper Bound PCDD/F TEQ (WHO 2005)	8.70

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	**16-21713-AC-4 ALKALINE FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-3	Extraction Date	15-Nov-16
Analysis Method	EPA 1613B	Sample Size	1.06 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	2

Approved:
R. Saxon
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A08
Run Date	18-Nov-16 18:08
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5ms USN396626H

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	<1.7	1.7	U		19
1,2,3,7,8-PeCDD	1	NotFnd	<0.78	0.78	U		95
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.79	0.79	U		95
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.81	0.81	U		95
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.85	0.85	U		95
1,2,3,4,6,7,8-HpCDD	0.01	35.63	1.35	0.63	J,B		95
OCDD	0.0003	37.11	4.26	0.47	M,J,B		190
2,3,7,8-TCDF	0.1	NotFnd	<1.4	1.4	U		19
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.60	0.60	U		95
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.58	0.58	U		95
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.53	0.53	U		95
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.51	0.51	U		95
2,3,4,6,7,8-HxCDF	0.1	33.87	<0.54	0.54	M,U	0.34	95
1,2,3,7,8,9-HxCDF	0.1	34.30	<1.1	0.68	J,R	1.1	95
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.55	0.55	U		95
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.65	0.65	U		95
OCDF	0.0003	37.20	<1.4	0.56	J,R	1.4	190

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.65	46	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.90	63	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	33.97	73	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.03	63	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.62	71	23-140
13C12-OCDD	8000	37.10	79	17-157
13C12-2,3,7,8-TCDF	4000	26.74	52	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.95	62	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.68	60	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.47	66	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.54	65	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.87	63	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.29	64	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.06	59	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.87	65	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.68	44	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0.00	<1.7	1.7	U	19
Total-PeCDD	0.00	<0.78	0.78	U	95
Total-HxCDD	0.00	<0.85	0.85	U	95
Total-HpCDD	1.00	1.35	0.63		95
Total-TCDF	0.00	<1.4	1.4	U	19
Total-PeCDF	0.00	<0.60	0.60	U	95
Total-HxCDF	0.00	<0.68	0.68	U	95
Total-HpCDF	0.00	<0.65	0.65	U	95

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.0148
Mid Point PCDD/F TEQ (WHO 2005)	1.74
Upper Bound PCDD/F TEQ (WHO 2005)	3.35

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor — TEQ Indicates the Toxic Equivalency
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-EC-4 EMULSION FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-4	Extraction Date	15-Nov-16
Analysis Method	EPA 1613B	Sample Size	1.35 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	2

Approved:
R. Saxon
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A09
Run Date	18-Nov-16 18:50
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5ms USN396626H

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	<0.78	0.78	U		15
1,2,3,7,8-PeCDD	1	31.92	<0.52	0.47	M,J,R	0.52	74
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.63	0.63	U		74
1,2,3,6,7,8-HxCDD	0.1	34.03	<0.63	0.63	M,U	0.61	74
1,2,3,7,8,9-HxCDD	0.1	34.14	<0.89	0.67	M,J,R	0.89	74
1,2,3,4,6,7,8-HpCDD	0.01	35.63	<14	0.51	J,R	14	74
OCDD	0.0003	37.11	153	0.47			150
2,3,7,8-TCDF	0.1	NotFnd	<0.60	0.60	U		15
1,2,3,7,8-PeCDF	0.03	NotFnd	<0.51	0.51	U		74
2,3,4,7,8-PeCDF	0.3	31.69	0.595	0.45	J		74
1,2,3,4,7,8-HxCDF	0.1	33.47	<0.58	0.42	J,R	0.58	74
1,2,3,6,7,8-HxCDF	0.1	33.56	0.706	0.42	J		74
2,3,4,6,7,8-HxCDF	0.1	33.89	<0.44	0.41	M,J,R	0.44	74
1,2,3,7,8,9-HxCDF	0.1	34.29	<0.61	0.61	U	0.51	74
1,2,3,4,6,7,8-HpCDF	0.01	35.07	6.87	0.44	M,J		74
1,2,3,4,7,8,9-HpCDF	0.01	35.87	1.33	0.62	M,J		74
OCDF	0.0003	37.20	36.2	0.56	J		150

Extraction Standards	**pg**		**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.63	79	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.89	79	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	33.97	80	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.02	77	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.62	66	23-140
13C12-OCDD	8000	37.10	59	17-157
13C12-2,3,7,8-TCDF	4000	26.72	82	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.94	79	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.68	80	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.47	75	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.54	75	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.87	71	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.29	65	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.06	63	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.87	61	26-138
Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.66	76	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	1.00	6.10	0.78		15
Total-PeCDD	0.00	<0.47	0.47	U	74
Total-HxCDD	2.00	4.59	0.67		74
Total-HpCDD	1.00	15.6	0.51		74
Total-TCDF	0.00	<0.60	0.60	U	15
Total-PeCDF	2.00	1.22	0.51		74
Total-HxCDF	3.00	5.39	0.61		74
Total-HpCDF	2.00	8.20	0.62		74

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.388
Mid Point PCDD/F TEQ (WHO 2005)	1.76
Upper Bound PCDD/F TEQ (WHO 2005)	2.28

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	WG2422933-1	Extraction Date	15-Nov-16
Analysis Method	EPA 1613B	Sample Size	1 g
Analysis Type	Blank	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	2

Approved:
R. Saxon
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A05
Run Date	18-Nov-16 16:02
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS-7 DB5ms USN396626H

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	<2.0	2.0	U		20
1,2,3,7,8-PeCDD	1	NotFnd	<1.3	1.3	U		100
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<1.0	1.0	U		100
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<1.0	1.0	U		100
1,2,3,7,8,9-HxCDD	0.1	34.15	1.66	1.1	J		100
1,2,3,4,6,7,8-HpCDD	0.01	35.63	1.62	0.93	J		100
OCDD	0.0003	37.10	7.51	0.51	J		200
2,3,7,8-TCDF	0.1	NotFnd	<1.2	1.2	U		20
1,2,3,7,8-PeCDF	0.03	NotFnd	<1.0	1.0	U		100
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.89	0.89	U		100
1,2,3,4,7,8-HxCDF	0.1	33.48	<0.99	0.88	M,J,R	0.99	100
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.81	0.81	U		100
2,3,4,6,7,8-HxCDF	0.1	33.89	1.72	0.87	M,J		100
1,2,3,7,8,9-HxCDF	0.1	34.29	<1.5	1.3	M,J,R	1.5	100
1,2,3,4,6,7,8-HpCDF	0.01	35.07	<1.2	0.79	J,R	1.2	100
1,2,3,4,7,8,9-HpCDF	0.01	35.87	<1.2	1.2	M,U		100
OCDF	0.0003	37.20	<3.1	0.90	M,J,R	3.1	200

Extraction Standards	**pg**	**Ret. Time**	**% Rec**	**Limits**
13C12-2,3,7,8-TCDD	4000	27.63	47	25-164
13C12-1,2,3,7,8-PeCDD	4000	31.89	64	25-181
13C12-1,2,3,4,7,8-HxCDD	4000	33.97	77	32-141
13C12-1,2,3,6,7,8-HxCDD	4000	34.02	75	28-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.62	71	23-140
13C12-OCDD	8000	37.09	75	17-157
13C12-2,3,7,8-TCDF	4000	26.72	56	24-169
13C12-1,2,3,7,8-PeCDF	4000	30.94	61	24-185
13C12-2,3,4,7,8-PeCDF	4000	31.68	63	21-178
13C12-1,2,3,4,7,8-HxCDF	4000	33.47	71	26-152
13C12-1,2,3,6,7,8-HxCDF	4000	33.54	75	26-123
13C12-2,3,4,6,7,8-HxCDF	4000	33.87	70	29-147
13C12-1,2,3,7,8,9-HxCDF	4000	34.29	60	28-136
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.06	65	28-143
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.86	63	26-138

Cleanup Standard	**pg**			
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.66	45	35-197

Homologue Group Totals	**# peaks**	**Conc. pg/g**	**EDL pg/g**		
Total-TCDD	0.00	<2.0	2.0	U	20
Total-PeCDD	0.00	<1.3	1.3	U	100
Total-HxCDD	1.00	1.66	1.1		100
Total-HpCDD	1.00	1.62	0.93		100
Total-TCDF	0.00	<1.2	1.2	U	20
Total-PeCDF	0.00	<1.0	1.0	U	100
Total-HxCDF	1.00	1.72	1.3		100
Total-HpCDF	0.00	<1.2	1.2	U	100

Toxic Equivalency - (WHO 2005)	**pg/g**
Lower Bound PCDD/F TEQ (WHO 2005)	0.356
Mid Point PCDD/F TEQ (WHO 2005)	2.62
Upper Bound PCDD/F TEQ (WHO 2005)	4.63

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

ALS Life sciences

Laboratory Control Sample Analysis Report

Sample Name	**Laboratory Control Sample**	Sampling Date	n/a
ALS Sample ID	WG2422933-2	Extraction Date	15-Nov-16
Analysis Method	EPA 1613B	Sample Size	1 n/a
Analysis Type	LCS	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	2

Approved:
R. Saxon
--e-signature--
21-Nov-2016

Run Information	**Run 1**
Filename	7-161118A02
Run Date	18-Nov-16 13:57
Final Volume	20 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5ms USN396626H

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
2,3,7,8-TCDD	400	27.63	101	67-158	
1,2,3,7,8-PeCDD	2000	31.89	103	70-142	
1,2,3,4,7,8-HxCDD	2000	33.96	92	70-164	
1,2,3,6,7,8-HxCDD	2000	34.02	94	76-134	
1,2,3,7,8,9-HxCDD	2000	34.14	106	64-162	
1,2,3,4,6,7,8-HpCDD	2000	35.62	93	70-140	
OCDD	4000	37.09	96	78-144	
2,3,7,8-TCDF	400	26.72	89	75-158	
1,2,3,7,8-PeCDF	2000	30.94	92	80-134	
2,3,4,7,8-PeCDF	2000	31.68	92	68-160	
1,2,3,4,7,8-HxCDF	2000	33.47	98	72-134	
1,2,3,6,7,8-HxCDF	2000	33.54	103	84-130	
2,3,4,6,7,8-HxCDF	2000	33.87	95	78-130	
1,2,3,7,8,9-HxCDF	2000	34.29	100	70-156	
1,2,3,4,6,7,8-HpCDF	2000	35.06	102	82-122	
1,2,3,4,7,8,9-HpCDF	2000	35.86	98	78-138	
OCDF	4000	37.19	89	63-170	
Extraction Standards	**pg**		**% Rec**	**Limits**	
13C12-2,3,7,8-TCDD	4000	27.62	60	20-175	
13C12-1,2,3,7,8-PeCDD	4000	31.88	79	21-227	
13C12-1,2,3,4,7,8-HxCDD	4000	33.96	81	21-193	
13C12-1,2,3,6,7,8-HxCDD	4000	34.02	88	25-163	
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.61	81	26-166	
13C12-OCDD	8000	37.09	91	13-138	
13C12-2,3,7,8-TCDF	4000	26.71	69	22-152	
13C12-1,2,3,7,8-PeCDF	4000	30.93	82	21-192	
13C12-2,3,4,7,8-PeCDF	4000	31.67	78	13-328	
13C12-1,2,3,4,7,8-HxCDF	4000	33.46	74	19-202	
13C12-1,2,3,6,7,8-HxCDF	4000	33.53	85	21-159	
13C12-2,3,4,6,7,8-HxCDF	4000	33.86	83	17-205	
13C12-1,2,3,7,8,9-HxCDF	4000	34.28	80	22-176	
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.05	74	21-158	
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.86	77	20-186	
Cleanup Standard	**pg**				
37Cl4-2,3,7,8-TCDD (Cleanup)	80	27.63	59	31-191	

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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4
ALS WO#:	L1848479		
Date of Report	23-Nov-16		
Date of Sample Receipt	24-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS: **PCB Congeners by EPA 1668A**

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

For the sample 16-21713-AC-4 ALKALINE FEED, the recoveries of mono and dichlorobiphenyl labelled standards are below the method control limit. As a result, the detection limits for these groups may be elevated. Native target data are not expected to be biased.

The results for some samples have been reported from the analysis of diluted extracts due to interferences causing localized suppression.

NOTE: The following peak assignments were made for this analysis with respect to PeCB compounds PCB-107, PCB-108 and PCB-109:

- First eluting of those three is PCB-108 (co-eluting with 119/86/97/125/87)
- Second eluting is PCB-107 (coeluting with PCB 124)
- Third to elute is PCB 109

These assignments are as per EPA 1668 Revision A. These congener numbers do not correspond to the current Congener Consensus Numbers as corrected in 1668 Revision C, but are retained for this report to conform to those listed in 1668A. The modern Congener Consensus numbers for these three congeners assign the elution order as PCB-109, PCB-108, then PCB-107 respectively.

Steve Kennedy
Technical Supervisor

ALS Life sciences

Sample Analysis summary Report

Sample Name	16-21713-RC-4 RICH FEED	16-21713-LC-4 LEAN FEED	16-21713-AC-4 ALKALINE FEED	16-21713-EC-4 EMULSION FEED
ALS Sample ID	L1848479-1	L1848479-2	L1848479-3	L1848479-4
Sample Size	1.05	1.09	1.06	1.03
Sample size units	g	g	g	g
Percent Moisture	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack
Sampling Date	n/a	n/a	n/a	n/a
Extraction Date	15-Nov-16	15-Nov-16	15-Nov-16	15-Nov-16
Target Analytes	**pg/g**	**pg/g**	**pg/g**	**pg/g**
PCB-081	<45	<7.0	<0.89	<76
PCB-077	<90	<64	<0.85	<85
PCB-123	<34	<14	<0.73	<42
PCB-118	1000	1340	<0.63	929
PCB-114	<39	31.3	<0.66	<41
PCB-105	518	450	<0.64	467
PCB-126	<42	<11	<0.68	<42
PCB-167	<44	70.3	<0.61	<55
PCB-156/157	<180	202	<0.85	<150
PCB-169	<47	<8.4	<0.69	<38
PCB-189	<25	18.6	<0.47	<29
Extraction Standards	**% Rec**	**% Rec**	**% Rec**	**% Rec**
13C12-PCB-001	115	55	6	147
13C12-PCB-003	103	66	6	76
13C12-PCB-004	117	78	8	92
13C12-PCB-015	101	92	14	107
13C12-PCB-019	153	97	12	140
13C12-PCB-037	103	97	49	97
13C12-PCB-054	101	91	17	85
13C12-PCB-081	111	93	82	84
13C12-PCB-077	104	90	86	81
13C12-PCB-104	105	97	42	90
13C12-PCB-123	108	90	84	76
13C12-PCB-118	101	91	86	78
13C12-PCB-114	101	87	86	72
13C12-PCB-105	100	88	88	71
13C12-PCB-126	105	89	93	77
13C12-PCB-155	119	106	75	89
13C12-PCB-167	112	103	126	90
13C12-PCB-156/157	113	102	125	89
13C12-PCB-169	118	102	139	90
13C12-PCB-188	98	98	113	91
13C12-PCB-189	123	92	125	88
13C12-PCB-202	120	104	140	95
13C12-PCB-205	114	87	121	85
13C12-PCB-208	110	96	122	79
13C12-PCB-206	116	95	125	78
13C12-PCB-209	110	92	119	73
Cleanup Standards				
13C12-PCB-028	108	95	28	99
13C12-PCB-111	122	104	91	90
13C12-PCB-178	99	101	101	88
Homologue Group Totals				
Total MonoCB	1460	9800	32.2	1290
Total DiCB	1110	5070	25.9	910
Total TriCB	1630	3810	<1.4	1260
Total TetraCB	5730	7520	6.41	5060
Total PentaCB	9410	11400	<0.34	7080
Total HexaCB	4470	6830	<0.50	4470
Total HeptaCB	1070	1640	1.00	977
Total OctaCB	50.0	376	<0.44	45.6
Total NonaCB	<70	118	<1.2	<71
DecaCB	190	713	2.10	71.0
Total PCB	25100	47200	67.6	21200
Toxic Equivalency - (WHO 2005)				
Lower Bound PCB TEQ	0.0455	0.0634	0.00	0.0419
Mid Point PCB TEQ	2.87	1.30	0.0446	2.74
Upper Bound PCB TEQ	5.69	1.42	0.0892	5.42

ALS Life sciences

Quality Control Summary Report

Sample Name	**Method Blank**
ALS Sample ID	WG2422933-1
Sample Size	1
Sample size units	g
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	15-Nov-16

Target Analytes	**pg/g**
PCB-084	<1.7
PCB-089	<1.5
PCB-152	<0.44
PCB-136	<0.41
PCB-148	<0.53
PCB-135/151	<0.59
PCB-144	<0.52
PCB-175	<0.62
PCB-187	<0.53
PCB-182	<0.60
PCB-195	<0.85
Extraction Standards	**% Rec**
13C12-PCB-054	15
13C12-PCB-081	69
13C12-PCB-077	72
13C12-PCB-104	33
13C12-PCB-123	69
13C12-PCB-118	72
13C12-PCB-114	72
13C12-PCB-105	74
13C12-PCB-126	80
13C12-PCB-155	61
13C12-PCB-167	96
13C12-PCB-156/157	100
13C12-PCB-169	113
13C12-PCB-188	83
13C12-PCB-189	105
13C12-PCB-202	106
13C12-PCB-205	102
13C12-PCB-208	102
13C12-PCB-206	108
13C12-PCB-209	97
Homologue Group Totals	
Total MonoCB	<13
Total DiCB	<6.5
Total TriCB	2.75
Total TetraCB	3.50
Total PentaCB	<0.57
Total HexaCB	3.38
Total HeptaCB	<0.43
Total OctaCB	1.20
Total NonaCB	<1.5
DecaCB	2.57
Total PCB	13.4
Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0212
Mid Point PCB TEQ	0.0689
Upper Bound PCB TEQ	0.117

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Sample Analysis summary Report

Sample Name	**Laboratory Control Sample**
ALS Sample ID	WG2422933-2
Sample Size	1
Sample size units	n/a
Percent Moisture	n/a
Sample Matrix	QC
Sampling Date	n/a
Extraction Date	15-Nov-16

Target Analytes	**% Rec**
PCB-001	86
PCB-003	84
PCB-004	99
PCB-015	97
PCB-019	93
PCB-037	81
PCB-054	96
PCB-081	92
PCB-077	95
PCB-104	91
PCB-123	98
PCB-118	98
PCB-114	96
PCB-105	97
PCB-126	100
PCB-155	94
PCB-167	95
PCB-156/157	96
PCB-169	96
PCB-188	97
PCB-189	103
PCB-202	94
PCB-205	94
PCB-208	94
PCB-206	99
PCB-209	103

Extraction Standards	**% Rec**
13C12-PCB-001	9
13C12-PCB-003	10
13C12-PCB-004	12
13C12-PCB-015	23
13C12-PCB-019	19
13C12-PCB-037	51
13C12-PCB-054	27
13C12-PCB-081	72
13C12-PCB-077	76
13C12-PCB-104	47
13C12-PCB-123	69
13C12-PCB-118	69
13C12-PCB-114	69
13C12-PCB-105	73
13C12-PCB-126	79
13C12-PCB-155	68
13C12-PCB-167	93
13C12-PCB-156/157	96
13C12-PCB-169	108
13C12-PCB-188	82
13C12-PCB-189	97
13C12-PCB-202	101
13C12-PCB-205	98
13C12-PCB-208	99
13C12-PCB-206	105
13C12-PCB-209	93

Cleanup Standards	
13C12-PCB-028	36
13C12-PCB-111	73
13C12-PCB-178	90

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Sample Analysis Report

Sample Name	**16-21713-RC-4 RICH FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-1	Extraction Date	15-Nov-16
Analysis Method	EPA 1668A	Sample Size	1.05 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
25-Nov-2016

Run Information	**Run 1**	**Run 2**
Filename	5-161121C07	5-161124A31
Run Date	21-Nov-16 21:30	25-Nov-16 03:05
Final Volume	250 ul	1000 uL
Dilution Factor	1	1
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS5 SPBOCTYL59722-01A	HRMS5 SPBOCTYL59722-01A

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg/g	EDL pg/g	Flags	EMPC pg/g	LQL	Ret. Time	Conc. pg/g	EDL pg/g	Flags	EMPC pg/g	LQL
PCB-081	0.0003							NotFnd	<45	45	U		960
PCB-077	0.0001							22.08	<90	52	J,R	90	960
PCB-123	0.00003							23.03	<34	34	M,U	23	960
PCB-118	0.00003							23.20	1000	37			960
PCB-114	0.00003							NotFnd	<39	39	U		960
PCB-105	0.00003							23.85	518	37	J		960
PCB-126	0.1							NotFnd	<42	42	U		960
PCB-167	0.00003							26.32	<44	44	U	37	960
PCB-156/157	0.00003							26.96	<180	59	J,R	180	1900
PCB-169	0.03							NotFnd	<47	47	U		960
PCB-189	0.00003							NotFnd	<25	25	U		960

Extraction Standards	pg	Time	% Rec	Limits	Time	% Rec	Limits	Flags
13C12-PCB-001	4000	8.93	115	25-150				
13C12-PCB-003	4000	10.46	103	25-150				
13C12-PCB-004	4000	10.66	117	25-150				
13C12-PCB-015	4000				14.24	101	25-150	
13C12-PCB-019	4000				12.55	153	25-150	R
13C12-PCB-037	4000				18.18	103	25-150	
13C12-PCB-054	4000				14.42	101	25-150	
13C12-PCB-081	4000				21.73	111	25-150	
13C12-PCB-077	4000				22.04	104	25-150	
13C12-PCB-104	4000				17.44	105	25-150	
13C12-PCB-123	4000				23.02	108	25-150	
13C12-PCB-118	4000				23.18	101	25-150	
13C12-PCB-114	4000				23.49	101	25-150	R
13C12-PCB-105	4000				23.85	100	25-150	
13C12-PCB-126	4000				25.43	105	25-150	
13C12-PCB-155	4000				20.41	119	25-150	R
13C12-PCB-167	4000				26.32	112	25-150	
13C12-PCB-156/157	8000				26.94	113	25-150	
13C12-PCB-169	4000				28.60	118	25-150	R
13C12-PCB-188	4000				23.41	98	25-150	
13C12-PCB-189	4000				29.87	123	25-150	
13C12-PCB-202	4000				26.17	120	25-150	
13C12-PCB-205	4000				31.24	114	25-150	
13C12-PCB-208	4000				29.59	110	25-150	
13C12-PCB-206	4000				32.30	116	25-150	
13C12-PCB-209	4000				33.39	110	25-150	

Cleanup Standards	pg	Time	% Rec	Limits
13C12-PCB-028	4000	16.01	108	30-135
13C12-PCB-111	4000	22.01	122	30-135
13C12-PCB-178	4000	25.04	99	30-135

Homologue Group Totals	Conc. pg/g	EDL pg/g	Flags	LQL
Total MonoCB	1460	100	J	240
Total DiCB	1110	67	J	960
Total TriCB	1630	41	J	960
Total TetraCB	5730	33	J	960
Total PentaCB	9410	28	J	960
Total HexaCB	4470	17	J	960
Total HeptaCB	1070	20	J	960
Total OctaCB	50.0	18	J	960
Total NonaCB	<70	70	U	960
DecaCB	190	15	J	960
Total PCB	25100		J	

Toxic Equivalency - (WHO 2005)

Lower Bound PCB TEQ	0.0455
Mid Point PCB TEQ	2.87
Upper Bound PCB TEQ	5.69

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.
1.	This result is an EMPC
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive Id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-LC-4 LEAN FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-2	Extraction Date	15-Nov-16
Analysis Method	EPA 1668A	Sample Size	1.09 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
25-Nov-2016

Run Information	**Run 1**
Filename	5-161122B07
Run Date	22-Nov-16 17:11
Final Volume	250 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<7.0	7.0	U		230
PCB-077	0.0001	22.08	<64	7.7	J,R	67	230
PCB-123	0.00003	23.05	<14	9.1	M,J,R	15	230
PCB-118	0.00003	23.23	1340	8.2			230
PCB-114	0.00003	23.52	31.3	9.3	J		230
PCB-105	0.00003	23.89	450	9.3			230
PCB-126	0.1	25.50	<11	9.5	M,J,R	12	230
PCB-167	0.00003	26.35	70.3	7.4	J		230
PCB-156/157	0.00003	26.97	202	10	J		460
PCB-169	0.03	28.63	<8.4	8.4	M,U	5.0	230
PCB-189	0.00003	29.92	18.6	7.0	J		230

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.86	55	25-150
13C12-PCB-003	4000	10.41	66	25-150
13C12-PCB-004	4000	10.57	78	25-150
13C12-PCB-015	4000	14.26	92	25-150
13C12-PCB-019	4000	12.58	97	25-150
13C12-PCB-037	4000	18.20	97	25-150
13C12-PCB-054	4000	14.44	91	25-150
13C12-PCB-081	4000	21.77	93	25-150
13C12-PCB-077	4000	22.08	90	25-150
13C12-PCB-104	4000	17.47	97	25-150
13C12-PCB-123	4000	23.05	90	25-150
13C12-PCB-118	4000	23.21	91	25-150
13C12-PCB-114	4000	23.52	87	25-150
13C12-PCB-105	4000	23.87	88	25-150
13C12-PCB-126	4000	25.46	89	25-150
13C12-PCB-155	4000	20.44	106	25-150
13C12-PCB-167	4000	26.35	103	25-150
13C12-PCB-156/157	8000	26.99	102	25-150
13C12-PCB-169	4000	28.63	102	25-150
13C12-PCB-188	4000	23.44	98	25-150
13C12-PCB-189	4000	29.90	92	25-150
13C12-PCB-202	4000	26.20	104	25-150
13C12-PCB-205	4000	31.27	87	25-150
13C12-PCB-208	4000	29.62	96	25-150
13C12-PCB-206	4000	32.35	95	25-150
13C12-PCB-209	4000	33.44	92	25-150

Cleanup Standards				
13C12-PCB-028	4000	15.96	95	30-135
13C12-PCB-111	4000	21.98	104	30-135
13C12-PCB-178	4000	25.02	101	30-135

Homologue Group Totals				
Total MonoCB	9800	11	J	230
Total DiCB	5070	10	J	230
Total TriCB	3810	3.9	J	230
Total TetraCB	7520	5.0	J	230
Total PentaCB	11400	3.6	J	230
Total HexaCB	6830	3.9	J	230
Total HeptaCB	1640	3.3	J	230
Total OctaCB	376	4.1	J	230
Total NonaCB	118	21	J	230
DecaCB	713	5.9	J	230
Total PCB	47200		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0634
Mid Point PCB TEQ	1.30
Upper Bound PCB TEQ	1.42

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.
1.	This result is an EMPC
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-AC-4 ALKALINE FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-3	Extraction Date	15-Nov-16
Analysis Method	EPA 1668A	Sample Size	1.06 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
25-Nov-2016

Run Information	**Run 1**
Filename	5-161121C09
Run Date	21-Nov-16 22:49
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<0.89	0.89	U		24
PCB-077	0.0001	NotFnd	<0.85	0.85	U		24
PCB-123	0.00003	NotFnd	<0.73	0.73	U		24
PCB-118	0.00003	NotFnd	<0.63	0.63	U		24
PCB-114	0.00003	NotFnd	<0.66	0.66	U		24
PCB-105	0.00003	NotFnd	<0.64	0.64	U		24
PCB-126	0.1	NotFnd	<0.68	0.68	U		24
PCB-167	0.00003	NotFnd	<0.61	0.61	U		24
PCB-156/157	0.00003	NotFnd	<0.85	0.85	U		47
PCB-169	0.03	NotFnd	<0.69	0.69	U		24
PCB-189	0.00003	NotFnd	<0.47	0.47	U		24

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.85	6	25-150
13C12-PCB-003	4000	10.38	6	25-150
13C12-PCB-004	4000	10.56	8	25-150
13C12-PCB-015	4000	14.23	14	25-150
13C12-PCB-019	4000	12.56	12	25-150
13C12-PCB-037	4000	18.16	49	25-150
13C12-PCB-054	4000	14.42	17	25-150
13C12-PCB-081	4000	21.73	82	25-150
13C12-PCB-077	4000	22.04	86	25-150
13C12-PCB-104	4000	17.46	42	25-150
13C12-PCB-123	4000	23.03	84	25-150
13C12-PCB-118	4000	23.20	86	25-150
13C12-PCB-114	4000	23.49	86	25-150
13C12-PCB-105	4000	23.85	88	25-150
13C12-PCB-126	4000	25.43	93	25-150
13C12-PCB-155	4000	20.43	75	25-150
13C12-PCB-167	4000	26.32	126	25-150
13C12-PCB-156/157	8000	26.96	125	25-150
13C12-PCB-169	4000	28.62	139	25-150
13C12-PCB-188	4000	23.43	113	25-150
13C12-PCB-189	4000	29.88	125	25-150
13C12-PCB-202	4000	26.19	140	25-150
13C12-PCB-205	4000	31.25	121	25-150
13C12-PCB-208	4000	29.59	122	25-150
13C12-PCB-206	4000	32.31	125	25-150
13C12-PCB-209	4000	33.40	119	25-150
Cleanup Standards				
13C12-PCB-028	4000	15.92	28	30-135
13C12-PCB-111	4000	21.95	91	30-135
13C12-PCB-178	4000	25.00	101	30-135

Homologue Group Totals				
Total MonoCB	32.2	12	J	24
Total DiCB	25.9	5.4	J	24
Total TriCB	<1.4	1.4	U	24
Total TetraCB	6.41	0.67	J	24
Total PentaCB	<0.34	0.34	U	24
Total HexaCB	<0.50	0.50	U	24
Total HeptaCB	1.00	0.46	J	24
Total OctaCB	<0.44	0.44	U	24
Total NonaCB	<1.2	1.2	U	24
DecaCB	2.10	0.59	J	24
Total PCB	67.6		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.00
Mid Point PCB TEQ	0.0446
Upper Bound PCB TEQ	0.0892

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.
1.	This result is an EMPC
EMPC	Estimated Maximum Possible Concentration - elevated detection limit due to interference or positive id criterion failure

ALS Life sciences

Sample Analysis Report

Sample Name	**16-21713-EC-4 EMULSION FEED**	Sampling Date	n/a
ALS Sample ID	L1848479-4	Extraction Date	15-Nov-16
Analysis Method	EPA 1668A	Sample Size	1.03 g
Analysis Type	Sample	Percent Moisture	n/a
Sample Matrix	Stack	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
25-Nov-2016

Run Information	**Run 1**
Filename	5-161124A32
Run Date	25-Nov-16 03:45
Final Volume	1000 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**TEF (WHO 2005)**	**Ret. Time**	**Conc. pg/g**	**EDL pg/g**	**Flags**	**EMPC pg/g**	**LQL**
PCB-081	0.0003	NotFnd	<76	76	U		970
PCB-077	0.0001	22.08	<85	85	U	63	970
PCB-123	0.00003	NotFnd	<42	42	U		970
PCB-118	0.00003	23.21	929	36	J		970
PCB-114	0.00003	NotFnd	<41	41	U		970
PCB-105	0.00003	23.87	467	41	J		970
PCB-126	0.1	NotFnd	<42	42	U		970
PCB-167	0.00003	26.33	<55	32	J,R	54	970
PCB-156/157	0.00003	26.96	<150	46	J,R	150	1900
PCB-169	0.03	NotFnd	<38	38	U		970
PCB-189	0.00003	NotFnd	<29	29	U		970

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**	
13C12-PCB-001	4000	8.86	147	25-150	R
13C12-PCB-003	4000	10.39	76	25-150	R
13C12-PCB-004	4000	10.56	92	25-150	
13C12-PCB-015	4000	14.24	107	25-150	
13C12-PCB-019	4000	12.56	140	25-150	
13C12-PCB-037	4000	18.18	97	25-150	M,R
13C12-PCB-054	4000	14.42	85	25-150	
13C12-PCB-081	4000	21.75	84	25-150	
13C12-PCB-077	4000	22.06	81	25-150	
13C12-PCB-104	4000	17.46	90	25-150	
13C12-PCB-123	4000	23.03	76	25-150	
13C12-PCB-118	4000	23.20	78	25-150	
13C12-PCB-114	4000	23.49	72	25-150	
13C12-PCB-105	4000	23.85	71	25-150	
13C12-PCB-126	4000	25.45	77	25-150	
13C12-PCB-155	4000	20.43	89	25-150	
13C12-PCB-167	4000	26.32	90	25-150	R
13C12-PCB-156/157	8000	26.96	89	25-150	
13C12-PCB-169	4000	28.62	90	25-150	
13C12-PCB-188	4000	23.41	91	25-150	
13C12-PCB-189	4000	29.87	88	25-150	R
13C12-PCB-202	4000	26.19	95	25-150	
13C12-PCB-205	4000	31.24	85	25-150	
13C12-PCB-208	4000	29.59	79	25-150	
13C12-PCB-206	4000	32.30	78	25-150	
13C12-PCB-209	4000	33.40	73	25-150	
Cleanup Standards					
13C12-PCB-028	4000	15.92	99	30-135	M,R
13C12-PCB-111	4000	21.95	90	30-135	
13C12-PCB-178	4000	24.99	88	30-135	

Homologue Group Totals	Conc.	EDL	Flags	LQL
Total MonoCB	1290	28	J	970
Total DiCB	910	45	J	970
Total TriCB	1260	25	J	970
Total TetraCB	5060	17	J	970
Total PentaCB	7080	15	J	970
Total HexaCB	4470	16	J	970
Total HeptaCB	977	20	J	970
Total OctaCB	45.6	21	J	970
Total NonaCB	<71	71	U	970
DecaCB	71.0	26	J	970
Total PCB	21200		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0419
Mid Point PCB TEQ	2.74
Upper Bound PCB TEQ	5.42

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.
1.	This result is an EMPC
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	WG2422933-1	Extraction Date	15-Nov-16	Approved:
Analysis Method	EPA 1668A	Sample Size	1 g	*E. Sabljic*
Analysis Type	Blank	Percent Moisture	n/a	--e-signature--
Sample Matrix	QC	Split Ratio	1	25-Nov-2016

Run Information	**Run 1**
Filename	5-161121C06
Run Date	21-Nov-16 20:50
Final Volume	25 ul
Dilution Factor	1
Analysis Units	pg/g
Instrument - Column	HRMS5 SPBOCTYL59722-01A

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		25
PCB-077	0.0001	NotFnd	<1.0	1.0	U		25
PCB-123	0.00003	NotFnd	<1.1	1.1	U		25
PCB-118	0.00003	NotFnd	<1.0	1.0	U		25
PCB-114	0.00003	NotFnd	<0.99	0.99	U		25
PCB-105	0.00003	NotFnd	<0.99	0.99	U		25
PCB-126	0.1	NotFnd	<0.95	0.95	U		25
PCB-167	0.00003	NotFnd	<0.57	0.57	U		25
PCB-156/157	0.00003	NotFnd	<0.78	0.78	U		50
PCB-169	0.03	28.62	0.705	0.57	J		25
PCB-189	0.00003	NotFnd	<0.62	0.62	U		25

Extraction Standards	**pg**	**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.85	6	25-150
13C12-PCB-003	4000	10.38	6	25-150
13C12-PCB-004	4000	10.54	8	25-150
13C12-PCB-015	4000	14.23	11	25-150
13C12-PCB-019	4000	12.55	11	25-150
13C12-PCB-037	4000	18.16	37	25-150
13C12-PCB-054	4000	14.42	15	25-150
13C12-PCB-081	4000	21.73	69	25-150
13C12-PCB-077	4000	22.04	72	25-150
13C12-PCB-104	4000	17.46	33	25-150
13C12-PCB-123	4000	23.02	69	25-150
13C12-PCB-118	4000	23.18	72	25-150
13C12-PCB-114	4000	23.49	72	25-150
13C12-PCB-105	4000	23.85	74	25-150
13C12-PCB-126	4000	25.43	80	25-150
13C12-PCB-155	4000	20.43	61	25-150
13C12-PCB-167	4000	26.32	96	25-150
13C12-PCB-156/157	8000	26.96	100	25-150
13C12-PCB-169	4000	28.60	113	25-150
13C12-PCB-188	4000	23.41	83	25-150
13C12-PCB-189	4000	29.87	105	25-150
13C12-PCB-202	4000	26.19	106	25-150
13C12-PCB-205	4000	31.24	102	25-150
13C12-PCB-208	4000	29.59	102	25-150
13C12-PCB-206	4000	32.31	108	25-150
13C12-PCB-209	4000	33.40	97	25-150
Cleanup Standards				
13C12-PCB-028	4000	15.92	22	30-135
13C12-PCB-111	4000	21.95	76	30-135
13C12-PCB-178	4000	24.99	93	30-135

Homologue Group Totals				
Total MonoCB	<13	13	U	25
Total DiCB	<6.5	6.5	U	25
Total TriCB	2.75	1.5	J	25
Total TetraCB	3.50	0.85	J	25
Total PentaCB	<0.57	0.57	U	25
Total HexaCB	3.38	0.35	J	25
Total HeptaCB	<0.43	0.43	U	25
Total OctaCB	1.20	0.43	J	25
Total NonaCB	<1.5	1.5	U	25
DecaCB	2.57	0.53	J	25
Total PCB	13.4		J	

Toxic Equivalency - (WHO 2005)	
Lower Bound PCB TEQ	0.0212
Mid Point PCB TEQ	0.0689
Upper Bound PCB TEQ	0.117

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.
1.	This result is an EMPC
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	WG2422933-2	Extraction Date	15-Nov-16
Analysis Method	EPA 1668A	Sample Size	1 n/a
Analysis Type	LCS	Percent Moisture	n/a
Sample Matrix	QC	Split Ratio	1

Approved:
E. Sabljic
--e-signature--
25-Nov-2016

Run Information	**Run 1**
Filename	5-161121C04
Run Date	21-Nov-16 19:31
Final Volume	25 ul
Dilution Factor	1
Analysis Units	% Rec
Instrument - Column	HRMS5 SPBOCTYL59722-01A

Target Analytes	**pg**	**Ret. Time**	**% Rec**	**Limits**	**Flags**
PCB-001	2000	8.86	86	50-150	
PCB-003	2000	10.39	84	50-150	
PCB-004	2000	10.57	99	50-150	
PCB-015	2000	14.24	97	50-150	
PCB-019	2000	12.58	93	50-150	
PCB-037	2000	18.18	81	50-150	
PCB-054	2000	14.44	96	50-150	
PCB-081	2000	21.75	92	50-150	
PCB-077	2000	22.06	95	50-150	
PCB-104	2000	17.47	91	50-150	
PCB-123	2000	23.05	98	50-150	
PCB-118	2000	23.21	98	50-150	
PCB-114	2000	23.51	96	50-150	
PCB-105	2000	23.87	97	50-150	
PCB-126	2000	25.45	100	50-150	
PCB-155	2000	20.44	94	50-150	
PCB-167	2000	26.33	95	50-150	
PCB-156/157	4000	26.98	96	50-150	
PCB-169	2000	28.62	96	50-150	R
PCB-188	2000	23.44	97	50-150	
PCB-189	2000	29.90	103	50-150	
PCB-202	2000	26.20	94	50-150	
PCB-205	2000	31.27	94	50-150	
PCB-208	2000	29.62	94	50-150	
PCB-206	2000	32.33	99	50-150	
PCB-209	2000	33.44	103	50-150	

Extraction Standards		**Time**	**% Rec**	**Limits**
13C12-PCB-001	4000	8.85	9	30-140
13C12-PCB-003	4000	10.39	10	30-140
13C12-PCB-004	4000	10.56	12	30-140
13C12-PCB-015	4000	14.23	23	30-140
13C12-PCB-019	4000	12.56	19	30-140
13C12-PCB-037	4000	18.18	51	30-140
13C12-PCB-054	4000	14.42	27	30-140
13C12-PCB-081	4000	21.75	72	30-140
13C12-PCB-077	4000	22.04	76	30-140
13C12-PCB-104	4000	17.46	47	30-140
13C12-PCB-123	4000	23.03	69	30-140
13C12-PCB-118	4000	23.20	69	30-140
13C12-PCB-114	4000	23.49	69	30-140
13C12-PCB-105	4000	23.85	73	30-140
13C12-PCB-126	4000	25.45	79	30-140
13C12-PCB-155	4000	20.43	68	30-140
13C12-PCB-167	4000	26.32	93	30-140
13C12-PCB-156/157	8000	26.96	96	30-140
13C12-PCB-169	4000	28.62	108	30-140
13C12-PCB-188	4000	23.43	82	30-140
13C12-PCB-189	4000	29.88	97	30-140
13C12-PCB-202	4000	26.19	101	30-140
13C12-PCB-205	4000	31.25	98	30-140
13C12-PCB-208	4000	29.61	99	30-140
13C12-PCB-206	4000	32.31	105	30-140
13C12-PCB-209	4000	33.42	93	30-140

Cleanup Standards				
13C12-PCB-028	4000	15.92	36	40-125
13C12-PCB-111	4000	21.96	73	40-125
13C12-PCB-178	4000	25.00	90	40-125

R Indicates that the ion abundance ratio for this analyte did not meet the control limit. The reported value represents an estimated concentration.

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: 21713
Received By:
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21713 - J2289

Test Number	ORTECH Sample ID 16-21713-M26-	Date Sampled	Contents of Impingers	Initial Volume (ml)	Final Volume (ml)	Gain (ml)	H_2O Rinse (ml)	Total Sample Volume (ml)	Analysis
1	1	OCT 18/16	0.1N H2SO4	30.0	123.0	93	27	150	Halides
	2	"	0.1N NaOH	15.0	10	-5	20	30	Cyanide
2	3	OCT. 19/16	0.1N H2SO4	30.0	113.0	83	37	150	Halides
	4	"	0.1N NaOH	15.0	15.0	Ø	15	30	Cyanide
3	5	OCT 20/16	0.1N H2SO4	30.0	114.0	84	36	150	Halides
	6		0.1N NaOH	15.0	15	Ø	15	30	Cyanide
Blank	7		0.1N H2SO4	30.0	30	0	120	150	Halides
	8		0.1N NaOH	15.0	15	Ø	15	30	Cyanide

Impinger 1 empty, Imp 2+3 30ml split 0.1n H2SO4, Imp 4 empty, Imp 5 15ml 0.1n NaOH, Imp 6 Si Gel

Relinquished by: [signature] Date: Oct 21, /16

Relinquished to: AARON BURTON Date: 21-Oct-2016 14:40

APPENDIX 13

Acid Gases Analytical Reports
(11 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:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1846996		Mississauga, ON L5J 2Y4
Date of Report	7-Nov-16		(905)822-4120
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS:

Cl as HCl Anion Analysed via Ion Chromatography Method USEPA 26 (FE 2-Nov-2016)
F as HF Anion Analysed via Ion Chromatography Method USEPA 26
I as HI Anion Analysed via Ion Chromatography Method USEPA 26
Br as HBr Anion Analysed via Ion Chromatography Method USEPA 26

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%)

R. Stolys

Certified by: ______________________
Rachael Stolys
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name	**16-21713-M26-1 TEST#1**	**16-21713-M26-3 TEST#2**	**16-21713-M26-5 TEST#3**	**16-21713-M26-7 BLANK**
ALS Sample ID	L1846996-1	L1846996-3	L1846996-5	L1846996-7
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Sample	Sample	Sample
Sampling Date/Time	18-Oct-16	19-Oct-16	20-Oct-16	20-Oct-16
Date of Receipt	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Ion Chromatography Analysis Method 26A	**mg**	**mg**	**mg**	**mg**
Total F^- as HF (ave)	<0.0589	<0.0582	0.0958	<0.0589
Analysis 1	<0.0589	<0.0582	0.0976	<0.0589
Analysis 2	<0.0589	<0.0582	0.0940	<0.0589
Total Cl^- as HCl (ave)	5.49	2.51	6.37	0.107
Analysis 1	5.48	2.50	6.44	0.108
Analysis 2	5.49	2.51	6.30	0.106
Total Br^- as HBr (ave)	<0.284	<0.280	0.354	<0.284
Analysis 1	<0.284	<0.280	0.357	<0.284
Analysis 2	<0.284	<0.280	0.350	<0.284
Total I^- as HI (ave)	<0.0847	<0.0837	<0.0857	<0.0847
Analysis 1	<0.0847	<0.0837	<0.0857	<0.0847
Analysis 2	<0.0847	<0.0837	<0.0857	<0.0847

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			
Method 26A	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	<0.0175	0.520	97%
Analysis 1	<0.0175	0.518	
Analysis 2	<0.0175	0.522	
Total Cl^- as HCl (ave)	<0.0309	0.751	95%
Analysis 1	<0.0309	0.748	
Analysis 2	<0.0309	0.755	
Total Br^- as HBr (ave)	<0.0844	2.37	93%
Analysis 1	<0.0844	2.36	
Analysis 2	<0.0844	2.39	
Total I^- as HI (ave)	<0.0252	0.715	95%
Analysis 1	<0.0252	0.711	
Analysis 2	<0.0252	0.718	

ALS Environmental

Sample QC Summary Report

Sample Name	**16-21713-M26-1 TEST#1**	**16-21713-M26-1 TEST#1**	**16-21713-M26-1 TEST#1**	**16-21713-M26-1 TEST#1**
ALS Sample ID	L1846996-1	L1846996-1DUP	L1846996-1MS	L1846996-1MS
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date/Time	18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16
Date of Receipt	21-Oct-16	21-Oct-16	21-Oct-16	21-Oct-16
Ion Chromatography Analysis				
Method 26A	**mg**	**mg**	**mg**	**% Rec**
Total F^- as HF (ave)	<0.0589	<0.0589	1.85	102%
Analysis 1	<0.0589	<0.0589	1.86	
Analysis 2	<0.0589	<0.0589	1.84	
Total Cl^- as HCl (ave)	5.49	5.53	8.02	98%
Analysis 1	5.48	5.52	8.07	
Analysis 2	5.49	5.53	7.97	
Total Br^- as HBr (ave)	<0.284	<0.284	8.78	102%
Analysis 1	<0.284	<0.284	8.58	
Analysis 2	<0.284	<0.284	8.98	
Total I^- as HI (ave)	<0.0847	<0.0847	2.48	98%
Analysis 1	<0.0847	<0.0847	2.48	
Analysis 2	<0.0847	<0.0847	2.48	

ORTECH CONSULTING INC.
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 21-OCT-16
Report Date: 07-NOV-16 08:04 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L1846996
Project P.O. #: 21713-J2289
Job Reference: 21713 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

Rachael Stolys

Rachael Stolys, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1846996-2 16-21713-M26-2 TEST#1							
Sampled By: Client on 18-OCT-16							
Matrix: Stack							
Miscellaneous Parameters							
Cyanide, Total	<0.20	DLM	0.20	ug	03-NOV-16	03-NOV-16	R3587096
Sample Size	30.0		0.10	mL		24-OCT-16	R3578133
L1846996-4 16-21713-M26-4 TEST#2							
Sampled By: Client on 19-OCT-16							
Matrix: Stack							
Miscellaneous Parameters							
Cyanide, Total	<0.020		0.020	ug	03-NOV-16	03-NOV-16	R3587096
Sample Size	28.5		0.10	mL		24-OCT-16	R3578133
L1846996-6 16-21713-M26-6 TEST#3							
Sampled By: Client on 20-OCT-16							
Matrix: Stack							
Miscellaneous Parameters							
Cyanide, Total	<0.020		0.020	ug	03-NOV-16	03-NOV-16	R3587096
Sample Size	30.0		0.10	mL		24-OCT-16	R3578133
L1846996-8 16-21713-M26-8 BLANK							
Sampled By: Client on 20-OCT-16							
Matrix: Stack							
Miscellaneous Parameters							
Cyanide, Total	<0.020		0.020	ug	03-NOV-16	03-NOV-16	R3587096
Sample Size	30.0		0.10	mL		24-OCT-16	R3578133

* 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 CONSULTING INC.
804 Southdown Road
Mississauga ON L5J 2Y4

Contact: Chris Belore

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed

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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Cyanides							
Cyanide, Total							
	2	18-OCT-16	03-NOV-16 00:00	14	16	days	EHT
	4	19-OCT-16	03-NOV-16 00:00	14	15	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1846996 were received on 21-OCT-16 14:40.

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.

ORTECH Environmental Recovery & Sample Log
Method 26
Incinerator Stack

L1846996

Client: Clean Harbors Sarnia
Job/Report Number: 21713
Received By:
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21713 - J2289

Test Number	ORTECH Sample ID 16-21713-M26-	Date Sampled	Contents of Impingers	Initial Volume (ml)	Final Volume (ml)	Gain (ml)	H_2O Rinse (ml)	Total Sample Volume (ml)	Analysis
1	1	OCT 18/16	0.1N H2SO4	30.0	123.0	93	27	150	Halides
	2	"	0.1N NaOH	15.0	10	-5	20	30	Cyanide
2	3	OCT. 19/16	0.1N H2SO4	30.0	113.0	83	37	150	Halides
	4	"	0.1N NaOH	15.0	15.0	Ø	15	30	Cyanide
3	5	OCT 20/16	0.1N H2SO4	30.0	114.0	84	36	150	Halides
	6		0.1N NaOH	15.0	15	Ø	15	30	Cyanide
Blank	7		0.1N H2SO4	30.0	30	0	120	150	Halides
	8		0.1N NaOH	15.0	15	Ø	15	30	Cyanide

Impinger 1 empty, Imp 2+3 30ml split 0.1n H2SO4, Imp 4 empty, Imp 5 15ml 0.1n NaOH, Imp 6 Si Gel

Relinquished by: [signature] Date: Oct 21, /16

Relinquished to: AARON BURTON Date: 21-Oct-2016 14:40 17.8°C

APPENDIX 14

Volatile Organics Analytical Reports
and DRE Compound Analysis in Feeds Report
(14 pages)

1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact:	Rachael Stolys	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road Mississauga, ON L5J 2Y4 CANADA
ALS WO#:	L1846988		
Date of Report	7-Nov-16		
Date of Sample Receipt	21-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 Clean Harbors

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

NS = Not spiked

Ketone data by VOST analyses are estimated values only

The absence of Trichlorotrifluoroethane and Ethyl Acetate has been determined as an absence of peaks at the expected masses for these targets.

For the samples analyzed 28-Oct-2016:

For the sample 16-21713-VOST-6A/6B TEST#2 PAIR#1, the recovery of the internal standard bromochloromethane is above the method control limit. The recovery is elevated, but within the control limit for selected other samples. The presence of bromomethane, bromodichloromethane and chlorodibromomethane is noted. The recovery of bromochloromethane may be elevated by the presence of measurable sample levels of this compound.

The recoveries of this standard are not elevated for the laboratory quality control samples.

The results for the reported targets from Dichlorodifluoromethane to 1,1,1-trichloroethane may be biased low as a result.

The recovery of 1,1,1-trichloroethane is marginally below the method control limit for the laboratory control sample (LCS). However, this target was not detected in the samples.

Certified by:

Steve Kennedy
Technical Supervisor

ALS Environmental

Sample Analysis Summary Report

Instrument	MSD-3	Sample Matrix	VOST Tube
Column	Rxi-624Sil MS 1360231	Analysis Units	ug/sample
Acquisition Start Date	10/28/2016		

		Laboratory Method Blank	Laboratory Control Sample	16-21713-VOST-1A/1B TEST#1 PAIR#1	16-21713-VOST-6A/6B TEST#2 PAIR#1	16-21713-VOST-11A/11B TEST#3 PAIR#1	16-21713-VOST-2A/AB TEST#1 PAIR#2	16-21713-VOST-3A/3B TEST#1 PAIR#3	16-21713-VOST-13A/13B TEST#3 PAIR#3	16-21713-VOST-14A/14B TEST#3 PAIR#4	Recovery Control Limtis
Client Sample ID											
ALS Sample ID		VOST-blank	250ng-controlstd	L1846988-1	L1846988-6	L1846988-11	L1846988-2	L1846988-3	L1846988-13	L1846988-14	
Filename		16102806.D	16102805.D	16102807.D	16102808.D	16102809.D	16102810.D	16102811.D	16102812.D	16102813.D	
Dilution factor				1	1	1	1	1	1	1	
		Blank	LCS	sample	sample	sample	sample	sample	sample	sample	
Sampling date				10/18/2016	10/19/2016	10/20/2016	10/18/2016	10/18/2016	10/20/2016	10/20/2016	
Acquisition Time		10/28/2016 14:34	10/28/2016 13:46	10/28/2016 15:50	10/28/2016 16:16	10/28/2016 16:42	10/28/2016 17:08	10/28/2016 17:33	10/28/2016 17:59	10/28/2016 18:24	
Target Analyte	**RL ug/sample**	**Conc. ug/sample**	**% Rec**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	
Dichlorodifluoromethane	0.02	<	69	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Vinyl Chloride	0.02	<	97	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Bromomethane	0.09	<	81	0.297	0.439	0.228	0.107	0.188	0.392	0.204	
Trichlorofluoromethane	0.02	<	96	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
1,1-Dichloroethene	0.01	<	103	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Acetone	0.1	<	57	<0.1	<0.1	0.443	0.105	<0.1	0.238	0.165	
Methylene Chloride	0.1	<	93	<0.1	<0.1	<0.1	<0.1	<0.1	0.101	<0.1	
trans,1,2-Dichloroethene	0.01	<	84	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
1,1-Dichloroethane	0.01	<	67	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
2-Butanone	0.01	<	59	0.026	0.065	0.177	0.046	0.037	0.096	0.038	
Chloroform	0.01	<	76	<0.01	<0.01	0.012	0.017	0.011	0.016	0.015	
1,1,1-Trichloroethane	0.01	<	48	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Carbon Tetrachloride	0.01	<	90	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Benzene	0.05	<	85	0.791	1.469	0.490	0.599	0.593	0.508	0.552	
Trichloroethene	0.01	<	98	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
1,2-Dichloropropane	0.01	<	84	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Bromodichloromethane	0.01	<	89	0.029	0.018	0.050	0.028	0.024	0.022	0.023	
Toluene	0.05	<	84	0.236	0.589	0.171	0.147	0.155	0.374	0.320	
Tetrachloroethene	0.01	<	95	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Chlorodibromomethane	0.01	<	86	0.037	0.019	0.020	0.038	0.031	0.026	0.030	
Ethylene Dibromide	0.02	<	73	<0.02	<0.02	0.028	0.024	<0.02	0.025	<0.02	
Ethylbenzene	0.01	<	87	0.031	0.038	0.022	0.015	0.013	0.023	0.032	
M&P-Xylene	0.03	<	84	0.115	0.130	0.057	0.049	0.044	0.069	0.127	
O-Xylene	0.01	<	83	0.037	0.041	0.021	0.017	0.016	0.025	0.039	
Styrene	0.02	<	74	0.056	0.053	0.049	0.042	0.034	0.058	0.051	
Bromoform	0.01	<	86	0.033	0.019	0.032	0.047	0.033	0.031	0.033	
Isopropylbenzene	0.02	<	88	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
1,3,5-Trimethylbenzene	0.02	<	83	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
1,2,4-Trimethylbenzene	0.02	<	84	0.022	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Ethyl Acetate	0.02	<	NS	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Trichlorotrifluoroethane	0.02	<	NS	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Field Standard		% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	
d10-Ethylbenzene		102	96	126	135	91	113	101	110	103	
Surrogate Standards		% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec
d4-1,2-Dichloroethane		83	73	59	69	110	112	113	112	115	50-150
d8-Toluene		96	92	95	98	104	100	100	97	96	50-150
4-Bromofluorobenzene		113	113	126	117	133	97	108	106	103	50-150
Internal Standards		% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec
Bromochloromethane		96	125	158	222 H	107	184	153	139	148	50-200
1,4-Difluorobenzene		144	132	99	112	107	132	124	118	114	50-200
d5-Chlorobenzene		127	132	96	104	95	112	107	108	103	50-200

NS indicates that compound was not spiked
H indicates that compound response exceeds instrument control range of 50-200% recovery

ALS Environmental

Sample Analysis Summary Report

Instrument	MSD-3	Sample Matrix	VOST Tube
Column	Rxi-624Sil MS 1360231	Analysis Units	ug/sample
Acquisition Start Date	10/31/2016		

		Laboratory Method Blank	**Laboratory Control Sample**	**16-21713-VOST-16A/16B TRIP BLANK**	**16-21713-VOST-15A/15B TEST#3 FIELD BLANK**	**16-21713-VOST-7A/7B TEST#2 PAIR#2**	**16-21713-VOST-9A/9B TEST#2 PAIR#4**	**Recovery Control Limtis**
Client Sample ID								
ALS Sample ID		VOST-blank	VOST-controlstd	L1846988-16	L1846988-15	L1846988-7	L1846988-9	
Filename		16103107.D	16103106.D	16103108.D	16103109.D	16103110.D	16103111.D	
Dilution Factor				1	1	10	10	
		Blank	LCS	sample	sample	sample	sample	
Sampling date				10/20/2016	10/20/2016	10/19/2016	10/19/2016	
Acquisition Time		10/31/2016 16:31	10/31/2016 15:52	10/31/2016 17:14	10/31/2016 17:40	10/31/2016 18:05	10/31/2016 18:31	
Target Analyte	**RL ug/sample**	**Conc. ug/sample**	**% Rec**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	**Conc. ug/sample**	
Dichlorodifluoromethane	0.02	<	93	<0.02	<0.02	<0.2	<0.2	
Vinyl Chloride	0.02	<	91	<0.02	<0.02	<0.2	<0.2	
Bromomethane	0.09	<	83	<0.09	<0.09	<0.9	<0.9	
Trichlorofluoromethane	0.02	<	108	<0.02	<0.02	<0.2	<0.2	
1,1-Dichloroethene	0.01	<	90	<0.01	<0.01	<0.1	<0.1	
Acetone	0.1	<	72	<0.1	<0.1	<1	<1	
Methylene Chloride	0.1	<	91	<0.1	<0.1	1.048	4.612	
trans,1,2-Dichloroethene	0.01	<	77	<0.01	<0.01	<0.1	<0.1	
1,1-Dichloroethane	0.01	<	69	<0.01	<0.01	<0.1	<0.1	
2-Butanone	0.01	<	93	<0.01	<0.01	0.306	0.356	
Chloroform	0.01	<	74	<0.01	<0.01	<0.1	<0.1	
1,1,1-Trichloroethane	0.01	<	89	<0.01	<0.01	<0.1	<0.1	
Carbon Tetrachloride	0.01	<	90	<0.01	<0.01	<0.1	<0.1	
Benzene	0.05	<	87	<0.05	<0.05	0.611	0.698	
Trichloroethene	0.01	<	106	<0.01	<0.01	<0.1	<0.1	
1,2-Dichloropropane	0.01	<	94	<0.01	<0.01	<0.1	<0.1	
Bromodichloromethane	0.01	<	100	<0.01	<0.01	<0.1	<0.1	
Toluene	0.05	<	86	<0.05	<0.05	<0.5	<0.5	
Tetrachloroethene	0.01	<	93	<0.01	<0.01	<0.1	<0.1	
Chlorodibromomethane	0.01	<	103	<0.01	<0.01	<0.1	<0.1	
Ethylene Dibromide	0.02	<	93	<0.02	<0.02	<0.2	<0.2	
Ethylbenzene	0.01	<	92	<0.01	<0.01	<0.1	<0.1	
M&P-Xylene	0.03	<	93	<0.03	<0.03	<0.3	<0.3	
O-Xylene	0.01	<	92	<0.01	<0.01	<0.1	<0.1	
Styrene	0.02	<	82	<0.02	<0.02	<0.2	<0.2	
Bromoform	0.01	<	96	<0.01	<0.01	<0.1	<0.1	
Isopropylbenzene	0.02	<	92	<0.02	<0.02	<0.2	<0.2	
1,3,5-Trimethylbenzene	0.02	<	90	<0.02	<0.02	<0.2	<0.2	
1,2,4-Trimethylbenzene	0.02	<	90	<0.02	<0.02	<0.2	<0.2	
Ethyl Acetate	0.02	<	NS	<0.02	<0.02	<0.2	<0.2	
Trichlorotrifluoroethane	0.02	<	NS	<0.02	<0.02	<0.2	<0.2	
Field Standard		**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	
d10-Ethylbenzene		96	94	98	103	162	134	
Surrogate Standards		**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
d4-1,2-Dichloroethane		88	82	132	123	125	123	50-150
d8-Toluene		97	97	97	98	102	95	50-150
4-Bromofluorobenzene		127	118	104	102	100	102	50-150
Internal Standards		**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
Bromochloromethane		117	117	68	114	122	126	50-200
1,4-Difluorobenzene		121	126	70	126	126	129	50-200
d5-Chlorobenzene		121	115	71	121	111	126	50-200

NS indicates that compound was not spiked

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 24-OCT-16
Report Date: 10-NOV-16 14:22 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L1848486
Project P.O. #: NOT SUBMITTED
Job Reference: 21713 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

Rachael Stolys

Rachael Stolys, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1848486-1 16-21713-FR-5 RICH FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	07-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
m+p-Xylenes	1860	DLM	120	mg/kg	31-OCT-16	07-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
o-Xylene	752	DLM	80	mg/kg	31-OCT-16	07-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Toluene	3470	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.4		50-150	%	31-OCT-16	07-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	98.4		50-150	%	31-OCT-16	07-NOV-16	R3592079
L1848486-2 16-21713-FL-5 LEAN FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	07-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
m+p-Xylenes	750	DLM	120	mg/kg	31-OCT-16	07-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
o-Xylene	261	DLM	80	mg/kg	31-OCT-16	07-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Toluene	1100	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.9		50-150	%	31-OCT-16	07-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	99.2		50-150	%	31-OCT-16	07-NOV-16	R3592079
L1848486-3 16-21713-FE-5 EMULSION FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	07-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
m+p-Xylenes	430	DLM	120	mg/kg	31-OCT-16	07-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
o-Xylene	179	DLM	80	mg/kg	31-OCT-16	07-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Toluene	450	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.3		50-150	%	31-OCT-16	07-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	98.9		50-150	%	31-OCT-16	07-NOV-16	R3592079
L1848486-4 16-21713-FA-5 ALKALINE FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	07-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	07-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	07-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	07-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	07-NOV-16	R3592079

* 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
L1848486-4 16-21713-FA-5 ALKALINE FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
Surrogate: 1,4-Difluorobenzene	100.2		50-150	%	31-OCT-16	07-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	97.6		50-150	%	31-OCT-16	07-NOV-16	R3592079
L1848486-5 16-21713-LW-5 LEACHATE FEED TEST#1							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	99.9		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	96.1		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-6 16-21713-FR-10 RICH FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	1550	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	634	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	2930	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	99.8		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	99.0		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-7 16-21713-FL-10 LEAN FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	270	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	97	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	420	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.1		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	99.3		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-8 16-21713-FE-10 EMULSION FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079

* 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
L1848486-8 16-21713-FE-10 EMULSION FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	410	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	181	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	350	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.4		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	97.3		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-9 16-21713-FA-10 ALKALINE FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.2		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	97.0		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-10 16-21713-LW-10 LEACHATE FEED TEST#2							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.0		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	95.9		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-11 16-21713-FR-15 RICH FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	1440	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	592	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	2730	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	99.9		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	98.1		50-150	%	31-OCT-16	08-NOV-16	R3592079

* 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
L1848486-12 16-21713-FL-15 LEAN FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	400	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	147	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	700	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.4		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	98.4		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-13 16-21713-FE-15 EMULSION FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	1090	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	7400	R	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	379	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	1420	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.2		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	96.6		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-14 16-21713-FA-15 ALKALINE FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Surrogate: 1,4-Difluorobenzene	100.1		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	97.9		50-150	%	31-OCT-16	08-NOV-16	R3592079
L1848486-15 16-21713-LW-15 LEACHATE FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
1,2,4-Trichlorobenzene	<1000	DLM	1000	mg/kg	31-OCT-16	08-NOV-16	R3592079
Ethyl Acetate	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
m+p-Xylenes	<120	DLM	120	mg/kg	31-OCT-16	08-NOV-16	R3592079
Methyl Ethyl Ketone	<2000	DLM	2000	mg/kg	31-OCT-16	08-NOV-16	R3592079
o-Xylene	<80	DLM	80	mg/kg	31-OCT-16	08-NOV-16	R3592079
Tetrachloroethylene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079
Toluene	<200	DLM	200	mg/kg	31-OCT-16	08-NOV-16	R3592079

* 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
L1848486-15 16-21713-LW-15 LEACHATE FEED TEST#3							
Sampled By: Client							
Matrix: Stack							
Volatile Organic Compounds							
Surrogate: 1,4-Difluorobenzene	100.8		50-150	%	31-OCT-16	08-NOV-16	R3592079
Surrogate: 4-Bromofluorobenzene	95.8		50-150	%	31-OCT-16	08-NOV-16	R3592079

* 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).
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.

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: L1848486 Report Date: 10-NOV-16

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 R3592079								
WG2422715-3 DUP		**L1848486-1**						
1,2,4-Trichlorobenzene		<1000	<1000	RPD-NA	mg/kg	N/A	50	07-NOV-16
Ethyl Acetate		<2000	<2000	RPD-NA	mg/kg	N/A	50	07-NOV-16
m+p-Xylenes		1860	1760		mg/kg	5.5	50	07-NOV-16
Methyl Ethyl Ketone		<2000	<2000	RPD-NA	mg/kg	N/A	50	07-NOV-16
o-Xylene		752	710		mg/kg	5.8	50	07-NOV-16
Tetrachloroethylene		<200	<200	RPD-NA	mg/kg	N/A	50	07-NOV-16
Toluene		3470	3190		mg/kg	8.3	50	07-NOV-16
WG2422715-1 MB								
1,2,4-Trichlorobenzene			<1000		mg/kg		1000	07-NOV-16
Ethyl Acetate			<2000		mg/kg		2000	07-NOV-16
m+p-Xylenes			<120		mg/kg		120	07-NOV-16
Methyl Ethyl Ketone			<2000		mg/kg		2000	07-NOV-16
o-Xylene			<80		mg/kg		80	07-NOV-16
Tetrachloroethylene			<200		mg/kg		200	07-NOV-16
Toluene			<200		mg/kg		200	07-NOV-16
Surrogate: 1,4-Difluorobenzene			100.4		%		50-150	07-NOV-16
Surrogate: 4-Bromofluorobenzene			94.7		%		50-150	07-NOV-16

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:

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.

