

GROUNDWATER MONITORING PROGRAM

First Student Canada

63 Third Avenue

Flin Flon, Manitoba R8A 0W8

Prepared for:

FirstGroup America, Inc.

600 Vine Street, Suite 1400

Cincinnati, Ohio 45202

Prepared by:

Strata Environmental Services, Inc.

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Knoxville, Tennessee 37922

December 2019



EXECUTIVE SUMMARY

Strata Environmental Services, Inc. (Strata) has prepared this report to document the findings of the third biennial Groundwater Monitoring Program (GMP) event conducted at the First Student Canada facility (formerly Greyhound Canada Transportation Corporation), 63 Third Avenue East, Flin Flon, Manitoba (Site).

Strata collected groundwater samples from four groundwater monitoring wells for laboratory analysis of petroleum constituents in accordance with its August 2014 Remedial Action Plan report.

Based on the observations and results presented herein, groundwater quality downgradient from the barrier wall has not been adversely impacted from the subsurface petroleum contamination related to the historical gasoline service station at the northeast portion of the Site. Groundwater samples from downgradient wells, collected on May 12, 2015; June 28, 2017; and July 10, 2019, did not exhibit visual or olfactory evidence of petroleum impact, and detected benzene, toluene, ethylbenzene and xylene (BTEX) or petroleum hydrocarbon (PHC) Fractions 1 or 2 concentrations were below applicable remedial action plan targets.

The next groundwater sampling event is scheduled for 2021. Strata discontinued soil gas sampling at the Site, based on the laboratory analytical results of the first two biennial soil gas sampling events and in accordance with the GMP.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
SECTION 1 INTRODUCTION	1
1.1 Objectives	1
SECTION 2 GROUNDWATER SAMPLING AND ASSESSMENT	2
2.1 Groundwater Conditions	2
2.2 Well Purging and Groundwater Sampling	2
2.3 Groundwater Laboratory Results	2
2.4 Quality Assurance/Quality Control	2
SECTION 3 CONCLUSIONS AND RECOMMENDATIONS	4
SECTION 4 LIMITATIONS, EXCEPTIONS, AND CERTIFICATION	5

FIGURES

Figure 1 Site Plan with Borehole and Monitoring Well Locations

TABLES

Table 1 Groundwater Sample Results

APPENDICES

Appendix A Laboratory Analytical Results



SECTION 1 INTRODUCTION

Under the authorization of First Student Canada (First Student), Strata Environmental Services, Inc. (Strata) is providing results of the third biennial sampling event for the Groundwater Monitoring Program (GMP) for the First Student facility (formerly Greyhound Canada Transportation Corporation), 63 Third Avenue, Flin Flon, Manitoba (Site). Strata performed the field activities for the sampling event on July 10, 2019.

1.1 Objectives

As prescribed in the 2014 Remedial Action Plan (RAP) for the Site, the GMP is designed to address residual petroleum constituent impacts in groundwater, using long-term risk management and contaminant management measures. The results presented in this report represent the third biennial sampling event in the GMP. A Soil Gas Monitoring Program (SGMP) composed of collecting two soil gas samples from monitoring point SV1 for laboratory analysis of petroleum constituents has historically been implemented for the Site. However, because soil gas concentration of petroleum constituents measured in all previous sampling events has been two to four orders of magnitude lower than applicable Soil Gas Objectives (SGOs), the SGMP has been discontinued.

The GMP is composed of biennial groundwater monitoring of on-site monitoring wells, which includes sample collection for laboratory analysis of petroleum constituents to be compared against the site-specific guidelines established in the RAP. Figure 1 shows sampling locations on a site plan.

This report also includes historical data collected during prior sampling events with one exception, which pertains to groundwater laboratory data collected on November 11, 2014, excluded due to quality assurance/quality control issues with the dataset. The Strata August 2015 “Soil Gas and Groundwater Monitoring Programs, First Canada, Inc., 63 Third Avenue East, Flin Flon, Manitoba, R8W 0W8” report provides details and rationale for the data exclusion.



SECTION 2 GROUNDWATER SAMPLING AND ASSESSMENT

The long-term GMP is conducted biennially to maintain an audit of subsurface groundwater conditions and demonstrate the existing barrier wall at the Site is effectively impeding migration of gasoline-related constituents toward Ross Lake. The barrier wall includes the foundation wall of the current and former buildings and a concrete monolith poured to bedrock beneath the east part of the former building. The data presented in this report represents the third groundwater sampling event.

2.1 Groundwater Conditions

Strata observed no visual or olfactory evidence of anthropogenic impact in groundwater samples collected from BH22, BH23, or BH24 on July 10, 2019. Non-aqueous phase liquid (NAPL) was noted atop groundwater in BH25. In addition, groundwater collected from BH25 exhibited a strong weathered gasoline odor. Groundwater condition observations remained consistent with previous monitoring events.

2.2 Well Purging and Groundwater Sampling

On July 10, 2019, Strata purged the monitoring wells at BH22, BH23, BH24, and BH25, using a peristaltic pump with dedicated downhole tubing in accordance with the GMP. Following purging, Strata collected groundwater samples, including a field duplicate sample, DUP-W1 from BH22, for quality assurance/quality control purposes into laboratory-supplied sample jars. Strata submitted the groundwater samples to ALS Environmental for analysis of BTEX and PHC Fractions 1 and 2. Although NAPL was present in monitoring well BH25, a groundwater sample was collected for analysis from BH25 to establish a baseline for the dissolved petroleum constituents.

2.3 Groundwater Laboratory Results

Laboratory analytical results show low concentrations of benzene, ethylbenzene, and PHC Fractions 1 and 2 are present in BH23. The concentrations detected are below RAP targets. Table 1 presents groundwater laboratory analytical results with historical results and RAP targets. Appendix A presents the lab certificate supporting the results

2.4 Quality Assurance/Quality Control

In accordance with the GMP, Strata used the following quality assurance/quality control protocols during the sampling event:

- Groundwater samples were placed and packed in ice-filled coolers in a manner which prevented damage to the sample containers during transport to the laboratory;
- Parameters analyzed, where applicable, were preserved according to laboratory specifications;
- New dedicated sampling equipment (e.g., downhole tubing) was used at each well location for groundwater sampling;
- New nitrile gloves, discarded after use, were used at each sample location;



-
- Fluid level monitoring equipment was decontaminated before use and between monitoring locations; and
 - Duplicate groundwater samples were collected and analyzed.



SECTION 3 CONCLUSIONS AND RECOMMENDATIONS

Based on the observations and results presented herein, groundwater quality downgradient from the barrier wall has not been adversely impacted from the subsurface petroleum contamination related to the historical gasoline service station at the northeast portion of the Site. Groundwater samples from downgradient wells, acquired on May 12, 2015; June 28, 2017; and July 10, 2019, did not exhibit visual or olfactory evidence of petroleum impact and BTEX or PHC Fractions 1 or 2 concentrations above applicable RAP targets.

As outlined in the RAP, Strata recommends continued groundwater monitoring. The next groundwater sampling event is scheduled for 2021. Strata discontinued soil gas sampling at the Site, based on laboratory analytical results of the first two biennial soil gas sampling events and in accordance with the GMP.



SECTION 4 LIMITATIONS, EXCEPTIONS, AND CERTIFICATION

Strata prepared this report in accordance with generally accepted engineering and environmental practices for the exclusive use of the client. No other warranties, expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report.

The findings and conclusions presented in this report are based exclusively on the field parameters measured and the chemical parameters tested at specific locations and are further defined by the mutually agreed upon scope of work, budget and schedule. Subsurface conditions between and beyond the sample locations may vary. The report is not intended to be exhaustive in scope or imply a risk-free site or the marketability of the site or fitness for a particular use. Areas of the Property not accessible during the investigation may, upon removal of access limitations, be found to exhibit conditions not identified during this assessment. Any change in fact or circumstance upon which this report is based may affect the expressed findings of this report. Should this occur, Strata reserves the right to modify its opinion(s).

This report is to be used only by the client and any other party authorized in writing by Strata to rely on this report. This report is intended to be used in its entirety; taking or using excerpts from this report is not permitted and any party doing so does at its own risk. Information in this report is not to be construed as legal advice. Any use of this report by a third party not specifically authorized by Strata, and any decision made based on the information contained in this report by the third party is the sole responsibility of that third party. Strata will not accept any responsibility for damages resulting from a decision or an action made by a third party based on the information contained in this report. All data, maps, field notes, report drafts, and other related information held by Strata are confidential and restricted, and are only available to the client and, upon written approval from client, to the client's attorney or designated agents, unless otherwise required by law to be made available through discovery in litigation.

Notwithstanding these limitations, this report is believed to provide a reasonable representation of the environmental conditions apparent at the Property on the dates of measurement and chemical testing.

STRATA ENVIRONMENTAL SERVICES, INC.