L1848486

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for ALS DRE Analysis

Test Number	Test Date	ORTECH Sample Identification		Sample Description
1		16- 21713-	FR-5	Rich Feed (250 ml bottle) 1
1		16- 21713-	FL-5	Lean Feed (250 ml bottle) 2
1		16- 21713-	FE-5	Emulsion Feed (250 ml bottle) 3
1		16- 21713-	FA-5	Alkaline Feed (250 ml bottle) 4
1		16- 21713-	LW-5	Leachate Feed (250 ml bottle) 5
2		16- 21713-	FR-10	Rich Feed (250 ml bottle) 6
2		16- 21713-	FL-10	Lean Feed (250 ml bottle) 7
2		16- 21713-	FE-10	Emulsion Feed (250 ml bottle) 8
2		16- 21713-	FA-10	Alkaline Feed (250 ml bottle) 9
2		16- 21713-	LW-10	Leachate Feed (250 ml bottle) 10
3		16- 21713-	FR-15	Rich Feed (250 ml bottle) 11
3		16- 21713-	FL-15	Lean Feed (250 ml bottle) 12
3		16- 21713-	FE-15	Emulsion Feed (250 ml bottle) 13
3		16- 21713-	FA-15	Alkaline Feed (250 ml bottle) 14
3		16- 21713-	LW-15	Leachate Feed (250 ml bottle) 15

Custody Relinquished by: [signature] Date: Oct 24 16

Custody Received by: R Stoeyo Date: 24-Oct-16 9:15

19.4°C

ORTECH

Table 5
Main Stack Sample Analysis

Contaminant Group	Contaminants
Acid Gas Anion Group	Chloride Fluoride Bromide Iodide Cyanide

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

APPENDIX 15

Feed and Baghouse Dust Metals Analytical Report
(11 pages)

ORTECH Environmental
ATTN: Chris Belore
804 Southdown Road
Mississauga ON L5J 2Y4

Date Received: 24-OCT-16
Report Date: 14-NOV-16 14:28 (MT)
Version: FINAL

Client Phone: 905-822-4120

Certificate of Analysis

Lab Work Order #: L1848483
Project P.O. #: NOT SUBMITTED
Job Reference: 21713 CLEAN HARBORS
C of C Numbers:
Legal Site Desc:

Rachael Stolys

Rachael Stolys, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1848483-1 16-21713-RC-1 RICH FEED							
Sampled By: Client							
Matrix: Stack							
Miscellaneous Parameters							
Mercury (Hg)	0.185		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306
L1848483-2 16-21713-LC-1 LEAN FEED							
Sampled By: Client							
Matrix: Stack							
Miscellaneous Parameters							
Mercury (Hg)	0.559		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306
L1848483-3 16-21713-AC-1 ALKALINE FEED							
Sampled By: Client							
Matrix: Stack							
Miscellaneous Parameters							
Mercury (Hg)	<0.010		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306
L1848483-4 16-21713-EC-1 EMULSION FEED							
Sampled By: Client							
Matrix: Stack							
Miscellaneous Parameters							
Mercury (Hg)	0.329		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306
L1848483-5 16-21713-BDC-1 BAGHOUSE DUST							
Sampled By: Client							
Matrix: Solid							
Miscellaneous Parameters							
Mercury (Hg)	13.7		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306
L1848483-6 16-21713-LWC-1 LEACHATE FEED							
Sampled By: Client							
Matrix: Stack							
Miscellaneous Parameters							
Mercury (Hg)	<0.010		0.010	mg/kg wwt	03-NOV-16	03-NOV-16	R3587306

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-7471A-CVAA-BU	Solid	Mercury in Solids	METHOD 7471A

Samples are digested at high temperature in an open vessel using strongly oxidizing, and acidic reagents. Mercury is reduced in the instrument, and released as a vapour. This vapour passes between a lamp and detector and the results quantified relative to calibration standards.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
BU	ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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
HG-7471A-CVAA-BU	Solid							
Batch **R3587306**								
WG2425743-5 **DUP**		**L1848483-4**						
Mercury (Hg)		0.329	0.333		mg/kg wwt	1.3	20	03-NOV-16
WG2425743-2 **LCS**								
Mercury (Hg)			94.5		%		85-115	03-NOV-16
WG2425743-1 **MB**								
Mercury (Hg)			<0.010		mg/kg wwt		0.01	03-NOV-16

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

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.

L1848483

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for ALS Metals Analysis

ORTECH Sample Identification			Sample Description
16-	21713-	RC-1	Rich Feed (500 ml bottle)
16-	21713-	LC-1	Lean Feed (500 ml bottle)
16-	21713-	AC-1	Alkaline Feed (500 ml bottle)
16-	21713-	EC-1	Emulsion Feed (500 ml bottle)
16-	21713-	BDC-1	Baghouse Dust (500 ml bottle)
16-	21713-	LWC-1	Leachate Feed (500 ml bottle)

Custody Relinquished by: [signature] Date: Oct 24, 16

Custody Received by: [signature] Date: 24 OCT 16 9:15

19.4°C

ORTECH

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:	Ron McLeod	**Client Name:**	ORTECH Environmental
ALS Project ID:	ORT100	**Client Address:**	804 Southdown Road
ALS WO#:	L1848483		MIssissauga, ON L5J 2Y4
Date of Report	14-Nov-16		(905)822-4120
Date of Sample Receipt	24-Oct-16	**Client Contact:**	Chris Belore
		Client Project ID:	21713 CLEAN HARBORS

COMMENTS:
Metals analysed via ICP-MS Method USEPA 6020A (4-Nov-2016)
Sample Preparation via Hotblock Digestion for Metals in Soils USEPA 200.2 (4-Nov-2016)

ANALYST COMMENTS:
Sulfur was not spiked for LCS/MS.
Low recoveries for Be, Li, Si in LCS. Data may be biased low for these targets.
Low recoveries for B, K, in LCS, however all other QC are within ALS DQOs for these targets. This is not expected to significantly impact data quality.
Low recoveries for Be, Li, Ti in MS. Limit 80-120%. Data may be biased low for these targets.

Si recovery in the MS is low (18% observed, limits 80-120%). This may point to a matrix interference for this target which provides a significant low bias. Aliquots of samples were taken and post-spiked to show similar results. Data for this target may be biased low by up to 60%

Recoveries for Al, Ca, Mg, Na in the MS cannot be determined due to high background in the sample relative to the spiking level. This is not expected to impact data quality.

PE 10-Nov-16

LCB = Laboratory Control Blank
LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
LOR = Limit of Reporting

R. Stolys

Certified by: ______________________
Rachael Stolys
Account Manager

ALS Environmental

Sample Analysis Summary Report

Sample Name		**16-21713-RC-1 RICH FEED**	**16-21713-LC-1 LEAN FEED**	**16-21713-AC-1 ALKALINE FEED**	**16-21713-EC-1 EMULSION FEED**	**16-21713-BDC-1 BAGHOUSE DUST**	**16-21713-LWC-1 LEACHATE FEED**
ALS Sample ID		L1848483-1	L1848483-2	L1848483-3	L1848483-4	L1848483-5	L1848483-6
Matrix		Stack	Stack	Stack	Stack	Solid	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		24-Oct-16	24-Oct-16	24-Oct-16	24-Oct-16	24-Oct-16	24-Oct-16
Multi-Metals via ICP-MS	**LOR mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Solids							
Aluminum	10	632	668	<	1200	14400	<
Antimony	0.4	<	0.614	<	0.530	9.54	<
Arsenic	0.4	2.81	182	<	4.39	2960	2.95
Barium	1	181	114	<	256	406	<
Beryllium	0.5	<	<	<	<	<	<
Boron	10	<	<	<	<	146	60.5
Cadmium	0.1	0.638	1.48	<	0.118	18.9	<
Calcium	50	579	1000	5020	1170	77800	514
Chromium	4	<	22.9	<	<	219	<
Cobalt	1	<	2.88	<	1.15	37.0	<
Copper	2.5	13.0	42.6	<	13.1	569	<
Iron	200	457	564	<	880	9030	<
Lead	0.1	8.69	6.56	<	14.7	89.6	0.236
Lithium	1	<	1.03	<	<	36.3	11.1
Magnesium	15	176	275	92.0	243	5470	306
Manganese	15	<	53.1	<	68.6	687	<
Molybdenum	1	6.40	12.2	<	10.3	268	4.64
Nickel	0.5	5.36	14.9	<	13.2	195	<
Phosphorus	100	124	1640	<	173	23300	<
Potassium	150	<	2720	<	<	50600	2370
Selenium	2	<	7.75	<	4.17	231	<
Silver	0.1	<	0.115	<	<	3.58	<
Sodium	10	816	3890	26.0	443	78700	8860
Strontium	2	6.07	6.88	2.05	9.04	168	5.37
Tin	2	<	<	<	<	12.1	52.5
Titanium	1	5.72	6.15	<	11.5	189	1.12
Vanadium	1	12.5	7.68	<	21.6	188	<
Zinc	20	62.0	56.2	<	114	623	<
Sulphur	1500	1800	4100	<	2420	39400	2460
Silicon	150	972.90	<	<	230.67	517.21	<

ALS Environmental

Sample QC Summary Report

Sample Name		**LCB**	**LCS**	**LCS**
ALS Sample ID		LCB	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	<	62.7	85
Antimony	0.4	<	5.98	90
Arsenic	0.4	<	30.8	93
Barium	1	<	30.6	92
Beryllium	0.5	<	21.9	66
Boron	10	<	24.5	73
Cadmium	0.1	<	14.8	89
Calcium	50	<	705	84
Chromium	4	<	31.0	94
Cobalt	1	<	31.8	96
Copper	2.5	<	31.7	94
Iron	200	<	<	90
Lead	0.1	<	36.2	109
Lithium	1	<	5.01	77
Magnesium	15	<	151	91
Manganese	15	<	31.7	94
Molybdenum	1	<	15.0	95
Nickel	0.5	<	29.8	93
Phosphorus	100	<	718	84
Potassium	150	<	612	78
Selenium	2	<	28.5	85
Silver	0.1	<	17.1	103
Sodium	10	<	717	88
Strontium	2	<	31.5	95
Tin	2	<	15.6	92
Titanium	1	<	28.6	84
Vanadium	1	<	31.1	93
Zinc	20	<	56.2	86
Sulphur	1500	<	n/a	n/a
Silicon	150	<	1376	18

ALS Environmental

Sample QC Summary Report

Sample Name		**QC Sample**	**QC Sample**	**QC Sample**	**QC Sample**
ALS Sample ID		L1850947-1	L1850947-1	MS	MS
Matrix		Solid	Solid	Solid	Solid
Analysis Type		Sample	Duplicate	Matrix Spike	Matrix Spike
Sampling Date		n/a	n/a	n/a	n/a
Date of Receipt		31-Oct-16	31-Oct-16	31-Oct-16	31-Oct-16

Multi-Metals via ICP-MS	**LOR mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**% Rec**
Solids					
Aluminum	10	276	284	356	nq
Antimony	0.4	<	<	6.08	92
Arsenic	0.4	<	<	31.9	96
Barium	1	2.01	1.91	32.2	91
Beryllium	0.5	<	<	23.2	70
Boron	10	<	<	27.5	83
Cadmium	0.1	0.172	0.166	15.1	90
Calcium	50	215000	221000	220000	nq
Chromium	4	4.57	5.01	37.2	99
Cobalt	1	<	<	32.6	99
Copper	2.5	<	<	31.3	92
Iron	200	<	<	339	103
Lead	0.1	0.105	0.107	32.8	99
Lithium	1	<	<	5.46	79
Magnesium	15	1180	1230	1450	nq
Manganese	15	<	<	45.5	101
Molybdenum	1	<	<	15.7	99
Nickel	0.5	0.921	1.13	32.3	95
Phosphorus	100	<	<	818	95
Potassium	150	<	<	736	89
Selenium	2	<	<	29.5	88
Silver	0.1	<	<	16.2	98
Sodium	10	37000	38500	42500	nq
Strontium	2	89.2	89.8	120	98
Tin	2	<	<	16.2	97
Titanium	1	17.0	16.1	44.1	83
Vanadium	1	1.88	1.92	34.1	98
Zinc	20	<	<	59.5	89
Sulphur	1500	1920	2910	n/a	n/a

ALS Environmental

Sample QC Summary Report

Sample Name			**16-21713-RC-1 RICH FEED**	**16-21713-RC-1 RICH FEED**	**16-21713-RC-1 RICH FEED**	**16-21713-RC-1 RICH FEED**
ALS Sample ID			L1848483-1	L1848483-1	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			24-Oct-16	24-Oct-16	24-Oct-16	24-Oct-16
Multi-Metals via ICP-MS		**LOR mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**% Rec**
Solids						
	Silicon	150	973	915	2301.60	18

APPENDIX 16

Master Sample Log/Chains of Custody Forms
(8 pages)

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for Petro Labs

PO: 21713-J2299

Test Number	Test Date	ORTECH Sample Identification		Sample Description
1	Oct 18, 16	16- 21713-	FR-2	Rich Feed (250 ml bottle)
1	"	16- 21713-	FL-2	Lean Feed (250 ml bottle)
1	"	16- 21713-	FE-2	Emulsion Feed (250 ml bottle)
2	Oct 19, 16	16- 21713-	FR-7	Rich Feed (250 ml bottle)
2	"	16- 21713-	FL-7	Lean Feed (250 ml bottle)
2	"	16- 21713-	FE-7	Emulsion Feed (250 ml bottle)
3	Oct 20, 16	16- 21713-	FR-12	Rich Feed (250 ml bottle)
3	"	16- 21713-	FL-12	Lean Feed (250 ml bottle)
3	"	16- 21713-	FE-12	Emulsion Feed (250 ml bottle)

Custody Relinquished by: JAMES SCOTT Date: Oct 24, 2016

Custody Received by: Date: Oct. 24. 2016

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for ALS Metals Analysis

ORTECH Sample Identification			Sample Description
16-	21713-	RC-1	Rich Feed (500 ml bottle)
16-	21713-	LC-1	Lean Feed (500 ml bottle)
16-	21713-	AC-1	Alkaline Feed (500 ml bottle)
16-	21713-	EC-1	Emulsion Feed (500 ml bottle)
16-	21713-	BDC-1	Baghouse Dust (500 ml bottle)
16-	21713-	LWC-1	Leachate Feed (500 ml bottle)

Custody Relinquished by: [signature] Date: Oct 24, 16

Custody Received by: [signature] Date: 24-OCT-16

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for ALS
for Dioxin, Furan and PCB analysis

ORTECH Sample Identification			Sample Description
16-	21713-	RC-4	Rich Feed (500ml Bottle)
16-	21713-	LC-4	Lean Feed (500ml Bottle)
16-	21713-	AC-4	Alkaline Feed (500mL Bottle)
16-	21713-	EC-4	Emulsion Feed(500ml Bottle)

Custody Relinquished by: [signature] Date: Oct 24, 16

Custody Received by: RStory Date: 24·OCT·16

Clean Harbors Lambton
ORTECH Project # 21713
Process Samples
Sample List for ALS DRE Analysis

Test Number	Test Date	ORTECH Sample Identification	Sample Description
1		16- 21713- FR-5	Rich Feed (250 ml bottle)
1		16- 21713- FL-5	Lean Feed (250 ml bottle)
1		16- 21713- FE-5	Emulsion Feed (250 ml bottle)
1		16- 21713- FA-5	Alkaline Feed (250 ml bottle)
1		16- 21713- LW-5	Leachate Feed (250 ml bottle)
2		16- 21713- FR-10	Rich Feed (250 ml bottle)
2		16- 21713- FL-10	Lean Feed (250 ml bottle)
2		16- 21713- FE-10	Emulsion Feed (250 ml bottle)
2		16- 21713- FA-10	Alkaline Feed (250 ml bottle)
2		16- 21713- LW-10	Leachate Feed (250 ml bottle)
3		16- 21713- FR-15	Rich Feed (250 ml bottle)
3		16- 21713- FL-15	Lean Feed (250 ml bottle)
3		16- 21713- FE-15	Emulsion Feed (250 ml bottle)
3		16- 21713- FA-15	Alkaline Feed (250 ml bottle)
3		16- 21713- LW-15	Leachate Feed (250 ml bottle)

Custody Relinquished by: [signature] Date: Oct 24 '16

Custody Received by: R Slonga Date: 24-Oct-16

ORTECH Environmental Recovery & Sample Log

Method 26

Incinerator Stack

Client: Clean Harbors Sarnia
Job/Report Number: 21713
Received By:
How Received: Train Recovery
Job Assigned To: ALS
PO #: 21713 - J2289

Test Number	ORTECH Sample ID 16-21713-M26-	Date Sampled	Contents of Impingers	Initial Volume (ml)	Final Volume (ml)	Gain (ml)	H_2O Rinse (ml)	Total Sample Volume (ml)	Analysis
1	1	Oct 18/16	0.1N H2SO4	30.0	123.0	93	27	150	Halides
	2	"	0.1N NaOH	15.0	10	-5	20	30	Cyanide
2	3	Oct. 19/16	0.1N H2SO4	30.0	113.0	83	37	150	Halides
	4	"	0.1N NaOH	15.0	15.0	Ø	15	30	Cyanide
3	5	Oct 20/16	0.1N H2SO4	30.0	114.0	84	36	150	Halides
	6		0.1N NaOH	15.0	15	Ø	15	30	Cyanide
Blank	7		0.1N H2SO4	30.0	30	0	120	150	Halides
	8		0.1N NaOH	15.0	15	Ø	15	30	Cyanide

Impinger 1 empty, Imp 2+3 30ml split 0.1n H2SO4, Imp 4 empty, Imp 5 15ml 0.1n NaOH, Imp 6 Si Gel

Relinquished by: [signature] Date: Oct 21, /16

Relinquished to: Aaron Burton Date: 21-Oct-2016 14:40

ORTECH Environmental Sample Log
Particulate and Metals Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21713
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21713 - J2289

ORTECH Sample ID 16-21713-PM-	Sample Date	Sample Description	Hazardous Material	Sample Analysis
1	oct 18, 16	Test 1 Probe Rinse Acetone	Acetone	Particulate & Metals
2		Test 1 Probe Rinse Nitric	0.1N Nitric	Metals
3		Test 1 Filter	Particulate	Metals
4		Test 1 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
5		Test 1 Impinger 6, 7 Solution	Acid. KMnO4	Metals
6		Test 1 Impinger 6, 7 Rinse	8N HCl	Metals
8	oct 19, 16	Test 2 Probe Rinse Acetone	Acetone	Particulate & Metals
9		Test 2 Probe Rinse Nitric	0.1N Nitric	Metals
10		Test 2 Filter	Particulate	Metals
11		Test 2 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
12		Test 2 Impinger 6, 7 Solution	Acid. KMnO4	Metals
13		Test 2 Impinger 6, 7 Rinse	8N HCl	Metals
15	oct 20, 16	Test 3 Probe Rinse Acetone	Acetone	Particulate & Metals
16		Test 3 Probe Rinse Nitric	0.1N Nitric	Metals
17		Test 3 Filter	Particulate	Metals
18		Test 3 Impinger 1,2,3,4 & 5 Solution	Nitric/Peroxide	Metals
19		Test 3 Impinger 6, 7 Solution	Acid. KMnO4	Metals
20		Test 3 Impinger 6, 7 Rinse	8N HCl	Metals
22	oct 20, 16	Blank Probe Rinse Acetone	Acetone	Particulate & Metals
23		Blank Probe Rinse Nitric	0.1N Nitric	Metals
24		Blank Filter	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

** Filters to follow, once particulate gain determined by ORTECH

Relinquished By: [signature] Date: oct 21, 16

Relinquished To: AARON BURTON Date: 21-Oct-2016 14:40

ORTECH Environmental
Project # 21713
Vost Sample List
Clean Harbors Sarnia

Test Number	ORTECH Sample ID 16-21713-VOST-	Sample Date	Sample Description	Sample Analysis
1	1A/1B	18-Oct-16	Tenax and Tenax/Charcoal (Pair 1)	VOCs
1	2A/2B		Tenax and Tenax/Charcoal (Pair 2)	VOCs
1	3A/3B		Tenax and Tenax/Charcoal (Pair 3)	VOCs
1	4A/4B		Tenax and Tenax/Charcoal (Pair 4)	Archive
1	5A/5B		Field Blank	Archive
2	6A/6B	19-Oct-16	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)	BROKEN
2	9A/9B		Tenax and Tenax/Charcoal (Pair 4)	VOCs
2	10A/10B		Field Blank	Archive
3	11A/11B	20-Oct-16	Tenax and Tenax/Charcoal (Pair 1)	VOCs
3	12A/12B		Tenax and Tenax/Charcoal (Pair 2)	Archive
3	13A/13B		Tenax and Tenax/Charcoal (Pair 3)	VOCs
4	14A/14B		Tenax and Tenax/Charcoal (Pair 4)	VOCs
3	15A/15B		Field Blank	VOCs
Blank	16A/16B	20-Oct-16	Trip Blank	VOCs

* Archived samples to be held for future reference

Custody Relinquished by: [signature] Date: Oct 21, 16

Custody Received by: AARON BURTON Date: 21-Oct-2016 14:40

ORTECH Environmental Sample Log
Semi-Volatile Organics Samples
Clean Harbors Sarnia

Client: Clean Harbors Sarnia
Job/Report Number: 21713
Received By: C Belore
How Received: Train recovery
Job Assigned To: ALS
PO #: 21713 - J2289

ORTECH Sample ID 16-21713-SVOC-	Sample Date	Sample Description	Hazardous Material	Sample Analysis
1	oct 18, 16	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	oct 19, 16	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	oct 20, 16	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	oct 20, 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: oct 21, 16

Relinquished To: AARON BURTON Date: 21-Oct-2016 14:40

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= 0.2575 inches	Acceptable
Nozzle- Semi-Volatile Organics Train	for n=4 measurements high-low <0.10 mm	average= 0.2559 inches	Acceptable
S-Type Pitot #15A (B03775) Metals Train	coefficient typically 0.84 ± 0.04	0.846	Acceptable
S-Type Pitot #SP4 (B04011) Semi-Volatile Organics Train	coefficient typically 0.84 ± 0.04	0.848	Acceptable
Inclined Manometer # TEAM2 (COE20092) Metals Train	percentage difference within 5%	-1.7% to 1.1%	Acceptable
Inclined Manometer #TEAM1 (COE20094) Semi-Volatile Organics Train	percentage difference within 5%	-2.1% to 1.3%	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 # TEAM2 (COE20092) Metals Train	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 0.993	Acceptable
Dry Gas Meter (A10117) Acid Gases/VOST Trains	± 1% over the working range DGMCF factor of 0.95-1.05	DGMCF: 0.991 (2 lpm) DGMCF: 1.001 (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: 0.989	Acceptable
Trendicator (COE20092)	±1.5% of actual value	-0.4% to 1.4%	Acceptable
Trendicator (COE20094)	±1.5% of actual value	-0.5% to 0.3%	Acceptable
Trendicator (A10117) (temperature readout)	±1.5% of actual value	-0.8% to 0%	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%	106.7	4	5.0	Acceptable
2	100 ± 10%	100.5	0	0	Acceptable
3	100 ± 10%	100.5	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%	104.0	4	5.0	Acceptable
2	100 ± 10%	102.0	0	0	Acceptable
3	100 ± 10%	101.0	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	$\leq$0.02 scfm or 4% of sampling rate, whichever is less	0.009 @ 15"Hg	0.009 @ 15"Hg	0.008 @ 15"Hg	0.004 @ 17"Hg	Acceptable
	2		0.008 @ 17"Hg	0.006 @ 15"Hg	0.005 @ 15"Hg	0.007 @ 16"Hg	Acceptable
	3		0.006 @ 15.5"Hg	0.005 @ 15"Hg	0.006 @ 15"Hg	0.005 @ 15"Hg	Acceptable
Semi-Volatile Organics Trains	1	$\leq$0.02 scfm or 4% of sampling rate, whichever is less	0.004 @ 15.5"Hg	0.002 @ 12"Hg	0.002 @ 15.5"Hg	0.002 @ 15.5"Hg	Acceptable
	2		0.008 @ 15"Hg	0.004 @ 15"Hg	0.005 @ 15"Hg	0.005 @ 15"Hg	Acceptable
	3		0.006 @ 15"Hg	0.004 @ 15"Hg	0.004 @ 15"Hg	0.003 @ 15"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	0.86	0.49	Acceptable
	O_2	"	0.53	0.12	Acceptable
	CO_2	"	0.01	0.30	Acceptable
	CO	"	0.60	0.04	Acceptable
	NOx	"	0.20	0.31	Acceptable
	THC	"	0.1	-1.0	Acceptable
2	SO_2	± 3% of span	0.76	1.35	Acceptable
	O_2	"	0.41	0.16	Acceptable
	CO_2	"	0.01	0.50	Acceptable
	CO	"	0.28	1.04	Acceptable
	NOx	"	0	0.67	Acceptable
	THC	"	0.20	-0.90	Acceptable
3	SO_2	± 3% of span	0.85	0.01	Acceptable
	O_2	"	0.29	0.16	Acceptable
	CO_2	"	0.03	0.10	Acceptable
	CO	"	0.28	0	Acceptable
	NOx	"	0.80	0.27	Acceptable
	THC	"	-0.20	-0.90	Acceptable

TABLE 5
Clean Harbors Sarnia
ORTECH CEM Bias Check Summary

Test No.	Analyzer	Analyzer Range	Recommended Acceptable Limits	Initial System Bias Zero %	Initial System Bias Span %	Final System Bias Zero %	Final System Bias Span %	QA/QC Status
1	SO_2	225 ppm	± 5% of span	-0.01	-1.32	0.85	-1.81	Acceptable
	O_2	25%	"	0.52	-0.96	-0.01	-0.84	Acceptable
	CO_2	25%	"	0	-0.90	0.01	-0.60	Acceptable
	CO	1000 ppm	"	0.60	-1.46	0	-1.50	Acceptable
	NOx	250 ppm	"	0	-1.61	0.20	-1.29	Acceptable
	THC	100 ppm	"	-1.10	-2.20	-	-	Acceptable
2	SO_2	225 ppm	± 5% of span	0.04	-1.22	0.80	-2.57	Acceptable
	O_2	25%	"	0.40	-0.80	-0.01	-0.64	Acceptable
	CO_2	25%	"	0	-0.65	0.01	-0.15	Acceptable
	CO	1000 ppm	"	0.62	-1.20	0.90	-0.16	Acceptable
	NOx	250 ppm	"	0	-0.63	0	-1.29	Acceptable
	THC	100 ppm	"	-1.80	-3.30	-	-	Acceptable
3	SO_2	225 ppm	± 5% of span	0.05	-1.29	0.90	-1.30	Acceptable
	O_2	25%	"	0.28	-0.76	-0.01	-0.92	Acceptable
	CO_2	25%	"	0	-0.60	0.03	-0.50	Acceptable
	CO	1000 ppm	"	0.62	-1.23	0.90	-1.23	Acceptable
	NOx	250 ppm	"	0	-0.90	0.80	-0.63	Acceptable
	THC	100 ppm	"	-1.90	-2.60	-	-	Acceptable

APPENDIX 18

Equipment Calibration Data
(10 pages)

ORTECH Environmental
Pitot Tube Calibration

Date	February 9, 2016
Probe/Pitot ID	15A
MII Number	B03775
Calibrated Against	B02911
Cp standard	0.99948
Calibration Procedure	93-T62-SP-012

Calibration Facility	ORTECH Environmental
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	7.61	0.140	0.195	0.847	0.0010
(0.25")	9.54	0.220	0.310	0.842	0.0039
	11.68	0.330	0.460	0.847	0.0007
	13.79	0.460	0.640	0.847	0.0015
	15.88	0.610	0.850	0.847	0.0008
			Mean	0.846	0.0016

Without Nozzle	7.47	0.135	0.190	0.842	0.0025
	9.32	0.210	0.290	0.851	0.0055
	11.41	0.315	0.440	0.846	0.0007
	14.23	0.490	0.685	0.845	0.0003
	16.14	0.630	0.890	0.841	0.0041
			Mean	0.845	0.0026

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 MOE 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 9, 2016
Probe/Pitot ID	SP4
MII Number	B04011
Calibrated Against	B02911
Cp standard	0.99948
Calibration Procedure	93-T62-SP-012

Calibration Facility	ORTECH Environmental
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	7.53	0.137	0.192	0.844	0.0039
(0.25")	9.58	0.222	0.310	0.846	0.0024
	11.50	0.320	0.450	0.843	0.0054
	14.01	0.475	0.650	0.854	0.0062
	16.01	0.620	0.850	0.854	0.0054
			Mean	0.848	0.0047

Without Nozzle	7.61	0.140	0.195	0.847	0.0011
	9.54	0.220	0.307	0.846	0.0019
	11.86	0.340	0.475	0.846	0.0024
	14.59	0.515	0.710	0.851	0.0032
	15.95	0.615	0.850	0.850	0.0022
			Mean	0.848	0.0022

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 MOE 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	September 6, 2016
Barometric Pressure	29.74
System Leak Check	< .001 cfm @ 23 "Hg

MII NUMBERS	
DGM	COE 20094
Gasometer	A01463
Barometer	COE 20028

Calibrated By	Thomas Timar
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ {}^{o}F+460}{Tstd\ {}^{o}F+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

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 Factor	Time
Initial	Final	cm	ft^3	^oC	Initial	Final	ft^3	^oF	in. H_2O	^oF		min.
80.10	17.80	62.30	2.931	24.0	42.380	45.330	2.950	76	0.75	75	0.993	6
78.90	11.30	67.60	3.180	24.0	45.330	48.530	3.200	75.5	0.75	75	0.992	6
81.90	19.20	62.70	2.949	24.0	48.530	51.480	2.950	75.5	0.75	75	0.998	6
82.10	19.70	62.40	2.935	24.0	57.655	60.600	2.945	75.5	1.8	75	0.993	4
82.10	19.90	62.20	2.926	24.0	60.600	63.540	2.940	75.5	1.8	75	0.991	4
80.10	18.20	61.90	2.912	24.0	63.540	66.450	2.910	75.5	1.8	75	0.997	4
81.30	17.20	64.10	3.015	24.0	71.945	74.965	3.020	75	3.4	75	0.990	3
82.10	17.70	64.40	3.029	24.0	74.965	77.990	3.025	75	3.4	75	0.993	3
80.10	15.90	64.20	3.020	24.0	77.990	81.010	3.020	75	3.4	75	0.991	3

DGMCF AVERAGE 0.993

BEFORE 0.983

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05, otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

ORTECH Environmental
Trendicator Calibration

Calibration Procedure	03 - J005
Trendicator Type	Team 1
MII	COE 20094
Date	Sept 6/16
Calibrated By	Thomas Timar
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°F)	Tredicator Display Value		Percent Difference (%)
	Before Adjustment (°F)	After Adjustment (°F)	
32	32	NA	0.0
70	69		1.4
100	100		0.0
200	200		0.0
250	251		-0.4
300	301		-0.3
400	400		0.0
500	499		0.2
600	600		0.0
700	700		0.0
800	799		0.1
900	899		0.1
1000	999		0.1
1100	1099		0.1
1200	1199		0.1
1250	1248		0.2

$$\% \text{ Difference} = \frac{(\text{micromite - after adjustment reading})}{\text{micromite}} \times 100$$

Acceptance Criteria:
Trendicator display must read within ± 1.5% of the micromite value at each output. Otherwise, the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use.
(MOE Source Testing Code, Version #2, Method 5)

ORTECH Environmental
Manometer Calibration Data

Date	September 6, 2016	Calibrated By	Thomas Timar
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 Before Adjustment	Manometer Reading "H_2O After Adjustment	Reference Manometer Reading "H_2O	Percent Difference %
	0.300	NA	0.295	-1.7
0-1.0	0.610		0.605	-0.8
	0.950		0.940	-1.1
	2.55		2.51	-1.6
1.0-10.0	5.40		5.40	0.0
	9.20		9.30	1.1

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer} - \text{Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

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 2
Date	October 12, 2016
Barometric Pressure	29.80
System Leak Check	< 0.002 cfm @ 23 "Hg

MII NUMBERS	
DGM	COE 20092
Gasometer	A01463
Barometer	COE20028

Calibrated By	T. Timar
Signature	
Reviewed and Accepted By	

$ft^3 =$ cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ ^oF+460}{Tstd\ ^oF+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

Make sure to inspect pump before each calibration

Gasometer Reading cm			Gasometer Volume	Gasometer Temperature	DGM Reading ft^3		DGM Volume	DGM Average Temperature	DGM Pressure	DGM Outlet	DGM Calibration Factor	Time
Initial	Final	cm	ft^3	°C	Initial	Final	ft^3	°F	in. H_2O	°F		min.
87.10	22.80	64.30	3.025	20.0	234.440	237.510	3.070	73	0.75	73	0.993	6.3
88.60	24.20	64.40	3.029	20.0	228.220	231.310	3.090	77	0.75	77	0.995	6.3
86.80	21.40	65.40	3.076	20.0	231.310	234.440	3.130	77	0.75	77	0.998	6.4
87.20	18.30	68.90	3.241	20.0	238.550	241.840	3.290	72.5	1.9	72	0.989	4.3
88.10	23.90	64.20	3.020	20.5	241.840	244.915	3.075	72.5	1.9	72	0.984	4
87.40	23.40	64.00	3.011	20.5	244.915	247.970	3.055	72.5	1.9	72	0.988	4
89.40	25.40	64.00	3.011	21.0	249.270	252.320	3.050	72.5	3.4	72	0.984	3
88.70	24.40	64.30	3.025	21.0	252.320	255.385	3.065	72.5	3.4	72	0.984	3
80.30	15.80	64.50	3.034	21.0	258.435	261.495	3.060	72.5	3.4	72	0.988	3

DGMCF AVERAGE: 0.989

BEFORE: 0.976

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05, otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

ORTECH Environmental
Manometer Calibration Data

Date	October 12, 2016	Calibrated By	T. Timar
Manometer Number	Team 2	Signature	
Manometer MII Number	COE 20092	Reviewed/Accepted By	
Calibrated Against	Omega HHP		
MII Number	B02679		
Calibration Procedure	03 - J010		

Front Leg

Manometer Scale "H_2O	Manometer Reading "H_2O Before Adjustment	After Adjustment	Reference Manometer Reading "H_2O	Percent Difference %
	0.410	NA	0.410	0.0
0-1.0	0.710	↓	0.700	-1.4
	0.935	↓	0.920	-1.6
	1.58	NA	1.60	1.3
1.0-10.0	4.20	↓	4.13	-1.7
	8.80	↓	8.62	-2.1

$$\text{Percent Difference} = \frac{(\text{Ref. Manometer} - \text{Instrument Reading})}{\text{Ref. Manometer}} \times 100$$

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
Trendicator Calibration

Calibration Procedure	03 - J005
Trendicator Type	Team 2
MII	COE 20092
Date	October 12, 2016
Calibrated By	T. Timar
Signature	
Reviewed and Accepted By	

Fluke Calibrator Output (COE 20024) (°F)	Tredicator Display Value		Percent Difference
	Before Adjustment (°F)	After Adjustment (°F)	(%)
32	32	NA	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	499		0.2
600	600		0.0
700	699		0.1
800	799		0.1
900	897		0.3
1000	998		0.2
1100	1098		0.2
1200	1198		0.2
1250	1247		0.2

$$\% \text{ Difference} = \frac{(\text{micromite - after adjustment reading})}{\text{micromite}} \times 100$$

Acceptance Criteria:
Trendicator display must read within ± 1.5% of the micromite value at each output. Otherwise, the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use.
(MOE Source Testing Code, Version #2, Method 5)

ORTECH Environmental

Dry Gas Meter Calibration Data

Calibration Procedure	03-J004
Meter Number	Vost 2
Date	September 19, 2016
Barometric Pressure	29.68
System Leak Check	0.01 lpm @ 21 "Hg

MII NUMBERS	
DGM	A10117
Gasometer	A01463
Barometer	COE20028

Calibrated By	Andrew Saikaley
Signature	
Reviewed and Accepted By	

ft^3= cm* 1.332 litres per cm/28.3168 litres per ft^3

$$DGMCF = \frac{Vstd\ ft^3}{Vdgm\ ft^3} \quad \frac{Tdgm\ ^{o}F+460}{Tstd\ ^{o}F+460} \quad \frac{Pbar\ (in.\ Hg)}{(Pbar\ in.\ Hg+DGMPressure/13.6)}$$

Gasometer Reading cm			Gasometer Volume	Gasometer Temperature	DGM Reading L		DGM Volume	DGM Average Temperature	DGM Pressure	DGM Outlet	DGM Calibration Factor	Time	Flow Rate
Initial	Final	cm	ft^3	°C	Initial	Final	ft^3	°C	in. H_2O	°C	Factor	min.	lpm
77.90	39.20	38.70	1.820	23.0	3234.550	3286.530	1.836	30.0	5.8	30.0	1.001	25	2.1
75.30	37.80	37.50	1.764	23.0	3442.750	3493.560	1.794	31.0	5.5	31.0	0.996	25	2.0
74.90	38.10	36.80	1.731	23.0	3391.920	3442.750	1.795	31.0	5.5	31.0	0.977	25	2.0
80.50	62.00	18.50	0.870	23.0	3160.520	3185.080	0.867	27.0	2.0	27.0	1.012	25	1.0
61.90	43.50	18.40	0.866	23.0	3185.260	3210.000	0.874	29.0	2.0	29.0	1.006	25	1.0
76.60	58.70	17.90	0.842	23.0	3210.000	3234.550	0.867	29.0	2.0	29.0	0.986	25	1.0

Acceptance Criteria:
Individual values of DGM calibration factor must be within ± 1.5% of the average value.
If not the calibration must be repeated. Also, the DGMCF average value must be 1.00 ± 0.05, otherwise the meter must be repaired and/or adjusted as necessary and recalibrated prior to use.
(Environment Canada Reference Method EPS 1/RM/8, Section 6)

DGMCF AVERAGE

2 Lpm	0.991
1Lpm	1.001

ORTECH Environmental
Trendicator Calibration

Calibration Procedure	**03-J005**
Trendicator Type	**Nutech**
MII	**A10117**
Date	**September 19, 2016**
Calibrated By	**Andrew Saikaley**
Signature	
Reviewed and Accepted By	CHRIS BELORE

Fluke Calibrator Output (COE 20024) (°C)	**Tredicator Display Value**		**Percent Difference**
	Before Adjustment (°C)	**After Adjustment (°C)**	**(%)**
0	0	NA	0.0
10	10		0.0
20	20		0.0
50	50		0.0
75	75		0.0
100	100		0.0
125	126		-0.8
150	150		0.0
200	200		0.0
300	300		0.0
400	400		0.0
500	500		0.0
600	600		0.0

$$\% \text{ Difference} = \frac{(\text{micromite - after adjustment reading})}{\text{micromite}} \times 100$$

Acceptance Criteria:
Trendicator display must read within ± 1.5% of the micromite value at each output. Otherwise, the Trendicator must be repaired and/or adjusted as necessary, and recalibrated prior to use. (MOE Source Testing Code, Version #2, Method 5)

APPENDIX 19

Pre-Test Plan Acceptance Letters
(7 pages)

Ministry of the Environment & Climate Change
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 de l'élaboration des normes

40, avenue St. Clair ouest
Toronto, ON M4V 1M2
www.ene.gov.on.ca

Ontario

Via email: cbelore@ortech.ca
File No.: SR:SA:109440:16

2016/09/28

Mr. Chris Belore
ORTECH Consulting Inc.
804 Southdown Rd.
Mississauga, Ontario
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 letters, dated 2016/09/07 and 2016/09/28, 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 # 21713).

The testing is required under Condition 2 of the Environmental Compliance Approval No. 6547-5G5MSP, issues in 2003/01/24.

Your letters indicate your intention at using the 2015 pre-test plan (dated 2015/06/17) approved by this section (on 2015/07/07) for the 2016 source testing program.

***Target contaminants*:**

1. Total Suspended Particulate Matter (TSP),
2. Metals (31 selected metals)
3. 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),
4. Other Semivolatile Organic Compounds (heptachlor, chlorodane, hexachlorophene, toxaphene, tributyltin),
5. Volatile Organic Compounds (29 selected VOCs)
6. Halides (HF, HCl, HBr, HI),
7. Nitrogen oxides (NO_X),
8. Sulphur dioxide (SO_2),
9. Cyanide,

10. Combustion gases (oxygen, CO, and CO_2), and
11. Total organic matter (THC).

***Reference methods*:**

1. TSP: OSTC Method ON-5,
2. Metals: US EPA 40CFR60 Method 29.
3. SVOCs: Environment Canada's Report EPS 1/RM/2,
4. VOCs: US EPA SW-846 Method 0030,
5. Halides: US EPA 40CFR60 Method 26,
6. Cyanide: Modified US EPA 40CFR60 Method 26,
7. NOx: US EPA 40CFR60 Method 7E,
8. SO_2: US EPA 40CFR60 Method 6C,
9. O_2/CO_2: US EPA 40CFR60 Method 3A,
10. CO: US EPA 40CFR60 Method 10,
11. THC: US EPA 40CFR60 Method 25A, and
12. 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, CO_2, H_2O, THC, O_2, SO_2, and opacity).

Liquid waste (rich, lean, alkaline and emulsion) samples will be collected by Clean Harbors personnel, based on US EPA Method S004 (Tap) in SW-846, 3rd Edition. A sample will be collected every thirty minutes during each of the three 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 2016 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 2016/10/17, with actual testing starting on Tuesday (2016/10/18) and extending for three continuous days. If changes in the sampling schedule occur, please notify both the MOECC's Sarnia District Office (don.hayes@ontario.ca) and the MOECC's Technology Standards Section (guillermo.azocar@ontario.ca).

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)
L. Hussain – MOECC SDB TSS (via email: lubna.i.hussain@ontario.ca)
C. Ruddy – MOECC SDB TSS (via email: caitlyn.ruddy@ontario.ca)

File AQ-02 (Clean Harbors Canada Inc. - Corunna)

Ministry of the Environment & Climate Change
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 de l'élaboration des normes
40, avenue St. Clair ouest
Toronto, ON M4V 1M2
www.ene.gov.on.ca

Ontario

Via email: carabott.erica@cleanharbors.com
File No.: SR:SA:109440:16

2016/10/07

Ms. Erica Carabott
Facility Compliance Manager
Clean Harbors Canada Inc.
4090 Telfer Rd.
Corunna, Ontario
N0N 1G0

Re: Revision of the Pre Test Plan approval, for source testing to be conducted at Clean Harbors Canada Inc. Environmental Compliance Approval No. 6547-5G5MSP.

Dear Ms. Carabott:

On 2016/09/28, we issued a letter of approval for the pre-test plan protocol comprised of two parts: 2015 pre-test plan (dated 2015/06/17), and pre-test plan addendum (dated 2016/09/28).

The pre-test plan protocol was prepared and submitted by ORTECH Consulting 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 # 21713).

The testing is required under Condition 2 of the Environmental Compliance Approval No. 6547-5G5MSP, issued on 2003/01/24.

The revision of the issued approval to the pre-test plan protocol was triggered by the following disclosures affecting the sampling strategy proposed by Clean Harbors:

- Up to 2013, Clean Harbors was injecting up to 100% leachate as quench water at a maximum of 180 lpm. This practice had been ongoing for many years.
- The provisional Environmental Compliance Approval for Waste Disposal site No. A 031806 (issued on 1997/09/05) included a condition (Condition 10 (b)) that states the need to properly process the leachate through incineration (thermal treatment/destruction) or properly disposed at a hazardous waste facility approved for the disposal of that type of waste.
- The Waste Disposal Site ECA No. A 031806, on its section for imposing Condition 10(b), among other Conditions (2 through 22), indicates that the rationale for imposing

the Conditions were well known to the facility operator through intensive discussions that took place between the facility's experts, the public and Ministry staff.

- Ministry staff in 2013 pointed out to Clean Harbors that the Waste Disposal Site ECA required the leachate generated by the landfill to be incinerated. To that end, Clean Harbors installed a series of injectors at the end of the secondary combustion zone, and complied with the Ministry staff request to stop the practice of using leachate as exhaust gas quenching.
- The leachate organic mix containing non-polar compounds with high nuisance capabilities (e.g., methyl ethyl ketone (2-butanone), toluene, 1,2,4-trichlorobenzene, and xylene (mixed isomers)), may escape the water spray due to their marginal solubility in water, and auto ignitions temperatures above the quenching zone temperature; which increases the potential for generating annoying odour impacts from the facility.

Based on the above mentioned disclosures, and reiterating the position of the Ministry that the leachate is to be incinerated on site, or removed from the facility to an approved hazardous waste facility handling that type of waste (as required by the Condition 10(b) of the ECA A 031806); the reinstatement of leachate as a quenching media is not an option available to Clean Harbors to deal with the mass of leachate being generated by its facility's landfill.

The pre-test plan protocol is acceptable, based on the proposed reference methodologies, process data monitoring/collection, and the understanding that the compliance testing strategy requires the incinerator to process waste reflecting normal operation, the TDU exhaust and the leachate at rates targeting worst case emissions scenario, within the waste limit processing rates imposed by the relevant ECAs issued to the facility.

It is our understanding that the source testing program schedule has not changed, starting on Tuesday (2016/10/18) and extending for three continuous days. If changes in the sampling schedule occur, please notify both the MOECC's Sarnia District Office (don.hayes@ontario.ca) and the MOECC's Technology Standards Section (guillermo.azocar@ontario.ca).

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,

G/Azocar

Guillermo Azocar
Source Assessment Specialist
Technology Standards Section

(Doc.Mgmt #5Z100139)

cc: M. Parker - Clean Harbors Canada Inc. (via email: parker.michaele@cleanharbors.com)
D. Baulcomb - Clean Harbors Canada Inc. (via email: baulcomb.david@cleanharbors.com)
C. Belore – ORTECH (via email: cbelore@ontario.ca)
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)
L. Hussain – MOECC SDB TSS (via email: lubna.i.hussain@ontario.ca)
C. Ruddy – MOECC SDB TSS (via email: caitlyn.ruddy@ontario.ca)

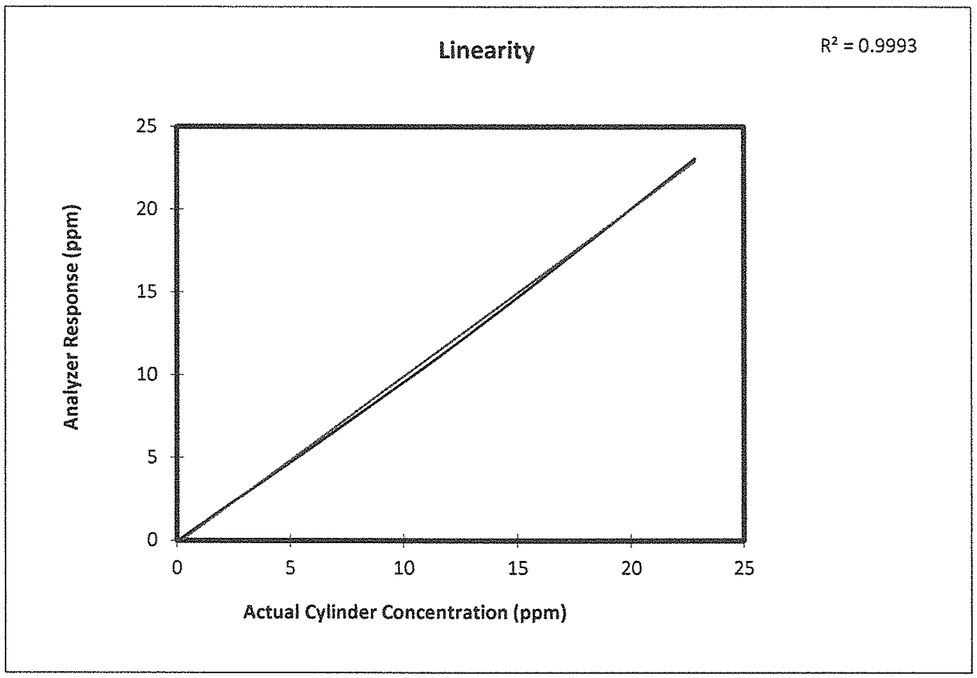
File AQ-02 (Clean Harbors Canada Inc. - Corunna)

APPENDIX 20

ORTECH CEM Linearity Check Data
(6 pages)

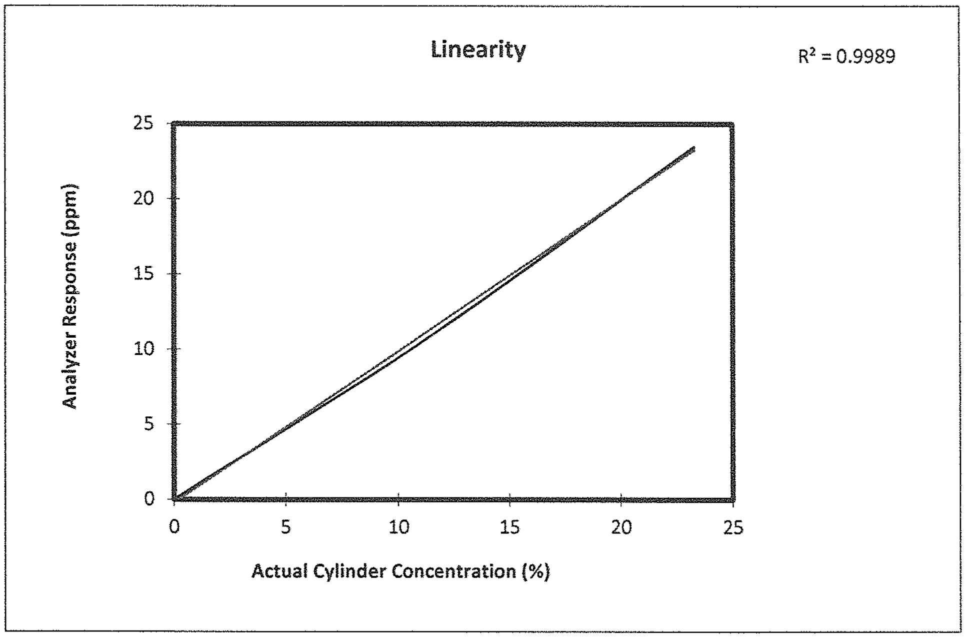
Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Oxygen Analyzer
Siemens Oxymat 61

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
25	COE 20060	0.00	0.02	0.1
		12.50	12.52	0.1
		23.30	23.30	0.0



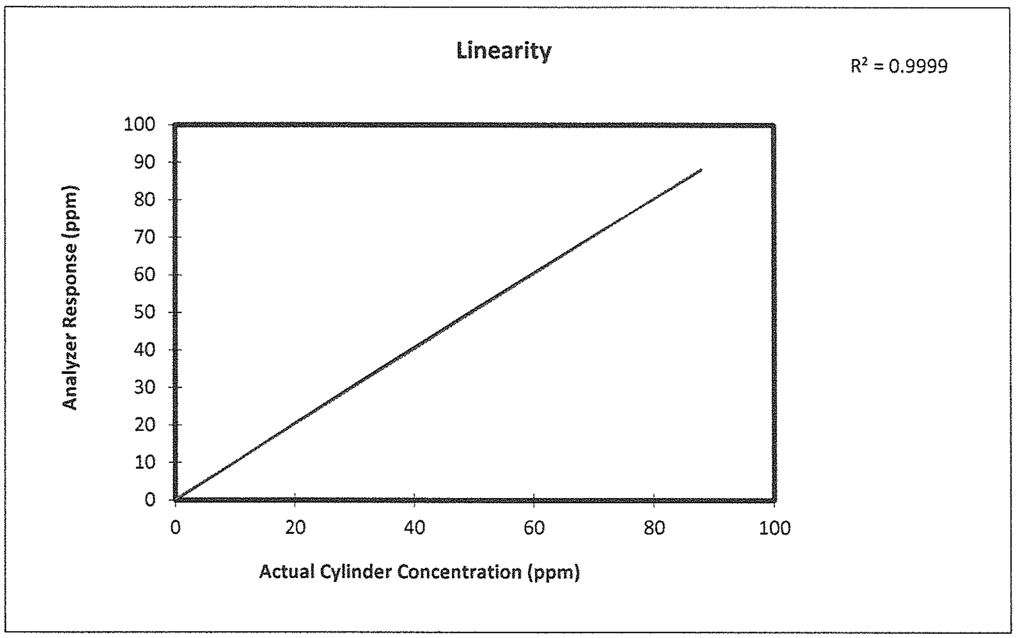
Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Carbon Dioxide Analyzer
Siemens Ultrmat 23

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
20	COE 20060	0.00	0.00	0.0
		12.50	12.39	-0.5
		19.90	19.89	0.0



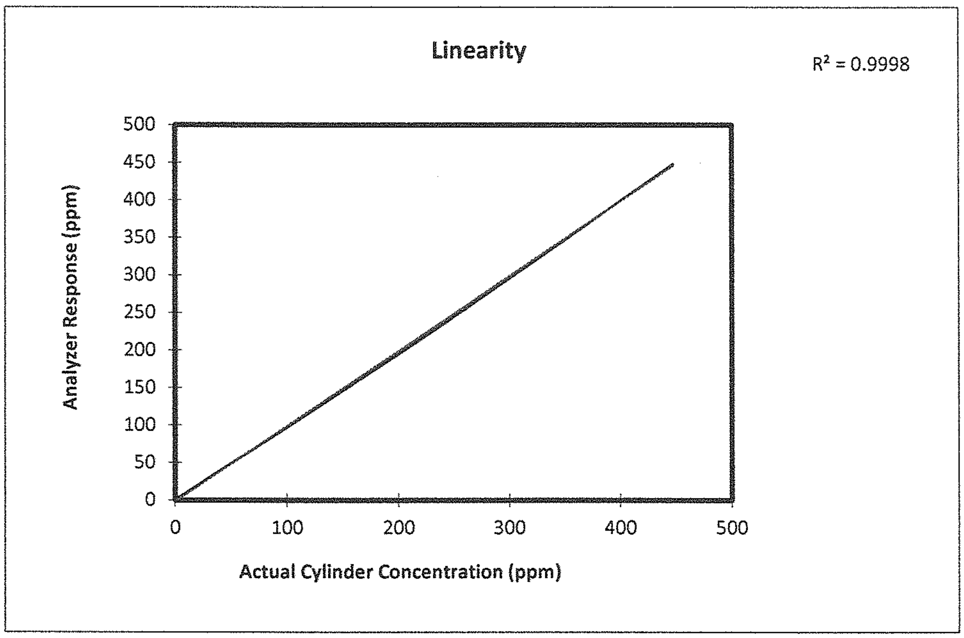
Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Sulphur Dioxide Analyzer
Teledyne API T100H

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
1000	COE 20099	0.0	0.5	0.1
		502.0	505.5	0.4
		953.0	953.6	0.1



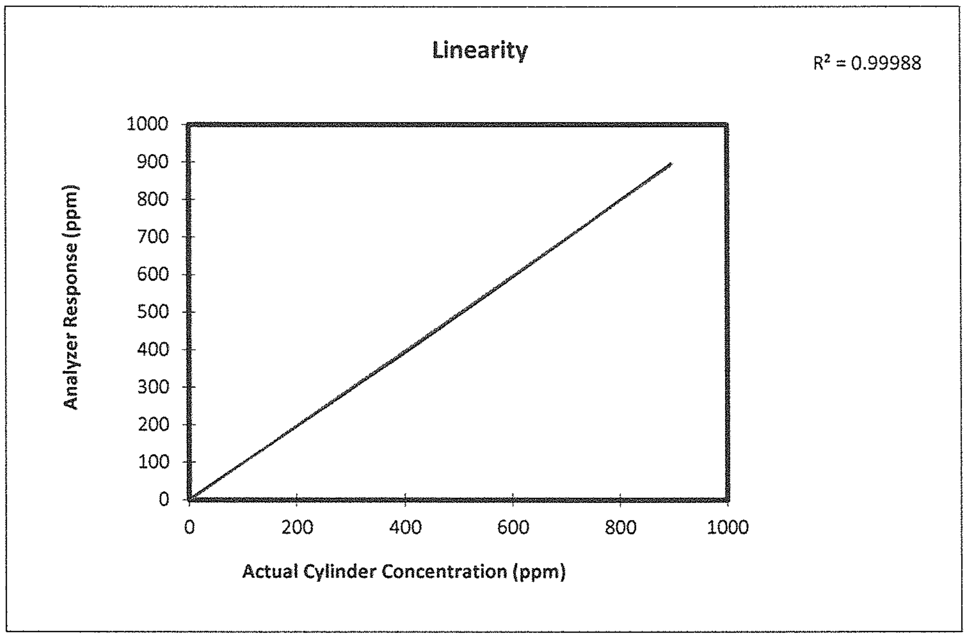
Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Carbon Monoxide Analyzer
Horiba Via-510

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
100	COE 20101	0.0	0.0	0.0
		49.5	51.2	1.7
		91.0	90.8	-0.2



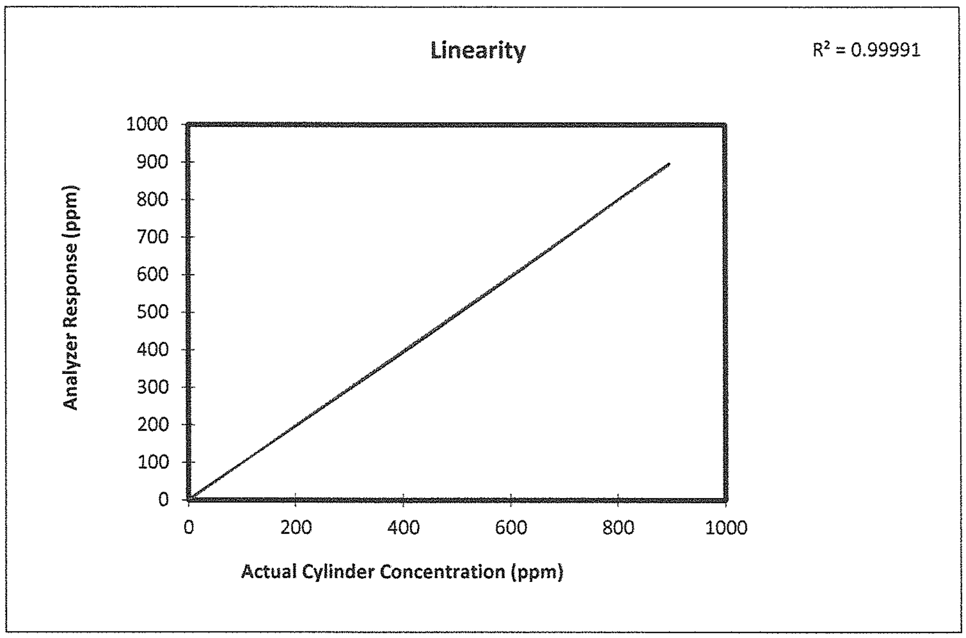
Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Nitric Oxide Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
255	COE 20061	0.0	0.1	0.0
		88.9	90.3	0.5
		254.0	255.4	0.5



Clean Harbors
October 18, 2016
Analyzer Linearity Determination
Nitrogen Oxides Analyzer
Teledyne 200EH

Range	Analyzer I.D.	Actual Concentration	Instrument Response	Calibration Error (as % of span)
255	COE 20061	0.0	0.0	0.0
		88.9	90.7	0.7
		254.0	255.8	0.7



APPENDIX 21

ORTECH CEM Calibration Data
(13 pages)

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
Project No. 21713
October 18, 2016
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 Oxymat 61	Siemens Ultrmat 23	Teledyne API T100H	Horiba Via-510	Teledyne 200EH	
Range		25	20	1000	100	255	255
Actual Cylinder Value	High	23.30	19.90	953	91	254	254
	Mid.	12.50	12.50	502	49.53	88.91	88.91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.02	0.00	0.5	0.0	0.1	0.0
	Mid	12.52	12.39	505.5	51.2	90.3	90.7
	High	23.30	19.89	953.6	90.8	255.4	255.8
System Initial Calibration	Zero	0.15	0.00	0.4	0.6	0.1	0.0
	Upscale	12.28	12.21	492.3	49.7	86.5	86.6
System Final Calibration	Zero	0.07	0.01	0.9	0.0	0.4	0.2
	Upscale	12.31	12.27	487.4	49.7	86.6	87.4

Calibration Error Results

Analyzer Calibration Error = (Measured Concentration of Cal Gas in Direct Mode - Manufacturer Certified Cal Gas Concentration)/Analyzer Range)*100

	Analyzer		O2	CO2	SO2	CO	NO	NOx
	Analyzer Span Range		25.00	20.00	1000	100	255	255
Calibration Error	Zero	%	0.08	0.00	0.05	0.00	0.04	0.00
	Mid	%	0.08	0.55	0.35	1.67	0.55	0.70
	High	%	0.00	0.05	0.06	0.23	0.55	0.71
Acceptable Limits	of Span		+-2%	+-2%	+-2%	+-2%	+-2%	+-2%

	O2	CO2	SO2	CO	NO	NOx
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	255	255
Initial System Bias	Zero	0.52	0.00	-0.01	0.60	0.00	0.00
	Upscale	-0.96	-0.90	-1.32	-1.5	-1.5	-1.6
Final System Bias	Zero	-0.01	0.01	0.85	0.0	0.4	0.2
	Upscale	-0.84	-0.60	-1.81	-1.5	-1.5	-1.3

System Zero Drift	%	0.53	0.01	0.86	0.60	0.36	0.20
System Cal Drift	%	0.12	0.30	0.49	0.04	0.04	0.31
Acceptable Limits	of Span	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %	+ - 3 %

	O2	CO2	SO2	CO	NO	NOx
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	255	255
Analyzer Initial	Zero	0.02	0.00	0.50	0.0	0.1	0.0
	Upscale	12.52	12.39	505.50	51.2	90.3	90.7
System Initial	Zero	0.15	0.00	0.40	0.6	0.1	0.0
	Upscale	12.28	12.21	492.30	49.7	86.5	86.6
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	0.90	0.0	0.4	0.2
	Upscale	12.31	12.27	487.40	49.7	86.6	87.4

Initial System Bias	Zero	%	0.52	0.00	-0.01	0.60	0.00	0.00
	Upscale	%	-0.96	-0.90	-1.32	-1.46	-1.49	-1.61
Final System Bias	Zero	%	-0.01	0.01	0.85	0.00	0.36	0.20
	Upscale	%	-0.84	-0.60	-1.81	-1.50	-1.45	-1.29
Acceptable Limits	of Span		+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %	+ - 5 %

	O2	CO2	SO2	CO	NO	Nox
Bias Results	PASS	PASS	PASS	PASS	PASS	PASS

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
Project No. 21713
October 19, 2016
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 Oxymat 61	Siemens Ultrmat 23	Teledyne API T100H	Horiba Via-510	Teledyne 200EH	
Range		25	20	1000	100	255	255
Actual Cylinder Value	High	23.30	19.90	953	91	254	254
	Mid.	12.50	12.50	502	49.53	88.91	88.91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.02	0.00	0	0.0	0.1	0.0
	Mid	12.49	12.34	503.6	51.3	90.0	90.7
	High	23.28	19.89	953.2	91.0	255.5	255.9
System Initial Calibration	Zero	0.12	0.00	0.4	0.6	0.0	0.0
	Upscale	12.29	12.21	491.4	50.1	88.8	89.1
System Final Calibration	Zero	0.07	0.01	0.8	0.9	0.6	0.0
	Upscale	12.33	12.31	477.9	51.1	86.5	87.4

Calibration Error Results

Analyzer Calibration Error = (Measured Concentration of Cal Gas in Direct Mode - Manufacturer Certified Cal Gas Concentration)/Analyzer Range)*100

	Analyzer		O2	CO2	SO2	CO	NO	NOx
	Analyzer Span Range		25.00	20.00	1000	100	255	255
Calibration Error	Zero	%	0.08	0.00	0.00	0.00	0.04	0.00
	Mid	%	0.04	0.80	0.16	1.77	0.43	0.70
	High	%	0.08	0.05	0.02	0.03	0.59	0.75
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	255	255
Initial System Bias	Zero	0.40	0.00	0.04	0.62	-0.04	0.00
	Upscale	-0.80	-0.65	-1.22	-1.2	-0.5	-0.6
Final System Bias	Zero	-0.01	0.01	0.80	0.9	0.6	0.0
	Upscale	-0.64	-0.15	-2.57	-0.2	-1.4	-1.3

System Zero Drift	%	0.41	0.01	0.76	0.28	0.60	0.00
System Cal Drift	%	0.16	0.50	1.35	1.04	0.90	0.67
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	255	255
Analyzer Initial	Zero	0.02	0.00	0.00	0.0	0.1	0.0
	Upscale	12.49	12.34	503.60	51.3	90.0	90.7
System Initial	Zero	0.12	0.00	0.40	0.6	0.0	0.0
	Upscale	12.29	12.21	491.40	50.1	88.8	89.1
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	0.80	0.9	0.6	0.0
	Upscale	12.33	12.31	477.90	51.1	86.5	87.4

Initial System Bias	Zero	%	0.40	0.00	0.04	0.62	-0.04	0.00
	Upscale	%	-0.80	-0.65	-1.22	-1.20	-0.47	-0.63
Final System Bias	Zero	%	-0.01	0.01	0.80	0.90	0.56	0.00
	Upscale	%	-0.64	-0.15	-2.57	-0.16	-1.37	-1.29
Acceptable Limits	of Span		+-5%	+-5%	+-5%	+-5%	+-5%	+-5%

Bias Results	PASS	PASS	PASS	PASS	PASS	PASS

Clean Harbors
Mobile Source Monitoring Laboratory # 1
Daily Analyzer Calibration Evaluation
Project No. 21713
October 20, 2016
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 Oxymat 61	Siemens Ultrmat 23	Teledyne API T100H	Horiba Via-510	Teledyne 200EH	
Range		25	20	1000	100	255	255
Actual Cylinder Value	High	23.30	19.90	953	91	254	254
	Mid.	12.50	12.50	502	49.53	88.91	88.91
	Zero	0.00	0.00	0	0	0	0

Analyzer Initial Calibration	Zero	0.02	0.00	0	0.0	0.0	0.0
	Mid	12.54	12.41	505.3	51.5	90.9	91.6
	High	23.28	19.89	953.5	90.7	254.3	254.8
System Initial Calibration	Zero	0.09	0.00	0.5	0.6	0.1	0.0
	Upscale	12.30	12.22	490.7	50.1	87.6	88.4
System Final Calibration	Zero	0.07	0.03	0.9	0.9	0.7	0.8
	Upscale	12.26	12.24	490.6	50.1	87.8	89.1

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	255	255
Calibration Error	Zero	%	0.08	0.00	0.00	0.00	0.00	0.00
	Mid	%	0.16	0.45	0.33	1.98	0.78	1.05
	High	%	0.08	0.05	0.05	0.28	0.12	0.31
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	255	255
Initial System Bias	Zero	0.28	0.00	0.05	0.62	0.04	0.00
	Upscale	-0.76	-0.60	-1.29	-1.2	-0.9	-0.9
Final System Bias	Zero	-0.01	0.03	0.90	0.9	0.7	0.8
	Upscale	-0.92	-0.50	-1.30	-1.2	-0.9	-0.6

System Zero Drift	%	0.29	0.03	0.85	0.28	0.66	0.80
System Cal Drift	%	0.16	0.10	0.01	0.00	0.08	0.27
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	255	255
Analyzer Initial	Zero	0.02	0.00	0.00	0.0	0.0	0.0
	Upscale	12.49	12.34	503.60	51.3	90.0	90.7
System Initial	Zero	0.09	0.00	0.50	0.6	0.1	0.0
	Upscale	12.30	12.22	490.70	50.1	87.6	88.4
Analyzer Final	Zero	0.00	0.00	0.00	0.0	0.0	0.0
	Upscale	0.00	0.00	0.00	0.0	0.0	0.0
System Final	Zero	0.07	0.03	0.90	0.9	0.7	0.8
	Upscale	12.26	12.24	490.60	50.1	87.8	89.1

Initial System Bias	Zero	%	0.28	0.00	0.05	0.62	0.04	0.00
	Upscale	%	-0.76	-0.60	-1.29	-1.23	-0.94	-0.90
Final System Bias	Zero	%	-0.01	0.03	0.90	0.90	0.70	0.80
	Upscale	%	-0.92	-0.50	-1.30	-1.23	-0.86	-0.63
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:	21713	Date:	October 18, 2016
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator Stack	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	0.3 B1	0.997 C		
High	90 A2	90 B2			
Mid	51.6 A4	50.87 B4		51.4 D4	-1.1 E4
Low	30.3 A3	29.54 B3		30.2 D3	-2.2 E3

Criteria +/-5%

Note: If the calibration Error (E3 and E4) are greater than 5%, repeat the procedure until values are acceptable.

Perform test. At the completion of the test or hourly; Calculate the calibration drift as a percent of full scale value.
Introduce the zero and mid level gases at the probe and record data as the system final response.

	System Initial Response (F)	System Final Response (G)	Calibration Drift (G-F)/span*100
Zero	0.3	0.2	0.1
Mid	29.54	30.5	-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	30		32
Run 2	33		34
Run 3	33		34
Average	**32**		**33**

Total Hydrocarbon Reference Method 25A Calibration Data Sheet
Method 25A:SOP Number 95-T62-SP001

Project Number:	21713	Date:	October 19, 2016
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator Stack	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	0.2 B1	0.999 C		
High	90 A2	90.08 B2			
Mid	51.6 A4	50.6 B4		51.5 D4	-1.8 E4
Low	30.3 A3	29.27 B3		30.3 D3	-3.3 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	0.2	0	0.2
Mid	50.6	51.5	-0.9

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	30		34
Run 2	32		32
Run 3	32		33
Average	**31**		**33**

Total Hydrocarbon Reference Method 25A Calibration Data Sheet
Method 25A:SOP Number 95-T62-SP001

Project Number:	21713	Date:	October 20, 2016
Company:	Clean Harbors	Operator:	T, Timar
Location:	Sarnia, ON	Analyzer ID	VIG 20
Test Location:	Incinerator Stack	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	0.2 B1	1.000 C		
High	90 A2	90.21 B2			
Mid	51.6 A4	50.6 B4		51.6 D4	-1.9 E4
Low	30.3 A3	29.52 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	0.2	0	0.2
Mid	29.52	30.4	-0.9

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	35		34
Run 2	36		32
Run 3	34		33
Average	**35**		**33**

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Oxygen
Location	Corunna, ON	**Analyzer ID.**	Siemens Oxymat 61
Project No.	21713	**Analyzer Span Setting**	25

Span Gas Concentration	23.30

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	61	62
2	62	62
3	61	62

System Response Time*	62	Seconds
Average Time	62	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	23.31
2	23.30
3	23.32
4	23.31
5	23.30
Mean	23.31
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 Ultrmat 23
Project No.	21713	**Analyzer Span Setting**	20

Span Gas Concentration	19.90

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	65	66
2	65	65
3	63	66

System Response Time*	66	Seconds
Average Time	65	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	19.89
2	19.91
3	19.92
4	19.89
5	19.92
Mean	19.91
Standard Deviation (SD)	0.02
% RSD Criteria <3%	**0.08**

% 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.	21713	**Analyzer Span Setting**	1000

Span Gas Concentration	953

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	96	93
2	97	94
3	97	94

System Response Time*	97	Seconds
Average Time	95	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	953
2	953
3	954
4	953
5	954
Mean	953
Standard Deviation (SD)	0.55
% RSD Criteria <3%	**0.06**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Carbon Monoxide
Location	Corunna, ON	**Analyzer ID.**	Horiba Via-510
Project No.	21713	**Analyzer Span Setting**	100

Span Gas Concentration	91

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	54	55
2	54	54
3	54	57

System Response Time* 57 Seconds
Average Time 55 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	91.0
2	90.9
3	90.9
4	91.0
5	90.9
Mean	91
Standard Deviation (SD)	0.05
% RSD Criteria <3%	**0.06**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitric Oxide
Location	Corunna, ON	**Analyzer ID.**	Teledyne 200EH
Project No.	21713	**Analyzer Span Setting**	254

Span Gas Concentration	254

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	75	78
2	74	80
3	75	80

System Response Time*	80	Seconds
Average Time	68	Seconds

* Reported as Greatest Value of all Response Time Checks
Criteria: < 200 seconds for a 95% response to a step change in concentration of gas at the probe exit

REPRODUCIBILITY CHECKS

Run	Analyzer Value
1	254
2	255
3	255
4	255
5	255
Mean	255
Standard Deviation (SD)	0.45
% RSD Criteria <3%	**0.18**

% RSD = SD/Mean X 100

RESPONSE TIME CHECK

Client	Clean Harbors	**Analyzer Type**	Nitrogen Oxides
Location	Corunna, ON	**Analyzer ID.**	Teledyne 200EH
Project No.	21713	**Analyzer Span Setting**	255

Span Gas Concentration	254

Response Time Test No.	Upscale Response Time (seconds)	Downscale Response Time (seconds)
1	93	92
2	93	94
3	94	94

System Response Time*	94	Seconds
Average Time	93	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	256
2	257
3	256
4	256
5	257
Mean	256
Standard Deviation (SD)	0.55
% RSD Criteria <3%	**0.21**

% RSD = SD/Mean X 100

METHOD 7E - Determination of Nitrogen Oxides Emissions From Stationary Sources

(Instrumental Analyzer Procedure)

NO_2 to NO Conversion Efficiency Test Procedure

Client:	Clean Harbors	Project No. 21713	
Date:	October 18, 2016	Location:	Corunna, On

Certified Concentration of NO_2 Calibration Gas	**79.4**

Analyzer Reading in Direct Mode	**77.63**

Equation 7E-7 (EPA Method 7E Section 12.7)

$$Eff_{NO2} = \frac{\text{Measured Concentration in Direct Mode}}{\text{Manufacturer Certified Concentration of Cal. Gas}} \times 100$$

$$Eff_{NO2} = \frac{77.63}{79.4} \times 100 = \mathbf{97.8\ \%}$$

Method 7E criteria is >/= 90%

Efficiency Test Result	**Pass**

APPENDIX 22

Particulate and Metals Test Emission Calculations
(12 pages)

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	1 - Metals and Particulate
Date:	October 18, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.846
DGM CORRECTION FACTOR	0.989
NOZZLE DIAMETER	6.54 mm
DRY REF GAS VOLUME SAMPLED	5.079 m^3
AVGERGE ISOKINETICITY	106.7 %
STACK DIAMETER	1.52 m
LENGTH	0.00 m
WIDTH	0.00 m
AREA OF STACK or DUCT	1.82 m^3

STACK GAS PHYSICAL PARAMETERS

AVERAGE GAS TEMPERATURE	192.5 ^oC
AVERAGE GAS MOISTURE BY VOLUME	48.8 %
AVERAGE GAS VELOCITY	30.88 m/s
BAROMETRIC PRESSURE (Station)	98.104 Kpa
STATIC PRESSURE	0.324 Kpa
ABSOLUTE GAS PRESSURE	98.427 Kpa
OXYGEN CONCENTRATION	8.8 %
CARBON DIOXIDE CONCENTRATION	8.82 %
CARBON MONOXIDE CONCENTRATION	41.7 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	56.34 m^3/s
DRY REF GAS FLOWRATE	17.95 Rm^3/s
DRY ADJ GAS FLOWRATE	21.94 Rm^3/s
WET REF GAS FLOWRATE	35.05 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	9.5 mg
	-FILTER	31.3 mg
	-TOTAL	40.8 mg
DRY REF GAS VOLUME SAMPLED		5.079 m^3
PARTICULATE CONC. - ACTUAL		2.559 mg/m^3
PARTICULATE CONC. - DRY REF		8.033 mg/m^3
PARTICULATE CONC. - DRY ADJ		6.573 mg/m^3
PARTICULATE CONC. - WET REF		4.115 mg/m^3
PARTICULATE EMISSION RATE		0.144177 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 18, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	31.3
DGMCF	0.989	**Probe (mg)**	9.5
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3520.7
Static Pressure	1.300 "H_2O	**WCBDA (g)**	35.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.9 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%	8.8
CO2%	8.82
COppm	41.7

Measured H2O
48.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	62.66	1.6	358	69	76	76	2	3.5		30.09	
	3	65.13	1.2	355	64	76	75	1.2	3.0		26.01	113.5
	6	67.20	0.9	363	62	76	76	0.9	2.5		22.63	109.5
	9	68.91	0.82	356	63	76	76	0.9	2.5		21.51	104.8
2	12	70.55	0.73	353	63	77	76	0.88	2.5		20.26	104.8
	15	72.19	0.66	351	62	77	76	0.75	2.5		19.24	110.8
	18	73.74	1.6	380	61	78	77	1.9	4.0		30.49	110.0
	21	75.74	1.3	365	62	78	77	1.6	4.0		27.24	92.8
3	24	77.94	1.7	386	61	79	77	2.05	4.0		31.54	112.2
	27	80.33	1.7	389	61	79	77	2.04	4.0		31.60	108.0
	30	82.76	1.7	385	61	80	77	2	4.0		31.52	110.0
	33	85.18	1.7	384	63	80	77	2	4.0		31.50	109.1
4	36	87.57	1.8	386	64	80	78	2	4.0		32.45	107.7
	39	90.00	1.8	384	67	81	78	2	4.0		32.42	106.5
	42	92.38	1.8	382	65	81	78	2	4.0		32.38	104.1
	45	94.81	1.9	381	64	81	78	2.1	4.0		33.24	106.1
5	48	97.28	1.8	383	63	81	78	2	4.0		32.40	105.0
	51	99.71	2	384	62	81	78	2.2	4.0		34.17	106.2
	54	102.27	1.9	380	62	81	78	2.1	4.0		33.22	106.2
	57	104.78	2	380	62	81	79	2.2	4.0		34.09	106.6
6	60	107.34	1.9	381	59	82	79	2.1	4.0		33.24	105.9
	63	109.84	1.7	381	62	82	79	2	4.0		31.45	106.0
	66	112.31	1.8	379	63	82	79	2	4.0		32.32	110.7
	69	114.74	1.8	378	62	82	79	2	4.0		32.30	105.7
7	72	117.17	1.7	378	59	84	80	1.9	4.0		31.39	105.7
	75	119.56	1.8	381	58	82	79	2	4.0		32.36	106.6
	78	121.99	1.7	379	59	82	80	1.9	4.0		31.41	105.9
	81	124.39	1.8	377	60	82	80	1.9	4.0		32.28	107.3
8	84	126.77	1.7	376	61	82	80	1.9	4.0		31.35	103.3
	87	129.14	1.6	378	60	82	80	1.8	4.0		30.45	105.8
	90	131.49	1.6	379	55	82	80	1.8	4.0		30.47	108.2
	93	133.80	1.7	376	56	82	80	1.9	4.0		31.35	106.5
9	96	136.15	1.6	377	57	83	80	1.9	4.0		30.43	104.9
	99	138.52	1.6	380	58	83	80	1.8	4.0		30.49	109.0

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 18, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	31.3
DGMCF	0.989	**Probe (mg)**	9.5
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3520.7
Static Pressure	1.300 "H_2O	**WCBDA (g)**	35.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.9 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%	8.8
CO2%	8.82
COppm	41.7

Measured H2O
48.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	140.85	1.8	380	58	83	80	2	4.0		32.34	107.3
	105	143.24	1.7	379	60	83	80	1.9	4.0		31.41	103.9
10	108	145.65	1.8	380	60	83	81	2	4.0		32.34	107.7
	111	148.07	1.7	382	61	83	81	2	4.0		31.47	105.1
	114	150.48	1.7	384	61	83	81	2	4.0		31.50	107.8
	117	152.91	1.7	382	60	83	81	1.9	4.0		31.47	108.8
	120	155.30								0.9		106.9
1	0	156.20	1.5	379	75	80	79	1.7	4.0		29.50	
	3	158.49	1.4	379	50	80	80	1.5	3.5		28.50	109.3
	6	160.65	1.4	377	49	80	80	1.5	3.5		28.47	106.5
	9	162.80	1.4	377	50	80	80	1.5	3.5		28.47	105.9
2	12	164.93	1.4	378	51	80	80	1.5	3.5		28.49	104.9
	15	167.06	1.4	378	52	80	80	1.6	3.5		28.49	105.0
	18	169.24	1.4	376	53	80	80	1.6	3.5		28.45	107.5
	21	171.42	1.3	376	53	81	80	1.5	3.5		27.42	107.4
3	24	173.55	1.4	380	54	81	80	1.5	3.5		28.52	108.7
	27	175.66	1.4	380	55	81	80	1.5	3.5		28.52	104.0
	30	177.81	1.5	378	55	81	80	1.6	3.5		29.49	106.0
	33	180.01	1.5	378	56	82	80	1.7	3.5		29.49	104.7
4	36	182.24	1.5	379	56	82	80	1.7	4.0		29.50	106.0
	39	184.51	1.5	380	56	82	80	1.7	4.0		29.52	108.0
	42	186.79	1.6	378	57	82	80	1.7	4.0		30.45	108.6
	45	189.06	1.6	377	58	83	80	1.8	4.0		30.43	104.5
5	48	191.36	1.6	379	58	83	80	1.8	4.0		30.47	105.8
	51	193.66	1.7	379	59	84	81	1.9	4.0		31.41	105.9
	54	196.03	1.7	378	59	84	81	1.9	4.0		31.39	105.7
	57	198.41	1.7	378	56	85	81	1.9	4.0		31.39	106.1
6	60	200.77	1.7	378	55	85	81	2	4.0		31.39	105.1
	63	203.20	1.9	381	54	85	82	2.1	4.5		33.24	108.2
	66	205.70	1.8	380	53	85	82	2	4.5		32.34	105.4
	69	208.16	1.9	379	54	85	82	2.1	4.5		33.21	106.5
7	72	210.64	1.9	380	54	85	82	2.2	4.5		33.22	104.5
	75	213.19	1.9	382	56	85	82	2.2	4.5		33.26	107.5
	78	215.73	1.9	382	57	86	82	2.2	5.0		33.26	107.2

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	1 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 18, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	31.3
DGMCF	0.989	**Probe (mg)**	9.5
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3520.7
Static Pressure	1.300 "H_2O	**WCBDA (g)**	35.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.9 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%	8.8
CO2%	8.82
COppm	41.7

Measured H2O
48.8 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	218.29	1.9	379	58	86	83	2.2	5.0		33.21	108.0
8	84	220.83	1.9	379	58	86	83	2.2	5.0		33.21	106.8
	87	223.40	2.1	383	58	86	83	2.4	5.0		34.99	108.1
	90	226.05	1.9	382	61	86	84	2.2	5.0		33.26	106.3
	93	228.65	1.9	382	59	86	84	2.1	5.0		33.26	109.5
9	96	231.19	1.8	385	55	87	84	2	5.0		32.43	106.9
	99	233.64	1.9	385	63	87	84	2.1	5.0		33.32	106.0
	102	236.13	1.9	383	55	87	84	2.1	5.0		33.28	104.9
	105	238.70	1.9	383	56	88	85	2.2	5.0		33.28	108.1
10	108	241.28	1.8	384	56	88	85	2	5.0		32.42	108.4
	111	243.75	1.9	386	59	88	85	2.1	5.0		33.34	106.6
	114	246.25	1.9	384	59	88	85	2.1	5.0		33.30	105.2
	117	248.79	1.9	382	60	89	86	2.1	5.0		33.26	106.7
	120	251.32										106.0

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	2 - Metals and Particulate
Date:	October 19, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.846
DGM CORRECTION FACTOR	0.989
NOZZLE DIAMETER	6.54 mm
DRY REF GAS VOLUME SAMPLED	4.818 m^3
AVGERGE ISOKINETICITY	100.5 %
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	192.1 °C
AVERAGE GAS MOISTURE BY VOLUME	48.5 %
AVERAGE GAS VELOCITY	30.33 m/s
BAROMETRIC PRESSURE (Station)	99.695 Kpa
STATIC PRESSURE	0.523 Kpa
ABSOLUTE GAS PRESSURE	100.218 Kpa
OXYGEN CONCENTRATION	8.99 %
CARBON DIOXIDE CONCENTRATION	8.81 %
CARBON MONOXIDE CONCENTRATION	40.4 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	55.33 m^3/s
DRY REF GAS FLOWRATE	18.06 Rm^3/s
DRY ADJ GAS FLOWRATE	21.72 Rm^3/s
WET REF GAS FLOWRATE	35.07 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	10.5 mg
	-FILTER	20 mg
	-TOTAL	30.5 mg
DRY REF GAS VOLUME SAMPLED		4.818 m^3
PARTICULATE CONC. - ACTUAL		2.066 mg/m^3
PARTICULATE CONC. - DRY REF		6.331 mg/m^3
PARTICULATE CONC. - DRY ADJ		5.262 mg/m^3
PARTICULATE CONC. - WET REF		3.260 mg/m^3
PARTICULATE EMISSION RATE		0.114308 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 19, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	20
DGMCF	0.989	**Probe (mg)**	10.5
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3301.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	34.7
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.95 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%	8.81
COppm	40.4

Measured H2O
48.5 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
1	0	56.94	1.3	383	79	65	65	1.1	2.5		27.26	
	3	58.82	1.3	379	64	66	65	1.2	2.5		27.20	99.3
	6	60.64	1.3	381	62	67	66	1.3	2.5		27.23	95.9
	9	62.53	1.3	374	60	66	65	1.3	2.5		27.12	99.5
2	12	64.44	1.2	371	58	66	65	1.2	2.5		26.01	100.3
	15	66.30	1.2	370	57	67	65	1.2	2.5		25.99	101.5
	18	68.12	1.2	370	58	67	65	1.2	2.5		25.99	99.2
	21	69.94	1.2	368	58	68	66	1.2	2.5		25.96	99.2
3	24	71.78	1.1	366	58	69	66	1.1	3.0		24.83	99.9
	27	73.58	1.5	378	59	70	67	1.6	3.0		29.20	101.9
	30	75.65	1.5	377	57	70	67	1.6	3.0		29.18	101.0
	33	77.76	1.5	379	55	71	67	1.5	3.0		29.22	102.9
4	36	79.83	1.5	378	54	71	68	1.5	3.0		29.20	100.9
	39	81.90	1.6	376	54	72	68	1.6	3.0		30.12	100.8
	42	84.04	1.6	376	54	73	68	1.6	3.0		30.12	100.7
	45	86.18	1.6	377	54	73	69	1.6	3.0		30.14	100.6
5	48	88.32	1.8	377	55	73	69	1.8	3.5		31.97	100.5
	51	90.56	1.7	374	55	74	69	1.7	3.5		31.01	99.3
	54	92.78	1.9	375	55	74	70	1.9	3.5		32.80	100.9
	57	95.08	1.7	374	54	75	70	1.7	3.5		31.01	98.9
6	60	97.33	1.8	375	54	75	70	1.8	3.5		31.93	102.1
	63	99.59	1.9	373	54	75	71	1.9	3.5		32.76	99.8
	66	101.91	1.9	371	54	76	71	1.9	3.5		32.73	99.5
	69	104.22	1.9	370	54	76	71	2	4.0		32.71	98.8
7	72	106.58	2	373	58	76	72	2.1	4.0		33.62	101.0
	75	109.01	1.9	371	56	76	72	2	4.0		32.73	101.4
	78	111.44	1.9	369	56	77	72	2	4.0		32.69	103.9
	81	113.83	2	368	56	77	73	1.9	4.0		33.51	102.0
8	84	116.18	2	368	56	77	73	1.9	4.0		33.51	97.6
	87	118.53	2	368	56	77	74	1.9	4.0		33.51	97.6
	90	120.89	1.9	368	56	77	74	1.9	4.0		32.67	97.9
	93	123.24	1.9	367	56	78	74	1.9	4.0		32.65	100.0
9	96	125.60	1.9	368	56	78	74	1.9	4.0		32.67	100.3
	99	127.96	1.9	366	56	78	74	1.9	4.0		32.63	100.3

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 19, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	20
DGMCF	0.989	**Probe (mg)**	10.5
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3301.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	34.7
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.95 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%	8.81
COppm	40.4

Measured H2O
48.5 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	130.31	1.9	366	57	78	75	1.9	4.0		32.63	99.8
	105	132.68	1.9	367	56	78	75	1.9	4.0		32.65	100.5
10	108	135.03	1.8	369	56	79	75	1.8	4.0		31.81	99.8
	111	137.33	1.9	372	57	79	75	1.9	4.0		32.75	100.3
	114	139.66	1.9	371	58	79	75	1.9	4.0		32.73	99.1
	117	142.03	2	371	57	79	76	2	4.0		33.58	100.8
	120	144.42								0.95		99.0
1	0	145.37	1.2	356	75	78	78	1.2	3.5		25.77	
	3	147.38	1.2	355	60	78	78	1.2	3.5		25.76	106.2
	6	149.26	1.2	355	59	78	78	1.2	3.5		25.76	99.2
	9	151.10	1.1	355	59	78	78	1.2	3.5		24.66	97.1
2	12	152.95	1.4	356	60	78	78	1.5	3.5		27.84	102.0
	15	154.96	1.5	386	61	79	78	1.5	3.5		29.34	98.4
	18	157.10	1.2	388	60	79	78	1.2	3.5		26.27	102.9
	21	159.11	1.5	385	62	80	78	1.5	3.5		29.32	108.1
3	24	161.19	1.5	385	63	81	79	1.5	3.5		29.32	99.9
	27	163.30	1.8	389	64	81	79	1.9	4.0		32.20	101.1
	30	165.58	1.6	387	62	82	79	1.7	4.0		30.32	100.1
	33	167.84	1.7	386	61	82	79	1.7	4.0		31.23	105.0
4	36	170.06	1.9	386	61	83	80	2	4.0		33.02	100.0
	39	172.43	1.8	388	61	83	80	1.9	4.0		32.18	100.8
	42	174.81	1.8	390	62	84	81	1.8	4.0		32.21	104.1
	45	177.11	1.7	388	63	84	81	1.7	4.0		31.27	100.5
5	48	179.35	1.9	388	65	85	82	1.9	4.0		33.06	100.6
	51	181.68	1.6	391	56	85	82	1.6	4.0		30.39	98.9
	54	183.90	1.6	390	56	86	83	1.6	4.0		30.37	102.8
	57	186.07	1.6	389	56	86	83	1.6	4.0		30.35	100.2
6	60	188.24	1.6	388	61	86	83	1.7	4.0		30.34	100.1
	63	190.42	1.4	388	61	87	84	1.5	4.0		28.38	100.6
	66	192.56	1.5	392	61	88	85	1.5	4.0		29.44	105.3
	69	194.68	1.6	390	62	88	85	1.6	4.0		30.37	100.8
7	72	196.85	1.6	390	59	89	86	1.6	4.0		30.37	99.8
	75	199.04	1.6	388	54	90	86	1.6	4.0		30.34	100.6
	78	201.20	1.5	390	54	90	87	1.5	4.0		29.41	99.0

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	2 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 19, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	20
DGMCF	0.989	**Probe (mg)**	10.5
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3301.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	34.7
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.95 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%	8.81
COppm	40.4

Measured H2O
48.5 %

				Temperatures								
Point	Time	DGM Reading	ΔP "H2O	Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	203.35	1.5	391	55	91	88	1.5	4.0		29.43	101.8
8	84	205.46	1.5	386	55	91	88	1.5	4.0		29.34	99.7
	87	207.57	1.4	385	61	91	88	1.4	4.0		28.33	99.4
	90	209.65	1.5	387	61	92	89	1.4	4.0		29.36	101.4
	93	211.70	1.5	386	62	93	89	1.5	4.0		29.34	96.5
9	96	213.82	1.7	386	62	93	90	1.9	4.0		31.23	99.6
	99	216.10	1.7	383	63	93	90	1.9	4.0		31.18	100.7
	102	218.46	1.7	385	63	93	90	1.7	4.0		31.21	104.0
	105	220.76	1.7	386	64	94	90	1.7	4.0		31.23	101.4
10	108	223.04	1.7	383	60	94	91	1.7	4.0		31.18	100.5
	111	225.31	1.9	383	60	94	91	1.9	4.0		32.96	99.8
	114	227.68	1.8	385	61	95	91	1.8	4.0		32.12	98.6
	117	230.03	1.8	387	61	95	92	1.8	4.0		32.16	100.5
	120	232.38										100.5

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, ON
Test Location:	Incinerator Exhaust Stack
Test No.:	3 - Metals and Particulate
Date:	October 20, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.846
DGM CORRECTION FACTOR	0.989
NOZZLE DIAMETER	6.54 mm
DRY REF GAS VOLUME SAMPLED	4.856 m^3
AVGERGE ISOKINETICITY	100.5 %
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	195.9 °C
AVERAGE GAS MOISTURE BY VOLUME	48.7 %
AVERAGE GAS VELOCITY	30.99 m/s
BAROMETRIC PRESSURE (Station)	99.560 Kpa
STATIC PRESSURE	0.622 Kpa
ABSOLUTE GAS PRESSURE	100.182 Kpa
OXYGEN CONCENTRATION	8.7 %
CARBON DIOXIDE CONCENTRATION	9.04 %
CARBON MONOXIDE CONCENTRATION	34.6 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	56.52 m^3/s
DRY REF GAS FLOWRATE	18.20 Rm^3/s
DRY ADJ GAS FLOWRATE	22.43 Rm^3/s
WET REF GAS FLOWRATE	35.53 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	9.2 mg
	-FILTER	21.5 mg
	-TOTAL	30.7 mg
DRY REF GAS VOLUME SAMPLED		4.856 m^3
PARTICULATE CONC. - ACTUAL		2.036 mg/m^3
PARTICULATE CONC. - DRY REF		6.322 mg/m^3
PARTICULATE CONC. - DRY ADJ		5.130 mg/m^3
PARTICULATE CONC. - WET REF		3.240 mg/m^3
PARTICULATE EMISSION RATE		0.115077 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 20, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	21.5
DGMCF	0.989	**Probe (mg)**	9.2
Barometric Pressure	29.4 "Hg	**CWTR (g)**	3357
Static Pressure	2.500 "H_2O	**WCBDA (g)**	39.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.76 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%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
48.7 %

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	33.30	1.5	366	54	64	63	1.5	3.0		29.00	
	3	35.40	1.5	362	45	65	64	1.4	3.0		28.93	**103.0**
	6	37.41	1.5	362	45	63	63	1.5	3.0		28.93	**98.1**
	9	39.42	1.5	362	45	64	63	1.5	3.0		28.93	**98.4**
2	12	41.45	1.5	362	45	64	63	1.5	3.0		28.93	**99.3**
	15	43.51	1.5	363	46	63	63	1.5	3.0		28.95	**100.8**
	18	45.54	1.6	363	47	64	63	1.6	3.0		29.90	**99.5**
	21	47.65	1.5	363	48	64	63	1.5	3.0		28.95	**100.0**
3	24	49.72	1.9	360	48	64	64	1.9	3.5		32.53	**101.3**
	27	52.00	1.8	389	49	66	64	1.8	3.5		32.21	**99.0**
	30	54.29	1.9	392	50	66	64	1.8	3.5		33.15	**103.7**
	33	56.56	1.8	390	51	66	64	1.8	3.5		32.23	**100.3**
4	36	58.81	1.9	390	53	66	64	1.8	3.5		33.11	**102.0**
	39	61.06	1.9	390	53	67	64	1.8	3.5		33.11	**99.3**
	42	63.30	1.9	392	52	67	64	1.9	3.5		33.15	**98.7**
	45	65.60	1.9	392	52	68	64	1.9	3.5		33.15	**101.5**
5	48	67.93	1.9	391	52	67	64	1.8	3.5		33.13	**102.7**
	51	70.20	1.9	390	49	67	65	1.8	3.5		33.11	**100.1**
	54	72.47	1.9	395	48	68	65	1.8	3.5		33.21	**100.0**
	57	74.74	1.9	393	48	68	65	1.8	3.5		33.17	**100.1**
6	60	77.01	1.8	392	48	67	65	1.8	3.5		32.27	**100.0**
	63	79.23	1.8	392	48	68	65	1.8	3.5		32.27	**100.5**
	66	81.45	1.8	395	49	68	65	1.8	3.5		32.33	**100.4**
	69	83.68	1.8	397	50	68	65	1.8	3.5		32.36	**101.1**
7	72	85.88	1.8	394	52	68	66	1.8	3.5		32.31	**99.8**
	75	88.06	1.9	394	55	68	66	1.9	3.5		33.19	**98.7**
	78	90.35	1.8	398	52	68	66	1.8	3.5		32.38	**100.9**
	81	92.62	1.9	397	50	68	66	1.9	3.5		33.25	**103.0**
8	84	94.89	1.7	395	51	68	66	1.7	3.5		31.42	**100.2**
	87	97.10	1.7	394	52	68	66	1.6	3.5		31.40	**103.0**
	90	99.28	1.7	394	54	68	66	1.6	3.5		31.40	**101.5**
	93	101.40	1.7	396	51	69	66	1.7	3.5		31.43	**98.7**
9	96	103.57	1.7	392	50	69	66	1.7	3.5		31.36	**101.1**
	99	105.77	1.7	391	49	69	66	1.6	3.5		31.34	**102.2**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 20, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	21.5
DGMCF	0.989	**Probe (mg)**	9.2
Barometric Pressure	29.4 "Hg	**CWTR (g)**	3357
Static Pressure	2.500 "H_2O	**WCBDA (g)**	39.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.76 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%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
48.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Imp. Out °F	DGM Out °F	DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	102	107.93	1.7	389	50	69	66	1.6	3.5		31.31	100.3
	105	110.07	1.7	392	50	69	66	1.7	3.5		31.36	99.2
10	108	112.23	1.7	390	52	69	66	1.7	3.5		31.32	100.4
	111	114.38	1.7	388	51	69	67	1.7	3.5		31.29	99.8
	114	116.53	1.7	388	51	69	66	1.6	3.5		31.29	99.6
	117	118.69	1.7	392	50	69	67	1.6	3.5		31.36	100.1
	120	120.85								0.76		100.2
1	0	121.61	1.1	378	54	68	67	1	3.0		25.02	
	3	123.44	0.98	379	44	67	67	0.9	3.0		23.63	104.6
	6	125.10	0.9	380	43	67	67	0.77	2.5		22.66	100.7
	9	126.63	0.9	383	43	66	67	0.8	3.0		22.70	96.9
2	12	128.20	0.95	382	43	67	67	0.9	3.0		23.31	99.7
	15	129.82	0.74	381	44	67	67	0.6	2.5		20.56	100.0
	18	131.28	0.74	381	45	68	67	0.6	2.5		20.56	102.0
	21	132.64	1.4	382	45	68	67	1.4	3.5		28.29	94.9
3	24	134.60	1.7	384	46	68	67	1.7	3.5		31.21	99.7
	27	136.77	1.5	381	47	68	67	1.5	3.5		29.27	100.3
	30	138.87	1.5	381	50	69	67	1.4	3.5		29.27	103.1
	33	140.90	1.5	384	52	69	67	1.5	3.5		29.32	99.6
4	36	142.91	1.6	382	50	70	68	1.6	3.5		30.24	98.8
	39	145.03	1.6	381	50	70	68	1.6	3.5		30.23	100.6
	42	147.17	1.6	380	50	71	68	1.6	3.5		30.21	101.5
	45	149.31	1.6	381	51	71	68	1.6	3.5		30.23	101.3
5	48	151.43	1.7	383	51	71	68	1.7	3.5		31.19	100.5
	51	153.61	1.7	381	50	71	68	1.7	3.5		31.16	100.4
	54	155.82	1.7	381	49	71	68	1.6	3.5		31.16	101.6
	57	157.99	1.6	381	49	71	68	1.5	3.5		30.23	99.8
6	60	160.09	1.8	384	48	71	68	1.8	3.5		32.12	99.5
	63	162.31	1.8	385	53	71	68	1.8	3.5		32.14	99.4
	66	164.58	1.9	383	48	71	69	1.9	4.0		32.98	101.7
	69	166.90	1.8	383	47	71	69	1.8	4.0		32.10	101.0
7	72	169.18	1.9	388	47	71	69	1.8	4.0		33.08	101.9
	75	171.44	1.9	387	48	71	69	1.9	4.0		33.06	98.6
	78	173.75	1.9	385	48	73	70	1.9	4.0		33.02	100.8

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, ON
Test No.:	3 - Metals and Particulate	**Test Location:**	Incinerator Exhaust Stack
Date:	October 20, 2016	**Operator:**	AN

Pitot Factor	0.846	**Filter (mg)**	21.5
DGMCF	0.989	**Probe (mg)**	9.2
Barometric Pressure	29.4 "Hg	**CWTR (g)**	3357
Static Pressure	2.500 "H_2O	**WCBDA (g)**	39.3
Nozzle	0.2575 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.76 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%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
48.7 %

Point	Time	DGM Reading	ΔP "H2O	Temperatures: Stack °F	Temperatures: Imp. Out °F	Temperatures: DGM Out °F	Temperatures: DGM In °F	ΔH "H2O	Vacuum "Hg	Leak Check Volume	Velocity m/s	Isokinetic %
	81	176.06	1.9	386	50	71	69	1.9	4.0		33.04	**100.4**
8	84	178.37	1.9	390	52	71	69	1.9	4.0		33.11	**100.7**
	87	180.68	2.1	390	52	71	69	2.1	4.0		34.81	**101.0**
	90	183.06	1.9	389	50	71	69	1.9	4.0		33.10	**99.0**
	93	185.43	2.1	389	50	71	69	2	4.0		34.79	**103.5**
9	96	187.80	1.9	390	51	71	69	2	4.0		33.11	**98.5**
	99	190.16	2	389	51	71	69	2	4.0		33.96	**103.2**
	102	192.53	2	385	49	71	70	1.9	4.0		33.88	**100.9**
	105	194.88	1.9	384	48	72	70	1.9	4.0		33.00	**99.7**
10	108	197.24	1.9	384	46	72	69	1.9	4.0		33.00	**102.6**
	111	199.57	2	385	46	71	70	1.9	4.0		33.88	**101.4**
	114	201.94	1.9	382	46	72	70	1.9	4.0		32.96	**100.6**
	117	204.26	1.9	381	47	71	70	1.9	4.0		32.94	**100.7**
	120	206.59										**101.2**

APPENDIX 23

Semi-Volatile Organics Test Emission Calculations
(12 pages)

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, Ontario
Test Location:	Incinerator Exhaust
Test No.:	1- Semi-Volatile Organic Compounds
Date:	October 18, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.848
DGM CORRECTION FACTOR	0.993
NOZZLE DIAMETER	6.50 mm
DRY REF GAS VOLUME SAMPLED	5.057 m^3
AVGERGE ISOKINETICITY	104.0 %
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	193.9 ^oC
AVERAGE GAS MOISTURE BY VOLUME	48.9 %
AVERAGE GAS VELOCITY	32.12 m/s
BAROMETRIC PRESSURE (Station)	98.104 Kpa
STATIC PRESSURE	0.324 Kpa
ABSOLUTE GAS PRESSURE	98.427 Kpa
OXYGEN CONCENTRATION	8.8 %
CARBON DIOXIDE CONCENTRATION	8.82 %
CARBON MONOXIDE CONCENTRATION	41.7 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	58.59 m^3/s
DRY REF GAS FLOWRATE	18.57 Rm^3/s
DRY ADJ GAS FLOWRATE	22.70 Rm^3/s
WET REF GAS FLOWRATE	36.35 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		5.057 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

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	1- Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 18, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3527.1
Static Pressure	1.300 "H_2O	**WCBDA (g)**	29.6
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.09 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%	8.8
CO2%	8.82
COppm	41.7

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	23.27	2	384	60	74	74	2.2	7.0		34.26	
	3	25.72	2	389	56	76	76	2.2	7.0		34.36	104.4
	6	28.15	2.2	387	53	76	76	2.2	7.0		36.00	103.5
	9	30.76	2	385	52	76	76	2.2	7.0		34.28	105.8
2	12	33.25	2	385	51	77	76	2.2	7.0		34.28	105.8
	15	35.85	2	388	51	77	76	2.2	7.0		34.34	110.3
	18	38.31	2	388	51	77	77	2.2	7.0		34.34	104.6
	21	40.78	1.9	387	51	77	76	2.1	6.0		33.45	104.9
3	24	43.12	1.9	387	52	77	77	2.2	6.0		33.45	102.0
	27	45.61	1.9	389	52	77	76	2.1	6.0		33.49	108.4
	30	47.94	1.9	386	53	77	76	2.1	6.0		33.43	101.7
	33	50.38	2	384	53	78	77	2.1	6.0		34.26	106.3
4	36	52.75	2	382	53	78	77	2.1	6.0		34.22	100.3
	39	55.12	2.2	398	54	79	78	2.4	7.0		36.23	100.2
	42	57.61	1.9	385	52	78	77	2.1	7.0		33.41	101.2
	45	60.04	2.1	382	49	78	77	2.4	7.0		35.06	105.6
5	48	62.61	1.8	381	49	78	77	2	6.0		32.44	106.1
	51	65.01	2	381	49	78	77	2.2	7.0		34.20	106.8
	54	67.45	1.9	382	48	78	77	2.1	7.0		33.35	103.1
	57	69.89	2.1	382	47	78	78	2.4	7.0		35.06	105.8
6	60	72.43	1.7	379	47	79	78	1.9	6.0		31.49	104.8
	63	74.76	1.7	378	47	79	78	2	6.0		31.47	106.4
	66	77.10	1.7	381	47	79	78	2	6.0		31.53	106.8
	69	79.40	1.7	379	47	79	78	2	6.0		31.49	105.2
7	72	81.70	1.5	378	48	79	79	1.7	6.0		29.56	105.0
	75	83.92	1.6	377	49	79	79	1.7	6.0		30.52	107.7
	78	86.12	1.6	379	49	79	78	1.7	6.0		30.55	103.3
	81	88.14	1.7	380	50	79	79	2	9.0		31.51	95.0
8	84	90.50	1.5	377	50	80	79	1.7	6.0		29.55	107.7
	87	92.88	1.5	376	50	80	79	1.7	6.0		29.53	115.3
	90	95.08	1.5	376	50	80	79	1.7	6.0		29.53	106.5
	93	97.27	1.5	378	51	80	79	1.6	6.0		29.56	106.0
9	96	99.41	1.3	376	52	79	79	1.5	5.0		27.49	103.7
	99	101.45	1.3	376	52	80	79	1.4	5.0		27.49	106.1

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	1- Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 18, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3527.1
Static Pressure	1.300 "H_2O	**WCBDA (g)**	29.6
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.09 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%	8.8
CO2%	8.82
COppm	41.7

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	103.42	1.4	377	53	80	79	1.6	5.0		28.54	102.3
	105	105.47	1.35	377	53	80	79	1.6	5.0		28.03	102.7
10	108	107.54	1.3	379	53	80	79	1.5	5.0		27.54	105.7
	111	109.59	1.3	379	53	80	79	1.5	5.0		27.54	106.7
	114	111.65	1.45	379	53	80	79	1.6	5.0		29.08	107.2
	117	113.75	1.25	382	53	80	79	1.3	5.0		27.05	103.5
	120	115.66								1.09		101.5
1	0	116.75	1.8	380	71	81	80	2	6.0		32.42	
	3	119.05	1.8	380	51	80	80	2	6.0		32.42	101.8
	6	121.34	1.9	381	50	80	80	2.1	6.5		33.33	101.4
	9	123.74	1.9	378	51	80	79	2.1	6.5		33.27	103.5
2	12	126.11	1.8	377	53	79	79	2.1	6.5		32.37	102.2
	15	128.45	1.8	377	54	80	80	2.1	6.5		32.37	103.7
	18	130.83	1.8	377	55	80	80	2.1	6.5		32.37	105.2
	21	133.20	1.8	378	56	80	80	2.1	6.5		32.39	104.8
3	24	135.54	1.8	378	56	80	80	2.1	6.5		32.39	103.5
	27	137.88	1.8	380	57	80	80	2.1	6.5		32.42	103.5
	30	140.23	1.8	381	58	80	80	2.1	6.5		32.44	104.1
	33	142.58	1.8	378	59	80	80	2.1	6.5		32.39	104.2
4	36	144.91	1.85	378	59	80	79	2.1	6.5		32.83	103.1
	39	147.27	1.9	379	57	80	79	2.1	6.5		33.29	103.1
	42	149.58	1.85	388	61	82	82	2.1	6.5		33.03	99.6
	45	151.89	1.85	379	61	80	80	2.1	6.5		32.85	101.0
5	48	154.25	1.85	377	57	80	80	2.1	6.5		32.81	103.1
	51	156.58	1.95	378	57	80	80	2.1	6.5		33.71	101.6
	54	158.93	1.9	381	58	80	80	2.1	6.5		33.33	99.9
	57	161.33	1.95	379	58	80	80	2.1	6.5		33.73	103.5
6	60	163.71	1.95	381	59	80	80	2.1	6.5		33.77	101.2
	63	166.11	2	377	56	80	80	2.1	7.0		34.12	102.2
	66	168.47	1.95	377	56	80	80	2.1	7.0		33.69	99.0
	69	170.83	2	382	56	80	80	2.1	7.0		34.22	100.3
7	72	173.22	2	382	56	80	80	2.1	7.0		34.22	100.6
	75	176.04	1.9	380	55	81	80	2.1	7.0		33.31	118.6
	78	178.42	1.9	380	55	81	80	2.1	7.0		33.31	102.5

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	1- Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 18, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	28.97 "Hg	**CWTR (g)**	3527.1
Static Pressure	1.300 "H_2O	**WCBDA (g)**	29.6
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.09 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%	8.8
CO2%	8.82
COppm	41.7

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	180.42	1.9	380	54	81	80	2.1	7.0		33.31	86.1
8	84	182.78	1.9	380	54	80	80	2.1	7.0		33.31	101.7
	87	185.17	1.9	383	59	81	81	2.1	7.0		33.37	103.0
	90	187.62	1.8	384	59	81	81	2	6.0		32.50	105.6
	93	190.00	1.4	379	61	81	81	1.6	6.0		28.58	105.5
9	96	192.13	1.6	381	60	81	81	1.8	6.0		30.59	106.6
	99	194.28	1.6	382	60	81	81	1.8	6.0		30.61	100.8
	102	196.51	1.5	384	61	82	82	1.7	6.5		29.67	104.6
	105	198.70	1.7	381	60	82	82	1.9	6.5		31.53	106.0
10	108	201.05	1.5	381	60	82	82	1.7	6.5		29.62	106.7
	111	203.19	1.6	381	61	82	82	1.8	6.5		30.59	103.4
	114	205.40	1.5	381	60	82	82	1.8	6.5		29.62	103.4
	117	207.61	1.6	381	61	82	82	1.8	6.5		30.59	106.8
	120	209.81										103.0

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, Ontario
Test Location:	Incinerator Exhaust
Test No.:	2 - Semi-Volatile Organic Compounds
Date:	October 19, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.848
DGM CORRECTION FACTOR	0.993
NOZZLE DIAMETER	6.50 mm
DRY REF GAS VOLUME SAMPLED	4.724 m^3
AVGERGE ISOKINETICITY	102.0 %
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	193.5 ^oC
AVERAGE GAS MOISTURE BY VOLUME	49.6 %
AVERAGE GAS VELOCITY	30.44 m/s
BAROMETRIC PRESSURE (Station)	99.695 Kpa
STATIC PRESSURE	0.523 Kpa
ABSOLUTE GAS PRESSURE	100.218 Kpa
OXYGEN CONCENTRATION	8.99 %
CARBON DIOXIDE CONCENTRATION	8.81 %
CARBON MONOXIDE CONCENTRATION	41.4 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	55.53 m^3/s
DRY REF GAS FLOWRATE	17.69 Rm^3/s
DRY ADJ GAS FLOWRATE	21.29 Rm^3/s
WET REF GAS FLOWRATE	35.10 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		4.724 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, Ontario
Test No.:	2 - Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 19, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3399.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	14.8
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.08 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%	8.81
COppm	41.4

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	13.29	1.7	383	59	64	63	1.7	5.5		31.33	
	3	15.53	1.95	383	52	65	64	2	7.0		33.56	**107.4**
	6	17.73	1.7	382	51	65	64	1.7	7.0		31.32	**98.4**
	9	19.87	1.75	381	50	65	65	1.7	7.0		31.75	**102.3**
2	12	22.00	1.7	383	49	66	65	1.7	7.0		31.33	**100.2**
	15	24.12	1.8	383	49	66	65	1.8	7.0		32.24	**101.3**
	18	26.28	1.7	381	47	66	65	1.7	7.0		31.30	**100.3**
	21	28.41	1.7	379	47	66	65	1.7	7.0		31.26	**101.6**
3	24	30.54	1.7	382	47	66	65	1.7	7.0		31.32	**101.5**
	27	32.67	1.7	386	48	68	67	1.7	7.0		31.39	**101.7**
	30	34.80	1.7	378	47	67	66	1.7	7.0		31.24	**101.5**
	33	36.92	1.8	377	47	67	66	1.8	7.0		32.13	**100.8**
4	36	39.10	1.7	379	48	67	66	1.8	7.0		31.26	**100.7**
	39	41.27	1.8	379	47	68	67	1.8	7.0		32.17	**103.2**
	42	43.44	1.75	377	47	68	68	1.8	7.0		31.68	**100.1**
	45	45.62	1.8	375	46	68	68	1.8	7.0		32.09	**101.8**
5	48	47.78	2	375	45	68	68	2	7.0		33.83	**99.3**
	51	50.06	1.75	375	45	69	68	1.8	7.0		31.64	**99.5**
	54	52.28	2	375	45	69	68	1.9	7.0		33.83	**103.4**
	57	54.52	1.8	374	45	69	68	1.9	7.0		32.07	**97.7**
6	60	56.75	1.85	372	46	69	68	1.9	7.0		32.47	**102.4**
	63	58.98	1.9	373	46	69	69	1.9	7.0		32.93	**100.9**
	66	61.20	1.95	372	46	70	79	1.9	7.0		33.34	**99.1**
	69	63.42	1.9	370	47	70	69	1.9	7.0		32.87	**96.7**
7	72	65.68	1.9	370	49	70	69	1.9	7.0		32.87	**100.6**
	75	67.91	1.85	371	49	70	69	1.9	7.0		32.45	**99.3**
	78	70.13	1.85	371	49	70	69	1.9	7.0		32.45	**100.2**
	81	72.35	1.9	370	49	71	70	1.85	7.0		32.87	**100.2**
8	84	74.55	1.8	368	47	71	70	1.9	7.0		31.95	**97.7**
	87	76.83	1.8	369	47	71	70	1.9	7.0		31.97	**103.9**
	90	79.10	1.8	369	47	71	70	1.9	7.0		31.97	**103.5**
	93	81.35	1.8	371	50	73	71	1.9	7.0		32.01	**102.6**
9	96	83.62	1.5	363	50	72	71	1.6	7.0		29.08	**103.4**
	99	85.76	1.6	363	51	72	71	1.7	7.0		30.04	**106.3**

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	2 - Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 19, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3399.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	14.8
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.08 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%	8.81
COppm	41.4

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	87.89	1.6	366	52	72	71	1.7	7.0		30.09	102.4
	105	90.03	1.6	365	52	72	71	1.7	7.0		30.07	103.1
10	108	92.15	1.5	365	52	72	71	1.6	7.0		29.12	102.1
	111	94.16	1.5	365	52	72	71	1.6	7.0		29.12	99.9
	114	96.17	1.5	367	52	72	71	1.6	7.0		29.15	99.9
	117	98.12	1.5	368	52	72	72	1.6	7.0		29.17	97.1
	120	100.15								1.08		101.0
1	0	101.23	1.9	388	69	75	75	2	7.0		33.22	
	3	103.48	1.7	386	48	75	75	1.8	7.5		31.39	100.2
	6	105.68	1.7	388	45	75	75	1.8	7.5		31.43	103.4
	9	107.88	1.7	388	45	75	75	1.8	7.5		31.43	103.5
2	12	110.05	1.5	387	45	75	75	1.8	7.5		29.50	102.1
	15	112.20	1.8	385	47	75	75	1.9	7.5		32.28	107.7
	18	114.41	1.6	389	46	76	76	1.7	7.5		30.51	100.9
	21	116.61	2	388	47	76	76	2	8.0		34.09	106.6
3	24	118.85	2	386	48	76	76	2	8.0		34.05	97.1
	27	121.15	2	386	48	76	76	2	8.0		34.05	99.5
	30	123.44	1.9	388	47	76	76	2	8.0		33.22	99.1
	33	125.76	2	390	48	76	76	2	8.0		34.13	103.1
4	36	128.06	1.6	389	49	76	76	1.7	8.0		30.51	99.8
	39	130.27	1.6	386	49	76	76	1.7	8.0		30.45	107.0
	42	132.40	1.7	388	50	77	77	1.8	7.5		31.43	103.0
	45	134.56	1.7	389	50	76	76	1.8	7.5		31.45	101.3
5	48	136.69	1.7	391	45	77	77	1.8	7.5		31.48	100.1
	51	138.91	1.6	388	48	77	76	1.8	7.5		30.49	104.3
	54	140.98	1.8	388	48	77	76	1.9	7.5		32.34	100.1
	57	143.27	1.6	391	48	76	77	1.7	7.5		30.54	104.5
6	60	145.44	1.6	388	49	77	77	1.7	7.5		30.49	105.1
	63	147.62	1.35	388	49	77	77	1.4	7.0		28.01	105.3
	66	149.67	1.5	388	48	77	77	1.6	7.0		29.52	107.8
	69	151.76	1.3	390	47	77	77	1.3	6.0		27.51	104.3
7	72	153.67	1.35	391	49	77	77	1.3	6.0		28.06	102.4
	75	155.59	1.25	388	48	77	77	1.3	6.0		26.95	101.1
	78	157.51	1.25	388	46	78	78	1.3	6.0		26.95	104.9

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	2 - Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 19, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	29.44 "Hg	**CWTR (g)**	3399.2
Static Pressure	2.100 "H_2O	**WCBDA (g)**	14.8
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	1.08 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%	8.81
COppm	41.4

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	159.42	1.3	390	45	78	78	1.3	6.0		27.51	104.1
8	84	161.33	1.25	386	45	78	78	1.3	6.0		26.92	102.2
	87	163.25	1.25	386	45	78	77	1.3	6.0		26.92	104.5
	90	165.18	1.3	384	43	78	78	1.3	6.0		27.42	105.2
	93	167.06	1	383	43	78	78	1.3	6.0		24.03	100.3
9	96	168.96	1	385	44	78	78	0.95	5.0		24.06	115.5
	99	170.62	0.95	382	46	78	78	0.85	5.0		23.41	100.9
	102	172.24	0.95	383	45	78	78	0.85	5.0		23.42	100.8
	105	173.79	1	381	45	78	78	0.95	5.0		24.00	96.5
10	108	175.43	1.1	381	45	78	78	1.1	5.5		25.18	99.4
	111	177.17	1.4	383	45	78	78	1.5	6.0		28.44	100.6
	114	179.15	1.4	382	44	78	78	1.5	6.0		28.42	101.7
	117	181.08	1.1	383	43	78	78	1.5	6.0		25.21	99.1
	120	182.93										107.2

ORTECH Environmental

Plant:	Clean Harbors
Plant Location:	Corunna, Ontario
Test Location:	Incinerator Exhaust
Test No.:	3 - Semi-Volatile Organic Compounds
Date:	October 20, 2016

STACK GAS SAMPLING PARAMETERS

PITOT TUBE COEFFICIENT	0.848
DGM CORRECTION FACTOR	0.993
NOZZLE DIAMETER	6.50 mm
DRY REF GAS VOLUME SAMPLED	4.755 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	197.3 °C
AVERAGE GAS MOISTURE BY VOLUME	49.1 %
AVERAGE GAS VELOCITY	30.90 m/s
BAROMETRIC PRESSURE (Station)	99.560 Kpa
STATIC PRESSURE	0.622 Kpa
ABSOLUTE GAS PRESSURE	100.182 Kpa
OXYGEN CONCENTRATION	8.7 %
CARBON DIOXIDE CONCENTRATION	9.04 %
CARBON MONOXIDE CONCENTRATION	34.6 ppm

FLOWRATE

ACTUAL GAS FLOWRATE	56.36 m^3/s
DRY REF GAS FLOWRATE	17.96 Rm^3/s
DRY ADJ GAS FLOWRATE	22.14 Rm^3/s
WET REF GAS FLOWRATE	35.32 Rm^3/s

PARTICULATE EMISSION DATA

PARTICULATE COLLECTED	-PROBE	0 mg
	-FILTER	0 mg
	-TOTAL	0 mg
DRY REF GAS VOLUME SAMPLED		4.755 m^3
PARTICULATE CONC. - ACTUAL		0.000 mg/m^3
PARTICULATE CONC. - DRY REF		0.000 mg/m^3
PARTICULATE CONC. - DRY ADJ		0.000 mg/m^3
PARTICULATE CONC. - WET REF		0.000 mg/m^3
PARTICULATE EMISSION RATE		0.000000 g/s

Note: * Reference conditions refers to 25 deg C (77 deg F) and 101.325 kPa (29.92 in. Hg)

Note: Dry Adj condition refers to 25 deg C (77 deg F)and 1 atmosphere, adjusted to 11% oxygen by volume

ORTECH Environmental

Plant: Clean Harbors
Test No.: 3 - Semi-Volatile Organic Compounds
Date: October 20, 2016

Plant Location: Corunna, Ontario
Test Location: Incinerator Exhaust
Operator: DU

Pitot Factor	0.848	
DGMCF	0.993	
Barometric Pressure	29.4	"Hg
Static Pressure	2.500	"H_2O
Nozzle	0.2559	inches
Stack Diameter	5.000	ft
Length	0.000	ft
Width	0.000	ft

Filter (mg)	0	
Probe (mg)	0	
CWTR (g)	3359.4	
WCBDA (g)	16.4	
Leak Check Volume	0.64	ft^3
Reading Interval	3	minutes
Number of Ports	2	
Number of points / Port	10	

Combustion Gases	
O2%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
49.1 %

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	85.30	1.8	384	55	62	62	1.8	4.0		32.22	
	3	87.41	1.8	385	48	64	63	1.8	5.0		32.24	97.8
	6	89.53	1.8	388	48	64	63	1.8	5.0		32.30	98.1
	9	91.67	1.8	389	48	64	63	1.8	5.0		32.32	99.2
2	12	93.82	1.8	387	46	63	63	1.8	5.0		32.28	99.7
	15	95.96	1.85	387	41	63	63	1.8	5.5		32.73	99.2
	18	98.15	1.95	389	44	64	63	1.9	6.0		33.64	100.1
	21	100.37	1.85	392	46	63	63	1.8	6.0		32.82	98.9
3	24	102.56	2	392	46	63	63	2	6.0		34.13	100.4
	27	104.83	1.8	392	47	63	63	1.8	6.0		32.38	100.2
	30	107.02	2.1	391	45	63	63	2.1	6.0		34.95	101.8
	33	109.31	1.8	393	45	63	63	1.8	6.0		32.39	98.6
4	36	111.55	2.05	393	44	63	63	2	6.0		34.57	104.2
	39	113.83	1.85	391	44	63	63	1.8	6.0		32.80	99.4
	42	116.05	1.8	392	45	63	63	1.8	6.0		32.38	101.8
	45	118.28	1.85	394	45	63	63	1.8	6.0		32.86	103.7
5	48	120.48	1.85	393	44	63	63	1.8	6.0		32.84	101.0
	51	122.69	1.8	391	45	63	63	1.8	6.0		32.36	101.4
	54	124.92	1.85	391	44	63	63	1.8	6.0		32.80	103.6
	57	127.09	1.8	394	44	63	64	1.8	6.0		32.41	99.5
6	60	129.29	1.7	395	44	63	63	1.7	6.0		31.52	102.3
	63	131.46	1.7	394	44	63	63	1.7	6.0		31.50	104.0
	66	133.58	1.7	394	44	64	64	1.7	6.0		31.50	101.5
	69	135.71	1.7	399	43	65	65	1.7	6.0		31.59	101.8
7	72	137.85	1.6	396	44	63	64	1.6	6.0		30.60	102.4
	75	139.92	1.8	398	44	63	63	1.8	6.0		32.49	102.2
	78	142.05	1.6	394	44	64	64	1.6	6.0		30.56	99.4
	81	144.15	1.7	399	46	65	65	1.6	6.0		31.59	103.4
8	84	146.23	1.7	397	46	65	65	1.6	6.0		31.56	99.5
	87	148.29	1.75	395	46	64	64	1.6	6.0		31.98	98.4
	90	150.36	1.4	392	44	64	64	1.4	5.0		28.55	97.5
	93	152.36	1.45	392	45	64	64	1.4	5.0		29.06	105.1
9	96	154.26	1.2	388	45	63	63	1.4	5.0		26.37	98.1
	99	156.01	1.2	388	46	64	64	1.2	5.0		26.37	99.3

ORTECH Environmental

Plant:	Clean Harbors	**Plant Location:**	Corunna, Ontario
Test No.:	3 - Semi-Volatile Organic Compounds	**Test Location:**	Incinerator Exhaust
Date:	October 20, 2016	**Operator:**	DU

Pitot Factor	0.848	**Filter (mg)**	0
DGMCF	0.993	**Probe (mg)**	0
Barometric Pressure	29.4 "Hg	**CWTR (g)**	3359.4
Static Pressure	2.500 "H_2O	**WCBDA (g)**	16.4
Nozzle	0.2559 inches		
Stack Diameter	5.000 ft	**Leak Check Volume**	0.64 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%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
49.1 %

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	158.04	1.2	386	47	64	64	1.2	5.0		26.34	114.9
	105	159.80	1.2	386	47	64	64	1.2	5.0		26.34	99.5
10	108	161.65	1.2	386	46	64	64	1.2	5.0		26.34	104.6
	111	163.44	1.2	385	47	64	64	1.2	5.0		26.33	101.2
	114	165.26	1.2	384	46	64	64	1.2	5.0		26.31	102.9
	117	167.05	1.2	383	46	64	64	1.2	5.0		26.29	101.1
	120	168.81								0.64		99.4
1	0	169.45	1.4	381	55	65	65	1.4	4.0		28.37	
	3	171.30	1.1	382	55	65	65	1	4.0		25.16	96.4
	6	173.00	1.1	382	45	64	65	1	4.0		25.16	99.9
	9	174.65	1.15	381	45	65	65	1.1	4.0		25.71	97.1
2	12	176.38	1.1	383	45	64	64	1.1	4.0		25.18	99.4
	15	178.13	1.1	385	39	64	64	1.1	4.0		25.21	103.2
	18	179.85	1.8	384	45	64	64	1.8	6.0		32.22	101.5
	21	181.92	1.7	382	45	65	65	1.8	6.0		31.28	95.6
3	24	184.04	1.9	382	45	65	65	1.9	6.0		33.07	100.4
	27	186.25	1.6	383	45	64	64	1.6	6.0		30.36	99.1
	30	188.28	1.8	383	45	64	64	1.8	6.0		32.20	99.3
	33	190.48	1.7	380	45	64	64	1.7	6.0		31.24	101.6
4	36	192.57	1.8	381	44	64	64	1.8	6.0		32.17	99.1
	39	194.72	1.7	384	43	65	65	1.8	6.0		31.32	99.1
	42	196.89	1.7	381	44	65	65	1.8	6.0		31.26	102.9
	45	199.04	1.7	380	44	65	65	1.7	6.0		31.24	101.8
5	48	201.18	1.75	380	42	65	65	1.7	6.0		31.70	101.2
	51	203.34	1.7	383	42	65	65	1.7	6.0		31.30	100.7
	54	205.52	1.75	384	42	65	65	1.7	6.0		31.77	103.3
	57	207.66	1.75	382	41	65	65	1.7	6.0		31.73	100.0
6	60	209.83	1.85	383	42	65	65	1.9	6.0		32.65	101.3
	63	212.02	1.85	386	42	65	65	1.8	6.0		32.71	99.5
	66	214.24	1.85	385	43	65	65	1.8	6.0		32.69	101.1
	69	216.43	1.8	383	41	65	65	1.8	6.0		32.20	99.6
7	72	218.66	1.8	384	41	65	65	1.8	6.0		32.22	102.7
	75	220.87	1.8	386	41	65	65	1.8	6.0		32.26	101.9
	78	223.06	1.8	386	41	65	65	1.8	6.0		32.26	101.1

ORTECH Environmental

Plant: Clean Harbors
Test No.: 3 - Semi-Volatile Organic Compounds
Date: October 20, 2016

Plant Location: Corunna, Ontario
Test Location: Incinerator Exhaust
Operator: DU

Pitot Factor	0.848	**Filter (mg)**	0		
DGMCF	0.993	**Probe (mg)**	0		
Barometric Pressure	29.4 "Hg	**CWTR (g)**	3359.4		
Static Pressure	2.500 "H_2O	**WCBDA (g)**	16.4		
Nozzle	0.2559 inches				
Stack Diameter	5.000 ft	**Leak Check Volume**		0.64	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%	8.7
CO2%	9.04
COppm	34.6

Measured H2O
49.1 %

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	225.29	1.8	387	42	65	65	1.8	6.0		32.28	**102.9**
8	84	227.53	1.8	387	42	65	65	1.8	6.0		32.28	**103.4**
	87	229.79	1.9	388	42	65	65	1.9	6.0		33.18	**104.4**
	90	231.93	1.8	389	42	65	65	1.9	6.0		32.32	**96.3**
	93	234.18	1.95	388	42	65	65	1.9	6.0		33.62	**104.1**
9	96	236.43	1.7	385	42	65	65	1.7	6.0		31.33	**99.9**
	99	238.61	1.7	384	42	65	65	1.7	6.0		31.32	**103.4**
	102	240.77	1.55	385	42	65	65	1.6	6.0		29.92	**102.4**
	105	242.85	1.6	383	42	65	65	1.6	6.0		30.36	**103.3**
10	108	244.93	1.5	381	43	65	65	1.6	6.0		29.36	**101.6**
	111	247.00	1.6	380	45	65	65	1.6	6.0		30.31	**104.3**
	114	249.03	1.55	381	45	65	65	1.6	6.0		29.85	**99.0**
	117	251.04	1.6	381	46	65	65	1.6	6.0		30.33	**99.6**
	120	253.13										**102.0**

APPENDIX 24

ORTECH One-Minute Average Combustion Gas Results
(15 pages)

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:16	8.58	8.93	266	51.1	7.2		96.6	99.5
11:17	8.96	8.73	261	60.9	7.5		83.5	86.4
11:18	8.59	8.91	270	65.7	8.6		86.0	87.7
11:19	8.59	9.04	267	55.8	7.5		80.5	82.8
11:20	8.44	9.06	269	47.3	6.8		90.8	92.3
11:21	9.25	8.54	257	41.2	6.9		89.1	90.8
11:22	8.77	8.81	266	42.2	7.8		90.9	93.1
11:23	8.89	8.79	257	41.5	7.4		87.1	88.7
11:24	8.53	9.00	270	37.8	7.7		92.1	93.9
11:25	9.13	8.60	256	33.4	7.5	7.5	88.5	91.2
11:26	8.69	8.86	264	39.5	8.5	7.6	91.9	93.2
11:27	8.90	8.80	258	38.0	9.0	7.8	87.9	89.2
11:28	8.59	8.95	269	43.5	9.2	7.8	97.9	99.7
11:29	9.40	8.33	252	37.0	6.5	7.7	90.0	93.2
11:30	8.65	8.89	270	47.8	7.5	7.8	92.2	95.4
11:31	8.86	8.80	271	57.1	8.3	7.9	87.1	89.6
11:32	8.37	9.12	283	57.8	9.1	8.1	86.0	89.3
11:33	9.16	8.58	269	54.8	7.3	8.1	82.2	84.2
11:34	8.38	9.10	283	51.4	9.6	8.3	84.8	87.5
11:35	8.57	9.00	272	43.7	8.3	8.3	78.9	79.4
11:36	8.03	9.38	295	53.4	8.6	8.3	81.7	85.1
11:37	8.95	8.69	277	55.6	8.1	8.3	75.5	77.7
11:38	8.24	9.23	289	60.1	8.9	8.2	80.0	81.3
11:39	8.63	8.96	272	69.3	7.4	8.3	76.3	78.6
11:40	8.06	9.38	289	39.5	8.5	8.4	89.8	93.1
11:41	9.08	8.62	269	37.0	7.0	8.3	81.5	84.3
11:42	8.44	9.10	287	32.8	7.1	8.1	93.1	95.5
11:43	8.87	8.80	268	29.5	6.4	8.0	99.8	100.2
11:44	8.74	8.92	276	31.9	6.9	7.7	106.8	109.7
11:45	9.48	8.22	252	32.8	7.5	7.6	103.7	104.3
11:46	8.88	8.77	268	33.6	7.2	7.5	102.1	104.6
11:47	8.94	8.69	261	38.6	6.3	7.3	100.6	102.5
11:48	8.64	8.97	270	33.4	6.7	7.1	100.4	104.0
11:49	9.20	8.47	253	33.3	6.1	7.0	97.3	99.2
11:50	8.64	8.96	271	30.5	6.3	6.7	100.1	102.3
11:51	8.84	8.77	262	35.2	6.6	6.7	101.2	102.4
11:52	8.85	8.85	274	33.3	7.2	6.7	102.4	105.3
11:53	9.35	8.31	252	37.5	7.2	6.8	94.7	100.8
11:54	8.93	8.74	267	34.8	7.3	6.8	99.8	102.2
11:55	8.91	8.71	262	37.1	6.6	6.7	100.9	102.5
11:56	8.84	8.81	272	31.6	6.7	6.7	100.4	103.2
11:57	9.09	8.55	264	35.3	6.7	6.7	98.7	101.0
11:58	8.65	8.96	274	32.2	6.4	6.7	95.8	99.1
11:59	8.81	8.80	275	35.4	6.6	6.8	100.1	100.8
12:00	9.03	8.74	283	34.9	6.4	6.8	99.6	102.2
12:01	9.08	8.53	266	36.3	7.0	6.8	98.6	98.8
12:02	8.88	8.78	270	32.4	6.8	6.8	99.3	100.1
12:03	8.77	8.81	273	40.7	6.9	6.7	99.6	100.3
12:04	8.87	8.83	275	34.9	6.6	6.7	96.4	98.3
12:05	8.84	8.71	271	35.4	7.3	6.7	94.5	97.7
12:06	8.60	9.02	277	31.1	6.6	6.7	90.3	93.6
12:07	8.65	8.91	273	42.3	6.9	6.7	99.4	100.3
12:08	9.09	8.61	269	38.1	6.8	6.8	97.4	99.9
12:09	8.95	8.64	264	41.0	6.7	6.8	97.2	99.3
12:10	8.86	8.81	265	41.8	6.8	6.8	96.3	98.1
12:11	8.63	8.90	273	37.7	6.5	6.8	99.5	100.7
12:12	9.09	8.67	265	34.0	6.1	6.7	95.8	99.4
12:13	8.83	8.72	277	38.8	5.7	6.6	99.1	100.6

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
12:14	8.84	8.85	281	39.3	5.9	6.5	96.1	99.0
12:15	8.79	8.79	275	46.2	6.4	6.4	103.2	105.1
12:16	9.38	8.42	264	36.8	6.0	6.4	98.6	100.8
12:17	8.97	8.64	273	45.3	6.6	6.4	98.0	99.6
12:18	8.96	8.73	267	40.9	6.4	6.3	94.9	96.5
12:19	8.67	8.88	275	43.3	6.8	6.3	97.2	99.7
12:20	9.16	8.58	270	45.8	5.9	6.2	91.7	94.3
12:21	8.76	8.80	284	48.8	6.0	6.2	94.1	96.9
12:22	8.85	8.84	273	39.2	5.8	6.1	93.2	93.8
12:23	8.74	8.85	279	52.9	6.1	6.2	100.8	102.7
12:24	9.57	8.23	266	41.7	6.2	6.2	98.7	99.6
12:25	8.97	8.65	281	47.1	6.9	6.3	101.0	102.2
12:26	9.07	8.64	278	43.4	6.5	6.3	96.7	98.6
12:27	8.59	8.96	294	52.4	6.3	6.3	99.0	100.7
12:28	9.22	8.53	273	47.5	5.8	6.2	93.5	95.4
12:29	8.70	8.86	289	47.3	6.0	6.1	97.9	99.6
12:30	8.94	8.75	280	47.9	5.9	6.1	97.0	98.6
12:31	8.67	8.90	289	59.9	6.3	6.2	102.0	104.3
12:32	9.51	8.26	270	52.0	6.1	6.2	94.4	97.8
12:33	8.90	8.73	289	54.4	6.2	6.2	97.6	98.3
12:34	9.07	8.64	279	49.6	5.9	6.2	96.5	97.7
12:35	8.61	8.95	290	51.6	6.4	6.1	96.4	99.5
12:36	9.37	8.40	270	50.8	6.3	6.1	91.9	93.6
12:37	8.66	8.91	292	54.3	7.2	6.2	94.7	96.3
12:38	9.01	8.69	278	51.1	6.6	6.3	95.0	95.4
12:39	8.68	8.96	293	59.5	6.4	6.3	97.6	100.5
12:40	9.53	8.21	269	55.4	6.3	6.4	94.8	95.3
12:41	8.92	8.76	288	57.2	5.9	6.3	96.6	97.3
12:42	9.10	8.60	279	52.9	6.1	6.3	99.2	100.1
12:43	8.68	8.95	292	50.7	6.3	6.3	96.4	100.3
12:44	9.29	8.43	280	48.9	6.1	6.4	93.6	94.1
12:45	8.63	8.98	299	42.1	6.2	6.3	92.9	94.2
12:46	8.94	8.73	284	51.3	6.5	6.4	93.9	95.3
12:47	8.75	8.90	298	52.8	6.4	6.3	96.6	99.1
12:48	9.30	8.36	273	52.2	6.7	6.3	89.0	91.3
12:49	8.71	8.93	296	53.9	6.3	6.3	91.4	93.8
12:50	8.87	8.76	283	59.9	6.1	6.3	93.4	94.3
12:51	8.70	8.96	292	52.8	6.2	6.3	92.0	95.2
12:52	9.08	8.57	286	49.3	6.3	6.3	89.9	90.9
12:53	8.60	9.03	307	41.4	6.3	6.3	90.4	92.5
12:54	8.82	8.81	292	51.3	6.5	6.4	95.6	96.2
12:55	8.91	8.83	301	48.6	6.1	6.3	95.4	98.8
12:56	9.16	8.48	283	47.5	6.8	6.4	93.4	95.8
12:57	8.79	8.86	300	45.3	6.8	6.4	93.4	95.2
12:58	8.67	8.90	295	41.2	7.0	6.4	93.7	94.6
12:59	8.67	8.98	306	39.2	6.9	6.5	90.1	92.9
13:00	8.88	8.71	297	40.0	6.8	6.6	91.4	93.2
13:01	8.60	9.03	310	37.0	6.8	6.6	90.3	92.0
13:02	8.69	8.91	305	43.4	6.2	6.6	95.6	95.5
13:03	9.01	8.72	304	51.5	6.6	6.6	93.4	96.5
13:04	8.93	8.66	297	48.1	6.9	6.7	92.1	92.5
13:05	8.63	8.99	306	40.5	6.9	6.8	88.7	91.1
13:06	8.50	9.03	308	42.8	7.6	6.8	91.0	92.9
13:07	8.69	8.97	306	40.8	7.1	6.9	83.4	87.1
13:08	8.60	8.93	310	45.5	6.8	6.8	86.0	88.3
13:09	8.52	9.12	309	44.1	7.3	6.9	84.5	88.4
13:10	8.50	9.03	313	50.2	6.7	6.9	88.5	89.7
13:11	8.94	8.75	310	44.4	6.1	6.8	88.5	92.3

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
13:12	8.77	8.81	306	41.1	6.9	6.9	92.6	93.7
13:13	8.77	8.90	312	38.0	6.7	6.9	91.3	93.1
13:14	8.46	9.05	321	40.5	7.0	6.9	94.5	96.3
13:15	8.87	8.83	306	39.2	6.6	6.9	85.6	88.6
13:16	8.55	8.97	314	41.2	7.0	6.8	89.3	90.9
14:13	9.29	8.46	299	33.6	4.4		97.3	100.6
14:14	8.95	8.63	295	38.3	4.6		96.9	99.4
14:15	9.00	8.69	297	35.2	4.5		96.3	98.2
14:16	8.67	8.87	304	35.6	4.4		99.6	101.7
14:17	9.15	8.59	297	32.3	4.0		94.6	98.4
14:18	8.76	8.78	301	35.0	4.2		96.5	99.0
14:19	8.86	8.81	300	30.8	4.2		94.8	96.2
14:20	8.68	8.85	304	42.2	4.4		101.6	102.4
14:21	9.49	8.29	292	32.8	3.7		97.2	100.1
14:22	8.84	8.72	297	36.1	4.7	4.3	99.7	100.6
14:23	8.92	8.74	296	35.9	4.4	4.3	94.7	94.7
14:24	8.50	8.99	310	39.2	5.0	4.3	95.6	98.0
14:25	9.08	8.60	302	34.3	4.2	4.3	89.2	91.5
14:26	8.61	8.90	305	37.0	4.8	4.3	93.7	95.4
14:27	8.82	8.83	303	36.7	4.8	4.4	89.6	91.4
14:28	8.58	8.94	309	42.7	4.6	4.5	99.2	100.9
14:29	9.44	8.32	297	38.8	4.4	4.5	96.3	98.3
14:30	8.78	8.79	310	40.7	4.5	4.5	95.9	98.3
14:31	8.98	8.69	305	38.5	4.5	4.6	94.5	95.3
14:32	8.47	9.02	319	35.7	4.8	4.6	96.7	98.6
14:33	9.23	8.49	311	35.6	4.3	4.6	92.3	94.5
14:34	8.53	8.97	320	37.4	4.7	4.6	94.1	95.9
14:35	8.82	8.81	312	36.4	4.6	4.6	93.6	93.5
14:36	8.50	9.05	322	39.8	4.8	4.6	97.8	100.8
14:37	9.28	8.40	303	35.2	4.5	4.6	91.4	94.1
14:38	8.63	8.93	317	36.2	5.0	4.6	93.4	94.9
14:39	8.78	8.80	312	35.2	4.9	4.7	93.5	93.6
14:40	8.52	9.05	326	35.0	4.5	4.7	93.1	94.9
14:41	9.06	8.57	309	33.4	4.8	4.7	91.1	92.8
14:42	8.48	9.06	328	35.2	4.9	4.7	90.4	92.3
14:43	8.80	8.82	314	39.6	4.5	4.7	92.4	92.7
14:44	8.66	8.94	325	42.1	4.9	4.7	96.1	98.9
14:45	9.22	8.41	303	38.5	4.5	4.7	90.7	93.6
14:46	8.78	8.85	318	35.8	4.6	4.7	94.3	95.3
14:47	8.81	8.76	310	39.2	5.0	4.8	96.4	97.0
14:48	8.70	8.94	326	36.1	4.9	4.8	93.4	97.0
14:49	9.07	8.56	307	34.7	4.7	4.7	92.9	94.0
14:50	8.65	8.94	322	32.8	4.6	4.7	93.9	95.5
14:51	8.86	8.75	313	38.2	4.5	4.7	97.3	98.0
14:52	8.90	8.79	322	37.8	4.5	4.7	97.6	100.6
14:53	9.11	8.48	302	38.0	4.6	4.7	92.6	94.9
14:54	8.77	8.86	320	41.7	5.1	4.7	91.6	94.7
14:55	8.63	8.93	329	42.6	4.4	4.7	92.9	94.2
14:56	8.81	8.87	338	36.8	4.6	4.7	88.6	91.0
14:57	8.78	8.79	334	38.6	4.5	4.6	91.0	92.0
14:58	8.61	9.02	342	34.0	4.5	4.6	89.5	90.9
14:59	8.61	8.97	342	43.1	4.4	4.6	96.5	96.8
15:00	9.15	8.59	333	38.2	4.1	4.5	92.0	95.2
15:01	8.90	8.71	334	40.6	4.4	4.5	92.4	94.0
15:02	8.84	8.84	335	37.2	4.3	4.5	92.6	94.2
15:03	8.58	8.97	340	39.9	4.8	4.5	95.5	96.4
15:04	9.03	8.70	336	33.7	4.1	4.4	90.2	91.9
15:05	8.71	8.85	344	40.1	4.3	4.4	91.4	92.9

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
15:06	8.67	8.98	344	33.9	4.5	4.4	90.2	91.5
15:07	8.51	9.02	351	42.0	4.9	4.4	96.4	97.1
15:08	9.11	8.58	338	37.1	4.1	4.4	90.8	93.4
15:09	8.74	8.84	344	40.3	4.6	4.4	94.6	95.2
15:10	8.84	8.85	341	38.1	4.3	4.4	89.9	90.9
15:11	8.46	9.06	350	39.2	4.5	4.4	95.2	96.6
15:12	9.04	8.70	339	34.8	4.2	4.4	88.8	90.5
15:13	8.56	8.97	351	35.9	4.5	4.4	92.6	94.4
15:14	8.74	8.94	342	34.0	4.4	4.4	89.1	91.2
15:15	8.49	9.04	347	46.7	4.3	4.4	97.8	100.9
15:16	9.39	8.37	333	40.1	4.0	4.4	90.5	91.5
15:17	8.74	8.85	349	39.9	4.4	4.3	90.8	91.8
15:18	8.91	8.78	343	40.4	4.4	4.4	92.6	93.3
15:19	8.44	9.08	360	37.4	4.8	4.4	94.3	94.9
15:20	9.08	8.63	343	37.6	4.5	4.4	87.2	90.4
15:21	8.54	8.99	364	34.7	4.7	4.4	92.0	93.6
15:22	8.86	8.83	352	37.1	4.5	4.5	91.8	92.0
15:23	8.45	9.06	365	43.1	5.0	4.5	96.0	98.7
15:24	9.32	8.43	342	37.0	4.0	4.5	88.8	90.9
15:25	8.56	8.99	364	38.9	5.1	4.6	93.7	96.0
15:26	8.83	8.83	354	41.3	5.1	4.7	89.5	90.8
15:27	8.36	9.16	367	39.5	5.1	4.7	90.7	92.6
15:28	9.09	8.59	350	36.9	4.8	4.8	86.2	87.7
15:29	8.30	9.20	375	40.0	6.3	4.9	84.9	87.1
15:30	8.60	8.99	353	49.6	5.5	5.0	81.2	83.3
15:31	8.44	9.15	368	41.7	4.8	5.0	90.2	91.0
15:32	9.22	8.46	339	37.6	4.3	5.0	84.9	88.6
15:33	8.55	9.03	361	38.0	4.7	5.0	91.4	93.5
15:34	8.72	8.88	352	40.3	4.6	5.0	91.2	92.0
15:35	8.39	9.16	368	35.2	5.2	5.0	89.6	92.6
15:36	8.97	8.65	353	34.8	4.6	5.0	87.9	88.1
15:37	8.47	9.10	375	34.7	4.9	5.0	89.0	91.4
15:38	8.69	8.90	356	37.1	4.4	4.9	92.4	93.4
15:39	8.60	9.04	374	39.8	4.7	4.8	93.2	95.9
15:40	9.06	8.53	343	40.0	5.1	4.7	85.7	90.1
15:41	8.56	9.03	369	53.1	5.5	4.8	80.0	85.0
15:42	8.53	9.00	363	42.2	5.8	4.9	89.3	88.9
15:43	8.37	9.19	384	43.7	6.2	5.1	83.3	85.8
15:44	8.84	8.76	359	37.5	4.7	5.1	84.3	85.7
15:45	8.39	9.17	373	35.1	5.7	5.2	87.7	90.3
15:46	8.62	8.95	360	46.1	4.8	5.2	88.1	88.7
15:47	8.83	8.82	371	37.7	4.8	5.2	94.8	96.7
15:48	8.97	8.62	357	42.6	4.7	5.2	91.4	92.6
15:49	8.74	8.89	372	42.4	5.8	5.3	88.0	90.7
15:50	8.71	8.86	369	40.1	5.2	5.3	89.4	91.6
15:51	8.76	8.92	374	35.5	5.4	5.3	88.1	91.0
15:52	8.79	8.76	364	40.7	5.2	5.2	86.4	87.7
15:53	8.52	9.07	380	35.8	5.4	5.2	87.6	89.5
15:54	8.59	8.97	372	40.5	5.4	5.2	93.3	94.2
15:55	9.01	8.66	370	38.3	5.0	5.2	91.0	93.0
15:56	8.80	8.75	367	40.8	5.4	5.2	88.7	93.0
15:57	8.70	8.93	379	40.5	4.8	5.2	87.6	88.6
15:58	8.51	9.00	378	40.8	5.4	5.3	93.7	94.4
15:59	8.83	8.88	375	41.0	5.5	5.3	84.4	88.1
16:00	8.60	8.90	377	47.4	5.5	5.3	88.9	90.1
16:01	8.57	9.06	382	41.1	5.1	5.3	85.5	87.0
16:02	8.53	8.99	378	46.0	5.3	5.3	92.7	94.4
16:03	9.01	8.69	366	40.4	5.1	5.3	87.7	89.4

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016

	O2	CO2	SO2	CO	THC (ppm)		NO	NOx
Time	%	%	ppm	ppm	1-min	10-min	ppm	ppm
16:04	8.69	8.87	374	44.5	5.0	5.2	88.0	88.2
16:05	8.76	8.89	368	39.8	4.7	5.2	87.7	89.5
16:06	8.42	9.09	378	41.3	5.5	5.2	91.9	92.0
16:07	8.94	8.75	366	37.1	4.8	5.2	86.2	89.0
16:08	8.61	8.92	380	40.1	5.2	5.2	93.0	93.9
16:09	8.72	8.94	377	36.7	4.9	5.1	88.6	90.0
16:10	8.45	9.04	374	47.5	5.4	5.1	96.3	97.8
16:11	9.28	8.49	357	40.8	4.7	5.1	86.8	89.9
16:12	8.63	8.92	376	48.5	5.1	5.0	91.5	91.7
16:13	8.76	8.88	367	43.6	5.0	5.0	88.6	89.6
16:14	8.37	9.13	381	47.5	5.8	5.1	90.9	93.5
16:15	8.94	8.73	369	40.1	5.6	5.2	84.2	86.3
16:16	8.47	9.05	387	47.2	6.3	5.3	84.5	85.5
16:17	8.78	8.90	378	44.4	5.3	5.3	82.6	83.0
16:18	8.48	9.04	388	47.4	5.6	5.4	91.8	94.2
16:19	9.27	8.45	355	45.1	5.3	5.4	86.9	88.5
16:20	8.67	8.91	375	46.7	5.2	5.4	89.8	90.8
Min	8.03	8.21	252	29.5	3.7	4.3	75.5	77.7
Max	9.57	9.38	388	69.3	9.6	8.4	106.8	109.7
Avg	8.80	8.82	313	41.7	5.8	5.8	92.5	94.4

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016

	O2	CO2	SO2	CO	THC (ppm)		NO	NOx
Time	%	%	ppm	ppm	1-min	10-min	ppm	ppm
10:47	8.80	8.89	224	48.0	4.2		108	111
10:48	9.29	8.63	221	36.9	3.9		108	112
10:49	9.03	8.69	215	44.4	4.1		105	107
10:50	8.95	8.85	217	39.0	4.3		106	109
10:51	8.73	8.93	228	48.2	4.1		108	110
10:52	9.04	8.80	226	32.1	4.2		106	110
10:53	8.92	8.78	223	42.5	4.1		107	108
10:54	8.95	8.86	221	34.1	4.2		107	110
10:55	8.82	8.88	224	51.3	4.2		109	110
10:56	9.41	8.47	217	40.7	4.2	4.1	110	112
10:57	8.99	8.72	222	47.2	4.1	4.1	107	109
10:58	9.03	8.79	222	39.7	4.2	4.2	107	110
10:59	8.61	9.04	236	41.4	3.7	4.1	108	109
11:00	9.22	8.66	224	31.9	3.9	4.1	106	109
11:01	8.84	8.85	227	43.2	3.9	4.1	108	108
11:02	9.02	8.82	218	33.6	4.2	4.1	108	111
11:03	8.74	8.94	225	49.4	4.2	4.1	109	110
11:04	9.50	8.43	215	40.7	4.1	4.1	107	110
11:05	8.96	8.76	215	45.6	4.0	4.1	108	109
11:06	9.05	8.76	208	39.8	4.1	4.0	107	110
11:07	8.66	9.01	212	40.0	3.9	4.0	107	109
11:08	9.29	8.58	197	33.5	4.1	4.0	106	108
11:09	8.81	8.89	213	39.6	3.8	4.0	107	110
11:10	9.18	8.70	206	37.1	4.5	4.1	107	109
11:11	8.89	8.83	219	53.9	4.2	4.1	110	112
11:12	9.74	8.21	204	45.4	4.6	4.2	104	109
11:13	9.06	8.75	220	50.6	4.2	4.1	106	107
11:14	9.15	8.66	217	46.0	4.3	4.2	106	108
11:15	8.84	8.95	233	40.8	3.8	4.1	107	109
11:16	9.39	8.46	219	43.6	4.6	4.2	104	106
11:17	8.87	8.91	233	43.9	4.1	4.2	105	107
11:18	9.21	8.65	224	50.0	4.6	4.3	107	107
11:19	8.99	8.87	236	53.0	4.2	4.3	110	112
11:20	9.56	8.29	215	53.0	4.6	4.3	105	107
11:21	9.01	8.81	228	48.6	4.3	4.3	105	107
11:22	9.16	8.66	222	51.4	4.4	4.3	105	107
11:23	8.97	8.86	234	43.8	4.2	4.3	107	109
11:24	9.36	8.49	222	50.1	4.7	4.3	103	105
11:25	8.88	8.92	233	42.7	4.3	4.4	106	107
11:26	9.13	8.70	225	54.3	5.2	4.4	106	107
11:27	9.21	8.68	233	56.1	4.4	4.5	108	110
11:28	9.47	8.37	220	53.7	4.7	4.5	104	107
11:29	9.12	8.73	227	48.6	4.3	4.5	106	109
11:30	9.11	8.70	227	52.0	4.8	4.5	106	108
11:31	9.09	8.80	231	42.4	4.4	4.5	107	109
11:32	9.21	8.59	213	49.1	4.6	4.6	105	106
11:33	8.90	8.91	215	39.6	4.2	4.6	106	107
11:34	9.04	8.76	228	53.3	5.0	4.6	107	107
11:35	9.32	8.63	231	48.5	4.3	4.6	108	111
11:36	9.26	8.53	222	51.8	4.5	4.5	105	104
11:37	9.11	8.76	214	46.7	4.5	4.5	104	107
11:38	8.98	8.79	223	53.3	4.4	4.5	105	106
11:39	9.23	8.68	228	41.6	4.3	4.5	104	108
11:40	9.20	8.60	229	51.9	4.7	4.5	104	107
11:41	9.19	8.72	227	43.5	4.6	4.5	105	107
11:42	9.17	8.65	227	61.3	5.1	4.6	108	110
11:43	9.64	8.36	212	52.0	4.7	4.6	106	111
11:44	9.31	8.53	214	59.7	4.7	4.6	105	106

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:45	9.39	8.58	220	53.7	4.9	4.6	105	108
11:46	9.09	8.71	230	65.6	4.8	4.7	106	107
11:47	9.44	8.54	222	49.3	4.8	4.7	104	106
11:48	9.20	8.60	215	59.3	4.7	4.7	104	106
11:49	9.24	8.68	206	50.0	5.0	4.8	104	107
11:50	9.20	8.65	226	69.2	5.4	4.9	108	111
11:51	9.77	8.21	217	61.8	5.6	5.0	105	108
11:52	9.36	8.50	223	71.2	5.3	5.0	104	105
11:53	9.48	8.50	216	61.9	5.6	5.1	104	106
11:54	9.09	8.71	220	66.9	5.0	5.1	105	106
11:55	9.68	8.34	212	53.4	5.4	5.2	103	107
11:56	9.23	8.60	229	62.2	5.0	5.2	105	106
11:57	9.46	8.53	223	55.0	5.4	5.2	104	106
11:58	9.22	8.62	233	71.7	5.6	5.3	106	108
11:59	9.96	8.11	217	67.4	5.4	5.4	103	106
12:00	9.40	8.48	226	71.8	5.2	5.4	105	105
12:01	9.49	8.46	219	64.1	5.4	5.3	104	106
12:02	9.12	8.71	231	64.0	4.9	5.3	105	106
12:03	9.66	8.33	219	54.8	5.3	5.3	102	104
12:04	9.09	8.72	230	63.9	5.2	5.3	103	105
12:05	9.41	8.55	218	57.9	5.7	5.3	102	104
12:06	9.00	8.80	231	70.5	5.3	5.3	107	108
12:07	9.93	8.09	216	62.1	5.6	5.4	102	106
12:08	9.25	8.62	226	67.1	5.4	5.3	104	105
12:09	9.40	8.52	218	63.6	5.9	5.4	103	105
12:10	8.98	8.85	235	63.5	5.4	5.4	103	104
12:11	9.71	8.28	221	57.8	5.7	5.4	102	104
12:12	9.11	8.74	229	58.0	5.2	5.5	103	105
12:13	9.43	8.52	219	60.6	6.1	5.5	103	105
12:14	9.08	8.80	233	71.7	5.5	5.6	106	106
12:15	9.83	8.12	215	64.3	5.6	5.6	103	104
12:16	9.23	8.66	228	62.2	5.4	5.6	104	105
12:17	9.33	8.54	220	68.9	6.1	5.6	104	105
12:18	9.05	8.81	231	57.9	5.2	5.6	104	106
12:19	9.58	8.34	213	60.3	5.8	5.6	101	104
12:20	9.14	8.74	226	57.6	5.6	5.6	102	104
12:21	9.43	8.49	215	68.3	6.6	5.7	103	104
12:22	9.47	8.54	227	69.1	5.8	5.8	106	108
12:23	9.84	8.11	211	67.8	6.2	5.8	102	105
12:24	9.41	8.54	215	65.5	5.7	5.8	104	105
12:25	9.37	8.51	211	67.0	6.0	5.8	103	106
12:26	9.28	8.67	227	54.9	5.5	5.8	105	105
12:27	9.60	8.31	222	64.3	5.9	5.8	102	104
12:28	9.24	8.68	231	52.5	5.5	5.9	103	105
12:29	9.39	8.50	231	71.3	6.5	5.9	104	104
12:30	9.56	8.42	237	63.1	5.6	5.9	106	107
12:31	9.64	8.26	228	69.7	6.3	5.9	104	104
12:32	9.42	8.52	232	64.9	6.0	5.9	103	106
12:33	9.29	8.57	233	68.3	5.8	5.9	102	105
12:34	9.35	8.59	233	52.7	5.6	5.9	103	105
12:35	9.34	8.51	230	63.1	5.8	5.8	102	103
12:36	9.17	8.73	231	52.0	5.7	5.9	101	103
12:37	9.27	8.60	231	67.3	6.0	5.9	105	106
12:38	9.62	8.38	234	60.4	5.0	5.8	105	107
12:39	9.41	8.44	228	64.4	4.7	5.6	102	104
12:40	9.32	8.63	230	54.0	4.8	5.6	104	106
12:41	9.12	8.69	238	58.5	4.6	5.4	104	105
12:42	9.37	8.58	238	46.9	4.4	5.2	103	107

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
12:43	9.22	8.60	242	58.4	4.5	5.1	103	104
12:44	9.19	8.72	239	46.2	4.6	5.0	104	105
12:45	9.15	8.69	245	66.9	4.9	4.9	105	105
12:46	9.65	8.33	235	57.5	4.7	4.8	103	107
12:47	9.25	8.58	239	57.8	4.6	4.7	104	104
13:38	8.60	9.05	304	26.8	3.1		110	112
13:39	8.48	9.25	306	20.4	3.0		111	113
13:40	8.51	9.16	310	29.4	3.2		114	116
13:41	9.04	8.81	303	24.9	3.2		110	116
13:42	8.73	8.95	304	29.9	3.2		108	114
13:43	8.68	9.07	299	24.1	3.0		112	114
13:44	8.38	9.24	313	26.2	3.2		112	114
13:45	8.86	8.94	306	21.3	3.1		110	113
13:46	8.47	9.15	311	24.8	3.1		113	114
13:47	8.57	9.20	304	20.1	3.1	3.1	110	113
13:48	8.36	9.25	311	30.4	3.5	3.2	116	117
13:49	9.06	8.74	298	24.9	3.2	3.2	111	114
13:50	8.65	9.03	305	28.8	3.2	3.2	111	113
13:51	8.76	9.01	298	25.4	3.4	3.2	110	112
13:52	8.36	9.25	303	26.5	3.2	3.2	112	114
13:53	8.95	8.86	284	22.0	3.1	3.2	108	114
13:54	8.50	9.15	305	25.0	3.1	3.2	112	114
13:55	8.82	8.98	296	23.2	3.3	3.2	112	115
13:56	8.48	9.17	306	32.1	3.3	3.2	113	116
13:57	9.40	8.47	283	28.8	3.2	3.3	111	114
13:58	8.78	8.94	299	30.6	3.2	3.2	113	114
13:59	8.95	8.86	290	28.3	3.2	3.2	112	115
14:00	8.50	9.15	305	29.0	3.2	3.2	114	117
14:01	9.22	8.65	281	25.8	3.1	3.2	110	113
14:02	8.51	9.15	297	25.3	3.0	3.2	113	115
14:03	8.88	8.93	292	26.6	3.2	3.2	113	116
14:04	8.47	9.19	304	31.0	3.2	3.2	117	119
14:05	9.39	8.50	281	27.7	3.0	3.2	112	116
14:06	8.68	9.03	296	28.7	2.9	3.1	112	117
14:07	8.89	8.91	287	28.1	3.4	3.1	112	115
14:08	8.47	9.23	303	25.8	3.2	3.1	113	115
14:09	9.18	8.65	287	27.2	3.2	3.1	109	113
14:10	8.54	9.17	310	25.4	3.1	3.1	112	115
14:11	8.87	8.91	293	28.1	3.2	3.1	113	115
14:12	8.68	9.09	307	29.7	3.1	3.2	117	121
14:13	9.34	8.49	282	28.7	3.0	3.1	113	115
14:14	8.70	9.05	296	28.3	3.2	3.1	113	117
14:15	8.79	8.95	289	29.1	3.2	3.2	112	115
14:16	8.53	9.19	303	24.3	3.1	3.2	113	115
14:17	8.96	8.78	279	26.9	3.2	3.1	109	112
14:18	8.54	9.20	304	23.3	2.9	3.1	111	113
14:19	8.88	8.90	293	32.1	3.3	3.1	113	114
14:20	8.93	8.94	303	29.8	3.0	3.1	116	119
14:21	9.24	8.54	276	28.8	3.0	3.1	110	115
14:22	8.89	8.92	294	29.5	3.0	3.1	113	117
14:23	8.88	8.88	292	31.0	3.3	3.1	112	115
14:24	8.82	8.97	298	25.2	3.2	3.1	113	116
14:25	9.02	8.75	289	28.6	3.3	3.1	111	114
14:26	8.68	9.09	302	24.1	3.1	3.1	112	115
14:27	8.89	8.88	293	32.5	3.2	3.1	114	116
14:28	9.14	8.78	289	28.6	2.9	3.1	116	119
14:29	9.10	8.66	279	30.7	3.3	3.1	112	114
14:30	8.86	8.94	290	27.7	3.1	3.1	113	116

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:31	8.79	8.94	296	31.6	3.2	3.2	113	116
14:32	8.87	8.96	298	25.3	3.1	3.2	111	115
14:33	8.84	8.87	295	29.5	3.2	3.2	110	112
14:34	8.65	9.12	301	23.6	3.3	3.2	110	113
14:35	8.69	9.03	300	31.9	3.3	3.2	114	115
14:36	9.08	8.75	293	26.7	3.1	3.2	113	118
14:37	8.88	8.85	294	30.9	3.2	3.2	112	114
14:38	8.85	8.96	286	26.6	3.2	3.2	113	115
14:39	8.55	9.12	292	28.5	3.1	3.2	114	115
14:40	9.01	8.86	298	22.8	3.0	3.2	112	116
14:41	8.68	9.00	307	26.7	3.2	3.2	112	115
14:42	8.68	9.12	301	21.8	3.2	3.2	114	117
14:43	8.56	9.11	306	31.7	3.4	3.2	115	116
14:44	9.11	8.75	294	24.4	3.2	3.2	111	116
14:45	8.71	8.99	303	28.1	3.5	3.2	113	114
14:46	8.75	9.04	302	25.1	3.5	3.2	112	116
14:47	8.36	9.26	308	26.4	3.5	3.3	112	115
14:48	8.84	8.99	302	21.0	3.5	3.3	109	111
14:49	8.43	9.21	319	24.8	3.5	3.3	110	113
14:50	8.60	9.18	313	22.5	3.7	3.4	109	112
14:51	8.28	9.32	316	29.9	3.7	3.5	114	117
14:52	9.09	8.72	288	22.7	3.2	3.5	110	113
14:53	8.47	9.19	309	24.2	3.3	3.5	112	114
14:54	8.68	9.08	306	24.6	3.6	3.5	111	114
14:55	8.23	9.38	321	24.1	3.5	3.5	113	115
14:56	8.92	8.92	307	22.1	3.6	3.5	109	113
14:57	8.32	9.30	320	23.0	3.6	3.5	111	115
14:58	8.67	9.12	310	21.8	3.6	3.5	111	113
14:59	8.33	9.29	316	27.6	3.6	3.5	117	119
15:00	9.23	8.63	288	24.3	3.4	3.5	109	113
15:01	8.56	9.12	304	25.8	3.7	3.5	112	115
15:02	8.79	9.00	294	24.9	3.7	3.6	111	112
15:03	8.38	9.28	306	24.2	3.5	3.6	114	115
15:04	9.12	8.71	298	24.1	3.8	3.6	109	114
15:05	8.33	9.30	324	24.2	3.8	3.6	110	113
15:06	8.69	9.08	302	25.5	3.8	3.6	110	112
15:07	8.44	9.29	309	28.0	3.9	3.7	114	116
15:08	9.26	8.57	297	26.5	3.8	3.7	110	112
15:09	8.60	9.11	313	26.6	3.9	3.7	111	114
15:10	8.71	9.01	303	27.4	3.7	3.8	111	112
15:11	8.41	9.29	321	23.9	3.7	3.8	114	115
15:12	8.98	8.76	290	25.6	3.8	3.8	109	111
15:13	8.45	9.25	318	23.6	3.9	3.8	110	114
15:14	8.79	8.97	308	28.2	4.1	3.8	112	114
15:15	8.61	9.13	314	27.4	3.8	3.8	115	119
15:16	9.16	8.60	296	28.2	3.8	3.8	107	113
15:17	8.68	9.07	308	27.3	3.9	3.8	112	116
15:18	8.75	8.98	311	29.0	3.8	3.8	112	115
15:19	8.63	9.13	325	25.2	3.6	3.8	113	116
15:20	8.91	8.81	307	26.6	3.8	3.8	110	114
15:21	8.48	9.24	314	22.0	3.9	3.8	111	114
15:22	8.66	9.05	311	28.1	3.9	3.8	114	115
15:23	8.81	9.03	324	26.7	3.6	3.8	113	117
15:24	8.96	8.75	293	28.3	3.3	3.7	108	111
15:25	8.64	9.12	310	25.4	3.5	3.7	110	113
15:26	8.66	9.04	316	28.8	3.5	3.7	111	113
15:27	8.62	9.15	315	22.6	3.4	3.6	111	115
15:28	8.81	8.91	322	27.2	3.6	3.6	108	111

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
15:29	8.59	9.17	327	23.4	3.6	3.6	110	113
15:30	8.72	9.01	316	31.7	3.7	3.6	114	115
15:31	9.13	8.76	318	26.9	3.4	3.5	115	117
15:32	8.94	8.80	306	29.6	3.7	3.5	113	113
15:33	8.78	9.02	313	25.6	3.8	3.5	112	115
15:34	8.66	9.04	331	29.7	3.9	3.6	113	116
15:35	8.84	9.01	323	23.8	3.7	3.6	112	114
15:36	8.66	9.01	315	27.9	3.7	3.6	112	113
15:37	8.56	9.20	317	22.4	3.8	3.7	112	115
15:38	8.58	9.11	321	30.9	4.1	3.7	116	118
Min	8.23	8.09	197	20.1	2.9	3.1	101	103
Max	9.96	9.38	331	71.8	6.6	5.9	117	121
Avg	8.99	8.81	263	40.4	4.1	4.2	108	111

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
09:46	8.60	9.10	242	33.5	4.4		107	109
09:47	8.73	9.01	236	33.1	4.3		107	110
09:48	8.32	9.36	254	30.3	3.8		107	109
09:49	9.01	8.79	242	28.2	4.1		106	108
09:50	8.32	9.30	256	25.7	4.1		107	110
09:51	8.73	9.03	242	31.1	4.4		108	109
09:52	8.40	9.31	255	33.5	4.4		110	113
09:53	9.19	8.59	232	34.5	4.6		106	108
09:54	8.53	9.19	249	31.4	4.8		107	110
09:55	8.61	9.08	240	33.1	4.8	4.4	106	109
09:56	8.36	9.31	252	25.3	4.7	4.4	109	111
09:57	8.92	8.83	236	29.4	4.5	4.4	103	108
09:58	8.35	9.31	252	24.4	4.5	4.5	108	111
09:59	8.62	9.10	243	32.2	4.4	4.5	107	111
10:00	8.65	9.14	253	30.3	4.5	4.6	109	112
10:01	9.05	8.68	234	34.9	4.3	4.6	106	108
10:02	8.65	9.11	246	29.4	4.4	4.6	109	111
10:03	8.59	9.08	242	33.5	4.7	4.6	109	111
10:04	8.43	9.30	253	23.7	4.6	4.5	110	112
10:05	8.69	8.97	245	31.8	4.7	4.5	105	107
10:06	8.25	9.42	260	22.8	4.6	4.5	105	108
10:07	8.53	9.15	248	31.3	4.5	4.5	110	111
10:08	8.61	9.14	258	26.0	4.4	4.5	109	114
10:09	8.75	8.92	244	31.3	4.5	4.5	103	108
10:10	8.50	9.21	250	24.9	4.4	4.5	107	110
10:11	8.42	9.22	252	29.7	4.4	4.5	107	110
10:12	8.54	9.20	256	21.1	4.3	4.5	108	111
10:13	8.55	9.10	251	28.0	4.4	4.5	105	108
10:14	8.36	9.34	258	19.8	4.2	4.4	107	109
10:15	8.47	9.19	256	32.1	4.2	4.4	111	113
10:16	8.95	8.93	256	25.3	3.8	4.3	108	113
10:17	8.67	9.00	254	32.3	3.9	4.2	106	108
10:18	8.68	9.10	255	26.9	3.8	4.2	108	110
10:19	8.38	9.23	267	29.7	3.8	4.1	110	113
10:20	8.77	9.04	265	21.1	3.7	4.0	108	112
10:21	8.48	9.14	268	29.9	4.1	4.0	106	108
10:22	8.53	9.20	258	22.6	4.0	4.0	109	110
10:23	8.25	9.36	275	31.8	4.3	4.0	110	112
10:24	9.03	8.78	258	25.0	3.9	3.9	105	111
10:25	8.55	9.11	268	32.1	4.1	3.9	106	109
10:26	8.65	9.12	260	27.3	4.1	4.0	106	108
10:27	8.30	9.30	267	29.9	4.1	4.0	109	111
10:28	8.91	8.94	257	22.4	3.7	4.0	106	111
10:29	8.44	9.18	269	27.9	3.9	4.0	110	112
10:30	8.61	9.17	264	22.2	3.7	4.0	109	112
10:31	8.24	9.35	275	33.4	4.1	4.0	111	113
10:32	9.14	8.73	255	26.0	3.7	4.0	105	110
10:33	8.50	9.16	269	30.2	4.3	4.0	106	108
10:34	8.73	9.03	258	27.5	4.0	4.0	108	110
10:35	8.21	9.38	273	27.3	4.3	4.0	110	112
10:36	8.91	8.90	264	22.3	4.1	4.0	105	110
10:37	8.25	9.35	282	23.9	4.4	4.0	109	112
10:38	8.51	9.22	263	24.9	4.1	4.1	108	109
10:39	8.13	9.45	278	31.8	4.5	4.1	110	112
10:40	9.22	8.65	262	26.1	4.1	4.2	106	110
10:41	8.41	9.24	277	27.7	4.2	4.2	109	112
10:42	8.56	9.16	268	27.1	4.1	4.2	108	110
10:43	8.11	9.51	286	22.1	4.0	4.2	108	111

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
10:44	8.82	8.95	272	23.3	4.2	4.2	106	109
10:45	8.14	9.46	292	21.1	4.2	4.2	108	110
10:46	8.54	9.20	276	26.2	4.2	4.2	108	110
10:47	8.14	9.51	291	27.2	4.2	4.2	110	111
10:48	9.07	8.69	268	26.0	4.2	4.2	106	108
10:49	8.36	9.32	291	25.0	4.6	4.2	107	110
10:50	8.50	9.19	284	25.4	4.7	4.3	107	110
10:51	8.14	9.50	298	20.5	4.9	4.3	110	114
10:52	8.79	8.94	275	23.4	4.4	4.4	106	110
10:53	8.15	9.48	290	19.3	4.5	4.4	110	112
10:54	8.41	9.27	280	26.0	4.6	4.4	110	112
10:55	8.44	9.33	290	24.8	4.5	4.5	111	113
10:56	8.88	8.84	267	26.3	4.7	4.5	105	108
10:57	8.27	9.41	285	22.3	4.6	4.6	108	111
10:58	8.35	9.30	277	24.2	4.4	4.6	108	110
10:59	8.19	9.50	284	18.2	4.0	4.5	110	113
11:00	8.62	9.07	272	22.8	4.7	4.5	107	109
11:01	8.15	9.52	294	17.8	4.2	4.5	108	113
11:02	8.47	9.23	285	28.1	4.5	4.5	110	111
11:03	8.56	9.18	290	22.9	4.6	4.5	113	116
11:04	8.70	8.99	278	28.9	4.9	4.5	107	110
11:05	8.44	9.29	286	21.4	4.7	4.5	109	112
11:06	8.37	9.29	290	25.4	4.5	4.5	110	112
11:07	8.39	9.35	285	17.3	4.5	4.5	109	115
11:08	8.44	9.20	288	23.4	4.5	4.5	106	109
11:09	8.21	9.48	296	15.8	4.0	4.5	108	110
11:10	8.38	9.31	291	26.5	4.4	4.5	113	113
11:11	8.79	9.02	284	20.0	4.8	4.5	114	119
11:12	8.66	9.02	270	26.5	4.7	4.6	110	112
11:13	8.53	9.26	275	21.2	4.4	4.5	110	114
11:14	8.40	9.26	283	26.4	4.5	4.5	111	113
11:15	8.62	9.17	279	17.1	4.3	4.4	110	115
11:16	8.48	9.17	280	24.1	3.8	4.4	109	112
11:17	8.46	9.31	284	18.0	4.4	4.4	109	111
11:18	8.42	9.25	285	31.4	4.8	4.4	112	114
11:19	9.04	8.85	270	21.9	4.9	4.5	109	115
11:20	8.69	9.02	276	31.3	5.0	4.6	109	111
11:21	8.74	9.08	274	25.0	4.6	4.5	109	112
11:22	8.38	9.26	285	30.4	4.9	4.6	111	113
11:23	8.90	8.95	278	20.2	4.8	4.6	110	114
11:24	8.55	9.14	291	27.9	4.9	4.6	111	113
11:25	8.57	9.23	283	21.2	4.9	4.7	111	114
11:26	8.37	9.29	280	36.1	4.9	4.8	111	114
11:27	9.07	8.79	266	29.0	3.7	4.7	110	113
11:28	8.67	9.07	277	36.8	3.3	4.6	109	109
11:29	8.75	9.06	274	29.4	3.3	4.4	108	112
11:30	8.39	9.29	286	29.5	3.2	4.3	109	112
11:31	8.99	8.86	275	23.6	3.5	4.1	107	111
11:32	8.49	9.20	287	27.6	3.6	4.0	108	108
11:33	8.71	9.11	274	24.9	4.0	3.9	109	113
11:34	8.39	9.29	283	35.4	3.8	3.8	110	113
11:35	9.34	8.56	257	33.4	3.8	3.7	109	111
11:36	8.71	9.05	278	35.7	3.7	3.6	108	110
11:37	8.90	8.93	267	31.5	3.8	3.6	108	111
11:38	8.28	9.38	291	27.2	3.6	3.6	109	111
11:39	9.17	8.72	271	28.6	3.7	3.7	106	109
11:40	8.45	9.24	287	27.2	3.7	3.7	109	111
11:41	8.77	9.04	275	30.2	3.9	3.7	109	111

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
11:42	8.40	9.31	291	36.0	4.0	3.8	109	111
11:43	9.36	8.53	259	35.8	4.1	3.8	103	109
11:44	8.75	9.03	273	33.8	4.1	3.8	108	112
11:45	8.85	8.98	270	35.2	4.3	3.9	107	110
11:46	8.44	9.30	285	29.3	4.5	3.9	108	110
12:37	8.51	9.13	241	50.5	2.9		105	108
12:38	9.38	8.50	233	44.1	2.9		102	105
12:39	8.80	8.92	248	50.4	2.7		103	106
12:40	8.94	8.88	253	48.2	2.9		101	104
12:41	8.52	9.14	263	43.2	2.3		103	105
12:42	9.23	8.65	242	37.6	2.6		101	105
12:43	8.57	9.09	255	37.8	2.3		103	105
12:44	8.84	8.97	248	38.1	3.0		103	106
12:45	8.42	9.24	255	48.2	2.6		105	107
12:46	9.31	8.56	242	43.5	2.7	2.7	101	104
12:47	8.67	9.03	261	48.5	2.5	2.6	103	106
12:48	8.83	8.93	252	43.0	2.7	2.6	102	104
12:49	8.37	9.29	268	35.8	2.3	2.6	104	107
12:50	9.17	8.66	255	38.3	2.6	2.6	101	104
12:51	8.52	9.16	269	32.9	2.4	2.6	104	107
12:52	8.88	8.91	252	40.3	3.0	2.6	104	107
12:53	8.65	9.10	265	43.5	3.0	2.7	107	110
12:54	9.32	8.49	244	41.5	3.0	2.7	104	106
12:55	8.79	8.97	257	39.6	2.7	2.7	105	108
12:56	8.88	8.87	247	45.7	3.1	2.8	105	107
12:57	8.63	9.12	261	33.4	2.6	2.8	105	109
12:58	9.13	8.67	249	39.8	2.9	2.8	103	106
12:59	8.65	9.10	266	32.6	2.4	2.8	106	109
13:00	8.93	8.84	249	47.1	3.0	2.8	104	107
13:01	8.90	8.94	257	44.2	2.5	2.8	108	110
13:02	9.26	8.50	233	49.0	2.8	2.8	104	106
13:03	8.80	8.96	242	42.9	2.8	2.8	104	107
13:04	8.81	8.91	246	49.6	2.9	2.8	103	107
13:05	8.71	9.06	259	35.6	2.6	2.8	104	107
13:06	8.99	8.75	238	42.1	2.7	2.7	101	103
13:07	8.59	9.13	251	29.7	2.6	2.7	104	107
13:08	8.75	8.98	246	46.4	3.3	2.8	106	108
13:09	9.07	8.82	256	42.5	2.6	2.8	105	110
13:10	9.11	8.63	233	50.4	2.8	2.8	102	104
13:11	8.89	8.92	247	44.5	2.7	2.8	104	107
13:12	8.74	8.95	257	49.4	2.7	2.8	103	106
13:13	8.80	9.01	258	30.6	2.5	2.7	104	108
13:14	8.91	8.81	246	45.3	2.6	2.7	102	104
13:15	8.72	9.05	254	30.4	2.6	2.7	104	108
13:16	8.78	8.93	245	50.0	2.9	2.7	105	108
13:17	9.18	8.68	244	42.1	2.8	2.7	104	109
13:18	9.07	8.68	237	51.2	2.8	2.7	102	103
13:19	9.01	8.82	231	45.0	2.9	2.7	103	107
13:20	8.82	8.89	235	51.4	2.6	2.7	104	106
13:21	9.19	8.70	236	36.3	2.8	2.7	102	107
13:22	8.92	8.79	242	49.2	2.5	2.7	104	106
13:23	8.84	8.96	245	32.5	2.9	2.7	103	106
13:24	8.64	9.03	254	54.3	2.8	2.8	105	107
13:25	9.36	8.55	250	42.9	2.8	2.8	102	106
13:26	8.87	8.84	253	52.1	3.1	2.8	101	103
13:27	8.89	8.92	248	45.4	3.2	2.8	101	103
13:28	8.49	9.14	252	46.2	2.8	2.8	102	104
13:29	8.98	8.85	253	35.0	3.0	2.8	100	103

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016

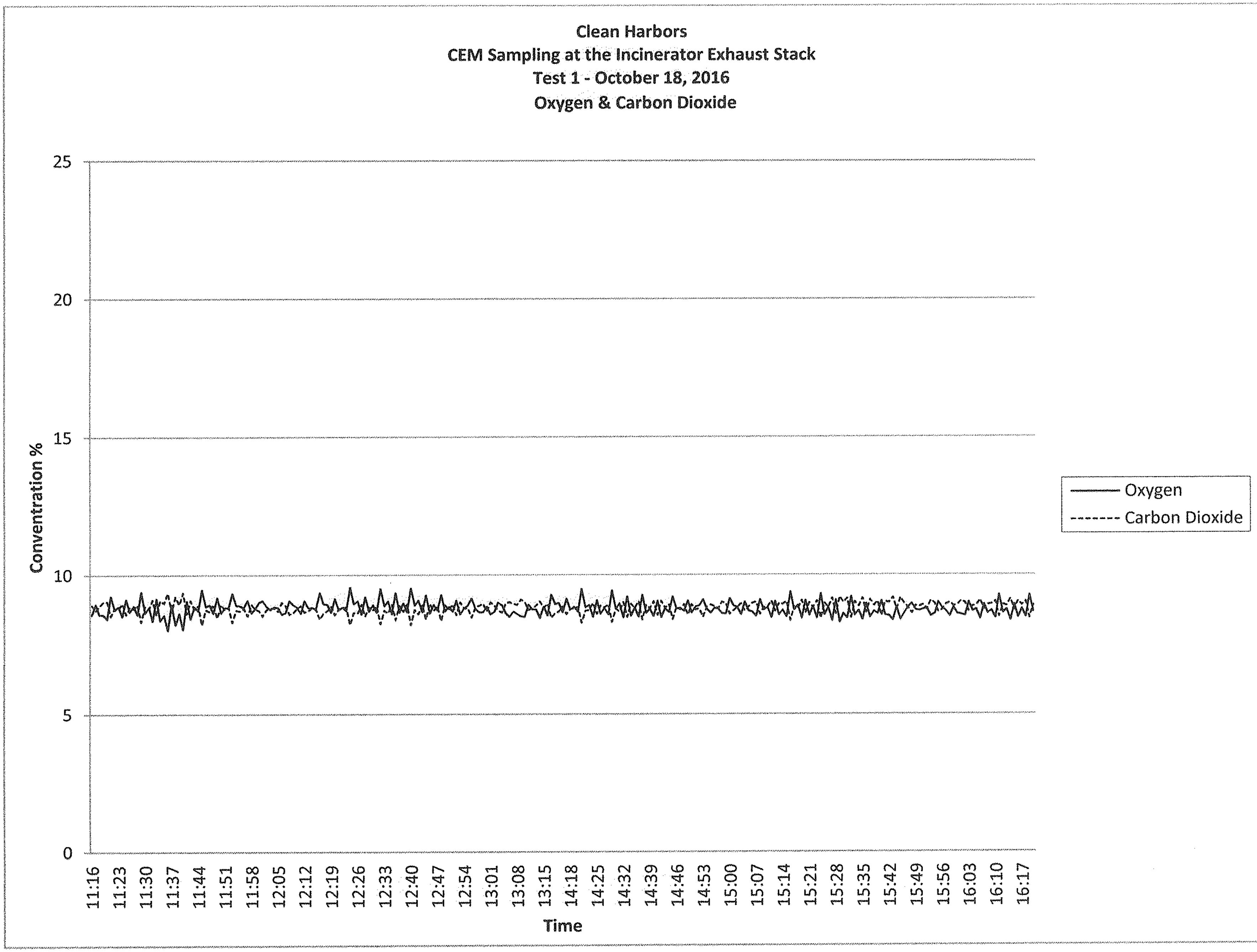
	O2	CO2	SO2	CO	THC (ppm)		NO	NOx
Time	%	%	ppm	ppm	1-min	10-min	ppm	ppm
13:30	8.63	9.03	264	45.6	2.7	2.8	101	103
13:31	8.71	9.06	244	32.3	3.0	2.9	101	104
13:32	8.55	9.12	249	50.3	2.9	2.9	104	106
13:33	9.38	8.50	243	43.9	3.1	2.9	100	106
13:34	8.81	8.90	253	54.2	2.9	2.9	104	106
13:35	8.94	8.87	259	44.8	2.9	2.9	102	105
13:36	8.47	9.16	276	45.0	2.7	2.9	104	106
13:37	9.10	8.75	257	35.8	3.2	2.9	102	105
13:38	8.46	9.16	265	38.7	3.1	2.9	103	106
13:39	8.72	9.08	267	34.2	3.4	3.0	103	106
13:40	8.37	9.25	263	52.9	3.2	3.0	105	108
13:41	9.21	8.65	251	41.9	3.2	3.1	101	105
13:42	8.61	9.06	264	47.0	3.1	3.1	103	105
13:43	8.73	9.02	263	42.1	3.2	3.1	103	105
13:44	8.26	9.35	278	33.4	3.0	3.1	105	106
13:45	9.02	8.79	266	34.8	3.1	3.1	101	105
13:46	8.36	9.26	279	32.1	3.2	3.2	104	107
13:47	8.71	9.07	251	34.5	3.4	3.2	104	107
13:48	8.34	9.34	261	41.8	3.0	3.2	107	111
13:49	9.21	8.59	248	40.3	3.0	3.1	105	108
13:50	8.57	9.15	269	37.7	2.8	3.1	103	106
13:51	8.64	9.06	272	40.3	3.2	3.1	103	106
13:52	8.37	9.32	292	29.5	2.8	3.1	104	108
13:53	8.93	8.84	266	36.2	3.0	3.0	101	104
13:54	8.35	9.33	272	27.3	3.1	3.1	103	105
13:55	8.66	9.07	272	42.9	3.8	3.1	104	107
13:56	8.45	9.26	282	40.5	3.3	3.1	107	109
13:57	9.02	8.71	248	41.9	3.6	3.2	103	105
13:58	8.55	9.18	267	33.7	3.2	3.2	105	107
13:59	8.59	9.10	262	38.6	3.4	3.2	105	108
14:00	8.38	9.33	280	25.3	3.1	3.3	106	109
14:01	8.81	8.92	257	33.1	3.3	3.3	104	106
14:02	8.41	9.30	275	24.2	3.4	3.3	106	109
14:03	8.58	9.13	265	41.5	3.6	3.4	106	108
14:04	8.79	9.03	276	36.0	3.2	3.4	108	112
14:05	9.00	8.74	259	46.1	3.5	3.4	103	105
14:06	8.67	9.11	281	34.9	3.2	3.4	105	109
14:07	8.58	9.11	288	42.7	2.9	3.3	105	108
14:08	8.52	9.24	292	24.2	3.0	3.3	105	109
14:09	8.69	8.99	273	37.6	3.0	3.2	102	105
14:10	8.28	9.39	291	21.4	3.5	3.3	104	107
14:11	8.36	9.28	275	41.4	4.1	3.3	103	106
14:12	8.70	9.12	277	29.7	3.4	3.3	105	108
14:13	8.85	8.89	264	44.0	3.5	3.3	104	105
14:14	8.84	8.99	266	34.1	3.5	3.4	106	109
14:15	8.74	9.00	266	41.9	3.6	3.4	107	111
14:16	8.94	8.92	273	29.2	3.6	3.4	107	110
14:17	8.84	8.89	273	43.0	3.4	3.5	105	106
14:18	8.76	9.05	255	27.7	3.3	3.5	106	109
14:19	8.72	9.00	260	52.3	3.8	3.6	107	109
14:20	9.33	8.62	263	40.8	3.5	3.6	106	110
14:21	8.98	8.77	257	55.7	3.6	3.5	103	106
14:22	8.96	8.89	251	42.9	3.7	3.5	105	108
14:23	8.67	9.03	264	50.9	3.5	3.6	105	107
14:24	9.05	8.82	265	34.3	3.6	3.6	104	108
14:25	8.77	8.95	276	48.2	3.2	3.5	104	106
14:26	8.88	8.98	277	34.5	3.4	3.5	105	108
14:27	8.66	9.07	292	58.6	3.3	3.5	106	108

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016

Time	O2 %	CO2 %	SO2 ppm	CO ppm	THC (ppm) 1-min	THC (ppm) 10-min	NO ppm	NOx ppm
14:28	9.48	8.46	274	48.7	3.3	3.5	105	108
14:29	8.97	8.82	284	59.3	3.2	3.4	104	105
14:30	9.07	8.79	288	52.4	3.4	3.4	104	107
14:31	8.64	9.09	306	50.3	3.2	3.4	105	107
14:32	9.39	8.56	285	44.9	3.4	3.4	102	106
14:33	8.81	8.94	294	52.2	3.3	3.3	104	105
14:34	9.17	8.76	284	51.8	3.8	3.3	103	106
14:35	8.77	8.98	296	72.4	3.6	3.4	105	108
14:36	9.77	8.23	273	63.2	3.8	3.4	103	106
14:37	9.00	8.81	292	68.5	3.8	3.5	102	105
Min	8.11	8.23	231	15.8	2.3	2.6	100	103
Max	9.77	9.52	306	72.4	5.0	4.8	114	119
Avg	8.70	9.04	265	34.6	3.7	3.7	106	109

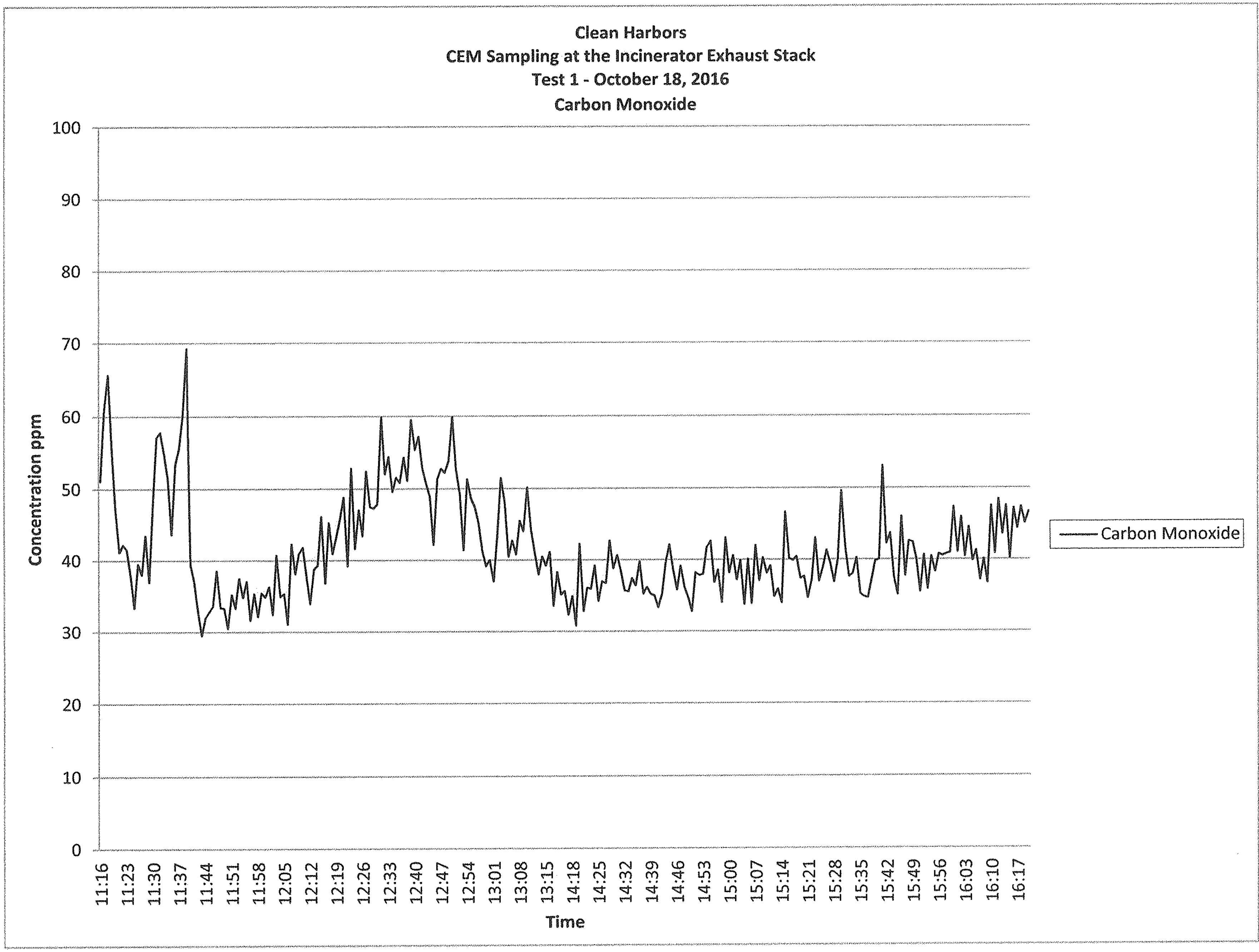
APPENDIX 25

Gas Analysis Graphs
(15 pages)

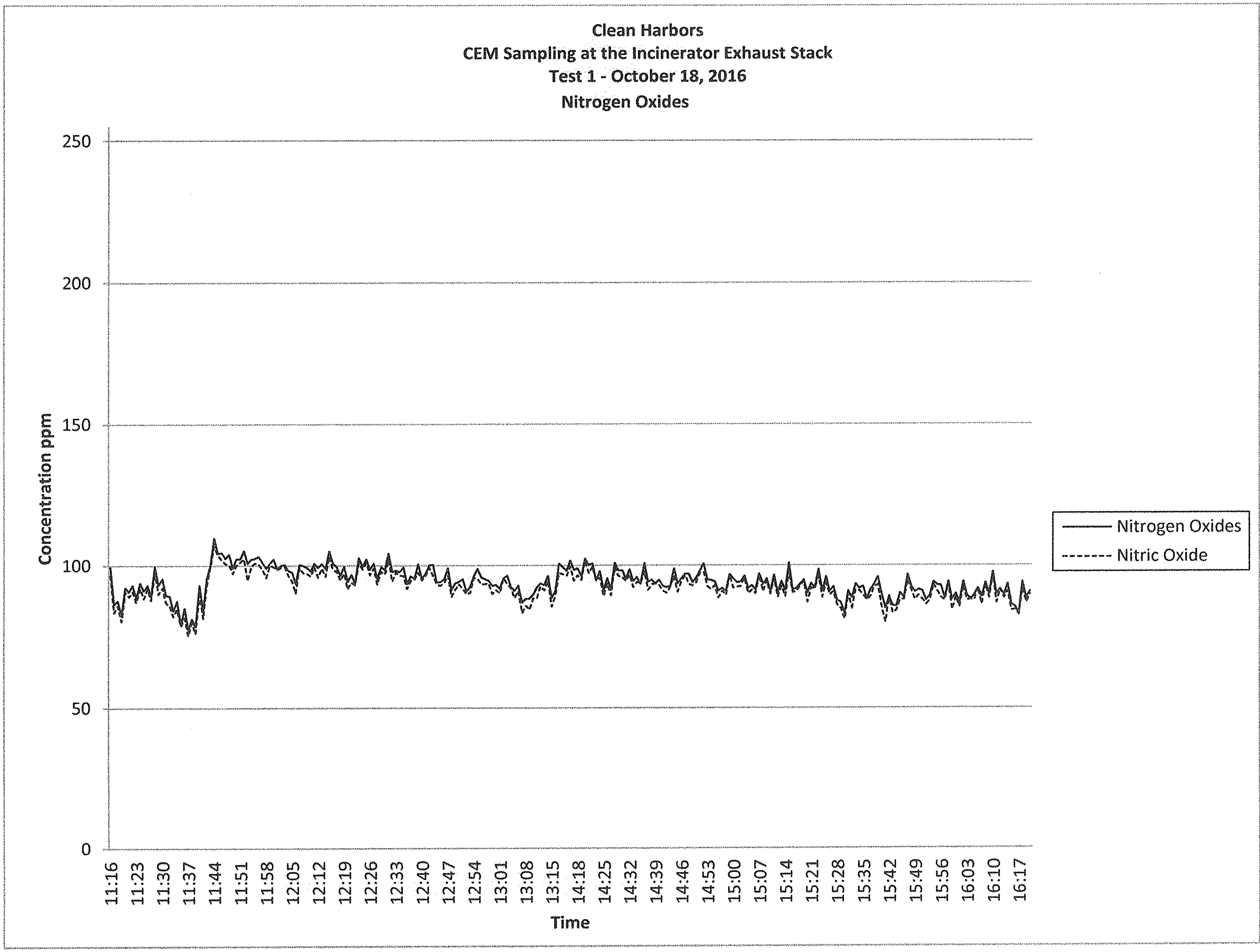


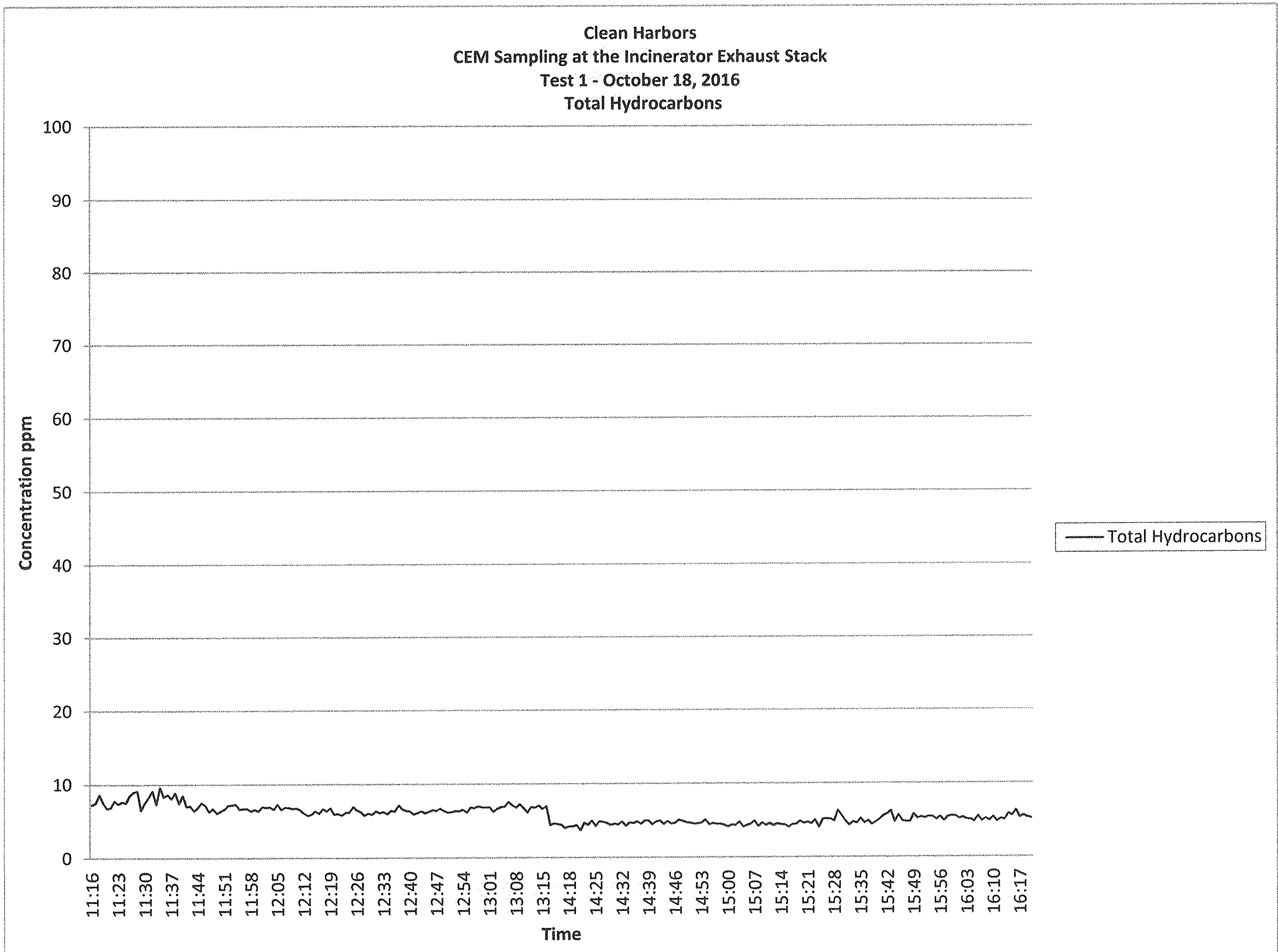
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016
Oxygen & Carbon Dioxide
Conventration %
25
20
15
10
5
0
11:16
11:23
11:30
11:37
11:44
11:51
11:58
12:05
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
15:42
15:49
15:56
16:03
16:10
16:17
Time
Oxygen
Carbon Dioxide

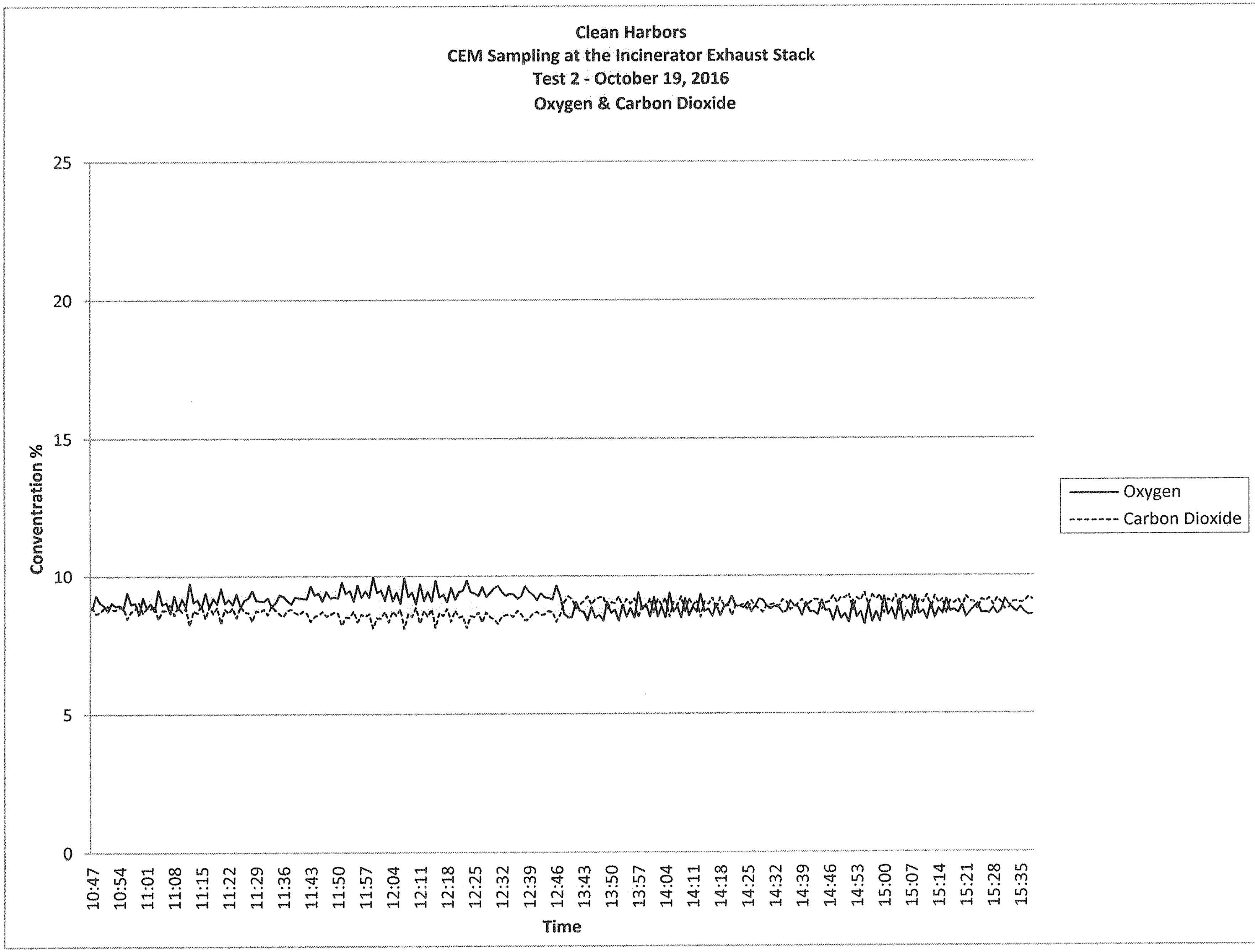
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016
Sulphur Dioxide

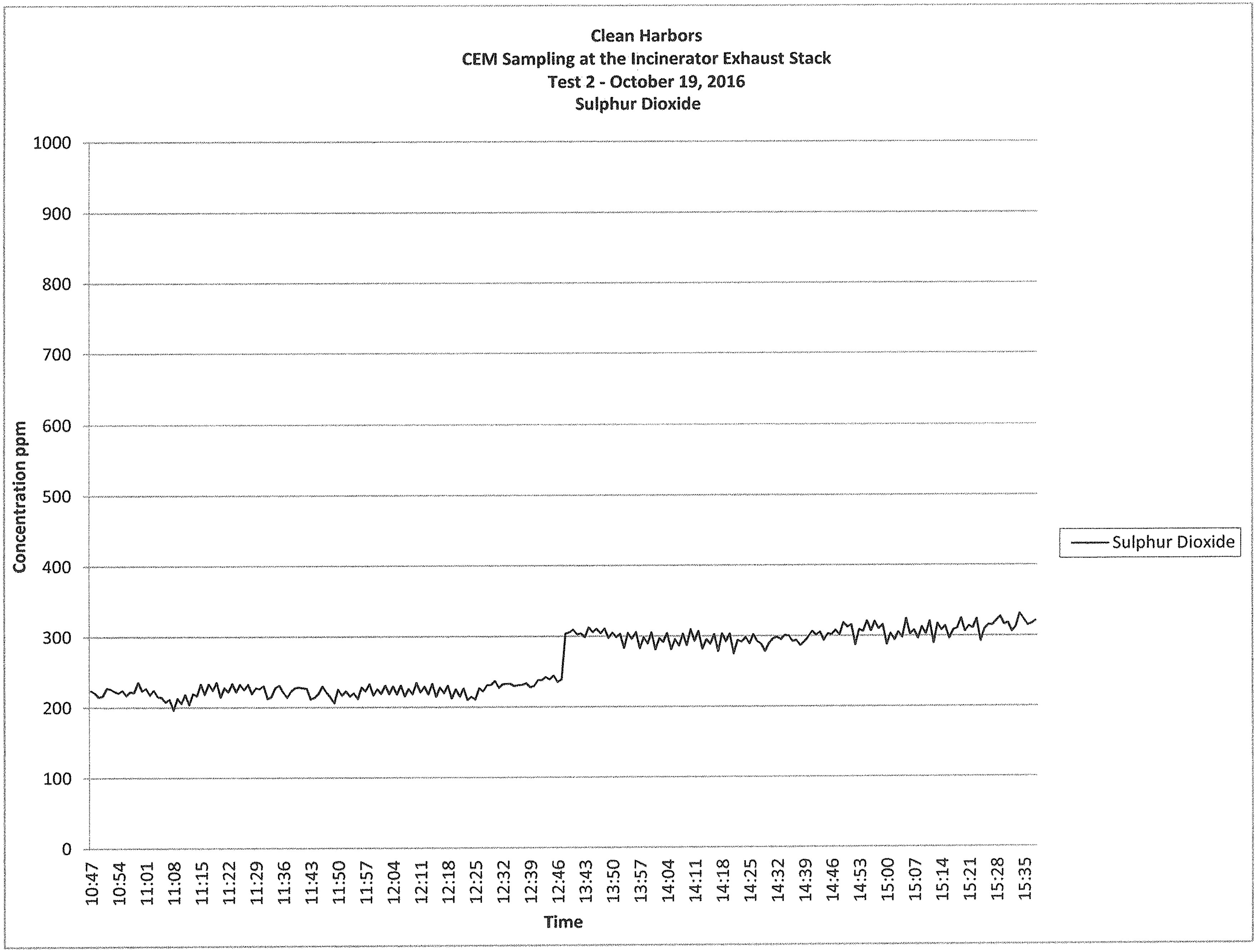


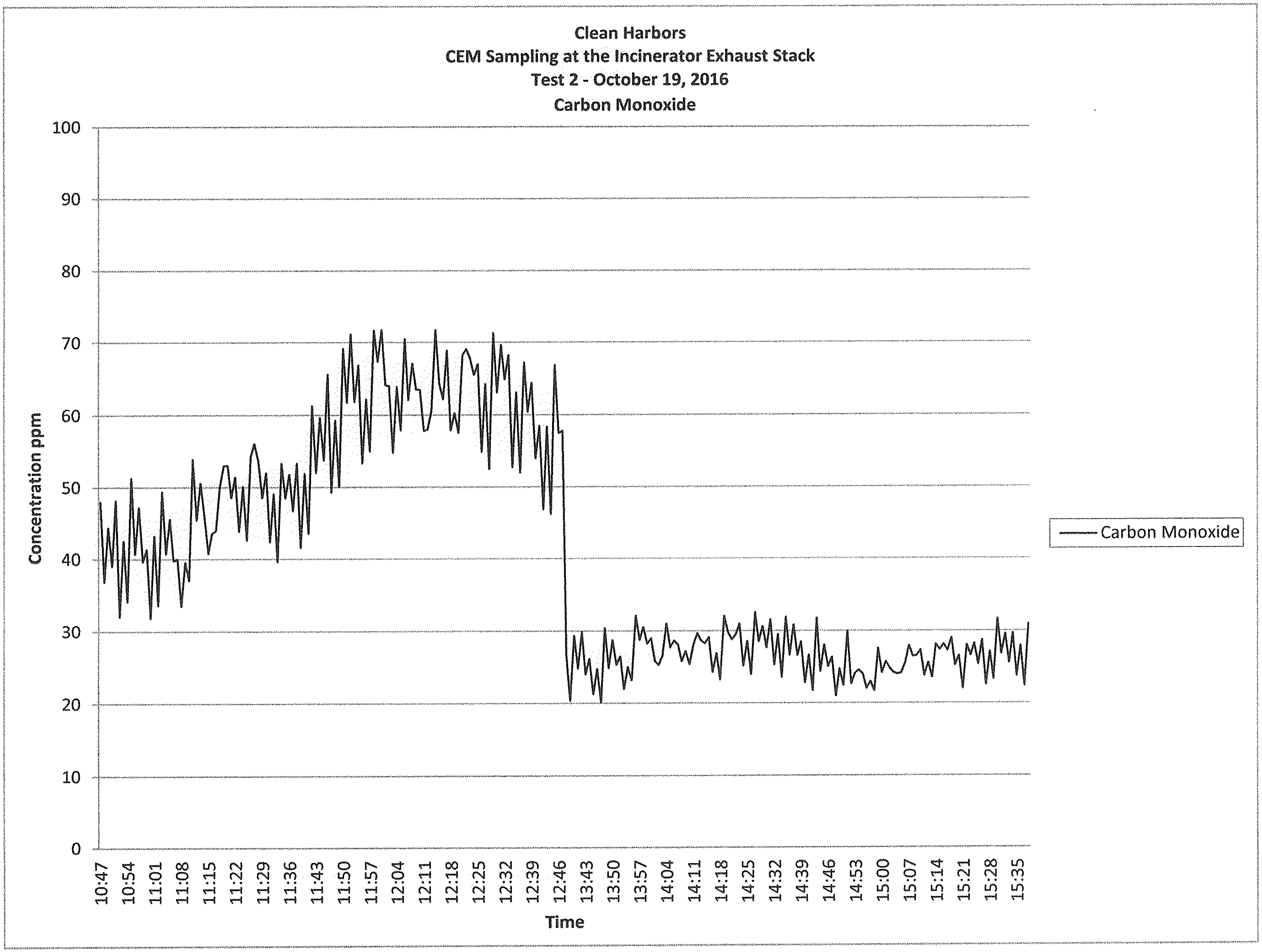
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016
Carbon Monoxide
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
11:16
11:23
11:30
11:37
11:44
11:51
11:58
12:05
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
15:42
15:49
15:56
16:03
16:10
16:17
Time
Carbon Monoxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016
Nitrogen Oxides
Concentration ppm
250
200
150
100
50
0
11:16
11:23
11:30
11:37
11:44
11:51
11:58
12:05
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
15:42
15:49
15:56
16:03
16:10
16:17
Time
Nitrogen Oxides
Nitric Oxide


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 1 - October 18, 2016
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
11:16
11:23
11:30
11:37
11:44
11:51
11:58
12:05
12:12
12:19
12:26
12:33
12:40
12:47
12:54
13:01
13:08
13:15
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
15:42
15:49
15:56
16:03
16:10
16:17
Time
Total Hydrocarbons

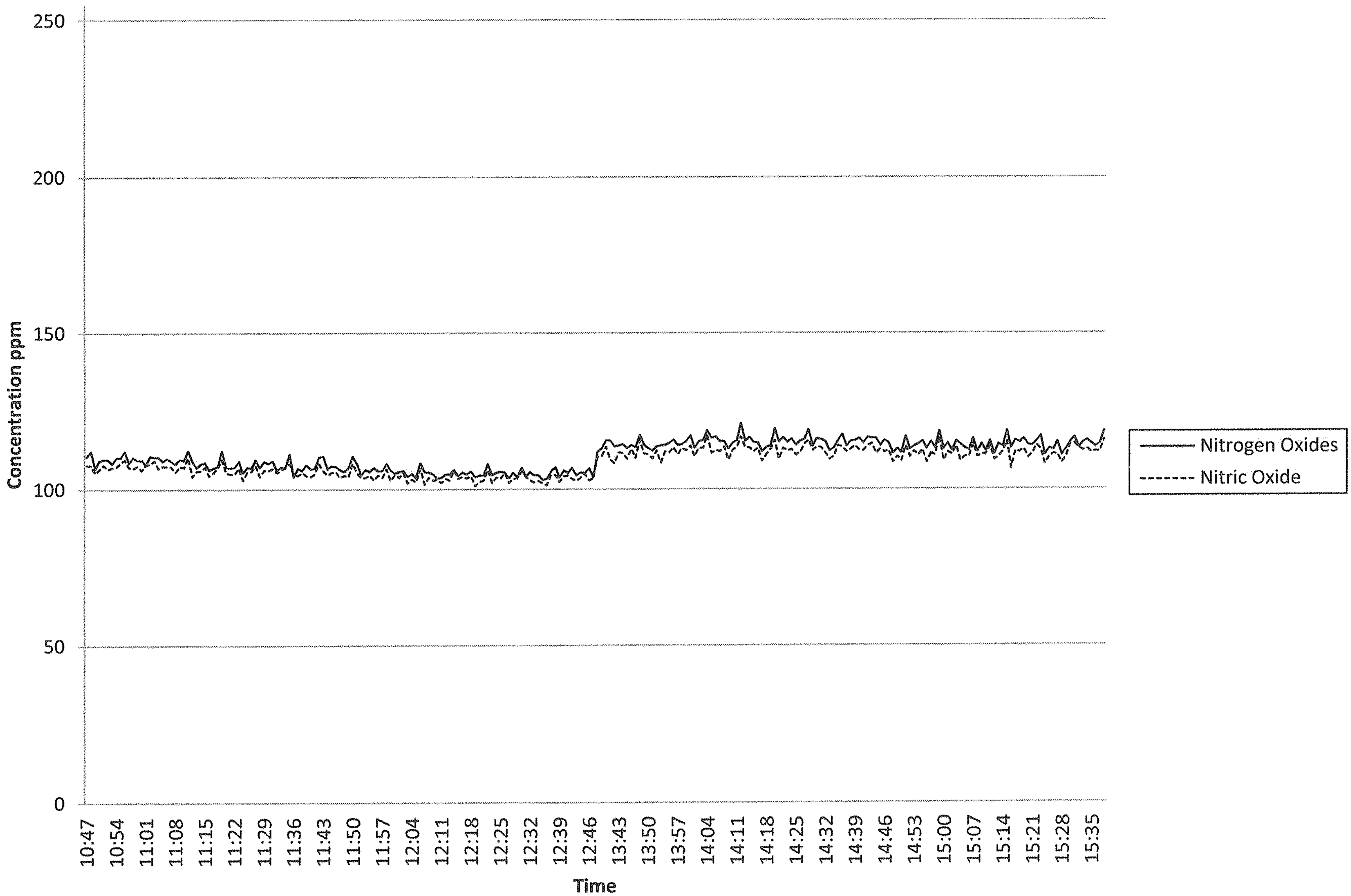

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016
Oxygen & Carbon Dioxide
Conventration %
25
20
15
10
5
0
10:47
10:54
11:01
11:08
11:15
11:22
11:29
11:36
11:43
11:50
11:57
12:04
12:11
12:18
12:25
12:32
12:39
12:46
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Oxygen
Carbon Dioxide

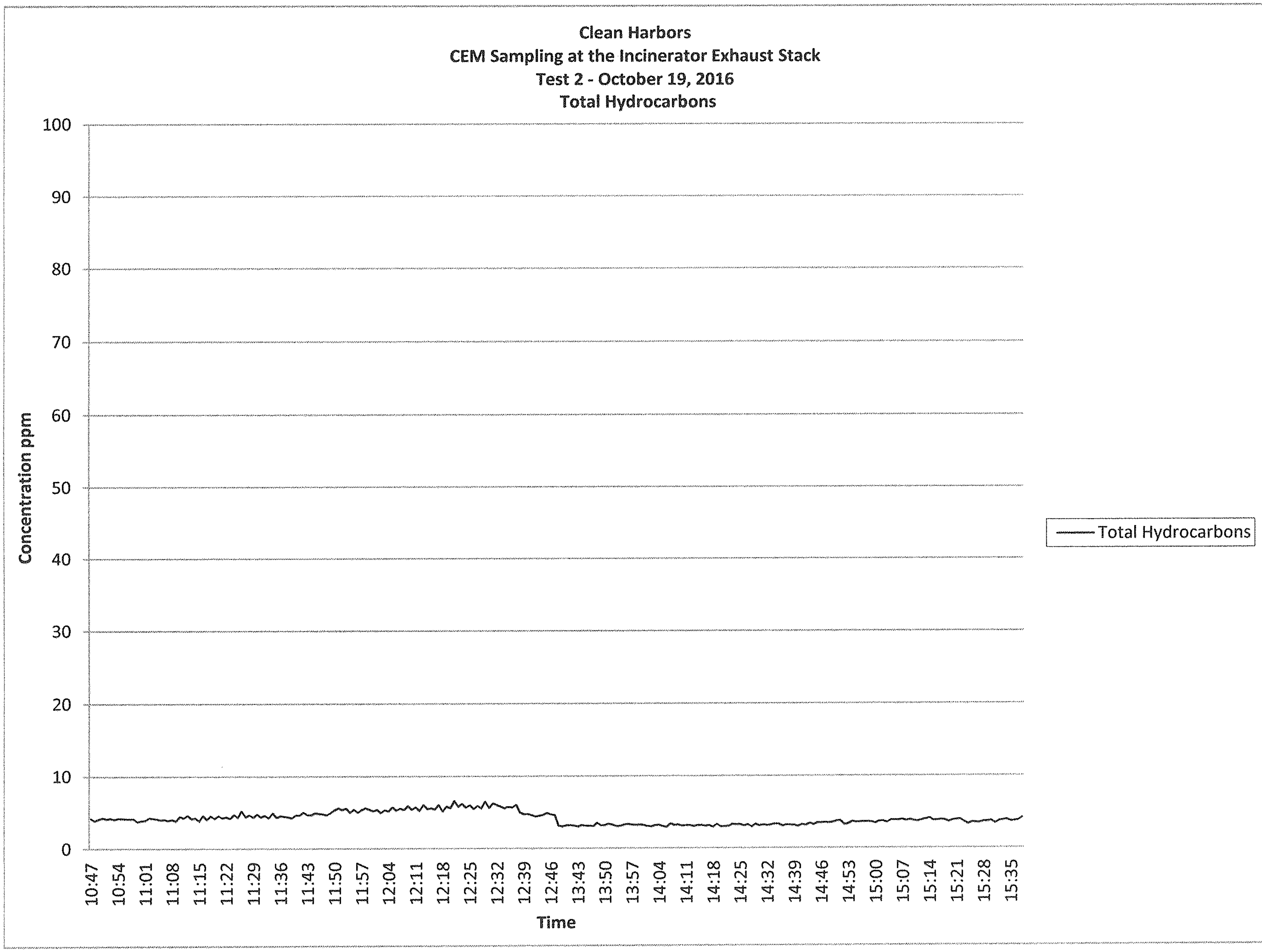

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016
Sulphur Dioxide
Concentration ppm
1000
900
800
700
600
500
400
300
200
100
0
10:47
10:54
11:01
11:08
11:15
11:22
11:29
11:36
11:43
11:50
11:57
12:04
12:11
12:18
12:25
12:32
12:39
12:46
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Sulphur Dioxide

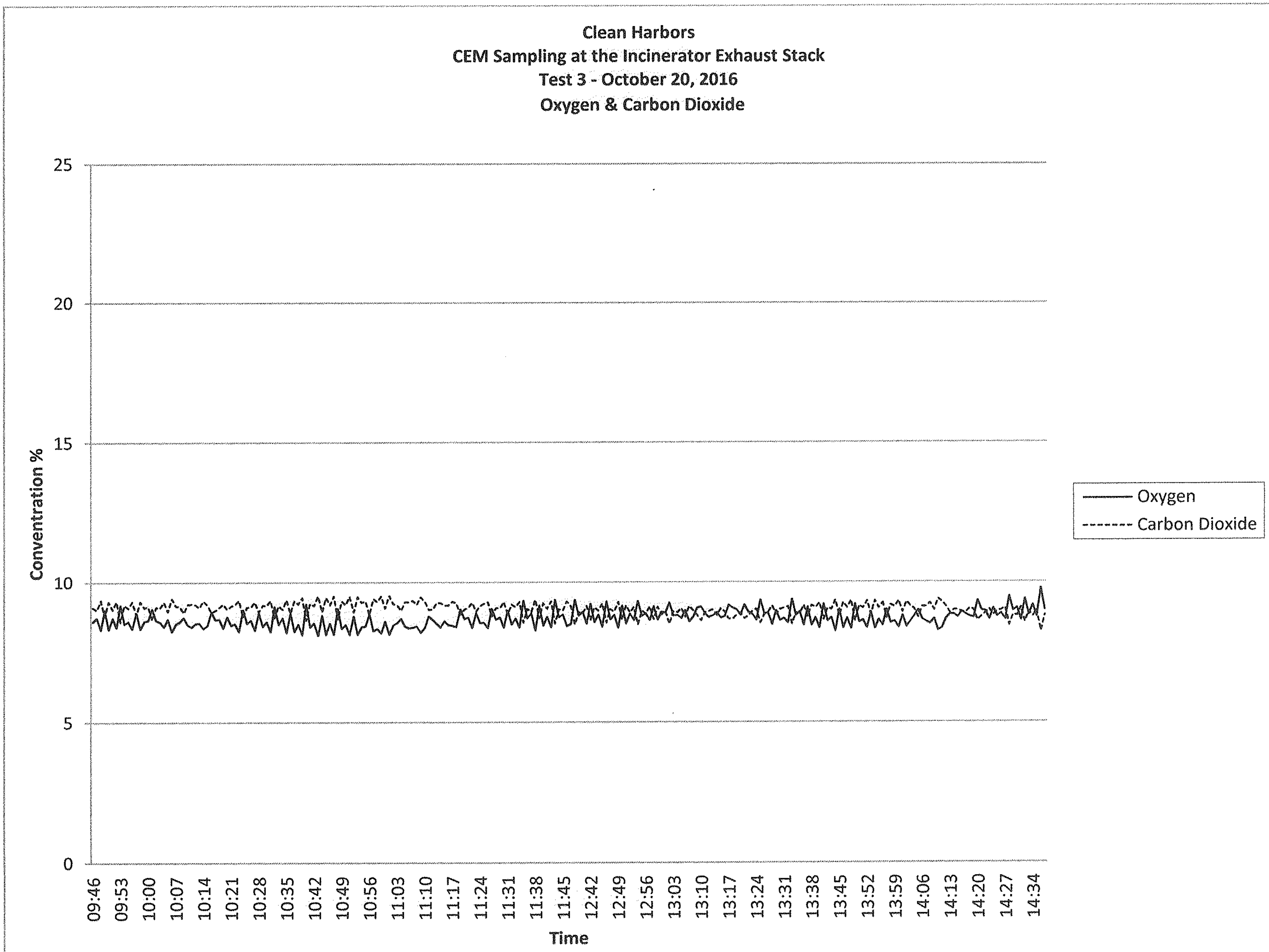


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016
Carbon Monoxide
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
10:47
10:54
11:01
11:08
11:15
11:22
11:29
11:36
11:43
11:50
11:57
12:04
12:11
12:18
12:25
12:32
12:39
12:46
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Carbon Monoxide

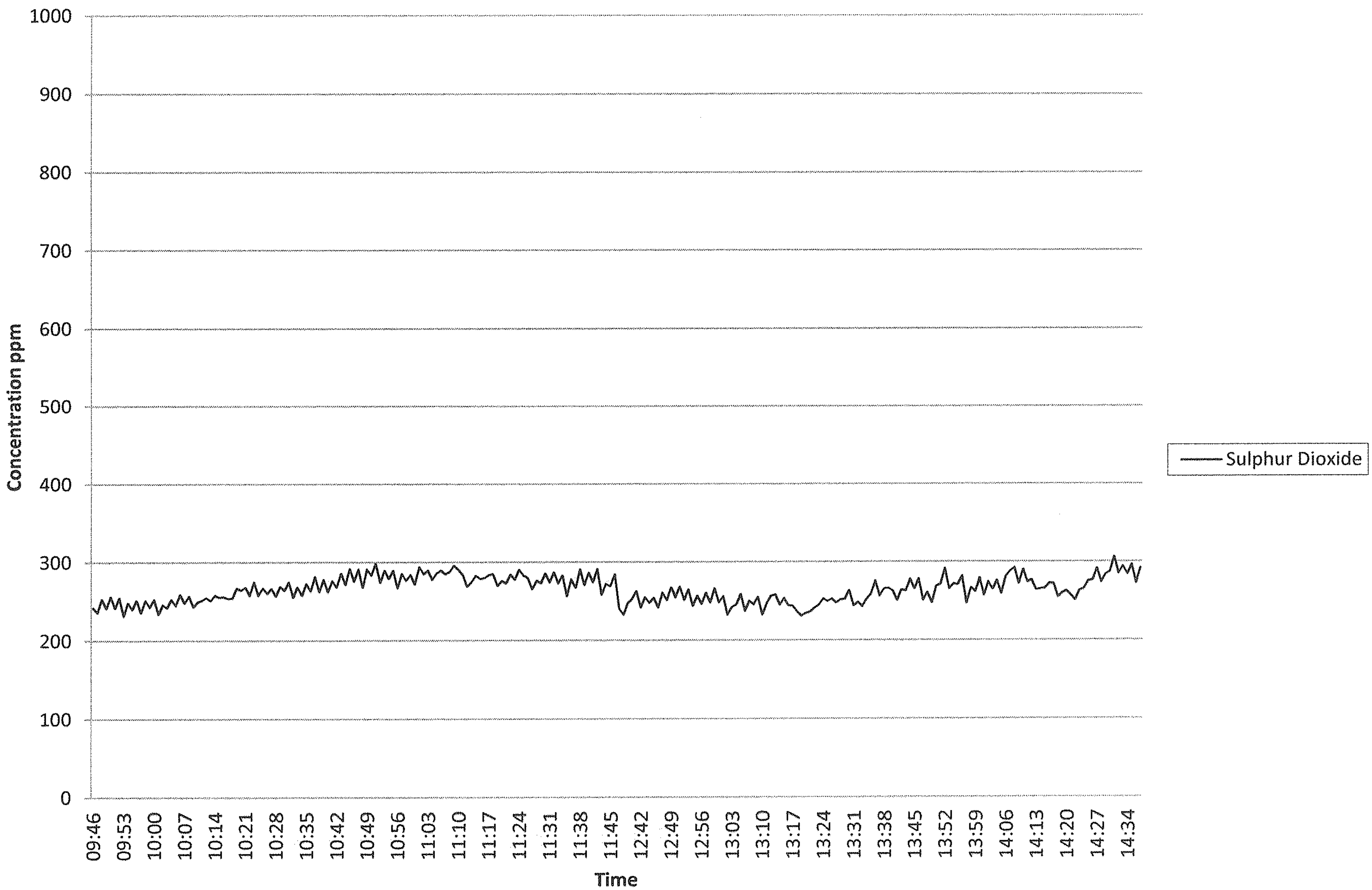
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016
Nitrogen Oxides

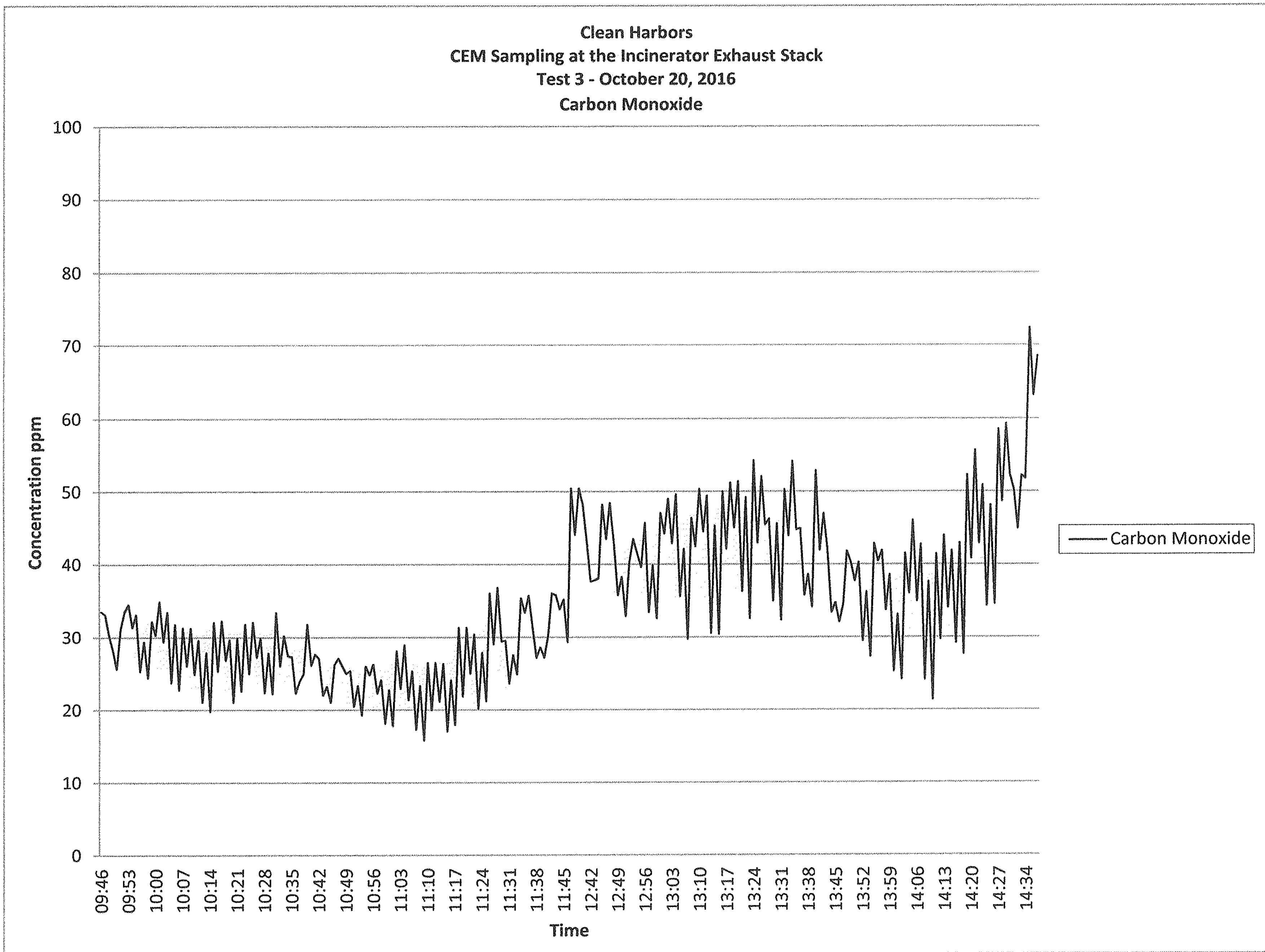



Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 2 - October 19, 2016
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
10:47
10:54
11:01
11:08
11:15
11:22
11:29
11:36
11:43
11:50
11:57
12:04
12:11
12:18
12:25
12:32
12:39
12:46
13:43
13:50
13:57
14:04
14:11
14:18
14:25
14:32
14:39
14:46
14:53
15:00
15:07
15:14
15:21
15:28
15:35
Time
Total Hydrocarbons


Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016
Oxygen & Carbon Dioxide
Conventration %
25
20
15
10
5
0
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
11:10
11:17
11:24
11:31
11:38
11:45
12:42
12:49
12:56
13:03
13:10
13:17
13:24
13:31
13:38
13:45
13:52
13:59
14:06
14:13
14:20
14:27
14:34
Time
Oxygen
Carbon Dioxide

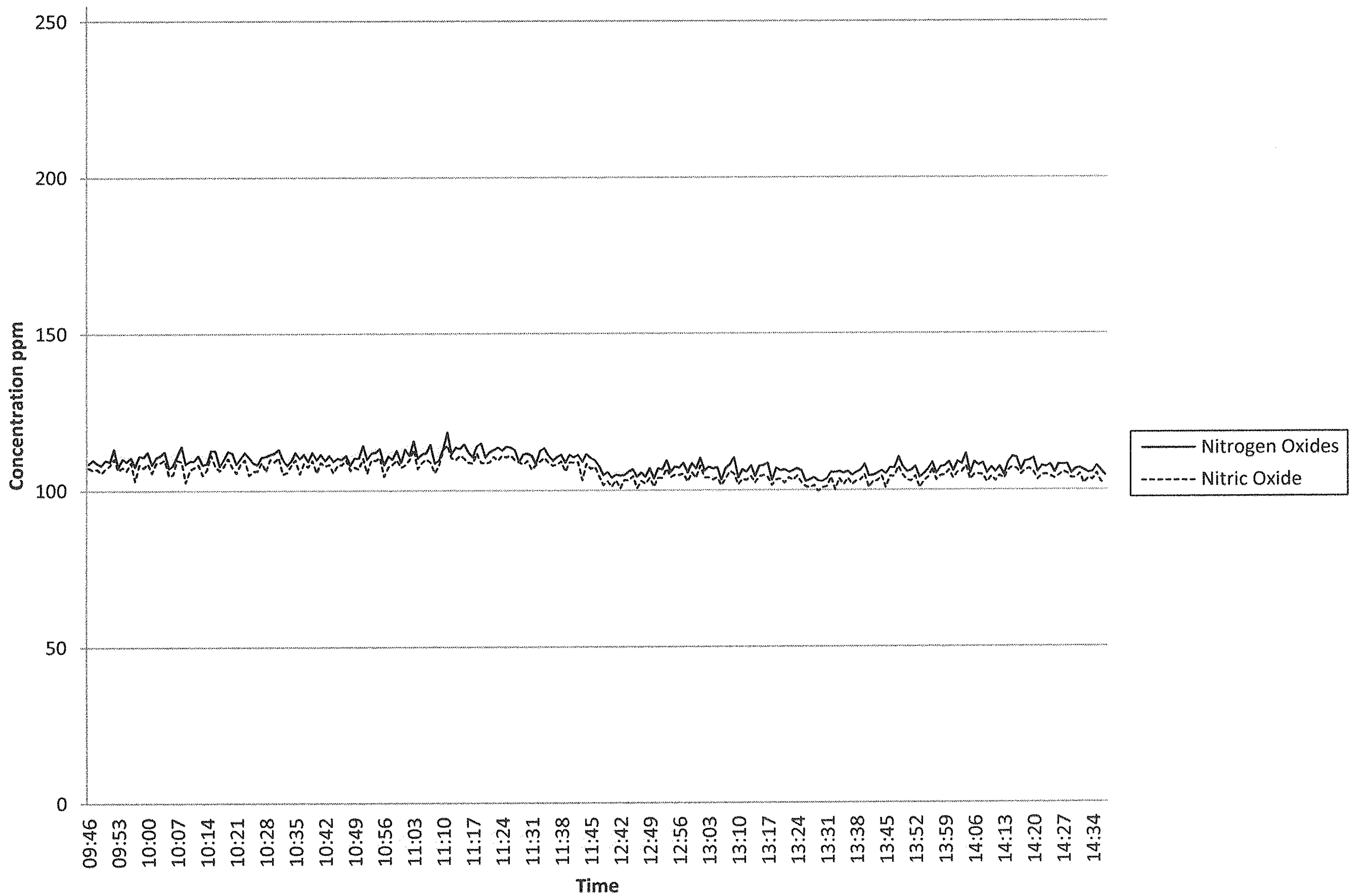
Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016
Sulphur Dioxide

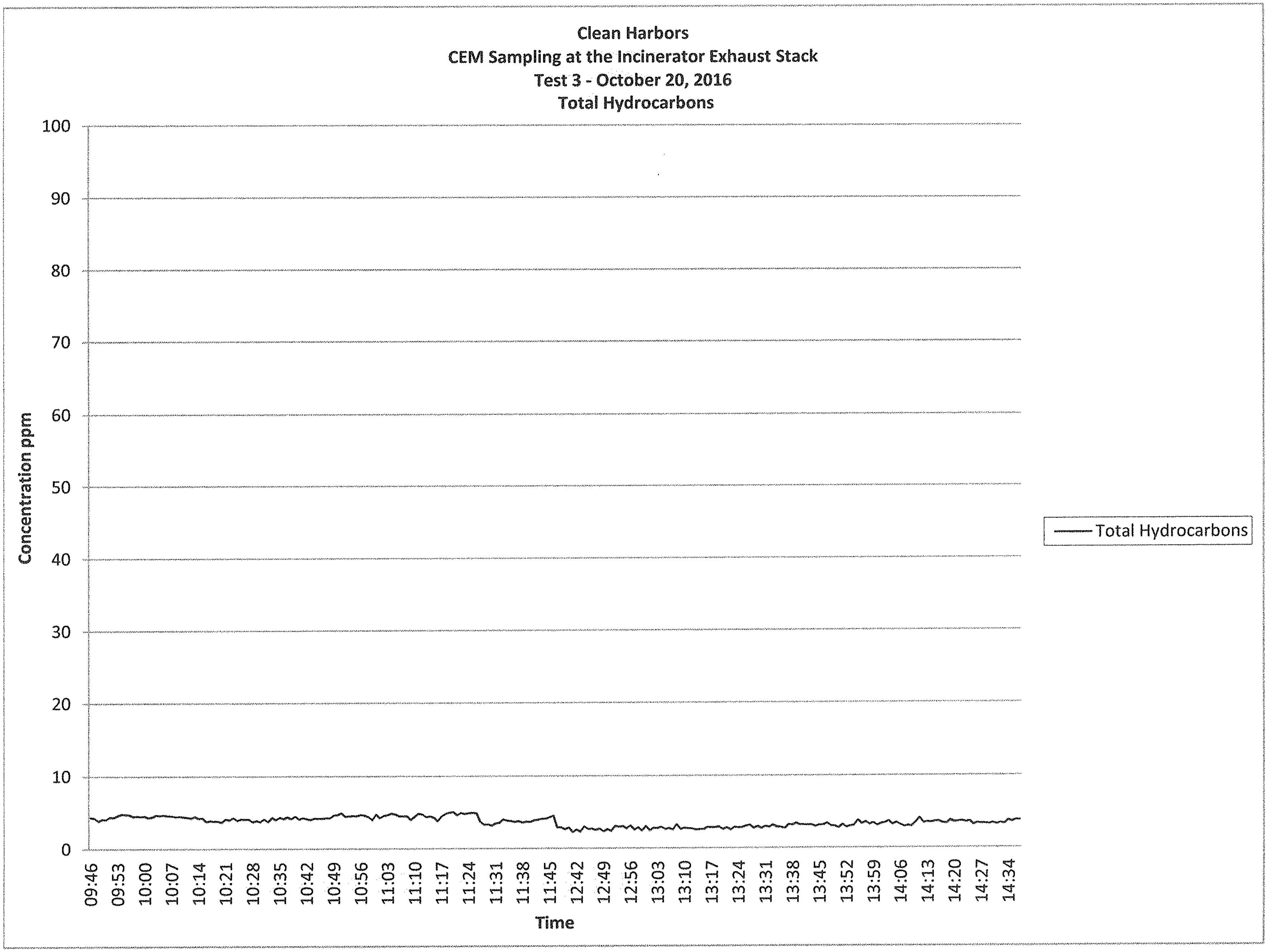




Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016
Carbon Monoxide
100
90
80
70
60
50
40
30
20
10
0
Concentration ppm
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
11:10
11:17
11:24
11:31
11:38
11:45
12:42
12:49
12:56
13:03
13:10
13:17
13:24
13:31
13:38
13:45
13:52
13:59
14:06
14:13
14:20
14:27
14:34
Time
Carbon Monoxide

Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016
Nitrogen Oxides




Clean Harbors
CEM Sampling at the Incinerator Exhaust Stack
Test 3 - October 20, 2016
Total Hydrocarbons
Concentration ppm
100
90
80
70
60
50
40
30
20
10
0
09:46
09:53
10:00
10:07
10:14
10:21
10:28
10:35
10:42
10:49
10:56
11:03
11:10
11:17
11:24
11:31
11:38
11:45
12:42
12:49
12:56
13:03
13:10
13:17
13:24
13:31
13:38
13:45
13:52
13:59
14:06
14:13
14:20
14:27
14:34
Time
Total Hydrocarbons

APPENDIX 26

AERMOD Modelling Files
(1 CD)

APPENDIX 27

Clean Harbors Feed Data Summaries
(4 pages)

CleanHarbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: ____________ Analysis Date: OCT 18/16

Storage Location: ____________ Lab No.: C16-2560

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					OCT 16/18	OCT 18/16		OCT 18/16	OCT 18/16	OCT 18/16				OCT 18/16
Time Received at LAB					7:00	7:00		7:00	7:00	7:00				7:00
pH		AM047	pH					8.85	11	7				11.8
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										1
Specific Gravity		AM045	g/ml					1.04	1.01	0.95				1
Heat Value		AM005	MJ/kg	0.3	3.43	6.35		4.26	14.9	33.6				
Ash @ 750 C		AM129	% mass	0.03				3.16	1.41	0.7				
Fluoride	Total	AM005	% mass F	0.05				0.001	0.001	0.001				
	Soluble	AM036	% mass F	0.05				0.042	0.009	0.007				0.001
	Organic	AM005	% mass F	0.05				0	0	0				
Chloride	Total	AM005	% mass Cl	0.05				0.311	0.139	0.126				
	Soluble	AM036	% mass Cl	0.05				0.273	0.078	0.021				0.008
	Organic	AM005	% mass Cl	0.05				0.038	0.061	0.105				
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02				0.831	1.009	1.049				
	Soluble	AM036	% mass S	0.02				0.188	0.064	0.029				0.006
	Non Sulphate	AM005	% mass S	0.02				0.643	0.945	1.02				
Alkalinity	as Carbonate	AM001	ppm CaCO3	30				6000						
	Normality	AM046	N	0.01										0.04
Phase Composition	Organic	AM045	% volume	0.5				5	20	82				
	Emulsion	"	% volume	0.5					68	10				
	Aqueous	"	% volume	0.5				85						
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5				10	12	8				<1
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100	<50				
Solids @ 110 C		AM003	% mass	0.03										0.27
Total Organic Carbon		AM142	ppm	1										46
Water Content by KF :		AM074	% H2O						54.12	14.34				

Additional Analysis: ____________

Comments: ____________

ANALYST: MS

CleanHarbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: ______________ Analysis Date: OCT 19/16

Storage Location: I6 Lab No.: C16-2577

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					OCT 19/16	OCT 19/16		OCT 19/16	OCT 19/16	OCT 19/16				OCT 19/16
Time Received at LAB					7:00	7:00		7:00	7:00	7:00				7:00
pH		AM047	pH					8.59	11	7				12.18
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										7.76
Specific Gravity		AM045	g/ml					1.05	1	0.95				1
Heat Value		AM005	MJ/kg	0.3	2.87	6.56		4.87	17.86	27.39				
Ash @ 750 C		AM129	% mass	0.03				3.19	1.51	1.1				
Fluoride	Total	AM005	% mass F	0.05				0.026	0.016	0.017				
	Soluble	AM036	% mass F	0.05				0.047	0.005	0.009				0.001
	Organic	AM005	% mass F	0.05				0	0.011	0.008				
Chloride	Total	AM005	% mass Cl	0.05				0.278	0.086	0.125				
	Soluble	AM036	% mass Cl	0.05				0.282	0.048	0.018				0.006
	Organic	AM005	% mass Cl	0.05				0	0.038	0.107				
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02				0.756	0.808	0.888				
	Soluble	AM036	% mass S	0.02				0.199	0.038	0.02				0.005
	Non Sulphate	AM005	% mass S	0.02				0.557	0.77	0.868				
Alkalinity	as Carbonate	AM001	ppm CaCO3	30				6060						
	Normality	AM046	N	0.01										0.165
Phase Composition	Organic	AM045	% volume	0.5				5	60	92				
	Emulsion	"	% volume	0.5					30					
	Aqueous	"	% volume	0.5				87						
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5				8	10	8				4
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100	<50				
Solids @ 110 C		AM003	% mass	0.03										0.83
Total Organic Carbon		AM142	ppm	1										81
Water Content by KF :		AM074	% H2O						51.14	28.94				

Additional Analysis:

Comments:

ANALYST: MS

CleanHarbors

DAILY INCINERATION REPORT OF ANALYSIS

Incineration Date: ____________ Analysis Date: OCT 20/16

Storage Location: I6 Lab No.: C16-2585

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					OCT20/16	OCT20/16		OCT20/16	OCT20/16	OCT20/16				OCT20/16
Time Received at LAB					7:30	7:30		7:30	7:30	7:30				7:30
pH		AM047	pH					8.6	10	9.6				12.3
Conductivity @ 20 - 25 C		AM007	mS/cm	0.02										8.3
Specific Gravity		AM045	g/ml					1.024	0.99	0.952				1.024
Heat Value		AM005	MJ/kg	0.3	3.3	6.6		4.6	18.9	27.9				
Ash @ 750 C		AM129	% mass	0.03				2.85	1.51	1.05				
Fluoride	Total	AM005	% mass F	0.05				0	0	0				
	Soluble	AM036	% mass F	0.05				0.04	0	0.01				0
	Organic	AM005	% mass F	0.05				0	0	0				
Chloride	Total	AM005	% mass Cl	0.05				0.29	0.08	0.04				
	Soluble	AM036	% mass Cl	0.05				0.27	0.06	0.04				0.003
	Organic	AM005	% mass Cl	0.05				0.02	0.02	0				
Nitrite	Soluble	AM005	% massNO2	0.05										
Sulphur	Total	AM005	% mass S	0.02				0.86	0.95	0.94				
	Soluble	AM036	% mass S	0.02				0.2	0.03	0.02				0.006
	Non Sulphate	AM005	% mass S	0.02				0.66	0.92	0.92				
Alkalinity	as Carbonate	AM001	ppm CaCO3	30				6300						
	Normality	AM046	N	0.01										0.24
Phase Composition	Organic	AM045	% volume	0.5				5	30	64				
	Emulsion	"	% volume	0.5					60					
	Aqueous	"	% volume	0.5				89		30				
	Sludge	"	% volume	0.5										
	Solid	"	% volume	0.5				6	10	6				2
Viscosity @ 20 - 25 C		AM066	cps	0.1					<100	<100				
Solids @ 110 C		AM003	% mass	0.03										1.01
Total Organic Carbon		AM142	ppm	1										100
Water Content by KF :		AM074	% H2O						48.2	25.6				

Additional Analysis:

Comments:

ANALYST: RT

2016 STACK TEST PROCESS DATA SUMMARY

10/18/2016 to 10/20/2016

Tag No.	PARAMETER	TEST 1	TEST 2	TEST 3	Average
FT-229	RICH FEED, Lpm	30.6	32.9	33.6	**32.4**
FT-219	EMULSION FEED, Lpm	15.6	15.8	13.7	**15.0**
FT-223	LEAN FEED, Lpm	170.5	175.0	176.8	**174.1**
FT-207	ALKALINE FEED, Lpm	127.7	118.6	128.8	**125.0**
FT-313B	TDU FEED, Lpm	4.6	5.5	4.5	**4.9**
FT-313	TDU FEED, scfm	275.4	332.0	267.5	**291.6**
FT-211	LEACHATE FEED, Lpm	15.8	17.3	16.5	**16.5**
PV-236	PRIMARY AIR, Nm^3/h	24423.9	25477.0	25953.4	**25284.8**
PV-209	SECONDARY AIR, Nm^3/h	14620.6	15039.0	15257.5	**14972.4**
FT-260	STACK GAS, Nm^3/h	103205.8	104408.2	104443.5	**104019.2**
TE-240	PRIMARY TEMP., °C	1532.3	1541.5	1521.2	**1531.7**
TE-241	SECONDARY TEMP., °C	965.2	960.7	960.6	**962.2**
TE-203	SDA INLET TEMP., °C	494.3	488.8	500.6	**494.6**
TE-625a	SDA OUTLET TEMP., °C	192.8	192.1	196.4	**193.8**
TE-258	STACK TEMP., °C	193.3	192.6	195.1	**193.7**
PT-242A	BURNER PRESS., mmH_2O	-10.7	-7.6	-7.6	**-8.6**
PT-249	SDA INLET PRESS, mmH_2O	-42.1	-43.4	-39.6	**-41.7**
PT-615	SDA OUTLET PRESS., mmH_2O	-107.8	-106.0	-102.2	**-105.3**
PDT-622	BAGHOUSE DP, mmH_20	213.8	218.2	217.9	**216.7**
AT-205	CO, PPMv dry	34.7	33.5	31.9	**33.4**
AT-213A	HCl, PPMv dry	13.0	8.9	15.5	**12.5**
AT-213B	CO2, % (v/v) dry	9.0	9.0	9.1	**9.1**
AT-213C	H2O, % (v/v)	47.7	47.4	47.5	**47.5**
AT-259	THC, PPMv	6.4	5.0	4.7	**5.4**
AT-261	O_2, % (v/v) dry	8.8	9.1	9.0	**9.0**
AT-263	OPACITY, %	0.1	0.8	0.9	**0.6**
AT-264	SO_2, PPMv dry	344.7	297.7	329.3	**323.9**
SC-PAC-FT	PAC Flow, lbs	23.1	23.0	23.0	**23.0**

Notes:

1. Values shown are the average of readings taken at 60 second intervals during the sampling period.

Alan Churchman
Instrument Technician, Lambton Incinerator
Clean Harbors Inc

APPENDIX 28

Clean Harbors One-Minute Average Combustion Gas Results (12 pages)

Test No. 1 - October 18, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
11:16:00	34.7	8.4	8.9	47.3	6.6	9.0	0.1	288.2
11:17:00	33.9	8.2	9.0	47.4	7.1	8.9	0.2	291.9
11:18:00	29.7	8.1	9.1	47.7	6.8	8.7	0.1	300.0
11:19:00	28.8	8.3	9.0	47.4	6.8	8.8	0.1	297.7
11:20:00	31.9	7.8	8.9	47.2	7.1	9.0	0.0	295.0
11:21:00	33.6	7.8	9.0	47.5	7.7	8.8	0.0	296.6
11:22:00	34.8	8.9	9.0	47.6	6.1	8.8	0.0	299.0
11:23:00	32.4	8.5	8.8	46.8	6.6	8.9	0.0	287.9
11:24:00	36.3	8.4	8.8	46.8	6.8	8.9	0.1	289.8
11:25:00	47.1	8.9	9.1	47.4	7.0	8.8	0.1	306.4
11:26:00	48.4	8.6	9.2	47.6	6.3	8.7	0.1	310.9
11:27:00	44.5	8.3	9.0	47.3	9.0	8.7	0.1	305.4
11:28:00	39.5	8.0	9.1	47.5	6.8	8.7	0.0	307.4
11:29:00	37.5	7.8	9.3	47.7	7.3	8.6	0.0	312.4
11:30:00	44.1	8.2	9.3	47.9	7.3	8.3	0.0	319.1
11:31:00	44.9	8.3	9.2	47.6	8.0	8.4	0.0	313.8
11:32:00	50.7	7.9	9.2	47.5	6.1	8.6	0.1	309.0
11:33:00	45.4	8.7	9.3	48.2	8.5	8.5	0.1	313.8
11:34:00	35.7	9.1	9.3	48.3	5.5	8.4	0.1	317.9
11:35:00	30.4	8.2	9.1	47.5	5.7	8.6	0.1	308.7
11:36:00	27.2	8.0	9.1	47.5	5.6	8.8	0.0	308.7
11:37:00	24.7	8.2	9.1	47.8	5.6	8.7	0.0	307.0
11:38:00	26.2	7.7	8.9	47.3	5.3	8.8	0.0	293.9
11:39:00	27.4	7.6	8.7	46.9	5.9	9.0	0.0	288.8
11:40:00	30.0	8.0	8.8	47.1	5.2	9.1	0.1	291.7
11:41:00	31.4	8.2	8.9	47.4	6.8	9.0	0.1	294.6
11:42:00	29.4	8.5	9.0	47.7	5.4	8.8	0.0	294.0
11:43:00	27.5	8.4	8.9	47.5	5.2	8.9	0.1	292.9
11:44:00	26.5	8.0	9.0	47.5	5.9	8.9	0.0	294.2
11:45:00	28.1	8.4	9.1	47.8	5.7	8.8	0.0	297.1
11:46:00	28.5	8.2	9.0	47.5	5.8	8.7	0.0	294.8
11:47:00	30.8	7.5	8.7	46.7	6.0	9.1	0.1	285.8
11:48:00	31.4	7.9	8.8	46.9	5.6	9.3	0.0	288.7
11:49:00	30.6	8.2	9.0	47.4	5.9	8.9	0.0	297.2
11:50:00	27.9	7.7	8.9	47.3	6.1	8.9	0.1	298.2
11:51:00	27.9	7.8	8.9	47.1	5.8	8.9	0.1	296.9
11:52:00	28.6	8.0	9.0	47.6	5.8	8.8	0.0	302.3
11:53:00	29.5	8.0	9.1	47.9	5.7	8.8	0.0	308.9
11:54:00	29.9	8.1	8.9	47.4	6.2	8.8	0.0	305.4
11:55:00	29.4	8.0	8.8	47.0	5.8	9.0	0.0	298.6
11:56:00	29.8	8.1	8.9	47.3	5.7	9.1	0.0	300.5
11:57:00	31.8	8.2	9.1	47.8	5.3	8.9	0.1	308.4
11:58:00	30.5	7.9	9.0	47.6	6.4	8.7	0.1	308.4
11:59:00	27.7	7.9	8.9	47.4	5.4	8.8	0.0	304.4
12:00:00	29.4	7.9	9.1	47.9	6.4	8.7	0.0	306.0
12:01:00	32.1	7.8	9.2	48.1	5.6	8.7	0.0	306.0
12:02:00	32.9	7.7	8.9	47.4	5.3	8.8	0.0	298.0
12:03:00	34.0	7.6	8.8	47.0	5.9	8.9	0.0	293.1
12:04:00	33.7	7.7	9.0	47.6	6.3	8.9	0.1	299.2
12:05:00	31.2	7.6	9.1	47.9	4.8	8.8	0.0	302.7
12:06:00	29.7	7.4	9.0	47.5	5.2	8.8	0.1	304.6
12:07:00	33.5	7.6	8.9	47.6	5.3	9.0	0.0	309.2
12:08:00	34.7	7.7	9.0	47.8	6.0	8.9	0.0	311.7
12:09:00	35.5	7.7	9.0	47.7	5.3	8.8	0.0	310.3
12:10:00	34.1	7.7	8.8	47.2	6.4	8.9	0.0	301.6
12:11:00	35.4	7.7	8.7	46.9	5.9	9.2	0.0	295.0
12:12:00	35.8	7.7	9.0	47.7	6.1	9.0	0.0	303.6
12:13:00	36.3	7.8	9.0	47.8	5.2	8.9	0.0	307.4
12:14:00	40.0	7.8	8.9	47.4	5.9	8.8	0.0	304.3
12:15:00	39.6	8.0	8.9	47.3	5.3	8.9	0.0	305.4
12:16:00	38.7	8.5	9.0	47.7	5.7	8.8	0.0	309.6
12:17:00	39.7	8.4	9.0	47.7	5.6	8.8	0.0	309.6
12:18:00	38.2	7.8	8.7	47.0	6.1	9.0	0.1	300.8
12:19:00	39.0	8.1	8.7	46.9	6.0	9.3	0.0	300.9
12:20:00	38.1	8.3	8.9	47.3	5.7	9.1	0.1	307.4
12:21:00	39.9	8.4	9.1	47.7	5.7	8.8	0.1	315.4
12:22:00	41.7	8.2	9.0	47.5	5.3	8.8	0.1	312.5
12:23:00	40.3	8.0	9.0	47.3	5.8	9.0	0.0	313.4
12:24:00	44.9	8.8	9.1	47.9	5.6	8.9	0.0	319.5
12:25:00	47.4	8.8	9.1	48.1	6.1	8.9	0.0	322.0
12:26:00	44.7	8.0	8.7	47.0	6.1	9.1	0.0	306.1
12:27:00	43.9	8.2	8.6	46.7	5.8	9.2	0.0	303.2
12:28:00	42.0	8.9	9.0	47.6	5.9	9.1	0.1	314.3
12:29:00	41.3	8.9	8.9	47.6	5.9	8.8	0.0	316.1

Test No. 1 - October 18, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
12:30:00	42.6	8.7	8.9	47.4	5.8	8.9	0.1	312.6
12:31:00	43.6	8.7	9.0	47.7	6.7	9.0	0.0	312.6
12:32:00	45.8	8.6	9.0	47.9	5.9	8.9	0.0	316.7
12:33:00	47.4	8.2	8.9	47.6	6.4	8.8	0.0	317.2
12:34:00	47.0	8.9	8.7	46.8	5.9	9.1	0.0	306.1
12:35:00	47.5	8.8	8.8	47.2	6.0	9.2	0.0	308.7
12:36:00	45.2	8.7	9.0	47.9	6.2	9.1	0.0	319.8
12:37:00	43.5	8.4	9.0	47.8	5.8	8.9	0.0	322.8
12:38:00	39.7	8.2	8.9	47.3	5.4	9.0	0.0	320.3
12:39:00	39.5	8.6	8.9	47.6	6.6	9.0	0.0	324.4
12:40:00	43.8	8.6	9.0	48.0	6.1	8.9	0.0	328.3
12:41:00	45.4	8.7	8.9	47.4	6.9	8.9	0.0	322.0
12:42:00	43.9	8.4	8.8	47.2	6.2	9.1	0.0	316.1
12:43:00	48.7	8.3	9.0	47.6	5.5	9.0	0.0	319.3
12:44:00	49.0	8.2	9.0	47.8	5.9	8.9	0.0	322.9
12:45:00	44.6	8.8	9.0	47.8	6.3	8.7	0.0	324.7
12:46:00	39.1	8.5	8.9	47.4	6.1	8.9	0.0	323.6
12:47:00	37.8	8.7	9.1	47.8	6.2	8.9	0.0	328.7
12:48:00	41.5	9.1	9.1	48.1	6.1	8.8	0.0	332.5
12:49:00	41.5	9.1	9.0	47.6	6.6	8.7	0.0	328.9
12:50:00	38.8	8.6	8.7	46.8	6.4	9.0	0.0	315.2
12:51:00	38.0	8.5	8.8	47.0	7.0	9.1	0.0	319.5
12:52:00	33.6	8.9	9.1	47.7	6.5	8.8	0.0	331.9
12:53:00	32.1	8.9	9.0	47.4	6.4	8.6	0.0	333.6
12:54:00	32.6	8.8	9.0	47.3	6.1	8.7	0.1	333.6
12:55:00	32.4	9.0	9.1	47.8	5.4	8.7	0.0	337.5
12:56:00	33.6	9.5	9.2	47.8	5.6	8.7	0.0	337.5
12:57:00	40.8	9.8	9.0	47.5	6.3	8.8	0.0	333.6
12:58:00	38.8	9.0	8.9	47.2	6.2	9.1	0.0	327.8
12:59:00	37.9	9.6	9.1	47.8	6.9	9.0	0.0	334.5
13:00:00	35.9	10.6	9.3	48.3	6.3	8.7	0.0	343.8
13:01:00	34.0	10.3	9.2	48.1	5.8	8.5	0.0	340.8
13:02:00	36.9	9.3	9.1	48.0	6.4	8.7	0.0	342.4
13:03:00	38.2	9.2	9.3	48.2	6.2	8.6	0.0	346.5
13:04:00	39.2	9.6	9.3	48.2	5.6	8.6	0.0	346.5
13:05:00	35.0	9.5	9.0	47.4	6.0	8.7	0.0	338.6
13:06:00	32.1	9.3	8.9	47.0	5.6	8.8	0.0	333.2
13:07:00	33.7	9.9	9.1	47.6	6.9	8.8	0.0	339.0
13:08:00	33.1	10.5	9.2	47.8	6.5	8.6	0.0	345.1
13:09:00	32.1	10.0	9.1	47.7	6.8	8.6	0.0	343.6
13:10:00	32.2	10.1	9.1	47.8	6.4	8.8	0.0	343.2
13:11:00	32.5	10.4	9.2	48.2	6.8	8.6	0.0	346.4
13:12:00	32.4	10.2	9.3	48.4	6.3	8.5	0.0	350.9
13:13:00	31.3	9.9	9.1	47.9	5.5	8.7	0.0	340.9
13:14:00	34.3	10.1	8.9	47.4	6.0	9.0	0.0	332.3
13:15:00	34.7	11.3	9.2	48.0	6.6	8.7	0.0	342.7
13:16:00	32.7	11.0	9.2	48.1	6.0	8.6	0.0	345.1
14:13:00	28.5	12.7	9.0	47.8	6.4	9.0	0.0	350.9
14:14:00	29.0	12.8	9.0	48.0	6.7	8.8	0.0	350.9
14:15:00	32.2	12.7	9.0	47.9	5.5	8.8	0.0	350.9
14:16:00	29.3	12.5	8.8	47.5	6.9	8.9	0.0	337.6
14:17:00	29.6	12.5	8.7	47.2	6.6	9.0	0.0	336.1
14:18:00	32.6	13.6	9.0	48.0	7.1	8.9	0.0	350.4
14:19:00	31.7	13.8	9.1	48.3	6.4	8.8	0.0	356.3
14:20:00	29.4	12.4	8.9	47.8	7.0	8.7	0.0	347.7
14:21:00	30.1	12.3	8.9	47.7	6.7	8.8	0.0	346.6
14:22:00	33.0	13.2	9.1	48.3	6.8	8.7	0.0	353.7
14:23:00	34.0	13.0	9.0	47.8	6.4	8.6	0.0	351.6
14:24:00	33.7	12.5	8.8	47.4	6.9	8.8	0.0	346.1
14:25:00	34.6	12.4	8.8	47.4	6.4	9.1	0.0	345.8
14:26:00	34.7	12.9	9.0	47.7	6.9	8.9	0.0	352.1
14:27:00	30.3	13.7	9.1	48.1	5.9	8.7	0.0	363.2
14:28:00	30.6	13.0	8.9	47.7	7.0	8.8	0.0	358.2
14:29:00	31.5	13.1	9.0	47.8	6.1	8.9	0.0	359.8
14:30:00	32.0	13.6	9.2	48.2	6.8	8.7	0.0	362.6
14:31:00	32.7	14.0	9.2	48.2	6.0	8.6	0.0	364.8
14:32:00	30.6	13.7	8.9	47.6	6.7	8.8	0.0	353.2
14:33:00	30.9	13.7	9.1	48.1	7.0	8.9	0.0	359.2
14:34:00	30.4	14.1	9.2	48.3	6.1	8.8	0.0	364.7
14:35:00	28.4	14.4	9.1	48.2	6.8	8.6	0.0	363.2
14:36:00	28.7	14.3	9.0	47.9	7.1	8.7	0.1	359.9
14:37:00	30.7	14.7	9.1	48.2	6.3	8.7	0.0	363.7
14:38:00	34.9	14.7	9.2	48.4	7.2	8.7	0.0	366.5
14:39:00	34.8	14.7	9.0	48.0	6.3	8.6	0.0	361.6

Test No. 1 - October 18, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
14:40:00	32.2	14.4	8.8	47.4	6.2	8.8	0.0	350.9
14:41:00	31.3	14.2	8.9	47.6	7.2	9.0	0.0	353.0
14:42:00	31.0	14.2	9.1	48.1	6.8	8.8	0.0	359.9
14:43:00	30.4	14.1	9.1	48.1	6.8	8.7	0.0	362.1
14:44:00	28.7	13.8	8.9	47.5	6.5	8.8	0.1	356.9
14:45:00	29.3	15.1	9.0	47.9	6.3	8.8	0.0	363.8
14:46:00	31.0	15.1	9.1	48.0	6.8	8.7	0.1	365.1
14:47:00	32.1	15.3	8.9	47.6	6.7	8.9	0.0	358.2
14:48:00	31.6	15.1	8.8	47.5	7.4	9.0	0.1	352.9
14:49:00	35.5	14.5	8.9	47.8	7.3	8.9	0.0	358.8
14:50:00	34.6	15.9	9.2	48.0	7.6	8.7	0.0	370.3
14:51:00	31.9	15.7	9.1	48.1	6.8	8.6	0.0	365.9
14:52:00	31.0	14.9	9.0	47.8	7.0	8.8	0.0	360.0
14:53:00	30.5	14.9	9.1	48.1	6.7	8.8	0.0	363.6
14:54:00	33.8	15.3	9.2	48.5	6.4	8.7	0.0	369.6
14:55:00	34.2	15.5	9.1	48.2	6.7	8.6	0.0	365.9
14:56:00	32.8	14.8	8.8	47.1	7.0	8.9	0.0	351.6
14:57:00	33.0	15.7	9.0	47.8	7.5	8.9	0.0	363.2
14:58:00	33.3	15.9	9.1	48.2	6.4	8.8	0.1	368.8
14:59:00	31.5	15.5	9.0	48.0	6.9	8.8	0.1	367.8
15:00:00	32.2	15.5	8.9	47.8	7.3	8.9	0.0	369.6
15:01:00	31.3	16.2	9.1	48.2	7.1	8.8	0.0	373.9
15:02:00	33.7	17.2	9.2	48.4	6.3	8.6	0.0	377.5
15:03:00	32.3	16.6	9.0	47.8	6.7	8.7	0.0	369.2
15:04:00	31.9	15.6	8.8	47.5	6.8	8.9	0.0	362.6
15:05:00	32.7	15.9	9.0	47.9	7.4	8.9	0.1	368.5
15:06:00	31.8	16.7	9.2	48.3	6.8	8.7	0.0	377.8
15:07:00	30.1	17.1	9.1	48.0	6.8	8.7	0.1	371.8
15:08:00	30.5	17.2	9.0	48.0	6.8	8.8	0.0	371.8
15:09:00	32.9	16.5	9.2	48.4	6.5	8.7	0.1	373.5
15:10:00	35.4	16.2	9.2	48.5	6.6	8.7	0.0	373.5
15:11:00	34.5	15.8	8.9	47.5	6.9	8.8	0.0	363.8
15:12:00	33.2	16.1	8.8	47.2	6.9	8.9	0.1	365.2
15:13:00	33.7	17.1	9.0	47.7	7.5	8.9	0.1	372.9
15:14:00	32.1	18.0	9.1	48.0	6.8	8.7	0.1	382.6
15:15:00	32.2	17.6	9.0	47.7	6.9	8.7	0.1	378.9
15:16:00	31.1	17.1	9.0	47.7	6.9	8.9	0.0	380.7
15:17:00	31.7	17.3	9.1	48.0	7.4	8.7	0.0	383.9
15:18:00	35.2	18.4	9.1	48.1	6.4	8.7	0.0	386.1
15:19:00	32.2	17.1	8.9	47.4	7.6	8.9	0.0	373.4
15:20:00	32.2	16.6	8.9	47.5	7.5	9.0	0.0	374.7
15:21:00	35.2	18.0	9.2	48.3	7.5	8.8	0.0	388.0
15:22:00	34.4	17.9	9.2	48.5	6.7	8.7	0.0	390.3
15:23:00	31.4	16.9	9.1	48.1	8.0	8.7	0.1	384.7
15:24:00	35.4	17.5	9.2	48.5	7.9	8.7	0.0	388.7
15:25:00	36.5	17.7	9.2	48.6	7.0	8.5	0.0	388.7
15:26:00	33.9	17.4	9.1	48.3	6.2	8.4	0.0	380.9
15:27:00	31.6	17.2	9.0	47.8	7.4	8.6	0.0	373.2
15:28:00	31.6	17.8	9.0	47.7	6.6	8.9	0.0	373.7
15:29:00	33.0	18.7	9.2	48.3	7.8	8.7	0.1	386.1
15:30:00	30.2	18.7	9.2	48.4	6.6	8.5	0.0	390.0
15:31:00	29.0	18.3	9.1	47.9	7.1	8.7	0.0	387.3
15:32:00	30.2	18.4	9.1	48.0	6.7	8.8	0.0	389.5
15:33:00	31.7	18.9	9.2	48.3	7.2	8.6	0.0	393.6
15:34:00	32.2	19.1	9.0	48.2	6.7	8.7	0.0	386.1
15:35:00	33.7	19.3	8.9	47.3	8.4	8.9	0.0	378.9
15:36:00	38.8	19.6	9.1	47.9	7.8	8.8	0.0	387.5
15:37:00	38.3	19.8	9.3	48.3	9.0	8.7	0.1	394.2
15:45:00	33.8	20.4	9.1	47.9	8.1	8.8	0.0	393.1
15:46:00	32.9	20.1	9.1	48.1	7.3	8.7	0.0	397.4
15:47:00	33.3	19.5	9.0	47.9	7.6	8.8	0.0	393.4
15:48:00	32.2	19.7	9.2	48.4	7.0	8.7	0.0	403.5
15:49:00	33.1	20.9	9.2	48.6	6.7	8.6	0.0	406.0
15:50:00	32.4	20.2	9.0	47.7	8.1	8.7	0.0	393.4
15:51:00	32.9	18.9	8.8	47.3	6.9	8.8	0.0	387.2
15:52:00	34.6	20.6	9.0	47.8	7.3	8.8	0.0	397.2
15:53:00	32.9	21.3	9.2	48.1	7.4	8.6	0.0	403.2
15:54:00	33.7	20.4	9.1	48.0	7.4	8.5	0.1	401.1
15:55:00	38.6	20.1	9.0	47.9	7.3	8.6	0.1	399.3
15:56:00	37.5	20.6	9.2	48.2	7.4	8.6	0.0	403.2
15:57:00	36.7	20.9	9.2	48.4	6.7	8.6	0.0	403.2
15:58:00	35.2	20.4	8.9	47.9	6.8	8.6	0.0	390.1
15:59:00	35.4	20.0	8.9	47.7	6.7	8.8	0.1	386.5
16:00:00	35.6	20.7	9.1	48.2	7.6	8.8	0.0	398.5

Test No. 1 - October 18, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
16:01:00	34.3	21.0	9.2	48.3	6.8	8.7	0.0	403.0
16:02:00	33.1	21.8	9.1	48.1	7.2	8.7	0.0	401.5
16:03:00	33.2	21.7	9.0	47.9	7.0	8.8	0.0	398.6
16:04:00	33.2	22.1	9.0	48.2	7.5	8.7	0.0	400.0
16:05:00	36.6	22.0	9.1	48.3	6.4	8.6	0.0	402.1
16:06:00	37.0	21.7	9.0	48.1	6.9	8.7	0.0	396.7
16:07:00	38.1	20.7	8.9	47.6	6.9	8.9	0.0	389.5
16:08:00	38.1	20.8	9.1	48.0	8.3	8.8	0.0	396.0
16:09:00	37.4	21.6	9.2	48.4	7.1	8.6	0.0	406.5
16:10:00	36.6	21.0	9.1	48.2	8.3	8.6	0.0	403.5
16:11:00	37.0	20.4	9.0	48.2	7.5	8.7	0.0	403.5
16:12:00	38.1	21.1	9.2	48.4	7.5	8.6	0.0	407.8
16:13:00	38.5	21.6	9.2	48.3	7.3	8.6	0.0	406.0
16:14:00	37.4	21.1	8.9	47.6	7.5	8.7	0.0	394.6
16:15:00	39.0	21.6	9.0	47.8	7.2	9.0	0.0	393.9
16:16:00	40.2	22.5	9.1	48.1	7.6	8.9	0.0	399.6
16:17:00	38.3	22.2	9.2	48.1	7.4	8.7	0.0	411.6
16:18:00	37.8	21.6	9.1	47.7	7.6	8.7	0.0	411.6
16:19:00	37.1	23.6	9.1	47.7	7.0	8.9	0.0	416.6
16:20:00	35.2	24.4	9.2	48.0	6.9	8.7	0.0	417.8
Max	50.7	24.4	9.3	48.6	9.0	9.3	0.2	417.8
Min	24.7	7.4	8.6	46.7	4.8	8.3	0.0	285.8
Average	34.8	12.9	9.0	47.7	6.6	8.8	0.0	345.5

Test No. 2 - October 19, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
10:47:00	32.8	11.9	9.0	47.4	4.9	9.2	0.9	253.4
10:48:00	35.6	12.4	9.1	47.7	4.8	9.0	0.8	256.1
10:49:00	38.0	12.4	9.1	47.7	5.1	9.0	0.8	256.1
10:50:00	36.6	10.9	8.9	47.0	4.9	9.1	0.8	247.2
10:51:00	36.1	10.5	8.8	46.8	5.3	9.2	1.0	245.6
10:52:00	36.3	10.6	9.1	47.5	4.4	9.1	1.0	256.5
10:53:00	30.8	11.0	9.2	47.6	4.8	8.8	0.9	261.0
10:54:00	31.3	10.6	9.1	47.4	4.5	8.9	1.0	258.1
10:55:00	32.8	10.5	9.0	47.3	5.1	9.1	0.9	256.2
10:56:00	32.8	10.4	9.1	47.5	4.8	9.0	0.9	256.2
10:57:00	37.4	10.2	9.1	47.7	5.2	8.9	0.8	257.7
10:58:00	35.9	9.2	8.8	46.9	4.7	9.3	0.8	246.5
10:59:00	36.4	9.5	8.8	47.0	5.3	9.4	0.9	244.7
11:00:00	34.4	10.0	9.1	47.8	4.7	9.1	0.9	249.7
11:01:00	32.3	9.8	9.2	48.0	4.9	9.0	0.9	248.6
11:02:00	31.0	8.7	9.0	47.6	4.4	9.1	0.9	241.1
11:03:00	32.1	8.9	9.0	47.6	5.5	9.1	0.8	249.6
11:04:00	36.9	8.9	9.0	47.5	4.9	9.1	0.9	252.1
11:05:00	42.5	8.7	8.9	47.1	5.5	9.1	0.8	253.8
11:06:00	40.9	8.6	8.8	46.7	5.2	9.3	0.9	249.7
11:07:00	41.6	9.0	8.9	47.0	5.4	9.4	0.9	246.8
11:08:00	40.2	8.9	9.0	47.3	4.7	9.3	0.9	250.7
11:09:00	34.4	8.1	9.0	47.5	5.6	9.0	1.0	252.8
11:10:00	36.1	7.9	8.9	47.2	4.8	9.2	1.0	246.2
11:11:00	38.1	7.9	8.9	47.3	6.2	9.2	0.9	247.8
11:12:00	43.1	7.7	9.0	47.5	5.3	9.1	0.9	249.3
11:13:00	44.9	7.7	8.9	47.4	5.7	9.1	0.8	249.3
11:14:00	43.0	6.9	8.7	46.8	5.2	9.4	0.9	239.3
11:15:00	42.9	7.6	8.9	47.2	5.2	9.3	0.9	241.9
11:16:00	41.8	7.9	9.0	47.3	4.8	9.2	0.9	245.6
11:17:00	39.6	7.3	9.0	47.4	5.7	9.2	1.0	248.7
11:18:00	41.2	7.4	8.9	47.2	4.9	9.3	0.9	248.7
11:19:00	40.4	7.3	9.0	47.3	6.3	9.2	0.8	248.7
11:20:00	43.4	7.4	9.1	47.4	5.4	9.1	0.9	248.7
11:21:00	47.0	7.4	8.9	47.0	5.5	9.2	0.8	245.5
11:22:00	44.8	6.5	8.7	46.5	5.2	9.4	0.9	239.3
11:23:00	44.4	7.3	8.8	47.0	5.8	9.5	0.9	243.6
11:24:00	41.6	7.4	9.0	47.3	4.8	9.2	0.9	248.4
11:25:00	38.6	6.9	9.0	47.3	5.2	9.1	0.9	245.5
11:26:00	38.0	6.9	8.8	47.2	4.7	9.2	0.9	232.0
11:27:00	38.9	6.5	9.0	47.5	5.6	9.1	0.8	239.7
11:28:00	41.1	6.5	9.1	47.6	4.6	9.1	0.9	249.1
11:29:00	42.3	6.7	8.9	47.0	5.1	9.3	0.8	245.9
11:30:00	41.8	6.7	8.8	46.7	4.9	9.4	0.9	239.0
11:31:00	42.5	6.6	8.9	47.3	5.3	9.3	0.9	236.6
11:32:00	40.9	6.3	9.1	47.6	4.5	9.1	0.9	246.4
11:33:00	38.4	5.9	9.0	47.2	5.2	9.1	0.9	246.4
11:34:00	41.5	5.7	8.8	46.8	4.8	9.3	0.9	248.8
11:35:00	41.8	5.5	8.9	47.0	5.9	9.3	0.8	248.8
11:36:00	47.9	6.2	8.9	47.4	5.2	9.3	0.8	245.6
11:37:00	46.6	6.1	8.7	46.9	5.5	9.4	0.8	229.2
11:38:00	46.4	5.8	8.6	46.6	5.7	9.5	0.9	228.0
11:39:00	51.7	5.9	8.8	47.1	5.8	9.5	0.9	243.4
11:40:00	51.3	5.8	8.9	47.2	5.5	9.4	0.9	246.9
11:41:00	46.7	5.5	8.8	47.1	5.5	9.3	0.9	240.8
11:42:00	46.7	5.6	8.8	47.1	5.3	9.4	0.8	234.4
11:43:00	50.4	5.9	8.9	47.5	6.0	9.3	0.8	234.7
11:44:00	57.0	5.5	8.8	47.1	6.3	9.3	0.8	246.6
11:45:00	57.0	5.4	8.6	46.5	6.3	9.5	0.8	240.9
11:46:00	58.6	5.4	8.5	46.4	6.6	9.8	0.9	236.7
11:47:00	58.8	5.3	8.7	46.9	5.9	9.6	0.9	238.4
11:48:00	54.7	5.4	8.8	47.3	6.2	9.4	0.9	237.0
11:49:00	51.5	4.9	8.7	46.8	5.5	9.4	1.0	239.2
11:50:00	52.5	5.0	8.7	46.6	6.0	9.5	0.8	245.5
11:51:00	53.8	5.3	8.8	47.0	6.1	9.5	0.8	249.2
11:52:00	57.8	5.1	8.8	47.0	6.6	9.5	0.8	249.2
11:53:00	59.7	4.7	8.5	46.1	6.0	9.6	0.8	236.5
11:54:00	59.5	4.7	8.4	45.9	6.7	9.7	0.9	234.4
11:55:00	57.9	5.2	8.7	46.8	5.7	9.6	0.9	244.5
11:56:00	50.5	5.5	8.8	47.0	6.3	9.3	0.9	246.3
11:57:00	50.5	5.2	8.7	46.8	5.8	9.4	1.0	242.8
11:58:00	52.1	4.9	8.8	47.0	6.7	9.5	0.8	242.8
11:59:00	54.1	5.1	8.8	47.2	5.6	9.4	0.8	245.2
12:00:00	58.3	5.2	8.8	47.2	6.5	9.3	0.8	245.2

Test No. 2 - October 19, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
12:01:00	55.9	4.9	8.5	46.5	5.8	9.6	0.8	236.2
12:02:00	57.2	5.3	8.6	46.5	6.7	9.7	0.9	237.4
12:03:00	56.7	5.3	8.8	47.3	5.8	9.5	1.0	247.4
12:04:00	55.0	5.0	8.9	47.6	6.5	9.4	0.9	250.6
12:05:00	51.3	4.8	8.7	47.0	5.8	9.5	1.0	247.3
12:06:00	50.5	4.6	8.8	47.2	6.7	9.4	0.8	247.2
12:07:00	54.5	4.8	8.9	47.3	6.0	9.4	0.8	248.8
12:08:00	59.5	4.6	8.7	46.8	6.4	9.5	0.8	246.4
12:09:00	56.5	4.7	8.6	46.5	5.9	9.6	0.8	241.0
12:10:00	54.7	5.2	8.7	46.8	6.6	9.6	0.9	241.9
12:11:00	55.9	5.1	8.9	47.4	5.5	9.4	0.9	246.9
12:12:00	53.1	5.0	8.9	47.4	6.4	9.2	0.9	246.9
12:13:00	52.1	4.5	8.8	46.9	5.8	9.4	1.0	240.8
12:14:00	51.7	4.5	8.8	47.0	7.5	9.5	0.8	240.8
12:15:00	58.9	4.5	8.8	47.1	6.3	9.4	0.9	244.8
12:16:00	60.9	4.3	8.7	46.9	6.5	9.4	0.8	246.6
12:17:00	57.7	4.1	8.5	46.2	6.0	9.8	0.9	237.4
12:18:00	59.9	4.5	8.7	46.9	6.6	9.7	0.9	235.9
12:19:00	56.7	4.4	8.8	47.2	5.8	9.6	0.9	237.7
12:20:00	51.1	4.4	8.8	46.8	6.2	9.4	0.9	248.3
12:21:00	53.0	4.6	8.7	46.7	5.5	9.5	0.9	253.5
12:22:00	51.2	4.9	8.8	46.8	7.0	9.5	0.8	257.9
12:23:00	59.6	4.7	8.9	46.8	5.9	9.5	0.9	264.3
12:24:00	58.5	4.7	8.7	46.2	6.7	9.5	0.8	258.9
12:25:00	57.3	4.6	8.5	45.6	6.3	9.7	0.9	250.6
12:26:00	60.3	4.7	8.6	46.2	6.2	9.7	0.9	255.0
12:27:00	54.8	5.1	8.8	46.9	5.5	9.5	0.9	261.7
12:28:00	50.2	5.4	8.8	46.7	6.0	9.4	0.9	259.8
12:29:00	50.7	5.4	8.8	46.7	5.4	9.4	0.9	259.8
12:30:00	50.9	5.2	8.9	47.1	6.2	9.3	0.8	259.8
12:31:00	54.6	5.3	8.9	47.1	5.6	9.4	0.8	261.8
12:32:00	54.8	4.8	8.7	46.4	6.1	9.5	0.8	257.5
12:33:00	52.0	5.0	8.6	46.2	5.7	9.7	0.8	255.1
12:34:00	50.3	5.3	8.8	46.5	5.7	9.5	0.9	261.3
12:35:00	46.4	5.5	9.0	47.0	5.2	9.3	0.9	272.0
12:36:00	45.5	5.6	8.9	47.0	5.8	9.4	0.9	272.0
12:37:00	47.4	5.1	8.9	46.7	5.2	9.5	0.9	272.0
12:38:00	45.5	5.1	8.9	46.9	5.7	9.4	0.8	272.0
12:39:00	54.4	5.3	9.0	47.0	5.5	9.4	0.8	275.9
12:40:00	50.4	4.9	8.6	46.2	5.7	9.5	0.8	263.7
12:41:00	47.5	5.1	8.6	46.1	5.5	9.6	0.9	260.0
12:42:00	47.6	5.7	8.9	46.8	5.2	9.3	0.9	274.4
12:43:00	45.0	5.4	9.0	47.1	5.3	9.3	0.9	283.9
12:44:00	42.9	5.2	8.9	46.8	5.1	9.2	0.9	283.3
12:45:00	43.0	6.0	8.9	46.7	5.3	9.3	0.8	282.7
12:46:00	43.6	6.2	9.0	47.1	5.6	9.3	0.8	284.6
12:47:00	50.0	6.2	8.9	47.0	5.5	9.2	0.7	288.6
13:38:00	20.2	9.5	9.4	48.2	4.3	8.7	0.8	336.1
13:39:00	19.8	9.9	9.3	48.0	4.4	8.7	0.9	332.1
13:40:00	20.0	9.3	9.3	47.7	4.3	8.8	0.8	332.5
13:41:00	21.1	9.2	9.4	48.2	4.7	8.7	0.8	334.0
13:42:00	21.9	9.3	9.4	48.3	4.5	8.7	0.8	335.3
13:43:00	20.7	8.5	9.1	47.2	4.5	8.8	0.8	322.7
13:44:00	20.7	8.6	9.0	46.9	4.7	8.9	0.8	319.7
13:45:00	21.1	9.1	9.3	47.6	4.5	8.9	0.9	327.5
13:46:00	21.1	9.0	9.3	47.9	4.1	8.8	0.8	326.2
13:47:00	19.6	9.3	9.2	47.9	4.2	8.8	0.9	315.9
13:48:00	19.8	9.1	9.3	47.9	4.5	8.9	0.8	326.5
13:49:00	21.9	9.6	9.3	47.9	4.7	8.8	0.8	331.5
13:50:00	25.6	9.7	9.2	47.6	4.7	8.8	0.7	329.5
13:51:00	25.0	8.8	9.0	47.2	4.4	9.0	0.7	321.7
13:52:00	25.1	8.5	9.0	47.0	4.6	9.3	0.8	316.7
13:53:00	24.9	9.1	9.2	47.4	4.6	9.0	0.8	327.5
13:54:00	24.0	9.4	9.3	47.8	4.5	8.9	0.8	329.5
13:55:00	22.0	9.6	9.1	47.4	4.0	9.0	0.9	315.3
13:56:00	22.0	9.3	9.1	47.5	4.6	9.1	0.8	318.7
13:57:00	23.5	8.8	9.3	47.8	4.5	8.9	0.7	328.6
13:58:00	24.2	9.3	9.1	47.3	4.6	8.8	0.7	322.2
13:59:00	23.2	9.1	9.0	47.1	4.3	9.0	0.8	316.5
14:00:00	23.9	9.2	9.1	47.3	4.8	9.1	0.8	316.8
14:01:00	23.4	9.5	9.2	47.6	4.4	9.0	0.9	322.1
14:02:00	20.6	9.6	9.2	47.6	4.5	8.8	0.8	328.5
14:03:00	22.1	9.2	9.2	47.5	4.4	8.9	0.9	328.5
14:04:00	22.2	9.4	9.2	47.4	4.5	9.0	0.7	330.4

Test No. 2 - October 19, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
14:05:00	24.1	10.0	9.3	47.7	4.5	8.9	0.8	332.2
14:06:00	25.3	9.6	9.2	47.5	4.2	8.8	0.7	332.2
14:07:00	24.5	9.2	9.0	46.9	4.4	9.1	0.8	317.3
14:08:00	24.0	9.4	9.0	47.1	4.5	9.3	0.8	317.3
14:09:00	22.6	10.1	9.2	47.7	4.1	8.9	0.9	324.5
14:10:00	21.9	9.9	9.2	47.9	4.4	8.9	0.9	317.1
14:11:00	21.6	9.3	9.2	47.6	4.1	8.9	0.9	313.7
14:12:00	21.8	9.2	9.3	47.8	4.6	8.9	0.7	327.3
14:13:00	24.5	9.8	9.3	47.8	4.3	8.9	0.8	334.1
14:14:00	25.7	9.5	9.1	47.4	4.5	9.0	0.7	324.3
14:15:00	24.7	9.1	8.9	47.1	4.7	9.3	0.8	312.0
14:16:00	26.4	9.6	9.1	47.1	4.6	9.3	0.8	320.2
14:17:00	24.5	9.5	9.2	47.5	4.5	9.1	0.8	329.0
14:18:00	22.2	9.5	9.2	47.4	4.5	8.9	0.8	327.4
14:19:00	22.5	9.5	9.1	47.2	4.3	9.1	0.9	324.6
14:20:00	22.1	9.5	9.2	47.4	4.6	9.1	0.7	328.7
14:21:00	24.7	9.4	9.2	47.6	4.0	8.9	0.9	328.2
14:22:00	24.6	9.3	9.0	47.0	4.6	9.1	0.7	310.9
14:23:00	24.1	9.4	8.9	46.8	4.3	9.2	0.8	308.2
14:24:00	24.7	9.3	9.1	47.1	4.7	9.1	0.8	322.0
14:25:00	24.8	9.3	9.1	47.3	4.2	9.1	0.8	328.1
14:26:00	22.9	9.4	9.2	47.4	4.5	9.0	0.8	330.8
14:27:00	22.6	9.9	9.2	47.4	4.5	9.1	0.8	331.2
14:28:00	22.3	9.8	9.3	47.7	4.6	9.0	0.8	332.6
14:29:00	25.1	9.6	9.3	47.9	3.9	8.9	0.8	334.7
14:30:00	24.5	9.5	9.1	47.3	4.6	8.8	0.7	329.1
14:31:00	23.6	9.4	8.9	46.8	4.3	9.1	0.8	316.6
14:32:00	23.5	9.8	9.2	47.6	4.3	9.0	0.8	321.1
14:33:00	22.0	10.0	9.3	48.0	3.9	8.9	0.8	327.9
14:34:00	20.4	9.7	9.2	47.5	4.4	8.9	0.8	333.9
14:35:00	20.7	9.5	9.1	47.2	4.2	8.9	0.8	333.9
14:36:00	21.2	9.9	9.3	47.9	4.7	8.9	0.8	339.6
14:37:00	22.9	10.4	9.3	48.0	3.8	8.8	0.7	339.6
14:38:00	21.6	10.1	9.1	47.3	4.3	8.9	0.7	329.9
14:39:00	21.8	9.3	9.1	47.3	4.5	9.2	0.8	331.3
14:40:00	22.1	9.5	9.3	47.6	4.6	9.0	0.9	338.2
14:41:00	20.5	10.4	9.4	48.1	4.5	8.8	0.8	341.8
14:42:00	19.2	10.4	9.4	48.0	4.4	8.8	0.9	340.2
14:43:00	19.5	10.2	9.3	47.6	4.7	8.9	0.8	348.4
14:44:00	22.2	11.2	9.4	48.1	4.7	8.7	0.8	352.2
14:45:00	23.3	11.4	9.4	48.3	4.2	8.6	0.7	350.2
14:46:00	19.7	10.1	9.2	47.7	4.2	8.8	0.7	326.2
14:47:00	18.8	9.8	9.1	47.5	4.7	8.9	0.8	326.2
14:48:00	20.4	10.3	9.4	48.0	4.3	8.8	0.9	348.4
14:49:00	18.6	10.9	9.4	48.3	4.6	8.6	0.8	351.4
14:50:00	18.4	10.6	9.3	47.9	4.3	8.7	0.8	346.7
14:51:00	18.1	10.4	9.4	48.2	4.5	8.8	0.7	349.0
14:52:00	18.8	10.5	9.4	48.2	4.5	8.7	0.8	349.0
14:53:00	21.7	11.0	9.3	48.0	4.3	8.6	0.7	342.1
14:54:00	20.8	10.9	9.1	47.7	4.6	8.9	0.7	332.5
14:55:00	20.6	10.6	9.1	47.7	4.7	9.1	0.8	326.0
14:56:00	21.1	10.6	9.3	48.5	4.2	8.9	0.9	336.5
14:57:00	20.9	10.4	9.3	48.5	4.7	8.8	0.8	338.7
14:58:00	20.4	10.2	9.2	47.8	4.9	8.9	0.9	341.4
14:59:00	20.6	10.9	9.3	47.8	4.7	8.8	0.8	347.6
15:00:00	22.1	10.7	9.4	48.4	4.6	8.7	0.7	344.0
15:01:00	22.9	10.2	9.2	47.9	4.6	8.8	0.7	334.6
15:02:00	22.0	10.1	9.1	47.4	4.9	9.0	0.7	332.8
15:03:00	22.6	11.0	9.2	47.8	4.6	9.1	0.8	338.2
15:04:00	22.2	11.1	9.3	48.1	4.6	8.9	0.8	343.7
15:05:00	19.7	10.4	9.3	48.1	4.7	8.6	0.8	343.4
15:06:00	19.7	10.5	9.2	47.9	4.6	8.8	0.9	335.4
15:07:00	19.7	11.1	9.3	48.0	4.9	8.9	0.7	342.0
15:08:00	23.6	11.0	9.3	48.3	4.5	8.8	0.8	348.2
15:09:00	24.8	11.0	9.2	48.1	4.5	8.7	0.7	344.9
15:10:00	23.0	10.6	9.0	47.2	4.6	9.1	0.8	334.7
15:11:00	23.5	10.9	9.2	47.4	4.6	9.0	0.8	341.8
15:12:00	23.7	11.2	9.3	47.9	4.2	8.9	0.8	348.4
15:13:00	22.6	11.6	9.3	47.9	4.6	8.9	0.8	351.8
15:14:00	21.6	11.6	9.2	47.8	4.6	9.0	0.8	346.2
15:15:00	20.3	11.5	9.3	48.2	4.6	8.8	0.7	343.6
15:16:00	21.4	11.4	9.4	48.3	4.2	8.8	0.8	349.6
15:17:00	22.8	11.7	9.2	47.8	4.5	8.7	0.7	347.5
15:18:00	22.1	11.4	9.0	47.4	4.6	9.0	0.8	328.1

Test No. 2 - October 19, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
15:19:00	22.6	11.6	9.2	47.8	4.6	9.0	0.8	336.3
15:20:00	21.0	11.9	9.3	48.0	4.5	8.8	0.8	349.4
15:21:00	19.9	11.9	9.3	48.0	4.9	8.6	0.8	347.6
15:22:00	21.2	11.5	9.2	47.6	4.6	8.8	0.8	354.3
15:23:00	23.3	11.9	9.3	48.0	5.1	8.8	0.7	356.5
15:24:00	24.4	11.9	9.3	48.0	4.6	8.8	0.8	355.1
15:25:00	23.8	12.0	9.0	47.4	4.9	9.0	0.7	346.6
15:26:00	23.6	11.5	9.0	47.2	4.9	9.1	0.8	338.9
15:27:00	22.8	11.8	9.2	47.5	5.3	9.0	0.8	351.8
15:28:00	22.1	12.5	9.3	48.0	4.7	8.9	0.8	366.4
15:29:00	22.0	12.6	9.2	48.0	4.8	8.9	0.8	356.9
15:30:00	21.4	12.3	9.2	48.0	4.8	9.0	0.8	348.9
15:31:00	20.8	12.4	9.3	48.1	5.1	8.8	0.7	348.9
15:32:00	23.8	13.0	9.3	48.3	4.8	8.8	0.7	357.3
15:33:00	23.1	12.4	9.0	47.7	4.8	8.9	0.7	345.9
15:34:00	23.1	12.3	9.0	47.1	5.0	9.0	0.8	341.3
15:35:00	23.5	13.3	9.3	48.1	5.4	8.9	0.8	351.1
15:36:00	22.9	13.1	9.3	48.4	4.5	8.8	0.8	356.3
15:37:00	20.3	12.4	9.3	48.0	5.0	8.7	0.9	354.1
15:38:00	19.9	13.1	9.2	47.9	4.5	8.7	0.8	352.2
Max	60.9	13.3	9.4	48.5	7.5	9.8	1.0	366.4
Min	18.1	4.1	8.4	45.6	3.8	8.6	0.7	228.0
Average	34.7	8.4	9.0	47.4	5.1	9.1	0.8	292.6

Test No. 3 - October 20, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
9:46:00	27.3	9.4	9.1	47.4	5.4	8.9	0.8	297.7
9:47:00	27.4	9.0	9.0	47.1	5.3	9.1	0.9	292.2
9:48:00	27.1	9.1	9.2	47.5	5.7	9.0	0.9	294.2
9:49:00	26.2	9.4	9.3	47.8	5.3	8.8	1.0	297.7
9:50:00	22.2	9.4	9.3	47.9	5.1	8.6	0.9	302.4
9:51:00	22.5	8.5	9.2	47.7	5.3	8.8	0.9	302.4
9:52:00	22.5	9.0	9.3	47.8	5.3	8.9	0.8	305.3
9:53:00	25.1	9.4	9.4	48.0	5.1	8.7	0.9	308.0
9:54:00	26.0	9.0	9.3	47.6	4.9	8.6	0.8	304.4
9:55:00	26.3	8.8	9.0	47.0	5.3	8.9	0.9	292.8
9:56:00	26.4	9.2	9.3	47.5	5.6	8.9	1.0	298.9
9:57:00	25.6	9.3	9.3	47.8	5.3	8.8	0.9	304.5
9:58:00	23.2	9.3	9.3	47.7	5.3	8.7	0.9	310.3
9:59:00	22.9	9.1	9.3	47.5	4.9	8.8	1.0	309.2
10:00:00	22.5	9.4	9.4	47.9	5.2	8.6	0.8	311.9
10:01:00	25.2	10.1	9.4	48.1	4.9	8.6	0.9	314.6
10:02:00	24.6	9.8	9.2	47.6	5.3	8.8	0.8	310.1
10:03:00	24.1	9.5	9.1	47.2	5.2	9.0	1.0	302.3
10:04:00	23.5	10.0	9.3	47.6	5.3	8.9	0.9	307.8
10:05:00	22.1	10.2	9.4	48.2	5.0	8.7	1.0	315.6
10:06:00	20.9	10.1	9.4	48.1	5.0	8.6	1.0	313.4
10:07:00	20.9	10.1	9.3	47.8	4.9	8.7	0.9	311.3
10:08:00	22.0	10.1	9.4	48.0	5.1	8.6	0.8	317.5
10:09:00	24.2	10.7	9.4	48.1	4.7	8.6	0.9	319.6
10:10:00	23.8	10.3	9.2	47.4	4.9	8.8	0.8	308.0
10:11:00	23.4	9.9	9.1	47.0	4.8	8.9	0.9	301.7
10:12:00	23.4	10.5	9.2	47.5	5.1	8.9	0.9	307.1
10:13:00	21.4	10.9	9.4	47.8	4.3	8.7	1.0	315.4
10:14:00	21.6	10.5	9.3	47.8	4.9	8.8	1.0	313.8
10:15:00	22.4	10.2	9.3	47.7	4.9	9.0	0.9	313.8
10:16:00	21.1	10.7	9.4	48.0	4.9	8.8	0.8	316.0
10:17:00	22.9	11.6	9.4	48.3	4.6	8.6	0.8	321.9
10:18:00	22.4	10.9	9.3	47.7	5.0	8.7	0.8	312.7
10:19:00	23.1	10.0	9.1	47.1	5.0	9.0	0.9	302.4
10:20:00	24.8	10.9	9.3	47.9	5.1	8.9	1.0	311.3
10:21:00	23.6	11.1	9.4	48.1	4.5	8.8	0.9	313.4
10:22:00	20.8	10.7	9.3	47.6	4.6	8.8	0.9	309.1
10:23:00	21.0	10.5	9.2	47.4	4.6	8.9	0.8	307.7
10:24:00	22.3	10.9	9.4	48.0	4.8	8.8	0.8	312.9
10:25:00	24.7	11.2	9.3	47.9	4.4	8.6	0.8	312.3
10:26:00	23.4	11.0	9.1	47.4	4.9	8.7	0.8	303.0
10:27:00	23.0	11.1	9.1	47.3	4.7	9.0	0.9	299.6
10:28:00	23.4	11.7	9.3	47.6	4.8	8.9	1.0	305.3
10:29:00	20.9	11.4	9.4	48.1	4.7	8.7	1.0	311.2
10:30:00	19.4	11.2	9.3	47.6	5.3	8.8	1.0	309.0
10:31:00	21.1	11.0	9.3	47.7	4.9	8.9	0.9	312.7
10:32:00	24.7	11.2	9.4	48.2	5.1	8.6	0.9	317.1
10:33:00	25.0	11.2	9.5	48.3	4.9	8.6	0.8	318.6
10:34:00	22.2	11.0	9.2	47.3	4.6	8.9	0.8	307.0
10:35:00	23.0	11.9	9.1	47.0	4.7	8.9	0.9	309.8
10:36:00	22.0	12.3	9.4	48.0	4.4	8.8	1.0	316.8
10:37:00	19.0	12.1	9.4	48.1	4.8	8.6	0.9	318.5
10:38:00	19.0	11.6	9.3	47.8	4.5	8.7	1.0	316.1
10:39:00	19.1	11.4	9.4	48.1	4.8	8.7	0.8	322.3
10:40:00	21.2	11.3	9.5	48.2	4.9	8.6	0.9	323.5
10:41:00	22.5	11.5	9.3	47.8	4.7	8.5	0.8	321.5
10:42:00	21.4	11.5	9.2	47.0	4.9	8.8	0.9	310.5
10:43:00	21.4	11.6	9.3	47.3	4.6	8.9	1.0	315.0
10:44:00	19.2	12.2	9.4	47.9	4.9	8.6	1.0	326.4
10:45:00	18.5	12.3	9.5	48.1	4.9	8.5	1.0	330.5
10:46:00	18.9	11.6	9.3	47.7	4.8	8.7	1.0	323.7
10:47:00	19.0	11.7	9.4	47.8	5.1	8.8	0.8	325.9
10:48:00	20.1	12.2	9.5	48.3	4.9	8.6	0.9	327.8
10:49:00	20.9	12.3	9.3	47.7	4.7	8.7	0.8	317.0
10:50:00	20.3	12.1	9.2	47.4	4.2	8.8	0.9	308.7
10:51:00	18.9	11.8	9.3	47.8	4.7	8.7	0.9	312.5
10:52:00	19.0	11.8	9.4	48.2	4.1	8.6	0.9	318.0
10:53:00	16.8	12.0	9.4	48.3	5.0	8.4	0.9	319.1
10:54:00	17.0	11.3	9.3	47.8	4.4	8.6	0.9	315.6
10:55:00	16.8	11.9	9.4	48.1	4.7	8.6	0.8	319.9
10:56:00	20.9	12.4	9.5	48.2	4.8	8.6	0.9	326.0
10:57:00	21.9	12.2	9.4	47.9	4.4	8.5	0.8	322.9
10:58:00	20.5	12.3	9.1	47.1	4.7	8.8	0.9	308.1
10:59:00	20.8	12.7	9.4	47.7	4.3	8.8	1.0	316.2

Test No. 3 - October 20, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
11:00:00	19.7	12.4	9.4	48.0	4.5	8.7	0.9	319.2
11:01:00	16.5	11.9	9.4	48.1	4.7	8.6	1.0	323.2
11:02:00	16.5	12.1	9.4	48.0	3.9	8.7	1.0	324.5
11:03:00	17.4	12.4	9.5	48.4	3.8	8.6	0.9	327.2
11:04:00	19.8	12.1	9.5	48.5	4.8	8.5	0.9	325.8
11:05:00	18.3	11.8	9.3	47.9	4.8	8.6	0.9	316.2
11:06:00	19.4	11.7	9.1	47.4	4.2	8.9	0.9	303.4
11:07:00	20.6	12.3	9.3	47.9	4.8	8.9	1.0	307.3
11:08:00	18.9	12.4	9.4	48.3	4.2	8.7	0.9	314.3
11:09:00	17.4	11.7	9.3	48.0	3.3	8.6	0.9	311.9
11:10:00	18.4	11.7	9.2	47.7	4.2	8.7	0.9	311.9
11:11:00	20.1	12.7	9.4	48.1	4.7	8.7	0.8	319.2
11:12:00	22.2	12.7	9.4	48.1	4.5	8.7	0.9	319.2
11:13:00	22.2	12.7	9.1	47.5	4.8	8.8	0.8	304.0
11:14:00	22.6	12.7	9.0	47.1	4.4	8.9	0.9	298.8
11:15:00	26.0	12.9	9.2	47.7	4.7	8.9	1.0	308.7
11:16:00	23.3	12.5	9.3	48.0	4.2	8.8	1.0	315.9
11:17:00	21.3	12.2	9.3	47.8	4.5	8.8	1.0	314.3
11:18:00	22.0	12.5	9.2	47.7	4.5	9.0	0.9	314.9
11:19:00	22.9	13.2	9.3	48.1	4.6	8.8	0.8	317.2
11:20:00	26.8	13.6	9.4	48.3	4.3	8.7	0.8	319.5
11:21:00	26.8	12.6	9.0	47.3	3.9	9.0	0.8	303.4
11:22:00	28.2	11.8	9.0	47.1	4.3	9.1	0.9	300.3
11:23:00	26.6	12.7	9.3	47.8	3.6	8.9	1.0	311.0
11:24:00	23.6	13.6	9.3	48.0	4.2	8.8	1.0	314.3
11:25:00	21.7	13.0	9.2	47.6	4.0	8.8	1.0	311.8
11:26:00	23.6	13.4	9.3	47.8	4.9	8.9	0.8	315.0
11:27:00	25.1	13.8	9.3	47.9	4.5	8.8	0.8	315.0
11:28:00	27.4	13.0	9.2	47.7	4.5	8.7	0.8	312.7
11:29:00	28.8	12.3	9.0	47.2	4.2	8.9	0.9	305.3
11:30:00	31.0	12.8	9.0	47.2	4.7	9.3	0.9	302.3
11:31:00	28.3	13.4	9.1	47.5	4.2	9.1	1.0	307.0
11:32:00	26.0	13.0	9.3	48.1	4.5	8.9	1.0	319.7
11:33:00	25.1	12.9	9.2	47.6	3.9	9.0	1.0	314.2
11:34:00	25.6	13.3	9.2	47.6	4.9	9.0	0.8	316.3
11:35:00	28.4	13.3	9.3	47.9	4.8	8.8	0.9	321.7
11:36:00	30.2	13.0	9.3	48.0	4.7	8.8	0.8	321.7
11:37:00	29.5	13.0	9.0	47.2	5.0	9.1	0.9	303.6
11:38:00	30.2	13.6	9.1	47.3	5.1	9.2	0.9	304.2
11:39:00	30.1	13.5	9.2	47.7	5.2	9.1	1.0	310.2
11:40:00	25.9	13.4	9.2	47.7	5.3	8.8	1.0	315.9
11:41:00	25.3	13.2	9.1	47.4	4.7	8.9	1.0	311.9
11:42:00	25.4	12.8	9.1	47.6	5.4	9.1	0.8	309.4
11:43:00	28.4	12.9	9.2	47.7	4.8	9.0	0.9	314.1
11:44:00	33.9	13.6	9.1	47.5	5.1	8.9	0.8	313.0
11:45:00	33.6	12.6	8.8	46.8	5.5	9.3	0.9	298.2
11:46:00	34.7	12.8	8.9	47.0	5.2	9.4	0.9	300.5
12:37:00	34.5	15.9	9.1	47.4	4.9	9.1	0.2	341.1
12:38:00	37.3	17.2	9.3	47.9	3.9	8.9	0.3	346.5
12:39:00	39.4	17.6	9.3	48.0	4.5	8.8	0.3	346.5
12:40:00	38.2	16.0	9.0	47.2	3.8	9.1	0.3	335.0
12:41:00	38.7	16.3	9.1	47.4	4.0	9.1	0.4	339.5
12:42:00	35.9	16.6	9.2	47.6	3.6	9.0	0.4	344.4
12:43:00	30.9	17.1	9.2	47.7	3.9	8.8	0.5	345.5
12:44:00	32.0	16.5	9.1	47.5	3.6	8.9	0.5	343.9
12:45:00	30.6	16.2	9.2	47.6	4.6	9.0	0.4	346.2
12:46:00	36.4	17.4	9.3	47.8	4.4	8.9	0.4	344.3
12:47:00	36.9	17.4	9.1	47.4	4.3	8.9	0.4	340.7
12:48:00	33.7	16.5	8.9	46.8	3.8	9.1	0.5	329.1
12:49:00	35.0	17.4	9.0	47.0	4.7	9.3	0.5	331.8
12:50:00	35.6	18.2	9.2	47.6	3.4	9.0	0.5	343.3
12:51:00	32.0	16.5	9.1	47.5	3.9	9.0	0.5	344.2
12:52:00	32.6	17.0	9.1	47.3	3.2	9.1	0.6	343.2
12:53:00	33.3	17.8	9.2	47.6	4.5	9.0	0.5	347.4
12:54:00	37.1	17.2	9.2	47.7	3.7	9.0	0.6	347.4
12:55:00	40.5	17.0	9.0	47.1	4.1	9.2	0.5	338.3
12:56:00	40.2	17.6	8.8	46.8	3.9	9.4	0.6	331.4
12:57:00	40.0	18.2	9.0	47.3	4.3	9.3	0.7	338.5
12:58:00	37.0	17.8	9.2	47.8	3.6	9.0	0.6	352.1
12:59:00	32.9	17.4	9.2	47.6	3.9	8.9	0.7	349.6
13:00:00	32.5	17.6	9.0	47.4	3.5	9.0	0.7	345.6
13:01:00	31.7	18.1	9.2	47.7	4.9	9.0	0.6	349.3
13:02:00	37.2	18.6	9.3	48.0	3.5	8.9	0.6	349.3
13:03:00	38.2	17.4	9.0	47.2	4.2	9.0	0.6	336.4

Test No. 3 - October 20, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
13:04:00	39.0	17.5	8.9	46.9	3.7	9.2	0.7	331.5
13:05:00	42.1	17.7	9.1	47.4	3.8	9.2	0.7	343.2
13:06:00	39.3	17.7	9.2	47.6	3.3	9.0	0.7	348.9
13:07:00	32.2	18.7	9.1	47.5	3.7	8.9	0.7	349.6
13:08:00	33.3	18.5	9.1	47.3	3.3	9.2	0.7	351.5
13:09:00	32.7	18.7	9.2	47.6	4.1	9.0	0.6	352.6
13:10:00	39.1	19.5	9.2	47.7	3.8	9.0	0.6	352.6
13:11:00	39.6	19.0	9.0	47.2	4.3	9.2	0.6	343.8
13:12:00	41.3	18.3	8.8	46.7	4.2	9.5	0.7	331.8
13:13:00	42.5	18.8	9.0	47.1	3.8	9.3	0.7	337.0
13:14:00	40.7	19.3	9.1	47.5	3.9	9.1	0.5	346.9
13:15:00	37.6	17.8	9.0	47.1	3.6	9.1	0.7	340.1
13:16:00	37.2	17.5	8.9	47.0	3.8	9.1	0.9	340.1
13:17:00	36.6	18.6	9.2	47.6	4.0	9.0	1.0	350.5
13:18:00	39.6	19.1	9.2	47.9	4.0	9.0	1.2	354.4
13:19:00	39.6	18.6	9.0	47.2	4.3	9.0	1.3	345.6
13:20:00	41.1	18.7	9.0	47.0	4.8	9.3	1.5	341.8
13:21:00	41.1	19.5	9.1	47.3	3.7	9.1	1.6	348.2
13:22:00	35.1	19.5	9.2	47.8	4.5	8.8	1.6	357.9
13:23:00	33.6	18.8	9.2	47.5	3.6	8.9	1.6	356.2
13:24:00	35.0	17.6	9.1	47.4	4.5	9.1	1.6	363.4
13:25:00	35.2	19.4	9.3	47.9	3.9	8.9	1.6	368.9
13:26:00	38.0	20.5	9.3	47.8	4.7	8.8	1.5	368.9
13:27:00	40.4	19.4	8.9	46.8	4.0	9.2	1.6	351.0
13:28:00	42.3	19.5	8.9	46.7	4.8	9.3	1.7	347.9
13:29:00	40.5	20.8	9.1	47.4	3.8	9.1	1.7	358.2
13:30:00	33.8	19.2	9.2	47.6	4.9	8.8	1.7	362.4
13:31:00	33.3	18.6	9.1	47.4	4.3	8.9	1.7	359.7
13:32:00	31.0	19.0	9.2	47.8	5.2	8.9	1.5	364.8
13:33:00	34.3	19.7	9.3	47.9	4.3	8.8	1.5	367.6
13:34:00	39.0	20.6	9.2	47.6	4.8	8.7	1.5	365.1
13:35:00	36.5	19.7	9.1	47.3	4.5	8.8	1.5	357.6
13:36:00	36.9	19.7	9.1	47.3	4.6	9.1	1.6	354.4
13:37:00	34.3	20.7	9.3	47.9	4.1	8.8	1.6	367.5
13:38:00	30.2	20.6	9.4	48.1	4.3	8.7	1.5	371.6
13:39:00	29.1	20.5	9.2	47.7	4.3	8.9	1.5	366.0
13:40:00	29.8	20.6	9.2	47.8	4.9	8.9	1.4	369.0
13:41:00	31.8	21.0	9.3	48.0	4.1	8.7	1.4	371.0
13:42:00	33.5	21.2	9.2	48.0	4.1	8.7	1.4	365.1
13:43:00	33.5	21.2	9.1	47.4	3.8	8.9	1.4	361.6
13:44:00	33.2	21.3	9.2	47.5	4.6	9.0	1.4	364.7
13:45:00	32.4	21.9	9.3	47.8	3.8	8.9	1.4	370.9
13:46:00	27.3	22.0	9.3	47.9	4.4	8.6	1.4	372.7
13:47:00	27.5	21.0	9.2	47.6	4.1	8.8	1.4	369.5
13:48:00	26.9	20.7	9.3	47.9	5.3	8.8	1.2	372.0
13:49:00	35.2	21.7	9.4	48.1	4.5	8.7	1.3	374.1
13:50:00	36.2	21.7	9.3	47.7	4.5	8.6	1.2	370.0
13:51:00	31.4	21.3	9.1	47.0	3.8	8.9	1.3	353.8
13:52:00	31.5	22.0	9.3	47.3	4.3	8.9	1.2	365.4
13:53:00	29.9	22.4	9.4	47.9	4.2	8.8	1.2	371.7
13:54:00	25.3	21.7	9.3	47.9	4.5	8.7	1.2	375.4
13:55:00	25.3	21.2	9.3	47.7	4.7	8.8	1.2	375.4
13:56:00	27.3	22.1	9.3	47.8	5.2	8.7	1.1	376.4
13:57:00	31.5	22.4	9.4	48.0	4.5	8.7	1.2	376.4
13:58:00	33.6	22.4	9.1	47.4	4.5	8.8	1.1	367.3
13:59:00	34.4	21.2	9.0	46.9	4.1	9.1	1.2	358.6
14:00:00	34.6	21.1	9.2	47.3	3.8	9.0	1.2	366.0
14:01:00	30.1	22.0	9.4	47.9	4.0	8.8	1.1	378.3
14:02:00	26.9	21.7	9.3	47.8	4.0	8.7	1.2	376.1
14:03:00	27.0	21.3	9.2	47.6	4.7	8.8	1.1	372.8
14:04:00	27.4	22.7	9.4	48.1	5.5	8.7	1.1	383.2
14:05:00	29.2	22.9	9.5	48.4	4.6	8.6	1.1	386.3
14:06:00	28.9	21.6	9.2	47.6	4.9	8.6	1.0	372.2
14:07:00	30.7	21.3	9.1	47.2	4.6	8.9	1.1	359.8
14:08:00	32.4	22.4	9.2	47.6	4.8	9.0	1.1	354.9
14:09:00	31.9	22.3	9.2	47.7	4.6	9.0	1.1	356.2
14:10:00	30.5	21.1	9.1	47.7	4.8	9.0	1.1	359.7
14:11:00	32.3	20.1	9.1	47.6	4.4	9.1	1.0	364.0
14:12:00	32.1	21.1	9.2	47.8	5.1	9.0	1.0	364.0
14:13:00	38.6	22.3	9.2	47.7	4.9	8.9	0.9	364.0
14:14:00	39.1	22.0	9.0	47.3	5.2	9.1	0.9	357.5
14:15:00	41.9	21.3	8.8	46.8	5.5	9.3	1.0	348.9
14:16:00	42.2	22.4	9.1	47.5	4.9	9.1	1.0	360.5
14:17:00	39.8	22.6	9.2	47.9	5.4	9.1	1.0	366.7

Test No. 3 - October 20, 2016
CEM Analyzers

Time	CO	HCl	CO2	H2O	THC	O2	Opacity	SO2
14:18:00	36.6	21.1	9.1	47.5	4.9	9.1	1.1	359.9
14:19:00	37.7	20.7	9.0	47.4	5.5	9.2	1.0	357.7
14:20:00	39.0	21.4	9.2	47.8	4.9	9.0	0.9	361.4
14:21:00	46.1	21.5	9.0	47.5	5.1	8.9	0.9	356.0
14:22:00	45.4	21.3	8.8	47.0	5.3	9.1	0.9	348.6
14:23:00	47.5	21.1	8.8	46.9	5.7	9.4	1.0	347.5
14:24:00	47.7	20.9	9.0	47.2	4.8	9.3	1.1	352.6
14:25:00	42.2	21.0	9.1	47.4	5.8	9.0	1.0	361.2
14:26:00	42.7	20.5	9.0	47.2	5.1	9.3	1.1	354.7
14:27:00	44.0	20.8	9.0	47.1	6.4	9.4	0.9	356.0
14:28:00	52.5	21.6	9.0	47.2	5.6	9.2	0.9	356.0
14:29:00	57.1	21.9	9.0	47.3	6.5	9.2	0.9	356.0
14:30:00	56.4	21.2	8.7	46.6	5.9	9.4	0.9	346.4
14:31:00	57.7	20.8	8.7	46.4	6.8	9.5	1.0	344.9
14:32:00	57.8	21.6	9.0	47.2	5.2	9.3	1.0	359.8
14:33:00	47.2	22.1	9.1	47.4	5.5	9.1	1.0	365.6
14:34:00	43.1	21.5	9.0	47.2	5.5	9.1	1.0	364.4
14:35:00	42.1	22.6	9.1	47.3	6.3	9.2	0.9	365.4
14:36:00	46.9	22.8	9.1	47.5	5.4	9.1	0.9	365.4
14:37:00	52.8	21.6	9.0	47.3	5.9	9.0	0.9	361.7
Max	57.8	22.9	9.5	48.5	6.8	9.5	1.7	386.3
Min	16.5	8.5	8.7	46.4	3.2	8.4	0.2	292.2
Average	30.0	15.7	9.2	47.6	4.6	8.9	0.9	334.1

APPENDIX 29

Clean Harbors One-Minute Average Process Data
(15 pages)

Test No. 1 - October 18, 2016

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 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
11:16:00	31.3	15.5	166.9	125.4	15.8	249.1	23.2	24080	14618	102268	1537.0	957.6	497.6	196.0	195.6	-12.0	-43.6	227.0
11:17:00	31.4	15.8	166.1	126.0	15.8	248.6	23.7	23908	14494	103091	1543.9	957.9	497.4	196.0	196.7	-7.2	-37.7	236.1
11:18:00	31.4	15.9	167.4	125.4	15.8	243.6	22.4	24080	14601	103059	1545.0	957.8	498.1	196.0	196.7	-11.1	-41.1	233.5
11:19:00	31.3	15.7	166.9	126.2	15.8	252.8	22.4	23818	14506	101042	1543.8	958.8	497.9	196.0	195.5	-8.3	-38.9	243.7
11:20:00	31.3	15.2	166.7	125.6	15.8	252.7	22.5	24087	14714	102984	1542.8	958.5	498.0	196.0	195.5	-12.9	-43.8	221.3
11:21:00	31.3	15.6	166.1	126.1	15.8	253.4	23.8	24170	14635	102236	1542.0	959.1	497.5	196.0	196.6	-10.3	-40.6	226.6
11:22:00	31.5	15.5	168.0	126.0	15.6	279.8	23.7	24080	14517	101407	1534.9	958.9	497.8	196.0	196.6	-10.7	-42.0	199.5
11:23:00	32.1	15.7	167.6	127.1	15.6	280.4	23.7	23908	14567	101996	1522.8	957.9	497.3	196.0	195.3	-9.8	-40.2	216.3
11:24:00	32.0	15.5	168.0	126.3	15.6	280.8	22.7	23997	14567	103156	1514.9	955.7	497.4	196.5	196.5	-9.3	-37.5	230.0
11:25:00	32.1	15.7	168.0	126.4	15.6	286.3	23.6	23735	14545	100869	1517.4	957.0	497.4	196.5	196.5	-7.4	-36.7	245.0
11:26:00	32.1	15.7	168.0	127.8	15.6	292.9	22.7	23901	14528	102767	1514.5	957.6	497.7	196.5	196.5	-7.4	-33.6	231.6
11:27:00	32.2	15.3	166.5	130.1	15.6	285.5	22.9	23991	14427	100506	1532.1	958.4	498.2	196.5	196.5	-7.4	-35.9	240.4
11:28:00	33.0	15.8	168.2	128.9	15.6	278.3	23.3	24260	14506	102734	1536.0	958.5	499.1	196.5	196.5	-9.5	-41.6	215.1
11:29:00	32.9	15.9	167.6	131.5	15.6	296.0	22.6	24343	14421	101942	1536.4	959.0	500.1	197.0	197.6	-8.0	-33.6	224.3
11:30:00	32.8	15.8	165.3	130.0	15.6	286.2	23.7	24343	14618	102928	1539.6	958.3	501.5	197.0	197.6	-8.3	-34.0	200.7
11:31:00	31.8	15.8	165.0	129.9	15.6	275.7	22.6	23728	14680	101789	1544.4	960.1	501.7	197.5	196.6	-7.1	-36.9	216.6
11:32:00	32.2	15.8	165.7	129.8	15.6	290.5	23.2	24080	14450	102040	1542.1	962.2	501.9	197.0	196.6	-5.6	-35.2	227.6
11:33:00	32.0	15.5	163.7	129.4	15.6	283.2	23.3	23818	14483	101483	1550.9	962.5	502.3	197.0	196.6	-7.3	-36.9	223.3
11:34:00	31.3	15.8	165.6	128.6	15.6	258.4	22.7	23728	14607	102615	1546.0	962.0	502.8	197.5	196.6	-8.0	-34.8	225.5
11:35:00	31.5	15.4	165.5	128.7	15.6	288.4	22.4	24170	14618	102920	1543.6	963.4	502.6	197.5	196.6	-9.6	-44.7	199.6
11:36:00	30.5	15.6	165.5	128.7	15.6	280.4	22.7	24343	14511	102681	1540.8	963.7	502.8	197.5	196.6	-11.0	-41.9	218.8
11:37:00	30.6	15.4	165.0	130.3	15.6	289.7	23.5	24440	14624	107431	1538.5	964.0	501.9	197.0	196.6	-17.3	-52.1	185.6
11:38:00	30.3	15.9	165.9	128.2	15.6	293.3	22.5	24170	14528	104002	1535.9	963.9	501.3	197.0	196.5	-10.2	-39.2	212.6
11:39:00	30.6	15.5	165.1	129.9	15.6	289.7	23.7	24343	14764	107514	1533.3	962.6	500.2	196.5	196.5	-19.9	-54.2	188.1
11:40:00	30.6	16.0	166.2	131.8	15.6	265.1	23.4	24260	14494	102073	1527.1	961.7	499.5	196.0	196.5	-8.0	-37.7	226.2
11:41:00	30.5	15.7	165.2	130.3	15.6	256.1	22.4	24260	14612	107782	1534.3	962.1	499.1	195.5	196.5	-19.8	-55.3	184.6
11:42:00	30.5	15.8	164.8	129.1	15.6	276.8	23.6	24253	14612	101404	1532.4	962.3	499.1	195.0	195.4	-7.3	-34.2	227.0
11:43:00	30.7	15.7	165.7	129.1	15.6	251.3	23.6	24523	14612	106752	1530.6	961.7	498.8	194.5	195.4	-21.5	-48.8	189.7
11:44:00	30.3	15.9	166.4	131.5	15.6	254.1	22.8	24350	14641	102388	1531.1	961.7	498.3	194.5	195.2	-10.8	-39.9	223.5
11:45:00	30.4	15.8	165.2	129.2	15.6	293.2	22.6	24343	14657	107986	1532.6	962.6	498.3	194.0	195.2	-22.8	-50.3	187.9
11:46:00	30.6	15.8	166.9	129.2	15.6	288.9	23.7	24170	14511	104172	1529.3	961.6	497.8	194.0	195.3	-13.4	-41.0	210.6
11:47:00	30.5	15.4	165.7	127.6	15.6	265.7	23.6	24440	14629	107071	1533.1	961.2	497.9	193.5	194.3	-23.4	-58.3	190.8
11:48:00	30.6	15.5	166.1	127.8	15.6	260.6	23.0	24087	14517	101974	1527.1	962.5	497.0	193.5	194.3	-8.2	-40.0	231.5
11:49:00	30.4	15.5	167.3	128.8	15.6	297.1	22.5	24523	14747	107515	1530.9	960.4	496.7	193.5	194.3	-21.3	-55.3	187.7
11:50:00	30.7	15.9	166.5	131.3	15.6	263.5	23.5	24170	14612	102411	1532.1	961.5	496.9	193.5	194.3	-6.5	-37.9	232.6
11:51:00	30.5	15.5	167.2	126.7	15.6	272.3	23.2	24696	14669	106697	1530.9	961.8	497.2	193.0	194.3	-21.8	-59.1	185.4
11:52:00	30.6	15.7	167.8	127.8	15.6	280.6	22.6	24170	14562	102628	1531.1	960.8	497.0	193.5	194.4	-10.5	-38.3	217.1
11:53:00	30.5	15.6	168.0	127.5	15.6	284.1	22.5	24260	14635	103807	1533.0	960.2	497.0	193.5	194.4	-16.7	-49.2	195.7
11:54:00	30.6	15.6	167.5	127.6	15.6	253.7	22.5	24440	14657	103905	1533.6	960.6	496.5	193.5	194.4	-10.3	-38.5	210.2
11:55:00	30.5	15.5	166.5	128.3	15.6	277.2	22.4	24702	14528	102793	1530.4	960.9	496.4	193.5	194.4	-12.7	-45.7	224.4
11:56:00	30.6	15.7	167.1	128.9	15.6	252.8	23.7	24170	14635	101347	1526.4	962.1	496.2	194.0	194.4	-8.3	-28.5	236.6
11:57:00	30.6	15.5	166.9	129.4	15.6	284.1	22.7	24433	14657	104346	1529.1	961.2	496.0	193.5	194.4	-11.0	-44.0	226.4
11:58:00	30.6	16.1	168.0	130.2	15.6	287.8	23.4	23818	14511	103009	1534.3	960.5	496.3	193.5	194.4	-7.8	-39.4	236.9
11:59:00	30.5	15.8	167.6	130.4	15.6	275.0	23.5	24440	14618	104636	1531.6	961.0	496.3	193.0	193.3	-18.4	-50.0	201.8
12:00:00	30.5	15.9	166.6	130.2	15.6	257.5	23.7	24350	14657	103808	1530.6	960.9	496.0	193.0	194.5	-9.5	-36.7	222.1
12:01:00	30.5	15.6	167.3	130.0	15.6	265.7	22.5	24516	14511	104985	1526.8	962.5	495.4	192.5	194.5	-14.4	-45.4	203.3
12:02:00	30.5	15.7	167.5	131.2	15.6	285.0	23.4	24343	14629	103541	1518.3	961.2	494.9	192.5	193.4	-9.6	-38.0	213.4
12:03:00	30.4	15.4	166.4	129.5	15.6	280.1	23.3	24440	14618	102291	1524.9	962.2	494.6	192.5	193.4	-9.4	-38.0	222.6
12:04:00	30.5	15.8	168.0	129.6	15.6	245.9	23.2	24260	14596	103765	1529.5	961.5	494.1	192.0	193.4	-9.1	-39.0	237.8
12:05:00	30.5	15.3	167.4	126.5	15.6	275.0	23.7	24343	14596	103445	1524.1	961.7	494.0	192.0	193.4	-10.8	-44.2	222.1
12:06:00	30.4	15.7	167.3	128.4	15.6	293.1	22.4	23997	14489	101577	1521.8	961.5	493.6	192.0	193.4	-6.7	-34.1	229.6
12:07:00	30.5	15.5	167.9	127.3	15.6	257.1	22.6	24523	14652	105303	1518.0	961.6	493.5	191.5	192.2	-14.4	-48.2	211.8

Test No. 1 - October 18, 2016

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 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
12:08:00	30.6	15.7	167.6	129.0	15.6	254.3	23.6	24350	14607	103477	1521.5	962.6	493.3	192.0	193.3	-11.3	-40.9	221.3
12:09:00	30.4	15.4	167.0	127.7	15.6	277.8	23.3	24440	14775	103627	1524.4	962.3	492.9	191.5	193.3	-15.3	-46.0	201.1
12:10:00	30.2	15.7	167.2	129.9	15.6	254.9	23.4	24343	14579	103261	1526.5	960.1	492.6	191.5	193.3	-8.5	-37.8	209.7
12:11:00	30.3	15.6	167.4	128.3	15.6	276.5	22.4	24343	14641	103532	1522.9	960.2	492.3	191.5	192.1	-13.5	-43.0	227.4
12:12:00	30.3	15.9	167.5	129.1	15.6	271.1	22.4	23991	14635	103965	1521.4	960.9	492.1	191.5	192.1	-7.0	-32.5	235.2
12:13:00	30.6	15.6	167.3	127.8	15.6	256.6	23.5	23991	14646	104408	1513.4	963.6	492.1	191.0	192.1	-11.2	-41.0	226.3
12:14:00	30.6	15.9	167.6	129.2	15.6	275.6	23.7	24163	14539	101984	1518.9	961.4	491.9	191.0	192.1	-6.5	-37.1	232.3
12:15:00	30.5	15.4	166.4	128.9	15.6	245.0	22.4	24440	14629	104205	1514.6	960.4	491.8	191.0	192.1	-13.5	-43.1	216.1
12:16:00	30.5	15.7	167.3	129.4	15.6	223.9	22.9	24087	14635	104093	1518.1	962.3	491.6	191.0	192.1	-11.7	-37.2	228.4
12:17:00	30.5	15.5	167.3	128.0	15.6	264.6	23.2	24702	14494	103900	1519.1	960.1	491.4	191.0	192.1	-14.8	-41.2	207.2
12:18:00	30.4	15.7	168.5	128.2	15.6	277.4	23.3	24087	14528	104106	1518.6	961.5	491.3	191.0	192.1	-11.3	-40.9	217.7
12:19:00	30.6	15.7	169.4	127.0	15.6	300.3	22.4	24260	14584	104053	1516.4	962.1	491.3	191.0	191.1	-11.0	-39.0	230.9
12:20:00	30.6	15.8	168.8	129.0	15.6	292.3	22.8	24170	14511	102751	1509.4	961.9	490.6	191.0	192.2	-7.2	-38.2	237.2
12:21:00	30.5	15.5	168.2	128.3	15.6	280.1	23.5	24440	14517	104186	1506.9	961.8	490.5	190.5	192.2	-10.0	-38.8	223.9
12:22:00	30.5	15.8	168.0	128.3	15.6	251.3	23.6	24260	14528	102544	1504.8	962.3	490.8	190.5	191.1	-9.4	-34.5	239.5
12:23:00	30.6	15.6	168.0	127.3	15.6	267.8	22.4	24087	14534	104347	1499.1	963.0	490.4	190.5	191.0	-12.4	-42.1	217.4
12:24:00	30.5	15.6	167.7	127.9	15.6	256.1	23.6	24087	14534	102335	1502.8	962.0	490.4	191.0	192.1	-12.1	-39.6	227.3
12:25:00	30.5	15.5	169.7	126.9	16.2	253.6	23.6	24343	14562	103762	1504.8	963.2	490.1	191.0	192.1	-11.1	-39.3	201.3
12:26:00	30.4	15.8	167.6	128.2	15.2	316.5	22.9	24343	14461	103296	1509.1	960.8	489.7	191.0	191.0	-10.6	-40.0	209.9
12:27:00	30.4	15.8	170.0	127.8	15.2	253.2	23.7	24177	14663	103123	1508.4	962.8	489.4	191.0	191.0	-10.4	-41.3	225.6
12:28:00	30.5	16.0	168.3	129.2	16.2	263.1	23.4	24170	14534	103339	1506.8	962.7	489.4	191.0	192.1	-8.2	-40.7	238.4
12:29:00	30.6	15.8	169.1	130.0	16.2	320.1	22.4	24170	14618	104302	1502.4	961.0	489.5	190.5	192.1	-7.9	-38.0	232.5
12:30:00	30.6	15.7	166.7	129.8	16.0	268.1	22.5	24087	14523	102303	1500.5	962.2	489.4	190.5	191.0	-8.3	-35.5	243.3
12:31:00	30.5	16.0	168.7	129.2	16.0	275.6	22.7	24267	14764	104262	1493.1	962.3	489.1	190.0	191.0	-11.7	-42.2	216.8
12:32:00	30.6	15.9	169.5	129.2	16.0	256.7	23.3	24087	14596	103675	1497.9	962.4	489.0	190.0	191.0	-9.3	-39.1	211.2
12:33:00	30.5	15.6	168.1	128.7	16.0	250.7	22.7	24080	14500	104036	1495.3	962.8	488.8	190.0	191.3	-12.8	-44.8	203.6
12:34:00	30.5	15.5	168.3	127.6	16.0	261.9	22.4	24260	14494	108068	1501.8	963.9	488.9	190.0	191.3	-17.7	-54.9	187.1
12:35:00	30.7	15.6	168.2	128.1	16.0	287.3	23.3	23991	14635	104059	1499.1	963.4	488.4	190.0	190.3	-11.9	-37.8	228.5
12:36:00	30.4	15.6	168.7	128.3	16.0	251.3	23.6	24170	14556	109360	1502.9	963.6	488.5	190.0	191.5	-21.4	-56.7	188.4
12:37:00	30.4	15.8	169.2	130.0	16.0	259.0	23.7	24170	14450	103058	1504.9	963.3	488.6	190.0	191.5	-7.5	-38.2	225.6
12:38:00	30.7	15.5	169.0	128.8	16.0	283.1	22.4	24260	14433	108128	1508.1	963.6	489.3	190.0	190.4	-20.5	-51.0	184.1
12:39:00	30.8	15.6	170.1	129.6	16.0	280.4	22.4	24267	14545	104327	1504.4	965.1	489.7	190.5	190.9	-10.8	-42.7	218.8
12:40:00	30.6	15.6	169.4	130.5	16.0	254.1	23.6	24080	14539	108142	1509.1	964.1	489.4	190.5	191.0	-21.0	-54.0	176.7
12:41:00	30.6	15.9	170.1	130.5	16.0	295.0	22.6	24170	14618	104241	1506.3	963.5	489.8	190.5	191.0	-11.9	-45.2	199.9
12:42:00	30.4	15.7	169.5	130.8	16.0	253.4	23.7	24343	14624	107470	1505.1	964.6	490.3	190.5	191.0	-23.5	-55.9	183.2
12:43:00	30.5	15.7	170.6	130.1	16.0	239.3	23.7	23908	14506	104318	1503.1	963.4	490.1	190.5	191.0	-9.0	-35.4	224.7
12:44:00	30.3	15.7	169.0	129.3	16.0	254.5	23.1	24267	14663	108707	1502.1	964.7	490.6	190.0	191.0	-21.9	-55.0	185.8
12:45:00	30.6	15.7	169.2	129.9	16.0	284.9	22.5	24087	14528	102654	1509.8	964.5	491.2	190.5	191.0	-8.9	-37.9	231.2
12:46:00	30.5	15.4	169.0	128.7	16.0	256.4	23.0	24440	14584	107871	1515.1	964.4	491.8	190.5	191.0	-21.0	-57.5	183.8
12:47:00	30.2	15.7	169.6	130.0	16.0	251.5	23.2	24260	14697	103709	1516.5	963.7	492.1	191.0	191.0	-13.5	-47.3	217.4
12:48:00	30.4	15.6	168.9	129.1	16.0	246.6	22.7	24613	14730	108649	1514.9	964.3	492.4	191.0	192.2	-21.7	-54.1	181.2
12:49:00	30.6	15.9	169.9	130.1	16.0	289.8	22.9	24440	14618	103405	1518.8	965.5	492.6	191.5	192.2	-11.5	-37.4	212.0
12:50:00	30.9	15.5	170.0	128.7	16.0	277.8	23.1	24620	14725	106865	1522.1	966.1	493.6	192.0	191.0	-19.9	-55.4	217.1
12:51:00	30.5	15.6	169.6	128.7	16.0	281.8	23.2	24170	14506	101940	1524.9	964.9	493.9	192.0	191.3	-6.0	-34.3	227.6
12:52:00	30.3	15.3	168.8	127.9	16.0	274.1	23.6	24343	14545	106037	1529.6	964.9	494.2	192.0	192.4	-17.4	-45.1	214.4
12:53:00	30.4	15.6	169.2	128.6	16.0	278.9	22.3	24087	14545	102609	1525.4	963.7	494.5	192.5	192.4	-9.1	-38.7	234.8
12:54:00	30.5	15.4	169.9	128.8	16.0	268.9	22.5	24440	14562	106653	1528.8	964.4	495.5	192.5	192.2	-21.1	-56.0	197.3
12:55:00	30.3	15.6	169.4	128.2	14.9	283.3	23.5	24080	14545	102302	1521.8	964.7	495.6	193.0	192.2	-10.6	-35.6	226.8
12:56:00	30.3	15.5	169.7	128.0	16.0	292.5	23.7	24530	14663	105076	1514.4	964.9	496.0	193.5	193.3	-13.7	-44.0	201.4
12:57:00	30.5	15.7	169.5	129.2	16.0	291.8	23.6	23997	14590	103162	1524.0	964.2	495.8	193.5	193.3	-8.9	-39.4	205.1
12:58:00	30.5	15.6	169.1	131.1	16.0	284.3	22.6	24440	14635	104222	1525.9	966.1	496.4	193.5	192.3	-10.5	-39.3	221.9
12:59:00	30.5	15.9	170.6	131.1	16.0	277.4	23.6	24343	14455	102685	1530.5	965.2	496.8	193.5	193.4	-7.1	-35.8	228.3

Test No. 1 - October 18, 2016

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 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
13:00:00	30.5	15.9	169.0	129.3	16.0	280.4	23.7	24523	14624	103239	1530.6	965.6	497.5	193.5	193.4	-9.3	-40.8	222.2
13:01:00	30.5	15.6	170.1	129.8	16.0	276.5	22.4	24087	14478	102586	1523.4	965.2	497.6	193.5	193.4	-8.1	-34.3	237.5
13:02:00	30.7	15.6	169.4	128.7	16.0	285.3	23.5	24440	14702	105118	1526.4	965.2	498.4	193.5	193.4	-14.6	-48.3	215.8
13:03:00	30.5	15.8	169.6	129.4	16.0	349.4	22.7	24170	14736	102039	1522.8	965.6	498.8	194.0	193.4	-9.0	-38.0	219.8
13:04:00	30.6	15.4	168.8	128.7	16.0	277.2	22.8	24350	14612	103667	1526.1	967.4	498.9	194.5	194.5	-10.9	-45.3	196.8
13:05:00	30.5	15.6	169.5	129.2	16.0	297.1	22.5	24260	14489	103064	1529.8	966.2	499.2	195.0	194.5	-8.8	-41.1	213.2
13:06:00	30.5	15.4	168.8	129.2	16.0	277.0	23.7	24260	14641	103291	1528.1	966.5	499.2	195.0	194.5	-9.6	-36.3	222.7
13:07:00	30.4	15.7	170.3	129.9	16.0	289.5	23.5	24087	14511	100251	1535.6	965.4	499.3	195.0	194.5	-6.4	-35.3	231.1
13:08:00	30.5	15.5	169.6	128.7	16.0	279.1	22.6	24260	14511	102976	1533.9	966.1	499.4	195.0	194.5	-9.6	-37.6	222.8
13:09:00	30.3	15.7	168.0	130.5	16.0	276.6	23.1	24350	14517	101194	1533.0	966.7	499.7	195.0	194.5	-6.5	-37.6	235.4
13:10:00	30.7	15.9	170.4	130.0	16.1	277.6	23.6	24440	14657	103862	1533.0	967.6	499.1	194.5	194.4	-11.6	-44.2	216.6
13:11:00	30.3	15.7	169.4	130.2	16.1	277.7	22.8	24087	14652	102640	1536.0	967.2	498.9	194.5	194.4	-9.4	-40.0	220.6
13:12:00	30.3	15.8	169.1	129.7	16.1	298.1	22.4	24350	14635	103051	1536.1	965.4	498.5	194.0	194.4	-10.3	-33.7	197.2
13:13:00	30.5	15.8	170.3	130.5	16.1	292.3	23.6	24170	14528	101963	1526.9	966.9	498.2	194.0	193.2	-9.6	-40.9	211.3
13:14:00	30.6	15.4	169.5	129.2	16.1	274.7	23.6	24087	14567	101545	1528.5	966.3	498.5	194.0	193.2	-9.1	-42.8	220.9
13:15:00	30.5	15.9	169.0	130.5	16.1	259.7	22.5	24087	14601	102149	1536.6	969.4	497.9	194.0	194.3	-5.6	-37.2	231.8
13:16:00	30.4	15.3	170.7	128.7	16.1	254.0	23.8	24170	14534	100894	1537.1	968.5	498.1	193.5	194.4	-9.6	-40.1	222.8
14:13:00	30.6	15.6	169.8	127.6	15.5	272.3	22.5	24792	14562	102882	1541.6	966.9	493.3	191.0	191.6	-11.3	-43.5	207.3
14:14:00	30.4	15.6	169.1	130.2	15.6	295.6	22.9	24530	14562	102017	1541.3	966.9	493.3	191.0	191.6	-9.4	-43.2	216.0
14:15:00	30.6	15.3	169.2	127.7	15.6	283.4	22.9	24613	14669	102532	1537.8	967.7	492.9	191.0	192.7	-11.3	-43.5	192.0
14:16:00	30.7	16.0	170.1	132.2	15.6	255.8	22.3	24523	14511	103243	1543.0	966.0	492.6	191.0	191.6	-8.5	-40.5	202.9
14:17:00	30.6	15.9	172.4	129.2	15.6	266.9	23.0	24523	14612	103426	1540.3	967.7	492.3	190.5	191.6	-9.2	-40.2	219.3
14:18:00	30.5	15.8	171.2	131.0	15.6	323.6	23.7	24343	14506	102171	1542.9	967.5	492.6	190.5	191.6	-6.1	-36.7	229.1
14:19:00	30.5	15.6	171.4	129.5	15.6	267.5	22.6	24606	14528	102226	1539.9	967.4	492.8	190.5	191.6	-8.7	-40.6	219.8
14:20:00	30.6	15.8	171.1	130.7	15.6	261.8	23.7	24260	14517	100340	1540.9	967.2	492.6	190.0	190.6	-6.6	-37.4	234.3
14:21:00	30.4	15.5	171.9	129.7	15.6	257.8	23.7	24523	14629	102270	1539.4	966.6	492.5	190.0	190.6	-11.7	-43.9	211.0
14:22:00	30.3	15.5	170.8	128.7	15.6	244.9	22.4	24523	14618	101995	1537.8	967.5	492.5	190.0	191.7	-9.3	-40.0	222.1
14:23:00	30.4	15.4	171.0	127.4	15.6	317.0	22.4	24350	14579	102237	1539.0	968.8	492.2	190.5	191.7	-11.0	-44.6	195.8
14:24:00	30.7	15.3	170.6	128.4	15.6	260.1	23.3	24350	14579	103015	1538.6	967.2	492.1	190.5	191.7	-8.8	-40.3	207.4
14:25:00	30.5	15.5	172.0	127.0	15.6	240.5	23.2	24523	14685	101432	1536.9	967.6	492.3	190.5	191.7	-7.4	-37.9	222.6
14:26:00	30.4	15.4	170.8	127.8	15.6	255.5	23.6	24523	14674	101587	1541.9	966.7	492.6	190.5	191.7	-7.3	-36.8	232.5
14:27:00	30.6	15.7	172.3	128.2	15.6	257.4	23.5	24350	14573	101553	1537.1	965.6	492.7	191.0	191.7	-8.2	-37.8	223.4
14:28:00	30.3	15.5	171.3	128.9	15.6	244.8	23.7	24350	14579	100729	1539.6	966.1	492.9	191.0	191.7	-5.2	-35.5	234.6
14:29:00	30.5	15.7	171.4	128.3	15.6	250.9	22.7	24523	14590	101565	1536.6	967.1	493.0	191.0	191.7	-11.2	-44.4	213.0
14:30:00	30.8	15.4	170.6	129.4	15.6	236.9	23.4	24523	14579	102083	1540.4	965.9	493.2	191.5	191.7	-8.2	-40.1	201.6
14:31:00	30.5	15.8	171.8	129.5	15.6	254.1	23.6	24530	14792	102171	1540.6	966.4	493.2	191.5	192.7	-10.3	-43.2	201.9
14:32:00	30.5	15.8	171.5	131.1	15.6	232.1	23.3	24447	14635	101995	1541.9	966.8	493.6	191.5	191.5	-9.9	-46.7	183.2
14:33:00	30.5	15.7	172.1	129.1	15.6	266.6	23.4	24177	14612	102105	1540.8	967.1	493.8	191.5	191.5	-8.1	-40.8	224.7
14:34:00	30.5	15.5	170.9	129.7	15.6	267.4	23.4	24350	14629	106708	1540.9	966.9	493.8	191.5	192.7	-14.8	-50.1	185.8
14:35:00	30.8	15.7	171.6	130.1	15.6	266.4	23.7	24350	14736	102171	1541.3	966.9	493.9	191.5	192.7	-5.9	-34.0	227.2
14:36:00	30.5	15.6	172.2	129.9	15.6	284.2	22.8	24260	14590	106223	1542.8	966.0	494.0	191.5	191.6	-16.2	-54.1	183.7
14:37:00	30.5	15.6	171.1	129.3	15.6	426.8	22.4	24440	14573	103264	1540.3	966.0	494.2	191.5	191.6	-10.5	-41.1	216.3
14:38:00	30.6	15.6	170.2	129.3	15.6	251.3	23.6	24260	14680	107357	1540.8	968.1	494.0	191.5	192.8	-20.3	-55.8	175.8
14:39:00	30.7	15.7	171.6	129.2	15.6	262.1	23.4	24350	14669	101885	1539.8	966.4	493.8	191.5	192.8	-9.7	-40.7	201.9
14:40:00	30.6	15.4	170.4	130.1	15.6	260.0	23.7	24530	14680	106155	1540.3	968.6	494.0	191.5	191.5	-19.3	-55.1	182.2
14:41:00	30.6	15.5	172.1	128.9	15.6	268.8	23.2	24267	14567	101929	1540.5	967.7	493.9	191.0	191.5	-7.8	-39.4	226.8
14:42:00	30.5	15.4	170.1	130.0	15.6	303.5	23.6	24433	14579	106155	1544.0	967.2	494.0	191.0	191.5	-19.5	-55.2	179.6
14:43:00	30.7	15.6	171.2	129.1	15.6	267.4	23.0	24343	14680	102182	1541.1	965.6	493.6	191.0	191.5	-7.5	-36.6	226.8
14:44:00	30.5	15.2	171.4	128.7	15.6	252.8	23.2	24530	14702	106402	1541.5	966.8	493.7	191.0	191.5	-19.9	-57.4	179.2
14:45:00	30.4	15.5	172.3	130.0	15.6	406.6	22.4	24350	14584	103535	1535.6	967.4	493.7	191.5	191.5	-8.9	-39.9	210.1
14:46:00	30.7	15.3	171.4	129.1	15.6	248.6	23.3	24702	14573	105539	1540.4	966.9	493.8	191.5	192.8	-19.6	-55.1	177.9
14:47:00	30.5	15.6	174.4	129.0	15.6	284.0	22.7	24350	14579	101984	1539.0	966.7	493.6	191.5	191.8	-8.5	-39.2	201.1

Test No. 1 - October 18, 2016

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 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
14:48:00	30.5	15.5	171.4	129.8	15.6	289.5	22.5	24613	14702	104044	1537.9	966.0	493.5	191.5	191.8	-15.3	-46.3	208.2
14:49:00	30.5	15.6	172.3	131.0	15.6	281.0	22.9	24350	14562	102653	1537.0	967.0	493.8	191.0	191.8	-7.4	-38.5	225.3
14:50:00	30.5	15.6	172.1	130.2	15.6	254.3	22.5	24702	14556	104261	1538.3	967.7	493.9	191.0	191.8	-13.0	-39.5	214.3
14:51:00	30.4	15.6	172.2	131.9	15.6	255.9	23.0	24440	14455	101995	1537.8	966.8	493.9	191.0	191.8	-8.7	-40.0	231.0
14:52:00	30.6	15.4	171.8	130.4	15.6	264.6	22.7	24792	14775	103957	1540.3	965.8	494.1	190.5	191.8	-17.0	-50.1	203.1
14:53:00	30.4	15.6	172.1	130.4	15.6	277.8	22.8	24350	14551	101057	1537.8	967.3	494.1	190.5	191.8	-9.4	-40.2	217.8
14:54:00	30.3	15.5	171.2	129.4	15.6	263.7	23.3	24530	14758	103263	1539.4	966.0	494.2	190.5	191.8	-12.4	-45.4	193.1
14:55:00	30.4	15.2	171.5	130.8	15.6	259.7	23.7	24440	14596	102522	1538.9	967.7	494.4	191.0	191.8	-8.9	-40.9	203.5
14:56:00	30.4	15.2	171.9	130.4	15.6	216.1	22.5	24702	14697	103242	1537.9	966.9	494.7	191.0	191.9	-10.9	-42.5	222.9
14:57:00	30.5	15.6	170.9	129.3	15.6	258.8	23.5	24350	14596	101995	1539.4	966.8	494.5	191.0	191.9	-8.1	-40.1	231.4
14:58:00	30.5	15.3	171.7	128.7	15.6	274.6	23.3	24440	14747	101763	1540.3	967.7	494.3	190.5	191.9	-10.8	-40.9	220.7
14:59:00	30.6	15.6	171.2	131.0	15.6	271.3	22.4	24260	14500	101895	1538.8	967.5	494.9	191.0	191.9	-6.3	-37.7	231.5
15:00:00	30.5	15.2	171.7	129.2	15.6	257.2	23.5	24523	14742	102248	1539.8	967.4	495.0	191.0	191.9	-11.9	-44.5	209.8
15:01:00	30.4	15.3	171.2	128.9	15.6	276.5	22.3	24260	14607	102248	1539.4	965.5	494.8	191.0	191.9	-7.2	-39.1	216.4
15:02:00	30.5	15.3	171.5	129.7	15.6	287.6	22.6	24440	14579	103361	1541.1	967.5	494.5	191.0	191.9	-12.1	-44.8	195.6
15:03:00	30.6	15.5	170.5	129.8	15.6	217.0	22.8	24087	14747	103644	1540.0	966.6	494.6	191.0	191.9	-8.3	-38.2	207.9
15:04:00	30.6	15.4	170.9	129.2	15.6	342.8	22.8	24523	14612	103417	1537.6	965.4	494.4	191.0	191.9	-8.6	-37.7	222.3
15:05:00	30.3	15.6	171.8	130.5	15.6	255.8	23.4	24350	14354	102566	1538.8	967.7	494.3	191.0	191.9	-7.1	-39.2	232.3
15:06:00	30.5	15.5	171.0	130.1	15.6	208.4	22.7	24350	14697	104011	1537.1	966.1	494.5	190.5	191.9	-9.2	-43.0	222.4
15:07:00	30.2	15.9	172.7	132.4	15.6	244.3	22.5	24350	14635	101807	1541.4	967.3	494.3	190.5	191.9	-6.7	-37.4	233.3
15:08:00	30.3	15.7	171.1	130.4	15.6	249.2	23.6	24613	14708	103893	1539.5	967.8	494.7	190.5	190.8	-12.3	-47.0	214.1
15:09:00	30.7	15.9	171.4	130.9	15.6	254.0	23.6	24440	14455	102796	1538.1	967.6	494.3	190.5	192.0	-10.2	-42.4	220.9
15:10:00	30.7	15.2	171.8	128.6	15.6	260.6	23.0	24530	14478	104390	1536.9	965.6	494.8	190.5	192.0	-10.6	-38.2	199.6
15:11:00	30.6	15.3	170.7	129.4	15.6	273.2	23.4	24350	14629	101719	1537.9	967.1	494.9	191.0	192.0	-9.2	-37.7	208.4
15:12:00	30.3	15.3	172.3	128.9	15.6	254.0	23.3	24260	14702	102544	1537.9	967.2	495.1	191.0	190.8	-7.3	-38.6	219.6
15:13:00	30.7	15.2	171.3	129.8	15.6	256.9	23.1	24170	14601	101708	1541.6	966.8	495.5	191.5	191.9	-8.5	-40.2	229.5
15:14:00	30.5	15.4	172.1	128.4	15.6	283.3	22.7	24440	14691	103871	1540.9	966.6	495.8	191.5	191.9	-9.4	-38.5	220.3
15:15:00	30.5	15.5	171.3	128.4	15.6	228.6	23.4	24260	14601	102281	1543.4	967.7	496.1	192.0	191.9	-6.9	-39.6	236.6
15:16:00	30.3	15.5	171.4	128.2	15.6	262.4	23.7	24613	14511	104430	1541.0	968.3	496.9	192.5	191.9	-11.0	-41.8	209.4
15:17:00	30.5	15.8	171.7	128.6	15.6	245.6	23.2	24350	14511	102662	1542.4	967.8	496.8	193.0	193.0	-9.5	-39.9	217.9
15:18:00	30.4	15.7	172.0	127.8	15.6	257.5	23.1	24523	14601	102979	1540.6	967.4	496.8	193.0	193.0	-10.8	-44.2	195.9
15:19:00	30.5	15.5	171.8	128.5	15.6	258.5	23.7	24267	14590	102072	1543.6	967.4	496.7	193.0	193.0	-7.0	-38.3	207.4
15:20:00	30.5	15.5	171.7	129.0	15.6	319.8	23.2	24350	14573	103902	1545.3	966.6	496.1	193.0	193.0	-8.2	-37.1	225.1
15:21:00	30.5	15.6	170.7	129.2	15.6	257.8	22.4	24350	14534	101710	1544.8	967.9	496.2	193.0	193.0	-6.0	-34.7	233.4
15:22:00	30.6	15.6	172.9	129.4	15.6	280.6	23.4	24260	14601	103272	1543.5	967.2	496.0	193.0	193.0	-6.9	-36.8	224.5
15:23:00	30.7	15.5	172.0	131.0	15.6	234.2	22.8	23908	14669	101179	1546.5	967.3	495.9	192.5	193.0	-4.9	-34.7	234.2
15:24:00	30.6	15.5	171.1	130.4	15.6	306.9	23.2	24170	14663	103545	1548.4	969.0	495.8	192.5	192.9	-10.0	-42.1	211.1
15:25:00	30.5	15.6	171.5	130.4	15.6	280.5	23.7	24260	14652	102379	1545.8	969.1	496.0	192.0	192.9	-7.3	-37.5	221.3
15:26:00	30.6	15.8	172.2	131.7	15.6	256.8	22.8	24440	14596	103577	1543.3	968.9	495.6	192.0	192.9	-9.4	-39.5	200.4
15:27:00	30.7	15.7	171.3	132.3	15.6	290.0	22.9	24260	14596	102968	1542.1	970.0	495.5	192.0	192.9	-7.3	-36.9	212.1
15:28:00	30.5	15.6	171.8	127.8	15.6	289.4	23.5	24433	14506	101510	1544.4	970.3	495.7	192.0	191.5	-8.1	-39.0	227.0
15:29:00	30.4	15.5	171.0	128.8	15.6	214.1	23.7	24350	14393	101731	1547.4	969.9	495.5	192.0	192.8	-6.1	-38.6	208.8
15:30:00	30.4	15.6	172.2	128.1	15.6	320.2	23.5	24530	14416	102215	1547.8	971.0	495.2	192.0	192.8	-7.1	-33.3	228.4
15:31:00	30.6	15.4	170.5	127.3	15.6	290.3	22.8	24087	14416	105297	1547.3	970.7	495.4	192.5	191.7	-15.4	-51.1	194.6
15:32:00	30.6	15.4	172.2	128.5	15.6	278.0	22.9	24350	14466	101808	1544.5	970.6	496.1	193.0	192.7	-9.2	-39.1	213.4
15:33:00	30.3	15.2	171.0	127.7	15.6	244.7	22.5	24260	14657	107600	1545.3	969.9	496.2	193.0	192.7	-14.7	-51.1	180.3
15:34:00	30.4	15.5	172.0	128.6	15.6	280.2	23.7	23735	14646	102718	1546.0	971.2	496.6	193.5	193.4	-12.0	-44.9	204.1
15:35:00	30.4	15.3	171.6	129.0	15.6	308.2	23.3	24357	14612	105622	1548.0	971.0	497.2	194.0	193.4	-19.6	-56.3	183.4
15:36:00	30.5	15.8	177.4	131.0	15.6	292.8	22.5	24267	14601	102466	1546.0	970.3	497.7	194.0	193.4	-6.5	-39.5	225.3
15:37:00	29.7	15.4	172.4	129.6	15.6	279.9	23.0	24440	14466	106556	1547.4	970.4	498.3	194.0	193.4	-17.4	-50.8	183.3
15:45:00	29.7	15.3	171.3	127.0	15.6	284.0	22.5	24613	14596	107196	1542.4	970.2	496.1	194.5	194.3	-20.1	-54.8	184.6
15:46:00	29.9	15.5	173.0	127.0	15.6	256.7	23.6	24260	14579	101501	1541.1	970.5	496.1	194.5	194.3	-6.6	-36.5	227.7

Test No. 1 - October 18, 2016

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 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
15:47:00	29.8	15.5	172.2	125.7	15.6	291.5	23.2	24523	14708	105708	1541.3	969.3	495.5	194.5	194.3	-18.9	-55.4	178.1
15:48:00	29.5	15.6	172.8	128.3	15.6	259.7	22.5	24087	14607	101755	1539.1	968.9	495.9	195.0	194.3	-9.6	-42.1	211.4
15:49:00	29.8	15.2	171.8	126.3	15.6	292.5	23.7	24620	14742	105776	1538.3	969.3	495.9	195.0	194.3	-18.2	-52.6	189.4
15:50:00	29.9	15.7	174.5	126.4	15.6	293.3	22.8	24087	14680	102607	1540.5	969.0	496.1	195.5	194.7	-8.1	-40.2	202.1
15:51:00	29.8	15.3	172.7	126.2	15.6	244.4	23.3	24702	14714	102705	1535.5	970.0	496.2	195.5	194.7	-13.5	-44.4	217.6
15:52:00	29.7	15.7	174.4	127.4	15.6	263.8	22.5	24170	14472	102214	1537.4	968.6	495.6	195.5	194.7	-8.5	-39.5	228.1
15:53:00	29.8	15.5	173.7	126.3	15.6	260.2	23.7	24530	14584	103654	1537.5	969.7	495.7	195.5	194.7	-11.6	-45.9	219.7
15:54:00	29.8	15.9	174.4	129.0	15.6	276.5	23.0	24343	14472	101612	1537.4	969.2	495.5	195.5	194.7	-5.4	-34.7	234.0
15:55:00	29.7	15.5	173.2	126.6	15.6	249.3	22.6	24702	14584	105135	1536.8	969.3	495.9	195.0	194.7	-18.4	-53.0	209.9
15:56:00	29.6	15.8	174.1	130.3	15.6	244.4	22.4	24350	14500	102519	1538.3	970.5	495.8	195.5	194.7	-8.3	-40.7	224.9
15:57:00	29.8	15.7	173.9	127.2	15.6	281.4	22.7	24440	14489	103470	1538.4	970.4	495.8	195.5	195.7	-10.1	-40.7	193.7
15:58:00	29.6	15.4	173.9	128.4	15.6	232.7	23.3	24087	14680	102280	1536.8	970.3	495.4	195.0	194.6	-8.1	-40.3	206.8
15:59:00	29.9	15.3	173.5	125.6	15.6	265.9	22.4	24440	14466	102105	1538.6	969.3	495.2	194.5	194.6	-9.4	-40.8	215.9
16:00:00	29.8	15.6	173.6	126.4	15.6	267.6	22.9	24170	14551	101206	1537.4	971.2	494.9	194.5	194.6	-7.2	-38.4	230.2
16:01:00	29.6	15.4	173.1	125.0	15.6	244.8	23.0	24447	14770	102476	1537.9	969.0	494.8	194.5	194.6	-8.3	-39.9	220.7
16:02:00	29.7	15.3	172.8	126.3	15.6	207.3	22.5	24170	14562	101755	1539.4	969.1	494.6	195.0	194.6	-7.3	-35.5	235.3
16:03:00	29.9	15.3	173.7	124.3	15.6	286.1	23.7	24433	14567	103355	1537.8	969.1	494.5	194.5	194.6	-12.5	-45.7	210.8
16:04:00	29.9	15.9	173.8	127.9	15.6	260.3	23.7	23818	14646	101525	1538.1	968.8	493.9	194.5	194.6	-8.5	-39.3	220.1
16:05:00	29.5	15.6	173.1	125.9	15.6	269.6	23.2	24447	14590	102519	1535.5	968.1	493.7	194.0	195.7	-8.5	-41.0	195.4
16:06:00	29.7	15.7	174.5	128.2	15.6	260.7	23.6	24177	14596	103041	1532.1	968.8	493.4	194.0	194.6	-7.7	-37.0	207.4
16:07:00	29.8	15.6	174.5	128.4	15.6	246.5	22.7	24350	14646	102149	1534.4	969.7	493.0	194.0	194.6	-9.0	-41.2	224.1
16:08:00	29.6	15.6	174.1	128.8	15.6	249.4	22.5	24350	14663	101327	1534.6	967.7	493.0	193.5	194.6	-6.2	-36.2	233.4
16:09:00	29.9	15.8	175.3	127.8	15.6	262.9	22.9	24267	14730	103009	1534.6	967.7	492.7	193.5	194.6	-9.1	-39.6	221.4
16:10:00	29.7	15.4	174.6	127.3	15.6	268.6	23.3	24087	14562	100537	1539.4	969.9	492.6	193.0	193.6	-5.8	-32.1	236.3
16:11:00	30.0	15.2	174.3	124.9	15.6	256.5	22.4	24620	14612	103140	1538.0	969.5	492.5	193.0	193.6	-11.7	-45.1	212.4
16:12:00	29.6	15.3	174.9	127.7	15.6	260.4	23.1	24260	14635	101480	1536.0	967.3	492.5	193.5	193.6	-9.0	-39.2	219.8
16:13:00	29.7	15.3	174.3	126.8	15.6	273.8	22.5	24440	14607	102824	1535.1	968.6	492.3	193.5	194.8	-13.0	-45.5	195.8
16:14:00	29.8	15.3	174.5	127.1	15.6	230.7	22.5	24267	14596	103086	1533.1	967.6	492.1	193.5	193.8	-8.9	-38.6	209.9
16:15:00	29.9	15.2	176.1	127.9	15.6	276.7	23.1	24440	14596	102116	1533.9	967.8	491.7	193.5	193.8	-7.3	-37.7	219.1
16:16:00	29.7	15.5	173.9	126.5	15.6	260.0	22.8	24260	14376	100126	1534.4	968.6	492.2	193.5	193.8	-5.2	-35.6	232.3
16:17:00	29.7	15.3	175.3	125.1	15.8	278.0	23.0	24357	14680	99828	1537.9	968.1	494.1	195.0	193.8	-6.3	-38.4	220.4
16:18:00	29.7	15.5	174.2	126.9	15.8	243.8	23.4	24260	14405	100029	1539.8	968.8	496.0	196.0	193.8	-5.4	-35.1	232.4
16:19:00	29.6	15.3	174.5	127.4	15.8	271.8	22.5	24523	14405	100488	1535.9	967.6	497.3	197.0	194.9	-9.7	-43.1	207.2
16:20:00	29.7	15.3	174.7	126.6	15.8	250.4	22.4	24350	14421	101581	1535.5	969.6	499.1	198.0	195.9	-10.8	-43.0	218.9
Max	33.0	16.1	177.4	132.4	16.2	426.8	23.8	24792	14792	109360	1550.9	971.2	502.8	198.0	197.6	-4.9	-28.5	245.0
Min	29.5	15.2	163.7	124.3	14.9	207.3	22.3	23728	14354	99828	1493.1	955.7	488.4	190.0	190.3	-23.5	-59.1	175.8
Average	30.5	15.6	170.1	128.8	15.7	270.5	23.1	24306	14589	103294	1531.8	965.3	494.9	192.8	193.2	-10.8	-41.8	214.7

Test No. 2 - October 19, 2016

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 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
10:47:00	33.0	15.9	175.3	117.7	17.2	276.9	22.5	26092	15163	105095	1540.0	960.1	486.0	191.5	193.0	-8.8	-42.8	218.9
10:48:00	32.7	15.8	175.2	118.2	17.2	294.9	23.0	25746	15180	103507	1539.3	960.2	485.6	191.5	194.1	-5.5	-39.9	227.5
10:49:00	32.9	15.5	175.2	117.5	17.2	315.5	22.6	25739	15180	105435	1537.9	961.6	485.7	191.5	194.1	-8.6	-42.6	201.1
10:50:00	32.5	15.9	175.1	117.7	17.2	305.3	23.4	25567	15303	104563	1536.1	961.5	485.5	191.5	193.1	-6.5	-41.0	214.9
10:51:00	32.8	15.9	175.4	117.5	17.2	286.9	22.4	25746	15169	103522	1534.8	961.0	485.6	192.0	193.1	-4.8	-38.1	227.9
10:52:00	33.2	16.0	175.0	117.5	17.2	280.9	23.2	25567	15056	102684	1534.0	960.9	485.9	192.0	193.1	-2.2	-34.3	243.3
10:53:00	33.2	15.7	175.6	116.8	17.2	286.9	23.7	25656	15090	104487	1532.9	961.8	485.7	192.0	193.1	-5.7	-41.7	231.6
10:54:00	32.8	15.6	174.5	117.9	17.2	277.4	23.5	25477	15191	102848	1534.3	960.7	486.0	192.5	193.1	-4.2	-37.5	240.1
10:55:00	33.1	15.9	176.0	117.2	17.2	295.3	23.3	25829	15219	104626	1531.6	960.5	486.0	192.0	193.1	-6.9	-40.6	218.6
10:56:00	32.6	16.0	174.2	117.2	17.2	270.4	22.4	25829	15191	104409	1535.8	960.0	486.0	192.5	193.1	-7.0	-41.5	230.5
10:57:00	33.0	16.3	175.4	118.9	17.2	267.1	23.7	25746	15191	104849	1535.5	960.5	485.5	192.5	194.2	-6.8	-42.7	201.3
10:58:00	33.2	16.2	175.8	118.9	17.2	295.8	22.4	25387	15073	103174	1536.3	961.2	485.4	192.0	192.9	-4.5	-38.0	215.2
10:59:00	33.3	16.1	176.0	122.2	17.2	246.1	22.5	25650	15056	103598	1537.6	959.7	485.1	192.0	192.9	-4.6	-39.2	229.9
11:00:00	33.2	16.0	175.4	124.1	17.2	275.6	23.4	25484	15056	102988	1539.6	958.4	485.0	191.0	192.9	-4.0	-37.2	245.9
11:01:00	32.7	16.1	175.5	118.4	17.2	286.6	22.4	25484	15062	104363	1537.1	957.5	484.8	190.0	192.9	-5.0	-36.7	230.8
11:02:00	32.9	16.5	175.6	119.0	17.2	274.1	23.1	25304	15039	102138	1539.0	958.1	484.8	190.0	192.9	-3.8	-37.2	247.1
11:03:00	33.0	15.8	174.6	117.3	17.3	288.7	22.9	25567	15045	104560	1534.5	960.0	485.0	190.0	191.6	-8.5	-46.0	223.1
11:04:00	33.3	15.9	174.3	117.3	17.3	301.1	23.4	25567	15084	104951	1534.0	957.9	484.6	190.0	192.7	-8.1	-41.0	231.4
11:05:00	33.3	16.1	175.3	118.4	17.3	275.1	23.6	25739	15090	104792	1537.3	959.2	484.6	190.5	192.7	-8.2	-43.5	207.5
11:06:00	33.0	15.7	174.8	118.4	17.3	396.8	23.0	25567	15185	104131	1535.3	957.5	484.4	190.5	191.5	-12.0	-53.6	196.4
11:07:00	33.3	16.0	175.4	118.6	17.3	323.1	22.4	25477	15073	104667	1534.9	956.9	484.3	190.5	191.5	-5.7	-41.2	237.4
11:08:00	33.0	15.7	174.5	118.6	17.3	289.2	23.5	25477	15011	102478	1534.9	956.0	483.8	190.0	191.5	-4.5	-41.9	194.7
11:09:00	33.3	16.3	176.1	119.3	17.3	282.3	22.4	25829	15219	104937	1535.0	957.9	483.2	190.0	191.5	-6.6	-41.1	234.6
11:10:00	33.2	15.8	175.1	118.8	17.3	270.8	22.4	25656	15112	107072	1535.4	958.2	483.4	189.5	191.5	-14.6	-56.0	191.8
11:11:00	33.3	16.2	174.9	118.9	17.3	324.4	22.9	25836	15101	104101	1532.6	959.2	482.9	189.5	190.3	-9.2	-43.7	221.7
11:12:00	32.9	15.9	175.1	118.3	17.3	298.5	23.5	25573	15101	109152	1532.6	959.2	482.8	189.5	191.4	-16.0	-57.1	184.6
11:13:00	33.2	16.4	175.3	118.9	17.3	251.1	23.0	25656	15096	105294	1529.5	960.8	482.6	189.5	191.4	-8.3	-42.6	205.5
11:14:00	33.0	16.2	174.7	119.4	17.3	254.6	22.7	25484	15096	110138	1532.8	958.7	482.3	189.0	190.3	-18.2	-57.6	191.5
11:15:00	33.4	15.8	174.9	117.2	17.3	301.7	22.7	25739	15096	104190	1531.5	958.6	481.9	189.0	190.3	-7.4	-41.2	236.8
11:16:00	33.0	15.6	174.4	117.8	17.3	274.5	23.6	25836	15096	110495	1533.6	958.3	481.8	189.0	190.3	-17.8	-57.6	190.3
11:17:00	33.3	16.1	175.4	117.8	17.3	361.0	23.7	25656	15096	103092	1531.8	958.1	481.5	189.0	190.3	-5.5	-40.0	233.0
11:18:00	32.7	15.8	174.7	117.7	17.3	326.7	23.3	25912	15242	108243	1534.8	959.4	481.4	188.5	190.3	-18.9	-59.0	187.0
11:19:00	33.0	16.1	175.2	118.1	17.3	475.7	23.5	25836	15101	104103	1530.6	959.0	481.4	189.0	190.3	-9.3	-46.0	223.8
11:20:00	33.2	15.8	174.6	117.5	17.3	318.0	23.5	26009	15112	108280	1531.9	958.9	481.3	189.0	191.4	-19.1	-60.1	182.2
11:21:00	32.7	15.8	174.9	117.5	17.3	288.9	23.8	25836	15090	104068	1529.1	958.0	481.4	189.5	190.1	-8.5	-44.7	211.4
11:22:00	33.3	15.6	174.5	116.9	17.3	280.4	23.7	26016	15090	107258	1529.3	958.9	481.0	189.5	190.1	-19.5	-59.6	212.6
11:23:00	32.9	15.7	174.8	116.5	17.3	400.7	23.3	25484	14994	102862	1534.4	960.1	480.7	189.5	190.1	-5.2	-38.2	238.1
11:24:00	33.2	15.6	174.4	120.4	17.3	299.1	22.8	25836	15051	107920	1534.4	958.6	480.7	189.5	191.2	-18.8	-57.7	210.3
11:25:00	33.2	15.8	175.4	123.7	17.3	312.2	23.5	25656	15051	103693	1533.3	957.9	480.5	188.5	190.0	-6.2	-39.9	236.1
11:26:00	33.2	15.7	175.3	116.5	17.3	435.5	22.4	25836	15185	107846	1535.0	958.4	480.8	187.5	190.0	-19.8	-59.3	205.9
11:27:00	32.9	16.1	175.4	117.3	17.3	430.3	22.7	25746	15079	104438	1534.5	957.2	480.6	188.0	190.0	-8.3	-42.8	228.9
11:28:00	33.3	16.2	174.9	116.7	17.3	476.0	23.2	25836	15298	106879	1533.3	957.0	480.3	188.0	190.0	-10.9	-48.2	201.3
11:29:00	33.2	16.3	175.2	121.9	17.3	475.7	23.3	25477	15169	105473	1532.3	958.1	480.4	188.5	190.0	-7.5	-43.0	213.4
11:30:00	32.8	15.7	174.9	122.4	17.3	279.2	23.5	25746	15180	104908	1532.3	957.6	480.5	187.5	188.9	-10.5	-44.3	227.9
11:31:00	33.0	15.8	175.7	117.8	17.3	400.4	22.6	25567	15174	103891	1533.1	958.3	480.0	187.0	188.9	-4.2	-38.7	239.9
11:32:00	32.8	15.7	174.3	116.6	17.3	195.2	22.7	25919	15253	106474	1532.4	957.5	480.2	187.5	188.9	-10.3	-47.6	229.8
11:33:00	33.0	15.9	175.0	116.5	17.3	297.5	23.7	25484	15135	104563	1532.1	958.4	480.3	188.0	188.9	-7.5	-41.7	243.1
11:34:00	33.0	15.8	175.1	115.2	17.3	270.2	22.6	26016	15146	105744	1530.6	957.5	480.2	188.0	188.9	-13.1	-52.5	216.2
11:35:00	32.9	15.8	174.5	120.9	17.3	274.1	23.7	25567	15146	105992	1530.4	957.0	480.0	188.0	190.1	-8.0	-41.3	224.9
11:36:00	32.8	15.5	174.5	120.2	17.3	266.8	23.0	25836	15124	105700	1529.6	956.3	479.3	187.0	190.1	-9.8	-45.5	197.4
11:37:00	33.2	16.2	175.3	117.1	17.3	421.7	23.6	25746	15096	105757	1528.5	957.5	479.1	186.5	188.8	-7.8	-42.8	212.0
11:38:00	33.1	15.9	174.7	116.6	17.3	436.3	23.0	25732	15230	105675	1524.6	956.1	478.6	186.5	188.8	-8.7	-42.3	227.1

Test No. 2 - October 19, 2016

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 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
11:39:00	32.9	16.2	174.8	119.0	17.3	224.6	23.5	25525	15101	104497	1526.5	957.2	478.7	186.5	188.8	-5.8	-39.9	239.2
11:40:00	32.9	15.8	175.6	121.5	17.3	214.6	22.4	25919	15202	105949	1525.1	956.1	478.2	186.5	188.8	-9.2	-42.7	227.9
11:41:00	32.7	16.2	175.5	125.0	17.3	436.2	23.1	25387	15090	105675	1524.9	956.4	477.5	185.5	187.8	-6.0	-41.9	241.3
11:42:00	32.5	16.0	174.7	117.3	17.3	323.2	22.3	25919	15090	106058	1523.3	956.6	477.4	185.0	187.8	-14.5	-52.0	219.9
11:43:00	32.7	16.0	175.1	117.8	17.3	455.0	23.6	25573	15090	105632	1523.0	956.5	476.9	185.0	187.8	-8.3	-43.4	225.7
11:44:00	33.0	16.0	175.3	117.1	17.3	475.4	22.9	25836	15079	106949	1524.6	956.1	476.7	185.0	187.8	-13.4	-49.1	202.3
11:45:00	33.1	16.2	175.2	118.4	17.3	436.0	22.9	25836	15079	104995	1528.1	955.4	476.5	185.5	187.8	-8.5	-44.9	212.0
11:46:00	32.6	15.8	174.3	120.3	17.0	229.4	23.6	25567	15191	106046	1526.4	955.3	476.0	185.0	186.8	-9.0	-45.1	227.3
11:47:00	33.1	16.1	175.1	119.5	17.0	354.8	22.8	25484	14994	104678	1528.4	956.9	475.6	184.5	186.8	-5.7	-40.2	240.3
11:48:00	33.3	16.0	175.0	115.2	17.0	262.8	22.4	25746	15174	106424	1527.9	955.2	475.4	184.0	186.8	-10.1	-46.0	230.1
11:49:00	33.1	15.9	175.5	117.4	17.3	323.6	22.7	25394	15062	103495	1528.0	955.8	475.2	184.5	186.8	-5.7	-42.0	238.8
11:50:00	33.2	15.9	175.3	115.8	17.3	289.3	23.7	26016	15124	106169	1524.6	955.3	474.8	184.5	186.8	-11.7	-47.0	219.7
11:51:00	33.0	15.8	174.0	117.2	17.3	435.5	23.3	25836	15039	105804	1528.1	954.9	474.5	184.5	186.8	-10.3	-46.4	230.6
11:52:00	33.1	15.7	175.4	116.6	17.3	378.3	23.1	25919	15214	106791	1524.9	954.9	474.1	184.5	186.8	-10.9	-46.5	202.2
11:53:00	33.0	15.8	175.2	117.2	17.3	284.3	22.9	25573	15129	104671	1523.9	954.5	473.9	185.0	186.8	-9.3	-44.0	213.9
11:54:00	32.9	16.0	175.7	117.1	17.3	436.4	23.7	25484	15169	105598	1525.3	955.4	473.5	185.0	186.8	-10.2	-45.0	234.6
11:55:00	32.7	15.9	175.0	118.2	17.3	435.5	23.5	25656	15067	104141	1528.6	953.7	473.2	184.5	186.8	-5.6	-38.6	242.6
11:56:00	33.2	16.0	175.3	117.9	17.3	475.6	22.8	25573	15062	105322	1526.6	952.6	473.5	184.5	186.8	-8.6	-44.8	230.1
11:57:00	33.1	16.0	175.0	118.6	17.3	232.7	22.7	25567	15062	103123	1528.9	953.9	473.1	184.5	186.8	-6.0	-41.1	245.1
11:58:00	32.9	16.1	176.0	118.6	17.3	376.0	23.1	25829	15079	106528	1523.8	953.6	473.4	184.0	186.9	-10.0	-46.7	221.6
11:59:00	33.0	16.1	175.4	119.9	17.3	260.6	22.7	25656	15079	104337	1526.4	953.4	473.4	184.0	186.9	-10.2	-44.2	232.4
12:00:00	33.3	16.2	174.9	118.3	17.3	475.1	23.7	25739	15124	106262	1522.0	954.4	473.1	184.0	186.9	-10.9	-45.7	207.0
12:01:00	33.1	16.0	174.5	119.4	17.3	253.9	22.4	25567	15124	105207	1523.0	953.7	473.2	184.0	185.7	-8.7	-43.0	220.0
12:02:00	33.2	16.2	176.2	118.8	17.3	435.5	22.9	25573	15112	105403	1527.6	952.8	473.3	183.5	185.7	-7.4	-40.6	232.8
12:03:00	33.1	15.5	174.5	117.0	17.3	435.4	22.6	25573	15112	104838	1531.6	952.6	472.9	183.5	185.7	-6.1	-43.7	244.4
12:04:00	33.3	16.2	175.1	117.7	17.3	171.0	22.9	25484	15112	105914	1530.9	952.9	473.2	183.5	185.7	-7.4	-43.5	234.1
12:05:00	33.0	15.9	174.9	118.4	17.3	436.0	23.6	25567	15096	104222	1535.0	953.5	473.4	183.5	185.7	-5.2	-39.6	213.9
12:06:00	33.0	15.9	175.2	117.9	17.3	460.1	23.2	25746	15096	105589	1531.8	952.8	473.2	183.5	185.7	-9.9	-47.8	219.8
12:07:00	33.2	15.9	174.6	118.3	17.3	435.5	22.6	25573	15096	107803	1529.5	953.1	473.0	183.5	185.7	-10.8	-51.9	187.9
12:08:00	33.5	16.2	175.4	118.3	17.3	475.4	22.5	25567	15096	106679	1526.9	952.8	473.1	183.5	185.7	-10.3	-48.2	203.7
12:09:00	33.1	15.8	174.7	120.0	17.3	473.5	22.4	25656	15096	109769	1525.0	953.3	473.0	183.5	185.7	-17.6	-59.4	189.8
12:10:00	33.1	16.0	175.4	120.0	17.3	400.5	22.4	25394	15124	105522	1527.0	953.4	473.2	183.0	185.7	-6.9	-41.2	232.9
12:11:00	33.2	16.0	174.8	120.6	17.3	435.7	23.3	25836	15067	110642	1530.3	953.0	473.2	182.5	185.7	-20.5	-61.1	190.2
12:12:00	32.8	15.9	175.4	120.0	17.3	435.9	22.6	25484	15062	104244	1527.8	951.9	473.8	182.5	185.7	-8.6	-44.0	234.0
12:13:00	33.2	15.8	175.2	120.1	17.3	474.5	23.5	25919	15062	111101	1532.0	953.3	473.2	182.0	184.5	-20.8	-62.0	185.3
12:14:00	33.1	16.0	174.7	119.0	17.3	436.1	23.3	25836	15174	105818	1527.4	951.2	473.5	182.0	184.5	-10.0	-48.9	218.5
12:15:00	33.3	15.6	174.3	117.7	17.3	350.9	23.6	25746	15146	111483	1527.8	953.3	473.5	182.0	184.5	-21.4	-63.5	178.6
12:16:00	33.3	15.7	175.1	121.1	17.3	269.8	22.6	25484	15129	105667	1524.4	953.1	472.9	182.0	184.5	-10.7	-45.2	200.3
12:17:00	33.2	15.7	174.2	122.2	17.3	287.6	23.2	26009	15141	109687	1525.4	951.8	473.1	181.5	184.5	-20.9	-60.0	182.4
12:18:00	33.3	16.1	175.3	118.5	17.3	435.5	23.0	25387	15023	105741	1529.4	952.2	473.4	181.5	184.5	-7.0	-40.9	230.4
12:19:00	32.9	15.8	174.2	117.4	17.3	245.0	23.7	25746	15236	109761	1530.8	952.7	473.5	181.5	184.5	-22.0	-63.2	184.8
12:20:00	33.2	15.8	175.3	117.4	17.3	279.3	22.4	25387	15006	104774	1528.6	951.6	473.8	182.0	183.3	-6.8	-42.1	232.9
12:21:00	33.1	15.6	174.6	117.3	17.3	435.1	23.6	25746	15157	109402	1531.1	950.0	474.5	182.5	184.6	-21.8	-62.5	185.7
12:22:00	32.6	15.8	174.2	118.5	17.3	175.2	22.4	25746	15051	105087	1528.6	951.6	475.6	183.5	184.6	-10.1	-47.0	220.9
12:23:00	32.6	15.5	174.8	117.9	17.3	455.9	23.1	26009	15174	107860	1530.4	951.6	476.7	184.0	185.8	-16.5	-51.7	195.8
12:24:00	32.7	15.8	175.3	119.3	17.3	246.3	23.6	25656	15039	104994	1529.4	951.2	477.5	185.0	185.8	-9.1	-43.9	206.0
12:25:00	32.8	15.7	175.2	118.5	17.3	218.9	22.4	25746	15197	107161	1529.6	951.7	478.4	185.5	185.8	-10.0	-46.9	223.6
12:26:00	33.0	15.9	175.3	119.0	17.3	265.3	23.4	25394	15084	104382	1533.1	950.8	479.1	185.5	185.8	-6.0	-39.9	234.4
12:27:00	32.5	16.0	175.1	119.6	17.3	271.4	23.2	25926	15180	107843	1532.6	949.2	479.3	185.5	185.8	-10.5	-48.0	225.6
12:28:00	33.1	16.2	175.9	120.2	17.3	253.5	22.4	25484	15062	104154	1535.8	948.9	480.0	185.5	185.9	-6.5	-43.0	235.7
12:29:00	33.0	15.9	174.9	120.2	17.3	312.8	22.4	25656	15197	107124	1537.5	950.8	480.6	185.5	185.9	-18.5	-59.7	204.4
12:30:00	33.3	15.9	175.1	119.6	17.3	293.7	23.6	25484	14848	103976	1534.6	951.4	481.2	186.0	186.0	-8.1	-42.6	224.6

Test No. 2 - October 19, 2016

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 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
12:31:00	33.2	15.8	174.7	119.0	17.3	369.5	22.5	25656	15090	106283	1532.4	952.0	481.7	186.0	187.2	-11.6	-48.5	203.1
12:32:00	33.0	16.1	175.4	119.8	17.3	224.3	23.5	25663	15006	105518	1534.1	953.3	482.0	186.5	186.1	-8.3	-43.1	211.4
12:33:00	33.0	15.7	174.3	118.0	17.3	278.9	22.6	25656	14994	104815	1532.4	950.4	482.4	186.5	186.3	-10.3	-45.6	228.6
12:34:00	32.7	15.7	174.0	117.6	17.3	270.8	22.8	25484	15084	104728	1530.9	951.1	482.8	187.0	186.4	-7.1	-42.3	238.2
12:35:00	33.2	15.8	174.9	117.6	17.3	252.6	22.7	25746	15096	104995	1532.0	951.3	483.1	187.0	188.0	-9.0	-43.4	229.4
12:36:00	33.4	16.0	174.5	119.2	17.3	324.0	23.7	25573	14966	102967	1531.5	949.4	483.5	187.5	187.9	-5.6	-40.4	240.1
12:37:00	33.1	15.8	174.5	118.0	17.3	288.9	22.6	26009	15270	105788	1535.8	950.2	484.4	188.0	187.9	-10.3	-48.8	216.5
12:38:00	33.2	15.8	175.7	119.7	17.3	200.0	22.5	25663	14983	104566	1532.1	951.9	484.8	188.5	187.9	-8.6	-42.5	224.1
12:39:00	33.1	16.0	174.5	119.7	17.3	475.7	23.8	25656	15124	105071	1531.3	950.6	485.1	188.5	189.0	-9.0	-46.3	199.6
12:40:00	33.3	15.9	174.5	120.4	17.3	275.2	22.8	25484	15107	104059	1530.1	950.8	485.4	189.0	189.0	-7.3	-42.0	210.9
12:41:00	33.2	15.9	175.4	116.3	17.3	240.8	23.7	25746	15101	104708	1530.6	949.7	486.0	189.0	189.0	-7.7	-43.6	227.1
12:42:00	33.3	15.9	175.2	117.0	17.3	281.2	23.2	25656	15101	103380	1528.9	950.4	486.7	189.5	189.0	-3.9	-39.4	238.6
12:43:00	32.6	16.1	175.3	116.4	17.3	298.7	22.8	25656	15056	103596	1529.5	950.6	486.9	190.0	189.0	-7.7	-41.7	229.1
12:44:00	32.7	16.1	174.8	116.4	17.3	241.5	23.7	25394	15056	102612	1532.1	951.8	487.1	190.5	189.0	-4.6	-35.7	239.4
12:45:00	33.1	15.7	175.2	115.4	17.3	300.6	22.7	25843	15067	104473	1534.4	952.4	486.9	190.5	190.1	-8.7	-45.8	216.7
12:46:00	33.4	15.9	174.7	115.4	17.3	316.5	22.6	25394	15067	103376	1533.1	950.7	486.9	191.0	190.1	-7.7	-41.7	225.5
12:47:00	33.0	16.0	175.3	116.2	17.3	247.9	23.0	25746	14966	102895	1533.3	951.9	486.9	191.5	190.1	-8.9	-43.5	201.4
13:38:00	32.6	15.7	175.3	117.7	17.3	289.1	23.2	25394	15011	103145	1550.1	961.5	496.8	197.0	196.3	-4.5	-39.4	226.9
13:39:00	32.9	15.9	174.9	119.2	17.4	475.8	22.4	25401	14927	101209	1550.5	960.9	497.2	197.0	196.3	-0.2	-34.0	237.6
13:40:00	32.5	15.9	175.4	119.1	17.4	268.7	23.1	25663	14916	104431	1548.9	962.7	497.5	197.0	196.3	-6.5	-43.9	216.2
13:41:00	32.7	15.9	174.6	119.7	17.4	369.0	23.7	25311	15023	102366	1548.0	962.4	497.6	197.0	196.3	-4.0	-37.8	227.1
13:42:00	33.0	15.6	174.8	117.2	17.4	404.3	22.6	25484	15067	104067	1546.4	962.3	497.9	197.0	196.3	-4.4	-39.5	199.9
13:43:00	32.6	15.6	174.1	118.4	17.4	464.3	22.7	25221	14989	103738	1550.4	962.4	498.0	197.5	196.3	-4.0	-36.7	211.0
13:44:00	33.0	15.7	175.9	120.6	17.4	436.2	22.6	25311	14905	103457	1551.6	962.6	498.0	197.5	196.3	-3.4	-38.4	225.1
13:45:00	33.2	16.0	175.4	122.9	17.4	318.7	22.9	25221	14865	101920	1555.3	963.3	497.8	197.0	196.3	-1.3	-34.9	234.3
13:46:00	32.6	15.8	174.5	119.7	17.4	352.4	23.4	25401	15023	103102	1554.0	963.1	498.1	196.0	196.3	-3.2	-37.7	228.9
13:47:00	33.1	15.9	174.8	118.4	17.4	435.2	23.6	25221	14910	102779	1552.5	964.1	497.9	196.0	196.3	-3.4	-39.9	240.6
13:48:00	33.3	15.9	176.1	118.8	17.4	292.6	22.4	25477	14899	104250	1551.4	963.8	497.8	196.0	195.2	-7.1	-43.5	214.6
13:49:00	33.3	16.1	174.5	119.4	17.4	337.3	22.4	25394	15523	104300	1550.4	964.0	497.9	196.5	196.3	-5.0	-40.1	226.1
13:50:00	33.2	15.8	175.9	119.0	17.4	244.9	23.3	25311	14933	103886	1549.8	962.3	498.3	196.5	196.3	-6.9	-42.7	200.1
13:51:00	32.7	15.9	174.3	118.9	17.4	256.5	22.8	25311	14933	103361	1549.9	963.5	498.3	197.0	196.3	-4.8	-39.4	210.8
13:52:00	32.9	15.8	175.2	117.3	17.4	252.8	23.5	25394	14955	102756	1549.8	963.4	497.9	197.0	196.3	-5.6	-40.8	226.3
13:53:00	33.1	15.7	174.6	121.6	17.4	231.2	23.7	25138	15056	102486	1549.5	964.9	497.8	197.0	196.3	-5.0	-39.9	237.1
13:54:00	33.0	15.6	175.1	123.0	17.4	330.9	22.7	25304	14978	103446	1548.4	966.2	497.3	196.5	196.3	-3.7	-39.1	227.4
13:55:00	33.2	15.6	174.3	118.5	17.4	291.5	22.7	25318	14950	101952	1551.5	964.1	497.6	196.0	196.3	-2.6	-37.6	239.3
13:56:00	32.6	15.8	175.4	119.0	17.4	279.2	23.1	25663	15017	104252	1547.3	965.2	497.8	196.5	195.3	-6.4	-42.5	215.0
13:57:00	32.8	15.8	175.4	119.9	17.4	283.7	23.1	25491	15017	102994	1548.3	965.5	497.4	196.5	196.4	-3.2	-37.1	224.3
13:58:00	32.6	16.0	175.5	119.2	17.4	310.9	23.1	25573	14910	103715	1545.0	964.8	497.3	196.5	196.4	-7.1	-43.6	200.2
13:59:00	32.6	16.0	174.5	120.0	17.4	329.1	22.4	25394	15039	103233	1544.5	965.9	497.5	196.5	196.4	-3.8	-38.3	211.4
14:00:00	33.3	15.7	175.4	118.4	17.4	251.4	22.5	25311	14978	103566	1547.0	962.9	497.3	196.5	196.4	-5.2	-39.9	227.7
14:01:00	33.2	15.8	174.5	118.9	17.4	422.0	23.1	25311	14978	101734	1550.3	963.9	497.9	196.5	196.4	-3.4	-37.1	236.2
14:02:00	33.3	15.7	175.7	117.9	17.4	265.4	22.6	25221	14882	102822	1548.1	964.8	498.0	197.0	196.4	-2.9	-38.0	231.2
14:03:00	32.9	15.6	174.7	118.4	17.4	223.8	22.4	25311	15006	102767	1548.4	963.2	497.7	197.0	196.4	-7.8	-48.5	206.1
14:04:00	32.5	15.7	175.2	118.2	17.4	128.6	23.3	25311	14933	102648	1542.0	964.4	497.9	197.5	196.4	-6.8	-41.1	220.8
14:05:00	33.4	15.7	174.7	118.9	17.4	262.0	23.5	25311	14933	106227	1546.0	965.0	498.2	197.5	197.4	-11.8	-51.5	185.4
14:06:00	33.3	16.0	175.1	120.1	17.4	364.3	22.4	25401	15062	103843	1543.4	962.9	498.5	198.0	197.4	-5.3	-40.2	204.4
14:07:00	33.1	15.9	175.2	119.5	17.4	244.4	22.8	25394	14843	105732	1545.4	964.8	498.5	197.5	196.3	-13.5	-53.4	187.3
14:08:00	33.0	16.0	174.8	122.3	17.4	414.7	23.0	25221	14938	102160	1546.0	965.7	498.2	197.5	196.3	-3.5	-37.7	229.1
14:09:00	32.9	15.9	173.8	124.9	17.4	317.7	22.6	25401	14938	109164	1549.5	966.5	498.2	197.0	196.3	-13.8	-54.5	185.9
14:10:00	32.9	15.9	175.2	118.6	17.4	436.1	22.9	25138	14950	102073	1551.1	963.3	498.4	196.5	196.3	-3.2	-35.9	230.9
14:11:00	33.0	16.0	175.0	118.4	17.4	298.0	22.5	25304	14972	107403	1551.8	965.3	498.6	196.5	195.3	-14.1	-55.2	186.8
14:12:00	32.6	15.8	174.5	117.4	17.4	475.4	22.7	25401	15034	102692	1546.9	964.9	498.8	196.5	196.4	-6.2	-41.2	220.3

Test No. 2 - October 19, 2016

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 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
14:13:00	32.9	15.6	174.0	118.4	17.4	167.5	22.5	25573	15180	108940	1548.0	964.4	498.5	197.0	196.4	-13.4	-51.7	178.8
14:14:00	33.0	15.7	175.4	117.8	17.4	412.1	23.7	25573	14978	104365	1544.8	965.8	498.4	197.0	196.4	-7.6	-41.7	204.7
14:15:00	33.3	15.5	175.0	117.3	17.4	284.9	23.8	25573	14961	107608	1546.3	964.3	498.4	197.0	196.4	-16.9	-57.8	187.3
14:16:00	33.4	16.0	175.4	118.4	17.4	268.9	23.7	25221	14938	102767	1548.1	964.8	498.3	197.5	196.4	-4.7	-37.9	230.7
14:17:00	33.3	15.5	174.9	118.4	17.4	475.4	23.1	25580	14938	108094	1548.3	965.8	498.2	197.5	196.2	-17.3	-57.6	184.9
14:18:00	33.2	15.9	175.4	117.7	17.4	435.9	23.7	25394	14944	101637	1548.3	964.8	498.0	197.5	197.2	-4.3	-38.5	231.4
14:19:00	33.0	15.5	174.6	117.7	17.4	240.0	23.1	25663	14989	107679	1551.1	964.6	497.9	197.5	197.2	-14.7	-56.0	185.1
14:20:00	33.1	15.5	175.9	121.5	17.4	364.5	22.7	25401	14860	104267	1544.6	965.5	498.0	198.0	197.2	-7.0	-43.0	216.7
14:21:00	32.7	15.4	174.1	119.4	17.4	337.4	23.6	25573	15067	107953	1546.3	965.0	498.3	197.5	197.2	-15.6	-53.8	195.0
14:22:00	33.2	15.5	175.1	118.5	17.4	314.3	23.7	25394	14966	103574	1545.1	965.2	498.1	197.5	197.2	-5.6	-41.3	205.6
14:23:00	33.2	15.5	175.0	117.8	17.4	301.0	23.3	25580	15112	104862	1545.3	964.6	498.3	197.5	197.2	-8.5	-45.2	221.1
14:24:00	32.6	15.7	175.0	118.4	17.4	277.1	23.6	25401	14871	103819	1546.9	963.2	498.0	197.5	196.3	-4.5	-37.5	231.6
14:25:00	32.8	15.6	175.5	118.4	17.4	184.4	22.5	25670	15090	103754	1551.3	964.0	498.4	197.5	197.5	-7.9	-43.7	225.3
14:26:00	32.6	16.1	175.2	119.5	17.4	345.4	22.5	25401	14927	103435	1550.1	963.7	498.4	198.0	197.4	-3.8	-38.6	236.8
14:27:00	32.9	15.5	175.9	118.8	17.4	226.6	23.5	25746	14978	107190	1550.3	964.8	498.6	197.5	196.3	-14.8	-54.1	204.0
14:28:00	32.6	16.0	175.1	119.4	17.4	286.5	23.6	25318	14905	103229	1550.3	964.9	498.7	198.0	197.4	-6.0	-40.0	224.2
14:29:00	33.0	15.8	174.9	118.9	17.4	435.5	23.3	25663	15039	104347	1548.0	964.2	498.7	197.5	197.4	-7.3	-45.2	196.9
14:30:00	32.7	15.8	174.6	120.7	17.4	298.4	23.4	25394	15028	103799	1550.1	965.1	498.5	198.0	197.4	-5.0	-40.5	208.1
14:31:00	32.7	15.6	175.1	122.0	17.4	276.8	23.0	25753	14921	104588	1550.4	964.4	498.5	197.5	196.3	-6.6	-42.2	223.3
14:32:00	33.1	15.6	175.1	116.9	17.4	435.5	23.7	25221	15000	102062	1553.4	964.7	498.0	197.0	196.3	-4.1	-35.5	235.4
14:33:00	32.8	15.7	174.8	116.3	17.4	254.7	23.0	25401	14978	103660	1550.5	963.5	498.2	197.0	197.4	-6.0	-39.7	226.0
14:34:00	33.3	15.7	174.1	117.5	17.4	329.9	22.7	25048	14978	103079	1553.5	964.5	498.1	197.0	196.3	-3.9	-36.7	237.8
14:35:00	33.1	15.8	175.4	118.1	17.4	273.6	23.3	25573	15096	104833	1551.1	964.1	497.8	197.0	197.4	-8.8	-43.9	218.1
14:36:00	33.1	15.8	175.4	119.3	17.4	229.4	22.7	25221	14983	104895	1553.3	963.8	497.9	197.5	197.4	-4.4	-39.2	224.6
14:37:00	33.2	15.5	174.5	117.2	17.4	285.6	22.6	25491	15084	105155	1553.5	965.0	498.0	197.5	197.4	-7.8	-43.1	200.9
14:38:00	33.1	15.6	174.8	118.5	17.4	475.8	22.5	25138	14983	103883	1553.0	965.6	498.1	198.0	197.4	-3.7	-40.0	211.7
14:39:00	33.3	16.0	175.5	120.8	17.4	378.9	23.5	25228	14989	104818	1553.6	966.1	498.3	198.0	197.4	-5.4	-40.4	225.7
14:40:00	33.0	15.8	174.5	121.7	17.4	344.8	23.8	25138	14989	103453	1556.4	965.4	499.0	198.0	197.4	-1.7	-35.6	235.5
14:41:00	32.5	15.9	175.4	118.0	17.4	299.0	23.5	25401	15045	104869	1556.4	965.3	499.6	198.0	197.4	-5.2	-38.7	228.7
14:42:00	32.9	15.9	175.3	118.5	17.4	270.8	23.0	25048	14933	102959	1559.9	966.6	500.0	198.5	197.4	-1.2	-33.7	238.4
14:43:00	32.6	16.0	175.8	119.2	17.4	475.3	22.4	25311	14961	103947	1556.0	966.5	500.6	199.0	197.4	-4.7	-41.0	215.6
14:44:00	32.9	15.7	174.6	122.3	17.4	270.5	23.7	24958	15067	101932	1554.9	965.9	500.4	199.0	198.5	-2.6	-33.4	224.9
14:45:00	32.5	16.0	175.1	119.7	17.4	300.9	22.8	25394	15067	103793	1556.5	967.8	500.3	198.0	198.5	-3.8	-38.3	200.4
14:46:00	33.0	15.9	174.3	116.8	17.4	277.4	22.6	25138	15062	103421	1555.9	966.8	499.5	197.5	197.3	-4.9	-37.9	212.6
14:47:00	32.9	15.9	175.0	116.9	17.4	275.8	22.4	25221	15028	103852	1558.6	965.5	498.8	197.5	197.3	-3.4	-38.2	226.7
14:48:00	33.0	15.9	173.6	118.0	17.4	403.1	22.7	25138	14876	101866	1561.0	965.7	498.1	197.5	197.3	-2.5	-36.3	237.9
14:49:00	32.8	15.9	175.5	117.4	17.4	339.6	23.3	25311	14871	104774	1561.0	966.7	497.8	197.0	197.3	-2.0	-36.5	225.9
14:50:00	33.4	15.8	174.8	117.7	17.4	475.7	22.8	25048	14865	101899	1560.6	968.9	497.3	197.0	197.3	-0.5	-33.8	238.0
14:51:00	33.2	15.8	174.6	119.5	17.4	369.4	22.6	25228	14921	104347	1557.1	969.9	497.3	197.0	196.0	-6.1	-40.5	215.9
14:52:00	33.2	15.5	174.8	120.9	17.4	444.5	22.4	25138	14927	103453	1557.1	969.0	496.6	196.5	197.1	-3.3	-37.8	224.4
14:53:00	32.9	15.7	176.5	121.3	17.4	355.5	22.9	25401	14927	104809	1558.1	968.3	496.1	196.0	197.1	-4.5	-39.9	200.1
14:54:00	33.2	15.8	175.0	121.9	17.4	272.1	22.5	25221	14921	103242	1556.6	969.2	495.9	195.5	196.1	-3.1	-38.9	210.9
14:55:00	33.0	15.7	175.4	121.0	17.4	382.6	22.5	25048	14871	104336	1555.8	968.6	495.5	195.0	196.1	-2.6	-36.8	224.4
14:56:00	33.0	15.7	175.1	116.6	17.4	304.9	22.6	25048	14725	102529	1560.8	968.5	495.0	194.5	196.1	-1.1	-34.2	237.0
14:57:00	33.0	16.0	175.5	117.4	17.4	345.8	22.4	25145	14989	103234	1558.6	968.9	494.7	194.5	195.1	-4.4	-38.5	230.9
14:58:00	32.6	15.9	175.1	119.2	17.4	343.2	22.9	25221	14950	101843	1558.6	969.5	494.6	194.5	195.1	-1.0	-34.2	240.1
14:59:00	32.6	15.8	176.5	123.1	17.4	292.4	22.5	25048	14950	105235	1554.9	969.7	494.2	194.5	195.1	-6.1	-40.5	217.1
15:00:00	32.7	15.9	175.0	118.4	17.4	475.7	23.8	24868	14950	102736	1558.4	969.3	493.9	194.0	195.1	-3.1	-39.4	222.1
15:01:00	32.7	16.2	175.2	118.2	17.4	315.4	22.4	25221	14978	104764	1557.5	967.6	493.7	194.0	195.1	-5.4	-39.9	203.4
15:02:00	32.6	15.8	174.3	119.9	17.4	282.0	23.7	25221	14978	103192	1558.6	969.4	493.8	194.5	193.9	-6.0	-41.2	190.1
15:03:00	33.0	15.7	174.7	118.7	17.4	277.0	23.5	25311	14972	102105	1553.9	968.5	493.2	194.0	194.0	-5.6	-40.6	230.3
15:04:00	32.7	15.7	174.5	122.6	17.4	340.6	22.4	25145	15023	102203	1557.6	968.8	493.2	194.0	195.3	-12.5	-54.1	192.6

Test No. 2 - October 19, 2016

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 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
15:05:00	33.2	15.7	174.8	119.0	17.4	271.3	22.5	25048	14933	103399	1557.5	968.6	493.3	193.5	194.1	-3.2	-35.5	235.3
15:06:00	33.1	15.6	174.9	117.6	17.4	265.5	22.6	24958	14820	106173	1559.6	970.0	492.8	193.0	194.1	-14.1	-55.0	190.2
15:07:00	33.1	15.7	175.8	122.7	17.4	321.2	22.4	25311	14950	104409	1554.1	968.6	492.6	193.5	194.1	-4.1	-39.6	220.3
15:08:00	33.4	15.6	174.8	116.8	17.4	280.4	23.7	25138	15023	108766	1557.8	968.7	492.2	193.0	194.1	-11.7	-51.0	182.9
15:09:00	32.5	15.9	175.4	121.0	17.4	237.3	22.5	25048	14916	103603	1554.8	969.0	492.0	193.5	194.1	-5.0	-39.5	206.3
15:10:00	33.0	15.4	174.4	116.6	17.4	365.1	22.5	25221	15017	108540	1557.6	969.4	492.3	193.0	194.1	-16.4	-57.2	187.7
15:11:00	33.3	15.7	175.5	117.9	17.4	472.7	23.2	25311	15017	103431	1554.6	968.2	492.1	193.5	194.1	-3.6	-38.7	232.4
15:12:00	32.9	15.6	174.5	117.3	17.4	256.4	23.7	25221	14916	109485	1559.1	969.5	491.9	193.5	194.1	-13.5	-53.8	187.8
15:13:00	33.3	15.6	175.4	122.7	17.4	331.9	22.5	25221	14972	103699	1556.4	966.9	491.7	193.5	194.1	-2.3	-35.2	233.3
15:14:00	33.0	15.5	174.3	117.8	17.4	475.5	22.8	25048	14972	108528	1559.0	968.3	491.6	193.0	194.1	-13.1	-52.1	187.1
15:15:00	33.3	16.1	176.0	117.5	17.4	284.1	23.7	25228	14798	103892	1557.4	968.1	491.6	193.0	194.1	-5.9	-41.4	222.9
15:16:00	32.9	15.7	174.5	121.8	17.4	475.6	22.7	25401	15000	109522	1558.1	966.9	491.7	193.5	195.4	-14.3	-55.2	180.6
15:17:00	33.1	15.8	175.6	125.0	17.4	475.1	23.1	25228	15011	104686	1555.4	968.4	491.6	193.0	194.2	-5.1	-39.9	204.9
15:18:00	33.3	15.5	174.9	117.0	17.4	292.2	23.5	25663	15006	108332	1556.4	968.2	491.8	192.5	194.2	-16.7	-56.9	214.8
15:19:00	32.9	16.1	175.9	122.9	17.4	475.7	22.4	25221	15006	103884	1554.8	968.9	491.7	193.0	194.2	-3.7	-38.6	229.3
15:20:00	33.2	15.8	175.4	117.2	17.4	288.7	23.7	25401	15118	107224	1555.3	968.8	492.0	192.5	194.2	-15.2	-54.5	218.9
15:21:00	32.8	15.8	175.2	118.2	17.4	320.0	22.4	25145	14978	104132	1552.3	968.0	492.2	193.0	194.2	-2.7	-40.2	232.6
15:22:00	32.9	15.5	173.9	120.1	17.4	475.8	22.8	25497	15096	107635	1556.4	966.3	492.4	193.5	194.2	-16.0	-57.7	190.3
15:23:00	32.6	15.6	175.1	114.9	17.4	293.1	23.3	25311	14989	102629	1554.3	969.7	492.9	193.5	194.2	-5.3	-43.4	221.7
15:24:00	32.6	15.4	173.7	119.3	17.4	316.2	23.1	25311	15129	105266	1554.0	966.1	493.0	194.0	195.2	-10.3	-46.5	195.4
15:25:00	32.6	15.9	175.9	123.8	17.4	475.5	23.4	25138	15017	104173	1553.1	967.9	493.0	194.0	195.2	-3.7	-40.6	203.8
15:26:00	32.6	15.4	174.4	113.9	17.4	281.3	23.3	25311	15118	104707	1551.1	968.2	493.2	194.0	194.0	-8.2	-46.1	221.8
15:27:00	32.6	15.7	174.9	120.1	17.4	404.9	23.7	25145	15000	104224	1554.3	968.3	493.0	195.0	195.2	-2.4	-36.9	230.4
15:28:00	32.6	14.7	174.6	120.8	17.4	312.9	23.1	25138	15000	104362	1554.4	967.9	493.1	194.5	195.2	-4.6	-40.4	222.6
15:29:00	33.0	15.7	174.9	121.0	17.4	475.7	22.7	25311	14876	102650	1556.3	968.8	493.3	194.0	195.2	-1.3	-34.6	234.4
15:30:00	32.5	15.5	174.0	119.5	17.4	306.6	22.4	25843	15135	105545	1554.0	968.6	492.8	193.5	194.9	-9.3	-45.7	215.7
15:31:00	33.0	15.8	175.2	120.2	16.3	475.4	23.1	25228	14955	104130	1553.5	968.0	492.6	193.0	194.9	-4.7	-40.8	225.6
15:32:00	32.6	15.5	174.9	119.7	17.4	290.7	22.8	25401	14955	104523	1551.6	968.4	493.0	193.5	194.9	-7.8	-44.2	199.0
15:33:00	33.2	16.0	175.9	120.7	17.4	292.2	23.7	25048	14961	101996	1549.4	968.3	492.6	193.5	193.8	-4.5	-40.1	209.0
15:34:00	32.9	15.7	174.8	120.5	17.4	453.8	22.8	25221	14961	103498	1549.9	969.3	492.8	193.0	193.8	-4.9	-40.5	225.2
15:35:00	32.9	16.0	175.6	119.8	17.4	261.2	23.6	25048	14955	101568	1553.1	967.6	492.6	193.0	193.8	-2.0	-36.1	237.0
15:36:00	33.0	15.7	175.3	120.0	17.4	475.2	23.7	25311	14978	102727	1551.1	969.0	492.1	192.5	193.8	-3.1	-38.6	227.8
15:37:00	32.9	15.8	173.3	122.5	17.4	314.0	23.3	24965	14865	103042	1552.6	967.4	492.4	192.5	193.8	-2.8	-37.7	236.6
15:38:00	32.8	15.8	174.5	121.4	17.4	475.7	23.7	25311	15000	103616	1549.6	968.6	492.2	192.0	192.7	-7.1	-44.6	219.1
Max	33.5	16.5	176.5	125.0	17.4	476.0	23.8	26092	15523	111483	1561.0	970.0	500.6	199.0	198.5	-0.2	-33.4	247.1
Min	32.5	14.7	173.3	113.9	16.3	128.6	22.3	24868	14725	101209	1522.0	948.9	472.9	181.5	183.3	-22.0	-63.5	178.6
Average	33.0	15.8	175.0	118.9	17.3	332.2	23.0	25491	15044	104817	1541.8	960.8	488.0	191.5	192.3	-7.9	-43.8	217.9

Test No. 3 - October 20, 2016

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 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
9:46:00	34.1	14.4	178.1	131.7	16.5	274.0	23.5	26189	15191	104368	1545.5	960.4	503.7	199.0	196.5	-6.0	-39.7	209.1
9:47:00	34.6	14.1	176.7	131.9	16.5	268.7	23.7	26009	15180	109027	1547.3	961.8	503.8	199.0	196.2	-13.8	-49.7	169.4
9:48:00	34.5	14.1	176.3	130.6	16.5	273.7	22.8	25836	15185	104364	1545.4	960.1	504.5	199.0	196.2	-4.4	-35.1	237.9
9:49:00	34.0	14.1	177.4	129.9	16.5	269.7	22.5	26099	15214	109260	1549.9	960.7	504.0	199.0	196.2	-14.0	-51.8	168.3
9:50:00	34.8	14.0	178.0	129.9	16.5	274.8	22.8	26099	15214	104262	1549.3	961.7	504.5	199.0	196.2	-4.7	-35.6	240.8
9:51:00	34.2	14.1	177.6	129.9	16.5	276.9	23.0	26092	15191	108266	1551.4	962.1	504.8	199.0	196.2	-13.8	-50.6	169.4
9:52:00	34.4	13.9	179.1	130.5	16.5	279.6	23.6	25919	15270	104854	1547.8	962.0	504.6	199.5	196.2	-6.8	-41.1	228.0
9:53:00	34.1	13.8	176.3	129.6	16.5	265.7	23.6	26272	15281	108448	1548.9	962.8	504.6	199.5	197.4	-14.8	-52.3	166.3
9:54:00	34.2	13.9	175.9	129.6	16.5	252.4	23.7	26002	15163	104303	1547.4	962.4	504.8	199.5	196.1	-5.3	-38.8	212.1
9:55:00	35.0	13.9	175.9	129.8	16.5	281.3	23.3	26189	15270	106420	1548.6	964.4	505.0	199.5	196.0	-15.8	-52.4	175.6
9:56:00	34.7	14.1	176.6	130.4	16.5	244.4	23.1	25746	15169	102615	1545.3	962.1	505.0	200.0	197.1	-2.7	-32.5	242.1
9:57:00	34.2	14.0	177.7	130.2	16.5	278.6	22.5	26272	15292	107525	1548.4	962.8	505.4	200.0	197.1	-14.6	-52.0	178.2
9:58:00	34.0	14.1	179.9	131.2	16.5	225.6	23.0	25919	15141	103046	1549.4	963.1	506.2	200.5	197.1	-3.8	-33.1	243.9
9:59:00	34.0	13.9	177.7	129.8	16.5	270.8	23.6	26092	15298	107819	1549.0	962.4	506.7	200.5	197.1	-14.1	-50.9	173.3
10:00:00	34.1	14.1	176.8	131.0	16.5	272.6	22.4	25836	15191	104785	1548.4	961.1	506.7	201.0	197.2	-5.1	-37.0	230.3
10:01:00	34.1	13.8	178.5	130.5	16.5	278.3	22.3	26189	15298	105509	1545.3	962.5	507.3	201.0	198.3	-9.4	-43.2	199.1
10:02:00	34.1	14.2	177.5	131.0	16.5	275.7	22.5	26009	15180	102938	1547.4	963.2	507.8	201.0	198.3	-3.7	-35.9	216.2
10:03:00	34.5	14.2	175.7	130.1	16.5	273.2	23.5	26099	15298	103754	1549.0	962.3	508.1	201.0	197.1	-6.9	-40.3	229.8
10:04:00	34.5	14.2	176.4	131.2	16.5	279.2	23.7	25829	15191	102689	1551.4	962.4	508.3	201.0	198.4	-3.6	-33.2	242.7
10:05:00	34.6	14.1	178.8	130.6	16.5	241.7	23.5	26189	15191	103795	1553.0	963.0	508.4	201.0	198.4	-6.6	-38.9	230.6
10:06:00	34.7	14.2	175.9	130.6	16.5	281.0	22.7	25656	15152	102127	1554.5	962.5	508.5	201.5	198.4	-2.8	-32.8	244.6
10:07:00	34.5	14.2	174.9	129.3	16.5	276.9	22.7	25919	15303	104581	1552.9	962.8	509.0	201.0	198.4	-10.2	-44.0	217.5
10:08:00	34.6	14.4	178.9	130.0	16.5	215.3	22.4	26009	15163	103173	1553.5	962.3	508.7	201.5	198.4	-5.6	-39.4	229.9
10:09:00	34.5	13.8	177.2	129.4	16.5	163.7	22.4	26196	15141	104109	1552.4	963.7	508.6	201.5	199.6	-7.2	-39.4	203.0
10:10:00	34.2	13.8	176.3	130.0	16.5	272.2	23.7	25926	15287	103078	1550.3	963.5	508.9	201.5	198.2	-5.4	-36.1	215.4
10:11:00	34.4	13.8	176.6	128.8	16.5	255.7	23.2	25919	15287	103613	1552.6	962.9	508.7	201.5	198.2	-6.1	-37.7	231.3
10:12:00	33.9	14.0	178.2	130.1	16.5	257.9	23.4	25656	15169	102300	1550.5	963.3	508.3	201.5	199.2	-3.2	-32.2	242.4
10:13:00	34.2	13.7	177.9	128.8	16.5	278.2	22.4	26009	15185	104259	1551.3	961.2	508.4	201.5	199.2	-6.7	-38.0	230.7
10:14:00	34.3	14.1	176.2	129.9	16.5	280.2	23.6	26009	15185	103215	1554.4	961.4	508.8	202.0	198.0	-2.3	-32.4	243.6
10:15:00	34.1	13.9	180.8	129.6	16.5	253.7	23.3	26009	15185	105118	1550.9	962.0	508.5	201.5	198.1	-7.3	-40.9	218.8
10:16:00	34.3	14.5	176.9	131.0	16.5	278.6	23.3	25912	15185	103459	1553.3	962.5	508.8	202.0	199.3	-4.4	-35.3	228.8
10:17:00	34.3	14.1	177.0	130.5	16.5	266.0	23.7	25926	15219	103567	1550.1	963.5	508.7	202.0	199.3	-7.4	-37.8	202.5
10:18:00	34.3	14.2	178.2	131.1	16.5	272.2	23.6	25926	15219	103526	1551.1	961.8	508.9	202.0	198.3	-5.1	-35.7	216.4
10:19:00	34.3	14.0	176.1	130.0	16.5	253.4	23.5	25836	15281	103868	1550.6	962.6	508.9	202.0	198.3	-5.9	-37.2	232.6
10:20:00	34.1	14.1	178.1	131.3	16.5	256.9	22.6	25836	15152	102753	1553.3	961.6	508.7	201.5	198.5	-3.6	-36.0	243.3
10:21:00	34.4	13.9	175.6	129.8	16.5	225.3	22.8	26099	15219	103333	1551.6	964.2	508.7	201.5	198.5	-6.2	-37.5	233.9
10:22:00	34.3	14.0	176.3	129.8	16.5	274.9	22.5	25919	15090	102840	1552.0	962.8	508.8	201.5	198.5	-3.0	-31.7	246.2
10:23:00	34.0	13.8	178.1	129.0	16.5	271.7	23.5	25919	15236	104250	1548.6	963.4	508.6	201.5	198.5	-6.5	-37.9	223.4
10:24:00	34.5	13.8	176.8	129.7	16.5	254.0	22.7	25836	15236	103053	1552.5	961.4	508.5	201.5	198.5	-4.7	-37.8	231.5
10:25:00	34.2	13.9	180.5	129.2	16.5	234.1	22.3	25843	15225	104408	1546.8	962.5	508.2	201.5	199.7	-5.8	-37.9	205.1
10:26:00	34.7	14.0	176.2	129.7	16.5	273.2	23.7	26009	15202	102743	1548.9	963.1	508.0	201.5	198.6	-5.9	-35.3	217.9
10:27:00	34.7	13.3	177.2	129.1	16.5	288.2	22.9	25926	15208	102872	1549.1	962.8	507.3	201.0	198.6	-4.3	-35.9	235.1
10:28:00	34.5	14.1	178.0	130.2	16.5	255.0	23.7	25739	15208	102678	1548.4	963.2	507.1	201.0	198.6	-3.0	-34.2	244.6
10:29:00	34.5	13.9	179.2	129.9	16.5	272.7	23.5	25836	15118	104292	1550.4	963.2	507.1	201.0	198.6	-3.5	-35.5	238.1
10:30:00	34.8	14.0	178.5	131.1	16.5	277.5	23.7	25746	15242	103410	1552.3	965.1	507.4	201.0	197.4	-1.7	-30.4	247.9
10:31:00	34.6	14.1	178.0	130.5	16.5	278.0	22.8	25919	15141	104942	1547.1	960.5	507.7	201.0	198.7	-6.2	-39.6	225.3
10:32:00	34.4	14.1	176.2	130.9	16.4	281.0	23.0	25567	15141	102483	1546.8	962.6	507.7	201.5	198.7	-3.3	-34.2	234.8
10:33:00	34.4	14.1	178.1	130.3	16.4	279.8	23.6	25836	15174	103684	1546.8	961.7	508.3	201.5	199.7	-5.8	-38.2	209.7
10:34:00	34.2	14.1	176.2	130.9	16.4	276.8	22.5	25836	15141	103717	1545.5	962.8	508.3	201.5	198.6	-3.5	-34.3	220.6
10:35:00	34.2	14.2	176.7	130.8	16.4	277.4	23.2	26092	15258	103707	1545.5	961.5	508.5	201.5	198.6	-4.6	-35.9	239.0
10:36:00	34.0	13.9	175.5	130.3	16.4	247.0	22.7	25836	15135	101640	1549.0	963.7	509.0	201.5	199.7	-2.6	-32.9	247.2
10:37:00	33.9	14.0	177.4	129.7	16.4	270.8	22.7	25836	15146	103321	1552.1	963.4	509.4	202.0	198.5	-3.3	-36.3	237.9

Test No. 3 - October 20, 2016

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 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
10:38:00	34.4	13.9	177.7	129.7	17.3	251.6	23.4	25836	15146	102084	1553.3	962.8	509.8	202.0	198.6	-2.5	-31.7	246.8
10:39:00	34.8	14.2	177.5	129.9	16.3	284.1	23.0	25836	15180	103820	1546.5	964.3	510.1	202.5	199.8	-5.6	-39.2	227.3
10:40:00	34.1	13.9	173.8	129.2	16.3	276.7	23.0	25926	15287	104085	1549.4	962.0	510.0	202.5	199.8	-7.6	-42.9	200.2
10:41:00	34.0	14.0	176.6	129.5	16.3	230.6	22.8	26099	15264	104677	1546.1	962.9	510.5	203.0	199.8	-5.3	-36.5	212.1
10:42:00	34.4	14.1	176.8	128.8	16.3	274.8	22.4	25926	15141	102698	1546.0	962.3	510.8	203.0	199.8	-12.6	-49.2	178.1
10:43:00	34.4	13.9	178.4	129.6	16.3	281.4	23.3	25836	15141	102784	1544.5	963.6	511.0	203.5	199.8	-3.6	-35.0	238.4
10:44:00	34.7	13.9	176.9	129.6	16.3	271.7	23.2	25836	15141	102537	1548.5	964.2	511.3	203.5	200.9	-11.9	-47.3	176.4
10:45:00	34.0	14.2	176.2	129.6	16.3	265.7	23.5	25656	15141	103990	1546.4	965.0	511.7	204.0	199.7	-3.9	-33.8	239.1
10:46:00	34.2	14.1	176.1	130.2	16.3	268.3	22.5	26009	15141	108809	1549.1	966.0	511.7	203.5	200.6	-13.1	-49.5	169.9
10:47:00	34.1	14.3	178.1	129.6	16.3	280.3	22.7	26009	15174	104803	1549.9	965.4	511.9	204.0	200.4	-6.2	-38.2	225.9
10:48:00	34.2	14.1	177.5	130.2	16.3	276.2	22.4	26016	15174	109069	1551.4	965.9	511.8	204.0	201.4	-14.3	-50.0	165.5
10:49:00	34.3	14.2	180.4	130.8	17.3	280.4	23.7	26099	15225	103902	1550.3	967.2	511.7	204.0	200.1	-3.1	-32.7	210.1
10:50:00	34.4	14.0	178.2	129.6	16.2	267.5	23.1	26009	15225	107253	1550.4	964.9	511.4	204.0	200.1	-13.7	-51.7	171.2
10:51:00	34.3	14.2	177.5	130.2	16.4	247.5	23.3	25746	15225	103094	1546.8	964.9	511.1	203.5	200.1	-3.7	-34.7	238.5
10:52:00	34.1	14.1	175.5	130.6	16.4	272.3	22.5	26016	15197	108624	1545.3	964.9	510.9	203.5	200.1	-13.4	-49.7	167.9
10:53:00	33.9	14.3	178.2	130.1	17.4	285.3	22.9	25746	15191	103051	1548.6	964.2	510.9	203.5	199.7	-2.6	-33.0	241.5
10:54:00	33.9	13.9	177.4	129.9	16.0	235.6	23.6	26099	15298	107983	1546.9	964.8	511.3	203.0	199.7	-13.5	-49.4	170.8
10:55:00	34.4	14.2	175.9	129.9	17.3	266.2	23.7	25739	15191	103754	1545.9	964.9	511.2	203.5	200.8	-5.4	-35.6	229.3
10:56:00	34.5	13.9	178.0	129.2	16.3	277.7	23.2	26099	15191	107670	1551.0	966.2	511.2	203.5	200.8	-14.7	-51.9	174.2
10:57:00	34.5	14.0	177.3	129.9	17.6	277.8	22.3	26099	15191	103202	1545.8	968.1	511.3	204.0	200.8	-4.4	-35.8	213.8
10:58:00	34.5	14.0	177.1	129.3	16.5	270.2	22.5	26009	15191	106088	1547.3	967.3	511.7	204.0	200.8	-10.1	-42.5	220.7
10:59:00	34.7	13.8	175.5	129.9	16.5	263.6	22.9	25836	15169	102911	1547.3	965.5	511.8	204.0	200.8	-3.0	-32.2	241.4
11:00:00	34.2	14.0	177.4	129.0	16.5	276.5	23.5	26099	15275	105155	1546.8	965.6	511.6	204.0	200.8	-10.0	-41.1	219.9
11:01:00	34.8	14.1	177.6	130.9	16.5	277.1	22.9	25836	15146	102375	1541.4	967.1	511.8	204.0	200.8	-2.7	-33.7	243.6
11:02:00	34.0	13.9	178.2	129.3	16.5	278.3	22.5	26009	15332	105991	1538.5	966.1	512.0	204.0	200.8	-11.5	-45.2	207.4
11:03:00	33.3	13.9	179.5	130.2	16.5	247.0	23.4	25843	15118	103092	1537.6	967.5	512.1	204.0	200.8	-4.0	-34.7	231.6
11:04:00	33.6	13.9	177.6	129.5	16.5	277.4	23.0	26092	15236	105400	1537.1	967.0	512.0	204.0	201.9	-7.8	-41.2	202.6
11:05:00	33.3	14.3	177.5	130.8	16.4	282.8	23.7	25739	15208	103936	1533.1	966.1	511.7	203.5	200.7	-3.8	-35.2	217.5
11:06:00	33.4	13.9	174.6	129.2	16.2	277.2	22.4	26016	15320	104960	1530.9	967.7	511.0	203.0	200.7	-6.2	-37.8	229.6
11:07:00	33.4	14.1	178.3	129.7	16.2	277.1	23.5	25919	15191	102794	1527.6	966.9	510.7	202.5	200.7	-3.1	-34.2	243.2
11:08:00	33.9	13.8	175.8	129.1	16.3	277.1	22.7	26009	15197	104253	1527.0	968.4	509.7	202.0	200.7	-5.3	-36.4	233.5
11:09:00	33.5	14.1	176.5	129.3	16.3	271.5	23.0	25926	15197	103116	1524.5	965.7	509.3	201.5	199.5	-3.2	-31.8	243.3
11:10:00	33.9	13.7	174.6	128.2	16.3	253.3	23.6	26189	15298	103535	1523.5	966.2	509.4	201.5	199.5	-8.4	-40.6	219.4
11:11:00	33.2	14.0	175.6	129.4	16.3	277.6	22.9	26099	15191	103137	1525.1	966.6	508.9	201.5	199.5	-6.5	-38.3	231.1
11:12:00	33.4	13.8	178.5	128.5	17.3	283.1	22.4	26009	15332	104370	1527.1	966.7	508.9	201.5	200.6	-6.4	-40.6	203.6
11:13:00	33.3	13.8	178.4	129.2	17.3	275.8	22.4	25656	15225	103886	1526.3	966.4	508.2	201.5	199.6	-4.9	-35.3	215.7
11:14:00	33.2	13.7	175.4	128.6	17.3	249.8	23.5	25746	15214	105238	1524.1	966.4	507.5	201.0	199.6	-5.5	-36.7	231.7
11:15:00	33.9	14.0	175.4	129.2	17.3	276.9	23.4	25836	15214	103556	1527.1	965.1	507.3	201.0	199.6	-4.2	-36.4	241.4
11:16:00	33.2	13.8	175.5	128.6	16.3	281.6	22.4	26009	15315	104150	1524.5	965.2	507.3	200.5	199.6	-4.9	-38.3	230.7
11:17:00	33.3	14.1	178.5	129.9	17.3	244.8	23.2	25843	15191	103686	1527.6	965.9	506.7	200.5	198.6	-0.8	-31.9	242.9
11:18:00	33.5	14.2	177.6	129.9	16.3	268.4	23.6	25836	15360	105520	1524.9	965.6	506.7	200.0	198.6	-7.4	-40.8	218.2
11:19:00	33.6	14.0	177.1	131.0	16.3	246.5	22.7	25656	15157	104398	1522.4	966.7	506.7	200.0	198.6	-5.2	-36.4	228.9
11:20:00	33.2	14.0	177.6	129.7	16.4	267.3	23.5	26009	15152	104746	1516.9	965.2	506.6	200.0	198.4	-8.2	-42.8	202.6
11:21:00	33.8	14.0	177.9	129.9	16.4	273.5	22.5	25836	15141	105089	1514.3	966.2	506.1	200.0	198.4	-5.4	-38.2	215.1
11:22:00	33.2	13.8	177.1	129.3	16.4	272.7	23.7	25919	15169	104124	1511.9	962.2	506.1	199.5	198.4	-6.7	-38.1	231.3
11:23:00	33.6	14.1	176.7	130.5	16.4	272.4	23.6	25836	15202	103108	1512.3	965.4	505.7	199.5	198.4	-3.3	-33.0	239.9
11:24:00	33.8	13.7	177.8	128.3	17.2	276.9	23.6	25746	15202	102969	1514.1	964.6	505.4	199.5	198.4	-5.2	-37.8	234.1
11:25:00	33.2	13.8	177.1	129.5	17.2	277.4	23.0	25836	15180	103953	1517.5	965.3	505.4	199.5	198.4	-3.9	-33.0	245.2
11:26:00	33.7	13.8	179.6	128.7	17.2	280.8	23.8	25926	15303	103932	1520.5	964.6	505.3	199.0	198.4	-6.8	-37.3	222.5
11:27:00	33.7	13.8	176.1	129.7	16.5	271.8	23.3	25919	15371	103313	1521.5	964.6	505.0	199.0	198.4	-4.8	-37.3	232.4
11:28:00	33.2	13.7	176.4	128.7	16.5	269.3	23.7	26099	15360	103963	1515.1	964.8	504.9	199.0	198.4	-7.8	-40.4	204.8
11:29:00	33.8	13.9	175.3	129.6	16.5	273.5	23.3	26009	15258	104702	1520.0	965.5	504.6	199.0	197.1	-6.2	-37.0	217.6

Test No. 3 - October 20, 2016

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 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
11:30:00	33.7	13.9	181.3	129.3	16.5	277.7	23.7	25919	15258	104712	1516.4	966.5	504.2	199.0	197.1	-3.9	-33.3	237.6
11:31:00	33.2	14.0	177.7	130.1	16.5	272.8	23.4	25663	15258	104033	1517.8	965.8	504.2	199.0	197.1	-3.6	-33.4	246.5
11:32:00	33.9	13.8	178.3	129.8	16.5	269.6	23.2	25919	15376	103720	1516.5	963.7	504.7	199.0	198.2	-5.1	-37.0	237.9
11:33:00	33.6	13.4	177.3	129.8	16.5	269.0	23.4	25746	15275	103078	1516.5	962.8	504.5	199.0	197.0	-4.2	-33.4	246.5
11:34:00	33.5	13.5	178.0	129.2	16.5	269.0	23.6	25919	15275	106135	1512.5	965.0	504.8	199.0	197.0	-7.4	-40.8	224.8
11:35:00	33.3	13.4	175.3	130.5	16.5	278.6	23.6	26009	15275	104063	1517.3	964.7	504.9	199.0	198.1	-4.6	-35.7	234.7
11:36:00	33.6	13.5	176.3	129.2	16.5	269.5	22.6	25926	15275	105036	1515.6	964.9	504.4	199.0	198.1	-7.2	-39.0	209.5
11:37:00	33.3	13.3	178.2	129.7	16.5	276.9	22.4	25656	15275	104214	1518.9	963.1	504.0	198.5	196.8	-7.0	-38.1	213.0
11:38:00	33.9	13.4	176.7	129.1	16.5	274.7	22.7	25746	15275	104393	1521.0	964.0	503.6	198.5	196.8	-6.5	-38.3	238.4
11:39:00	33.4	13.3	174.7	129.8	16.5	272.4	23.7	25746	15275	102496	1525.3	962.3	503.2	198.0	196.8	-4.5	-33.0	206.4
11:40:00	34.0	13.3	177.4	128.6	16.5	277.2	22.5	25919	15275	102258	1525.4	965.3	502.4	197.5	196.6	-5.0	-36.4	238.9
11:41:00	34.0	13.3	174.6	128.8	16.5	276.6	23.0	25746	15275	103693	1524.0	964.0	502.2	197.5	196.6	-9.0	-45.2	185.4
11:42:00	33.6	13.3	180.2	128.8	16.5	280.7	23.0	25836	15275	104123	1522.1	963.0	502.0	197.5	196.6	-7.2	-38.6	226.3
11:43:00	33.2	13.2	176.9	128.9	16.5	277.3	23.4	25843	15174	106636	1525.1	962.1	501.6	197.5	196.6	-12.8	-49.4	171.3
11:44:00	33.9	13.4	179.0	128.6	16.5	253.6	23.6	26092	15326	103466	1520.3	962.4	501.4	197.0	196.4	-7.8	-39.5	209.6
11:45:00	33.6	13.2	175.4	128.6	16.5	278.4	22.9	26361	15270	108232	1523.9	961.4	500.8	197.0	196.4	-14.8	-53.4	172.1
11:46:00	33.2	13.3	176.0	129.2	16.5	257.3	22.7	26009	15270	104517	1521.8	961.4	500.7	197.0	196.4	-6.1	-36.5	236.9
12:37:00	33.3	13.6	178.2	130.6	16.4	274.5	23.4	25919	15337	102968	1498.8	958.7	499.2	194.0	192.8	-6.2	-36.1	224.2
12:38:00	33.9	13.6	177.9	131.3	16.4	267.8	23.3	25753	15230	103422	1501.4	959.0	499.0	194.0	194.0	-5.1	-35.7	200.9
12:39:00	33.7	13.6	178.1	130.3	17.4	274.7	22.4	26099	15230	104989	1499.4	958.5	499.8	194.5	192.5	-7.0	-37.6	209.1
12:40:00	33.6	13.4	178.0	130.3	16.3	256.5	22.4	25919	15230	105981	1500.6	959.2	499.6	194.5	192.5	-13.7	-51.9	184.0
12:41:00	33.4	13.7	178.6	130.2	16.3	264.6	23.7	25656	15332	104296	1499.4	959.6	499.6	194.5	193.7	-4.7	-34.8	237.9
12:42:00	33.6	13.2	176.7	129.2	16.2	253.0	23.5	25836	15230	109424	1501.5	960.3	499.9	194.5	193.6	-12.7	-46.4	182.5
12:43:00	33.7	13.3	178.0	129.2	16.2	275.0	22.7	25843	15124	104426	1500.1	960.2	500.4	194.5	193.6	-4.8	-35.9	236.8
12:44:00	33.6	13.0	177.0	128.7	16.2	288.9	23.6	25746	15281	109088	1502.6	960.0	500.2	194.5	192.5	-13.9	-51.3	178.4
12:45:00	33.1	13.3	177.9	129.2	16.2	265.8	22.4	26016	15270	103878	1499.6	959.5	500.1	194.5	193.7	-7.0	-38.8	225.4
12:46:00	33.9	13.3	177.6	129.8	16.2	259.8	22.4	26099	15270	109566	1505.9	959.6	499.9	194.5	193.7	-15.0	-50.9	171.4
12:47:00	33.5	13.5	177.7	129.2	17.4	269.0	23.2	25926	15169	105202	1501.1	960.8	500.1	194.5	193.7	-6.8	-38.7	208.5
12:48:00	33.5	13.4	177.0	130.0	16.4	265.9	22.4	26189	15354	108447	1500.4	960.1	499.8	194.5	193.7	-17.2	-51.1	173.3
12:49:00	33.9	13.4	177.7	130.0	16.4	286.1	23.0	25836	15118	104100	1500.3	960.8	500.1	195.0	193.7	-4.6	-35.1	235.1
12:50:00	33.7	13.1	176.5	128.6	16.4	249.7	23.4	26099	15399	109240	1500.3	960.7	500.1	194.5	193.7	-17.1	-53.7	171.9
12:51:00	33.3	13.4	177.7	129.9	16.4	270.1	22.4	25656	15174	102934	1500.0	961.6	500.2	194.5	193.7	-4.8	-34.8	238.4
12:52:00	33.8	13.2	177.2	129.2	16.4	269.2	22.5	26009	15292	108550	1498.9	959.6	500.0	194.5	193.7	-16.5	-54.6	170.6
12:53:00	33.9	13.4	177.2	129.7	16.4	278.1	22.4	25926	15236	104984	1497.1	958.3	499.8	194.5	193.7	-7.3	-39.8	222.9
12:54:00	33.3	13.3	176.8	129.1	16.4	269.4	22.3	26099	15393	108871	1496.5	960.1	500.1	194.5	194.7	-16.8	-52.0	176.4
12:55:00	33.7	13.6	177.9	130.7	16.4	273.9	22.4	25926	15270	103790	1494.1	960.3	499.8	194.5	193.5	-5.7	-37.0	208.4
12:56:00	33.3	13.4	177.8	129.9	16.4	277.5	22.6	26196	15371	107130	1495.4	960.9	500.2	194.5	193.5	-9.8	-39.8	215.1
12:57:00	33.4	13.6	178.1	130.5	16.4	277.2	23.3	25836	15146	103119	1497.9	958.9	499.7	194.0	193.5	-4.4	-34.7	235.4
12:58:00	33.9	13.4	177.9	130.5	16.4	274.2	22.4	26189	15382	103812	1499.5	959.2	500.1	194.0	193.5	-8.5	-39.3	217.2
12:59:00	33.1	13.9	178.5	130.3	16.4	270.5	23.2	25836	15242	104413	1498.6	960.2	499.7	194.0	193.5	-3.7	-35.7	239.6
13:00:00	33.9	13.5	177.0	129.6	16.4	273.8	22.4	26279	15281	107072	1497.5	960.1	500.1	193.5	193.7	-13.7	-47.0	202.8
13:01:00	33.4	13.7	178.0	130.7	16.4	265.2	23.5	25926	15281	104507	1499.9	960.0	500.2	193.5	193.8	-6.9	-40.7	226.8
13:02:00	33.5	13.5	176.9	129.8	16.4	273.9	23.4	26368	15281	105189	1497.5	959.8	499.9	193.5	194.0	-9.8	-42.5	193.5
13:03:00	33.3	13.3	178.4	129.9	16.4	266.0	22.5	25836	15421	104392	1495.3	959.3	500.2	193.5	192.9	-6.0	-40.2	212.3
13:04:00	33.9	13.5	177.4	129.4	16.4	268.0	23.7	25919	15348	103576	1491.8	960.0	499.9	193.5	192.9	-7.2	-41.2	227.3
13:05:00	33.5	13.7	177.6	130.5	17.5	263.0	22.5	25836	15247	102761	1494.3	959.3	499.5	193.5	192.9	-5.3	-36.5	240.3
13:06:00	33.6	13.4	177.3	129.2	16.4	271.4	22.5	26099	15376	104221	1494.6	961.3	499.8	193.5	192.9	-9.9	-39.4	227.4
13:07:00	33.4	13.3	177.0	129.2	16.4	254.6	22.8	25746	15298	103877	1493.8	960.3	499.5	193.5	192.9	-4.9	-33.4	241.8
13:08:00	33.1	13.3	177.3	128.6	16.4	267.4	23.6	26099	15337	105420	1492.3	960.3	499.3	193.0	193.0	-9.8	-42.5	215.0
13:09:00	33.4	13.3	177.0	129.9	16.4	268.9	23.7	26009	15118	104882	1494.0	960.6	499.3	193.5	193.0	-7.0	-38.0	227.9
13:10:00	33.5	13.2	176.2	128.7	16.4	274.4	23.4	26009	15303	105053	1492.4	959.6	498.8	193.0	193.0	-8.0	-41.1	200.5
13:11:00	33.8	13.3	176.9	129.5	16.4	269.3	23.7	25926	15247	104082	1492.4	960.5	498.3	193.0	193.0	-7.2	-38.8	214.0

Test No. 3 - October 20, 2016

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 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
13:12:00	33.1	13.1	176.4	127.8	16.4	273.7	22.4	26009	15124	104664	1493.3	959.2	497.9	193.0	191.9	-7.8	-38.5	229.6
13:13:00	33.7	13.1	176.5	129.0	16.4	273.0	23.7	26009	15185	103251	1492.8	960.1	497.8	193.0	193.0	-3.8	-32.9	242.1
13:14:00	33.1	13.2	176.1	128.3	16.4	269.4	22.8	26099	15315	104383	1493.8	959.1	497.5	193.0	193.0	-6.5	-36.9	230.9
13:15:00	33.5	13.6	176.9	129.6	16.4	280.0	22.4	25746	15202	103554	1494.8	958.6	497.2	192.5	191.9	-4.3	-34.6	242.6
13:16:00	33.7	13.7	179.5	128.7	16.4	265.9	23.7	26196	15315	106210	1493.9	958.8	497.2	192.5	191.9	-9.4	-43.1	217.9
13:17:00	33.4	13.7	178.0	130.1	16.4	263.3	22.5	25919	15275	103963	1493.9	958.2	497.2	193.0	193.0	-7.2	-38.0	228.8
13:18:00	34.1	14.0	179.2	129.5	16.4	272.0	23.5	26099	15303	106093	1492.9	959.1	497.4	193.0	193.0	-8.1	-42.5	202.1
13:19:00	33.2	14.1	178.6	130.6	16.4	241.3	23.6	25829	15169	104996	1493.8	959.3	497.3	193.0	193.0	-5.6	-38.0	215.5
13:20:00	33.8	14.1	178.9	129.4	16.4	277.9	23.5	26009	15163	105029	1493.8	958.6	497.8	193.0	193.2	-5.1	-34.0	229.8
13:21:00	33.8	14.2	178.6	130.5	17.4	269.1	23.0	25919	15399	102313	1498.0	958.8	497.9	193.0	192.1	-3.2	-33.0	240.9
13:22:00	33.7	14.2	179.2	127.4	16.4	279.3	23.7	26009	15275	104672	1494.8	959.0	497.9	193.0	193.2	-5.1	-35.5	230.5
13:23:00	33.5	14.2	178.5	128.1	16.4	263.0	23.6	25919	15174	104083	1498.5	958.5	498.2	193.5	192.1	-4.4	-34.1	241.9
13:24:00	33.2	13.6	178.2	126.9	16.4	278.0	23.7	26189	15332	106065	1494.9	960.5	498.1	194.0	192.1	-9.8	-40.6	216.4
13:25:00	33.8	13.8	178.2	127.4	16.4	277.7	23.6	26009	15230	104559	1497.0	959.9	498.1	194.5	193.3	-7.7	-39.6	228.8
13:26:00	33.3	13.5	179.7	126.7	16.4	272.0	23.1	26092	15354	105370	1493.1	959.6	498.3	195.0	193.3	-8.5	-40.9	202.6
13:27:00	33.9	13.8	178.5	127.4	16.4	262.9	22.7	25829	15197	103953	1495.8	959.5	498.6	195.0	192.3	-7.1	-38.2	214.2
13:28:00	33.4	14.0	179.5	126.5	16.4	256.8	23.7	26009	15343	103834	1493.5	959.8	498.4	195.0	192.7	-5.8	-36.0	229.7
13:29:00	33.7	14.0	178.6	127.3	16.4	257.6	23.7	25650	15225	102727	1496.0	960.4	498.0	195.0	193.8	-4.4	-35.2	240.8
13:30:00	33.9	13.8	179.5	126.5	16.4	271.0	22.8	25829	15236	104434	1498.1	960.8	497.2	195.0	193.8	-5.3	-35.8	233.5
13:31:00	33.7	13.9	178.2	128.3	17.4	275.1	22.5	25829	15236	103584	1502.3	960.9	497.3	195.0	193.8	-4.4	-35.1	244.4
13:32:00	33.8	14.3	179.2	127.5	16.4	267.9	22.4	26189	15247	105147	1499.1	960.7	497.3	195.0	193.8	-6.6	-38.8	220.6
13:33:00	33.2	13.8	178.5	127.5	16.4	278.2	23.6	25836	15180	104193	1499.8	962.2	497.6	195.5	195.2	-6.3	-36.7	232.1
13:34:00	33.8	14.0	178.6	126.9	16.4	236.8	22.4	26099	15281	105653	1497.3	959.5	497.3	195.5	194.0	-6.6	-39.2	205.2
13:35:00	33.6	13.9	178.2	127.6	16.4	273.5	23.7	25919	15315	104272	1498.3	961.4	497.6	195.5	194.0	-5.2	-34.1	215.1
13:36:00	33.4	13.8	178.9	127.0	16.4	264.9	23.7	26009	15180	103657	1498.9	960.2	497.3	195.5	194.0	-4.0	-34.2	235.1
13:37:00	33.1	13.8	178.1	126.5	16.4	260.9	22.4	26002	15242	103020	1500.5	961.1	497.6	195.5	194.0	-4.2	-39.2	215.5
13:38:00	33.7	13.8	179.5	126.8	16.4	263.9	23.5	25919	15236	103637	1501.3	961.0	498.2	196.0	194.0	-3.7	-35.1	236.3
13:39:00	33.5	13.7	178.3	126.5	16.4	275.1	22.5	25746	15236	108473	1503.6	961.7	498.0	196.0	194.0	-12.7	-49.6	196.6
13:40:00	33.5	13.8	178.9	126.6	16.4	265.1	23.3	25919	15337	105619	1501.1	961.4	497.9	196.0	194.0	-6.4	-38.7	223.2
13:41:00	33.7	13.7	178.3	126.6	16.4	271.3	22.5	25919	15225	108699	1500.9	961.0	497.9	196.5	195.2	-12.9	-47.2	181.4
13:42:00	33.9	13.5	179.2	126.4	16.4	277.4	22.6	26002	15253	104662	1499.4	960.7	498.0	196.5	195.2	-5.8	-38.0	209.1
13:43:00	33.5	13.6	177.7	126.4	16.4	266.3	23.2	26272	15253	108209	1498.9	961.9	498.5	197.0	195.2	-14.1	-49.9	185.6
13:44:00	33.9	13.9	178.5	127.4	16.4	281.5	22.9	26099	15275	103039	1499.9	961.6	498.6	197.5	195.2	-5.7	-34.5	236.1
13:45:00	33.3	13.5	178.6	126.6	16.4	270.0	22.5	26009	15214	108044	1503.4	961.5	498.4	197.5	195.2	-13.9	-50.0	183.6
13:46:00	33.6	13.9	178.9	127.6	16.4	276.4	22.4	25746	15258	104307	1502.0	961.3	498.6	197.5	195.2	-4.8	-34.7	235.1
13:47:00	33.5	13.6	178.0	126.2	16.4	248.6	22.9	25919	15433	107516	1506.3	961.9	498.5	197.5	195.2	-14.9	-50.4	182.6
13:48:00	33.8	13.9	178.9	127.1	16.4	268.4	23.4	25919	15315	102930	1503.3	961.7	499.3	197.5	195.2	-6.6	-36.7	223.9
13:49:00	33.6	14.0	178.6	127.4	16.4	272.6	22.4	25919	15337	110066	1503.8	962.1	499.7	198.0	196.2	-14.7	-49.8	174.3
13:50:00	33.6	14.1	179.0	127.6	16.4	281.0	23.7	25912	15219	103446	1502.5	961.6	499.8	198.0	196.2	-5.0	-35.9	208.3
13:51:00	33.5	13.8	178.5	126.3	16.4	265.4	22.6	26009	15343	108138	1502.6	961.9	499.7	198.0	195.1	-16.4	-52.1	183.4
13:52:00	33.5	14.1	178.8	127.2	16.4	276.4	23.2	25829	15214	103373	1504.9	961.7	500.7	198.5	196.4	-3.7	-32.2	234.1
13:53:00	33.4	13.8	178.7	126.5	16.4	254.3	23.7	26272	15326	107553	1507.1	960.7	500.9	198.5	196.4	-15.1	-50.9	186.2
13:54:00	34.0	13.7	178.1	127.4	16.5	255.0	23.4	26009	15225	102767	1503.9	962.4	500.8	198.5	196.4	-4.4	-35.3	235.1
13:55:00	33.8	13.8	178.3	125.7	16.5	268.3	22.5	26009	15354	107036	1507.8	962.1	501.2	198.5	196.4	-16.6	-54.4	185.2
13:56:00	33.3	13.8	179.4	126.0	16.5	265.4	22.4	25829	15219	103521	1507.4	961.1	501.5	199.0	196.4	-6.6	-37.7	222.0
13:57:00	33.0	13.7	178.2	126.0	16.5	273.2	23.5	26189	15332	104522	1507.9	962.9	501.3	199.0	197.4	-13.0	-46.6	192.6
13:58:00	33.6	13.5	179.4	124.0	16.5	247.4	22.7	26009	15230	103091	1504.5	962.3	501.3	199.0	196.3	-7.8	-40.1	208.0
13:59:00	33.3	13.4	177.6	126.1	16.4	274.4	22.6	26182	15270	103219	1503.6	962.3	501.8	199.0	196.3	-9.9	-42.1	219.0
14:00:00	34.0	13.6	178.9	127.6	16.5	268.4	23.6	25919	15247	102745	1504.0	961.8	501.5	199.0	196.3	-4.6	-32.4	234.8
14:01:00	33.6	13.4	178.8	126.6	16.5	276.5	22.4	26092	15247	103208	1504.6	961.9	501.6	199.0	197.4	-7.0	-36.0	218.9
14:02:00	33.6	13.7	182.0	126.6	16.5	268.7	23.1	25567	15253	101877	1503.6	963.5	501.3	199.0	197.4	-2.5	-31.3	235.6
14:03:00	33.9	13.6	179.2	125.8	16.5	277.4	22.4	26099	15360	103553	1509.4	963.5	501.1	198.5	197.0	-10.4	-42.6	213.8

Test No. 3 - October 20, 2016

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 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
14:04:00	33.3	13.7	182.1	127.0	16.5	276.4	22.4	26009	15258	103358	1515.6	963.6	500.8	198.5	197.0	-5.0	-34.9	226.1
14:05:00	33.7	13.6	176.3	126.7	16.5	273.9	23.1	26009	15258	104138	1516.1	962.6	501.4	198.5	197.0	-10.6	-42.3	198.1
14:06:00	33.0	13.8	177.7	127.4	16.5	277.6	22.4	26009	15382	103253	1517.4	962.7	500.4	198.5	197.0	-5.3	-34.6	209.7
14:07:00	33.0	13.8	176.5	125.3	16.5	272.6	22.5	26009	15298	102192	1515.5	962.7	500.0	198.0	195.8	-6.1	-36.3	224.5
14:08:00	33.2	13.7	177.0	126.5	16.5	248.3	23.3	25656	15163	102062	1517.6	962.0	499.1	197.5	195.8	-4.3	-35.1	238.6
14:09:00	33.1	13.7	177.8	125.4	16.5	269.0	23.3	26189	15281	102681	1514.3	960.2	498.5	196.5	195.8	-5.3	-34.6	225.1
14:10:00	32.3	13.8	177.8	126.2	16.5	265.4	23.7	25829	15163	101821	1514.0	961.0	498.0	196.0	195.8	-3.8	-33.3	239.1
14:11:00	32.9	13.6	178.6	125.7	16.5	233.1	23.6	26092	15315	103374	1508.3	960.1	497.2	195.5	194.8	-9.0	-40.1	214.0
14:12:00	33.2	13.8	177.3	126.2	16.5	255.2	22.9	25746	15315	104009	1505.8	959.7	496.9	195.5	194.8	-6.5	-35.8	227.4
14:13:00	32.6	13.7	178.6	124.9	16.5	284.1	22.4	26182	15393	104417	1508.5	959.3	496.0	195.0	194.6	-8.6	-39.6	200.3
14:14:00	32.6	13.8	178.0	125.4	16.5	280.2	22.4	25919	15354	104343	1512.0	959.8	495.7	195.0	194.6	-6.2	-36.0	212.8
14:15:00	32.4	13.6	178.9	124.9	16.5	268.7	23.0	26009	15343	104216	1510.3	957.8	494.9	195.0	194.6	-4.2	-34.7	225.6
14:16:00	32.9	13.5	178.1	126.3	16.5	274.7	22.4	25836	15225	102127	1514.0	959.8	495.0	194.5	194.7	-4.2	-34.3	240.2
14:17:00	33.4	13.5	178.4	126.0	16.5	271.5	23.4	25919	15264	103851	1513.4	957.9	494.5	194.0	194.7	-6.5	-36.2	225.9
14:18:00	32.6	13.8	178.5	126.6	16.5	163.5	23.7	25836	15157	102226	1516.3	958.7	494.2	194.0	193.6	-4.2	-34.1	241.5
14:19:00	32.5	13.7	178.5	126.6	16.5	252.5	22.6	25919	15405	104358	1513.9	958.8	493.9	193.5	193.6	-8.5	-38.6	213.1
14:20:00	32.5	13.5	178.3	127.3	16.5	254.4	22.4	26009	15287	102716	1512.9	958.5	493.4	193.5	193.6	-6.5	-37.8	227.6
14:21:00	32.9	13.5	178.1	126.1	16.5	274.8	22.7	26009	15405	105139	1512.1	957.9	493.3	193.0	193.6	-8.4	-38.9	199.1
14:22:00	32.3	13.5	178.3	126.7	16.5	277.4	22.4	25836	15303	103251	1513.0	957.1	492.9	193.0	192.5	-6.9	-37.7	214.2
14:23:00	32.5	13.4	179.2	126.1	16.5	266.0	23.6	25656	15298	104049	1511.3	956.8	492.6	193.0	192.5	-6.2	-35.3	226.0
14:24:00	32.8	13.2	177.1	126.5	16.5	262.7	23.2	25746	15303	103986	1515.3	958.1	492.6	192.5	192.5	-4.5	-33.9	241.4
14:25:00	33.0	13.2	178.4	125.8	16.5	255.8	23.0	25746	15242	102891	1514.0	956.1	492.5	193.0	192.5	-6.6	-34.8	225.8
14:26:00	32.6	13.4	177.6	126.4	16.5	227.9	22.5	25919	15141	103120	1516.6	955.8	492.7	192.5	192.5	-5.2	-35.2	239.2
14:27:00	32.6	13.2	178.1	125.7	16.5	259.3	22.4	26099	15320	104469	1516.8	956.5	492.5	192.5	192.5	-7.8	-39.1	213.6
14:28:00	33.4	13.2	178.1	126.3	16.5	277.7	23.1	26009	15320	104123	1514.4	956.0	492.5	192.5	192.5	-7.1	-38.0	227.1
14:29:00	32.4	13.3	179.3	126.2	16.5	277.9	23.6	26009	15438	104479	1517.8	955.3	491.9	192.5	193.6	-10.9	-43.7	201.3
14:30:00	32.3	13.5	178.2	125.7	16.5	263.1	22.7	25656	15315	104395	1518.0	956.1	491.8	192.5	192.5	-7.0	-38.3	214.7
14:31:00	32.5	13.6	179.3	126.3	16.5	270.3	23.6	25919	15326	103597	1515.5	954.6	491.4	192.5	192.5	-7.3	-36.9	229.1
14:32:00	33.1	13.4	177.1	126.9	16.5	259.5	22.5	25926	15191	102532	1515.8	955.4	491.2	192.5	192.5	-4.1	-33.7	240.9
14:33:00	33.1	13.5	177.9	126.1	16.5	276.0	22.9	25836	15298	102269	1516.1	955.2	491.5	192.5	192.5	-7.5	-39.8	230.9
14:34:00	32.9	13.7	177.6	126.9	16.5	236.9	22.4	25573	15258	103718	1520.1	955.5	491.4	192.5	192.5	-5.3	-34.7	242.8
14:35:00	32.6	13.9	178.2	126.7	16.5	279.8	22.5	26099	15292	103643	1518.9	955.0	491.5	192.5	192.5	-8.5	-39.0	218.3
14:36:00	32.8	13.8	176.9	126.6	16.5	279.9	23.3	25746	15264	102837	1521.3	954.2	491.8	192.5	192.5	-6.6	-38.8	204.3
14:37:00	32.9	13.4	179.1	125.3	16.5	267.3	23.1	26099	15264	103012	1518.3	954.6	491.7	192.5	192.5	-7.1	-38.5	204.8

Max	35.0	14.5	182.1	131.9	17.6	288.9	23.8	26368	15438	110066	1554.5	968.4	512.1	204.0	201.9	-0.8	-30.4	247.9
Min	32.3	13.0	173.8	124.0	16.0	163.5	22.3	25567	15090	101640	1491.8	954.2	491.2	192.5	191.9	-17.2	-54.6	165.5
Average	33.7	13.8	177.7	128.8	16.5	267.5	23.0	25941	15247	104436	1521.3	961.9	502.8	198.0	196.3	-7.1	-39.0	218.5

APPENDIX 30

Feed Ultimate
Analysis Report
(9 pages)

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
Attn: Christine Belore, Tina Sanderson

Lab no.: 6436 - 1 to 3
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Re: Process Samples from Clean Harbors, Lambton, project no. 21713
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.
6436	Test #1 16-21713	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-2 Rich Feed	1.17	0.55	52.85	11.19	0.53	33.71	30.98
2	FL-2 Lean Feed	2.89	0.39	10.91	11.47	0.84	73.50	79.28
3	FE-2 Emulsion Feed	1.54	0.26	36.62	10.83	0.59	50.16	59.47

* 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.: 6436 - 4, to 6
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Lambton, project no. 21713
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.
6436	Test #1 16-21713	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-7 Rich Feed	1.16	0.34	53.59	10.81	0.62	33.48	32.50
5	FL-7 Lean Feed	3.02	0.29	9.98	10.69	0.74	75.28	82.72
6	FE-7 Emulsion Feed	1.42	0.35	41.40	11.31	0.57	44.95	51.38

* 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.: 6436 - 7 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Re: Process Samples from Clean Harbors, Lambton, project no. 21713
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.
6436	Test #1 16-21713	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-12 Rich Feed	1.12	0.55	53.84	11.90	0.64	31.95	32.02
8	FL-12 Lean Feed	3.01	0.43	11.06	11.55	0.93	73.02	84.90
9	FE-12 Emulsion Feed	1.10	0.29	46.75	11.35	0.57	39.94	43.82

* 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

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Ash content - % by weight -test method- ASTM D482

Lab no.	Sample ID#				Repeatability
6436	16-21713	Run 1	Run 2	Average	Difference between Run 1 and 2
1	FR-2 Rich feed	1.18	1.16	1.17	0.02
2	FL-2 Lean feed	2.88	2.90	2.89	0.02
3	FE-2 Emulsion feed	1.53	1.55	1.54	0.02
4	FR-7 Rich feed	1.14	1.18	1.16	0.04
5	FL-7 Lean feed	2.99	3.05	3.02	0.06
6	FE-7 Emulsion feed	1.43	1.41	1.42	0.02
7	FR-12 Rich feed	1.11	1.13	1.12	0.02
8	FL-12 Lean feed	3.03	2.99	3.01	0.04
9	FE-12 Emulsion feed	1.09	1.11	1.10	0.02

Tested by : P.S.(chemist)
Member of ASTM
JS:LN

Approved by James Szeto
James Szeto, B.Sc.
Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Sulfur content - % by weight -test method- ASTM D1552

Lab no. 6436	Sample ID# 16-21713	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-2 Rich feed	0.54	0.56	0.55	0.03
2	FL-2 Lean feed	0.37	0.41	0.39	0.04
3	FE-2 Emulsion feed	0.24	0.27	0.26	0.03
4	FR-7 Rich feed	0.36	0.32	0.34	0.04
5	FL-7 Lean feed	0.32	0.26	0.29	0.06
6	FE-7 Emulsion feed	0.37	0.33	0.35	0.04
7	FR-12 Rich feed	0.57	0.53	0.55	0.04
8	FL-12 Lean feed	0.42	0.44	0.43	0.02
9	FE-12 Emulsion feed	0.29	0.29	0.29	0.00

Tested by : P.S. (chemist)

Member of ASTM
JS:TL

Approved by James Szeto

James Szeto, B.Sc.
Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
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Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Carbon content - % by weight -test method- ASTM D3176

Lab no. 6436	Sample ID# 16-21713	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-2 Rich feed	53.04	52.66	52.85	0.38
2	FL-2 Lean feed	10.79	11.03	10.91	0.24
3	FE-2 Emulsion feed	36.48	36.76	36.62	0.28
4	FR-7 Rich feed	53.42	53.76	53.59	0.34
5	FL-7 Lean feed	9.88	10.08	9.98	0.20
6	FE-7 Emulsion feed	41.24	41.56	41.40	0.32
7	FR-12 Rich feed	53.70	53.98	53.84	0.28
8	FL-12 Lean feed	10.92	11.20	11.06	0.28
9	FE-12 Emulsion feed	46.91	46.59	46.75	0.32

Tested by : A.C.(chemist)
Member of ASTM
JS:LN

Approved by James Szeto
James Szeto, B.Sc.
Chief Chemist

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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
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L5J 2Y4

Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Hydrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no.	Sample ID#				Repeatability
6436	16-21713	Run 1	Run 2	Average	Difference between Run 1 and 2
1	FR-2 Rich feed	11.10	11.28	11.19	0.18
2	FL-2 Lean feed	11.36	11.58	11.47	0.22
3	FE-2 Emulsion feed	10.94	10.72	10.82	0.22
4	FR-7 Rich feed	10.69	10.93	10.81	0.24
5	FL-7 Lean feed	10.58	10.80	10.69	0.22
6	FE-7 Emulsion feed	11.22	11.40	11.31	0.18
7	FR-12 Rich feed	11.78	12.02	11.90	0.24
8	FL-12 Lean feed	11.67	11.43	11.55	0.24
9	FE-12 Emulsion feed	11.25	11.47	11.35	0.20

Tested by : A.C.(chemist)
Member of ASTM
JS:LN

Approved by James Szeto
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QA/QC REPORT

Ortech Environmental Inc.
804 Southdown Road,
Mississauga, Ontario
L5J 2Y4

Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Nitrogen content - % by weight -test method- ASTM 3176 (Modified)

Lab no.	Sample ID#	Run 1	Run 2	Average	Repeatability
6436	16-21713				Difference between Run 1 and 2
1	FR-2 Rich feed	0.57	0.49	0.53	0.08
2	FL-2 Lean feed	0.90	0.78	0.84	0.12
3	FE-2 Emulsion feed	0.64	0.54	0.59	0.10
4	FR-7 Rich feed	0.57	0.67	0.62	0.10
5	FL-7 Lean feed	0.69	0.79	0.74	0.10
6	FE-7 Emulsion feed	0.63	0.51	0.57	0.12
7	FR-12 Rich feed	0.59	0.69	0.64	0.10
8	FL-12 Lean feed	0.88	0.98	0.93	0.10
9	FE-12 Emulsion feed	0.63	0.51	0.57	0.12

Tested by : A.C.(chemist)
Member of ASTM
JS:LN

Approved by *James Szeto*
James Szeto, B.Sc.
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QA/QC REPORT

Ortech Environmental Inc.
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Lab no.: 6436 - 1 to 9
Report date: Nov 15, 2016
Sample in: Oct 24, 2016
P.O. no.: 21713-J2299

Attn: Christine Belore, Tina Sanderson

Process Samples : Clean Harbors, Lambton, project no. 21713
Water content - % by weight -test method- ASTM D3113, D1744

Lab no. 6436	Sample ID# 16-21713	Run 1	Run 2	Average	Repeatability Difference between Run 1 and 2
1	FR-2 Rich feed	30.52	31.44	30.98	0.92
2	FL-2 Lean feed	78.79	79.77	79.28	0.98
3	FE-2 Emulsion feed	59.96	58.98	59.47	0.98
4	FR-7 Rich feed	32.01	32.99	32.50	0.98
5	FL-7 Lean feed	82.02	83.42	82.72	1.40
6	FE-7 Emulsion feed	51.89	50.87	51.38	1.02
7	FR-12 Rich feed	31.51	32.48	32.02	0.92
8	FL-12 Lean feed	84.21	85.59	84.90	1.38
9	FE-12 Emulsion feed	44.28	43.36	43.82	0.92

Tested by : A.C.(chemist)
Member of ASTM
JS: LN

Approved by James Szeto
James Szeto, B.Sc.
Chief Chemist