Prepared by:



Timothy L. Riddle
Principal Geologist



Darren Coleman, P.Eng., QP












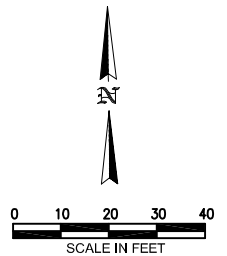
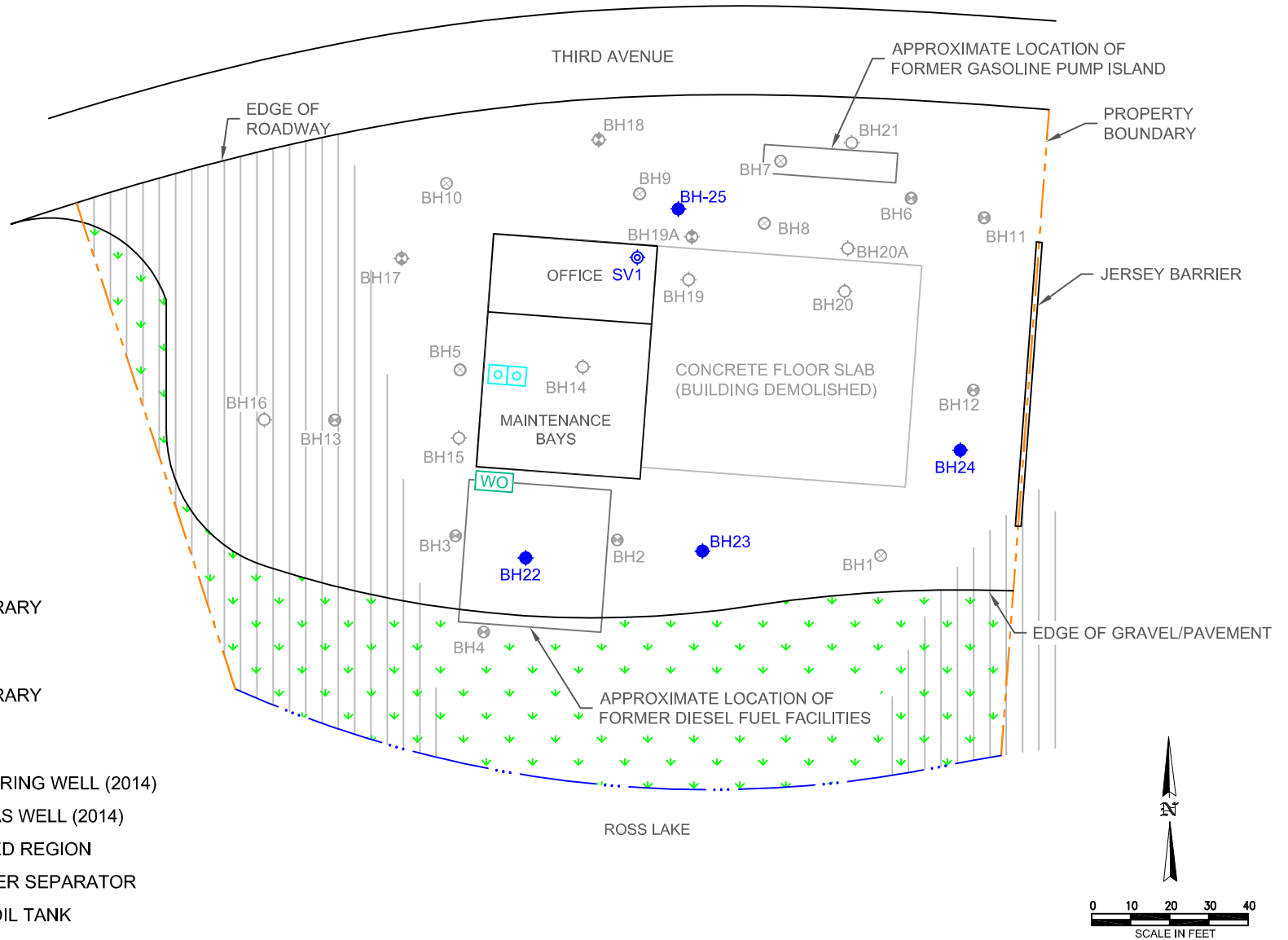
FIGURE



z:\project_784_(greyhound)\1728475 flin flon supplemental report_2015_08\figures\drawings\1728403.dwg

LEGEND:

-  BOREHOLE WITH TEMPORARY MONITORING WELL (2011)
-  BOREHOLE (2011)
-  BOREHOLE WITH TEMPORARY MONITORING WELL (2013)
-  BOREHOLE (2013)
-  BOREHOLE WITH MONITORING WELL (2014)
-  BOREHOLE WITH SOIL GAS WELL (2014)
-  APPROXIMATE LAKEFILLED REGION
-  UNDERGROUND OIL/WATER SEPARATOR
-  ABOVEGROUND WASTE OIL TANK



TABLE



Table 1 Groundwater Sample Results
First Student Canada - 63 Third Avenue, Flin Flon, Manitoba

		BTEX (mg/L)				PHC F1 (mg/L)	PHC F2 (mg/L)
		Benzene	Toluene	Ethylbenzene	Xylenes	(C6-C10) BTEX	C10-C16
RAP Target		370	2	90	300	9100	1300
BH22	5/12/2015	<0.5	<0.1	<0.5	<1.1	<50	<50
	6/28/2017	<0.5	<0.5	<0.5	<0.5	<25	<100
	7/10/2019	<0.5	<0.5	<0.5	<0.5	<25	<100
BH23	5/12/2015	<0.5	<0.1	<0.5	<1.1	<50	<50
	6/28/2017	6.33	1.14	<0.5	<0.5	81	120
	7/10/2019	30.5	<0.8	17.9	<0.5	254	230
BH24	5/12/2015	<0.5	0.3000	<0.5	<1.1	<50	<50
	6/28/2017	<0.5	<0.5	<0.5	<0.5	<25	<100
	7/10/2019	<0.5	<0.5	<0.5	<0.5	<25	<100
BH25*	7/10/2019	277	268	858	5600	5600	5330
Dup-W1	5/12/2015	<0.5	<0.1	<0.5	<1.1	<50	--
	6/28/2017	<0.5	<0.5	<0.5	<0.5	<25	<100
	7/10/2019	<0.5	<0.5	<0.5	<0.5	<25	<100

Notes:

PHC Petroleum Hydrocarbons

F1/F2 Fractions 1 and 2

-- Not sampled

Bold Entries Indicate Exceedance of RAP target concentrations

BH25* LNAPL was present on the groundwater surface.

Dup-W1 Collected from BH24

APPENDIX A

LABORATORY ANALYTICAL RESULTS





COLESTAR Environmental Inc.
ATTN: Darren Coleman
178 Fincham Avenue
Markham ON L3P 4B3

Date Received: 15-JUL-19
Report Date: 22-JUL-19 15:17 (MT)
Version: FINAL

Client Phone: 905-554-4156

Certificate of Analysis

Lab Work Order #: L2309644
Project P.O. #: NOT SUBMITTED
Job Reference: 0100-06
C of C Numbers: 17-825511
Legal Site Desc:


Harman Bhullar
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9450 17 Avenue NW, Edmonton, AB T6N 1M9 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2309644-3 BH24 Sampled By: CLIENT on 10-JUL-19 @ 12:00 Matrix: WATER BTEX, F1-F4-O.Reg 153/04 (July 2011) BTEX by Headspace Benzene <0.50 OWP 0.50 ug/L 22-JUL-19 R4719633 Ethylbenzene <0.50 OWP 0.50 ug/L 22-JUL-19 R4719633 m+p-Xylenes <0.40 OWP 0.40 ug/L 22-JUL-19 R4719633 o-Xylene <0.30 OWP 0.30 ug/L 22-JUL-19 R4719633 Toluene <0.50 OWP 0.50 ug/L 22-JUL-19 R4719633 Surrogate: 1,4-Difluorobenzene 99.8 70-130 % 22-JUL-19 R4719633 Surrogate: 4-Bromofluorobenzene 98.4 70-130 % 22-JUL-19 R4719633 F1-F4 Hydrocarbon Calculated Parameters F1-BTEX <25 25 ug/L 22-JUL-19 Total Hydrocarbons (C6-C50) <370 370 ug/L 22-JUL-19 F1-O.Reg 153/04 (July 2011) F1 (C6-C10) <25 25 ug/L 22-JUL-19 R4719633 Surrogate: 3,4-Dichlorotoluene 99.3 60-140 % 22-JUL-19 R4719633 F2-F4-O.Reg 153/04 (July 2011) F2 (C10-C16) <100 100 ug/L 15-JUL-19 16-JUL-19 R4712977 F3 (C16-C34) <250 250 ug/L 15-JUL-19 16-JUL-19 R4712977 F4 (C34-C50) <250 250 ug/L 15-JUL-19 16-JUL-19 R4712977 Chrom. to baseline at nC50 YES 15-JUL-19 16-JUL-19 R4712977 Surrogate: 2-Bromobenzotrifluoride 89.0 60-140 % 15-JUL-19 16-JUL-19 R4712977 Sum of Xylene Isomer Concentrations Xylenes (Total) <0.50 0.50 ug/L 22-JUL-19							
L2309644-4 BH25 Sampled By: CLIENT on 10-JUL-19 @ 12:30 Matrix: WATER BTEX, F1-F4-O.Reg 153/04 (July 2011) BTEX by Headspace Benzene 277 OWP 0.50 ug/L 22-JUL-19 R4719633 Ethylbenzene 858 DLHC 5.0 ug/L 22-JUL-19 R4719940 m+p-Xylenes 3650 DLHC 4.0 ug/L 22-JUL-19 R4719940 o-Xylene 1950 DLHC 3.0 ug/L 22-JUL-19 R4719940 Toluene 268 OWP 0.50 ug/L 22-JUL-19 R4719633 Surrogate: 1,4-Difluorobenzene 92.3 70-130 % 22-JUL-19 R4719633 Surrogate: 4-Bromofluorobenzene 101.1 70-130 % 22-JUL-19 R4719633 F1-F4 Hydrocarbon Calculated Parameters F1-BTEX 5600 1900 ug/L 22-JUL-19 Total Hydrocarbons (C6-C50) 20700 440 ug/L 22-JUL-19 F1-O.Reg 153/04 (July 2011) F1 (C6-C10) 12600 DLHC 250 ug/L 22-JUL-19 R4719940 Surrogate: 3,4-Dichlorotoluene 115.3 60-140 % 22-JUL-19 R4719940 F2-F4-O.Reg 153/04 (July 2011) F2 (C10-C16) 5330 100 ug/L 15-JUL-19 16-JUL-19 R4712977 F3 (C16-C34) 1660 250 ug/L 15-JUL-19 16-JUL-19 R4712977 F4 (C34-C50) 1070 250 ug/L 15-JUL-19 16-JUL-19 R4712977 Chrom. to baseline at nC50 YES 15-JUL-19 16-JUL-19 R4712977 Surrogate: 2-Bromobenzotrifluoride 110.1 60-140 % 15-JUL-19 16-JUL-19 R4712977 Sum of Xylene Isomer Concentrations Xylenes (Total) 5600 5.0 ug/L 22-JUL-19							

* 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
L2309644-5 DUP-W1							
Sampled By: CLIENT on 10-JUL-19 @ 11:30							
Matrix: WATER							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX by Headspace							
Benzene	<0.50		0.50	ug/L		22-JUL-19	R4719633
Ethylbenzene	<0.50		0.50	ug/L		22-JUL-19	R4719633
m+p-Xylenes	<0.40		0.40	ug/L		22-JUL-19	R4719940
o-Xylene	<0.30		0.30	ug/L		22-JUL-19	R4719940
Toluene	<0.50		0.50	ug/L		22-JUL-19	R4719633
Surrogate: 1,4-Difluorobenzene	100.9		70-130	%		22-JUL-19	R4719633
Surrogate: 4-Bromofluorobenzene	101.0		70-130	%		22-JUL-19	R4719633
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<25		25	ug/L		22-JUL-19	
Total Hydrocarbons (C6-C50)	<370		370	ug/L		22-JUL-19	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<25		25	ug/L		22-JUL-19	R4719633
Surrogate: 3,4-Dichlorotoluene	112.5		60-140	%		22-JUL-19	R4719633
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<100		100	ug/L	15-JUL-19	16-JUL-19	R4712977
F3 (C16-C34)	<250		250	ug/L	15-JUL-19	16-JUL-19	R4712977
F4 (C34-C50)	<250		250	ug/L	15-JUL-19	16-JUL-19	R4712977
Chrom. to baseline at nC50	YES				15-JUL-19	16-JUL-19	R4712977
Surrogate: 2-Bromobenzotrifluoride	81.8		60-140	%	15-JUL-19	16-JUL-19	R4712977
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.50		0.50	ug/L		22-JUL-19	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX-511-HS-WT	Water	BTEX by Headspace	SW846 8260 (511)
BTX is determined by analyzing by headspace-GC/MS.			
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS
--------------	-------	-----------------------------	----------------------

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	EPA 3511/CCME Tier 1
--------------	-------	--------------------------------	----------------------

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
---------------------	-------	-------------------------------------	-------------

Total xylenes represents the sum of o-xylene and m&p-xylene.

** 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:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
17-825511			

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 ww_t - milligrams per kilogram based on wet weight of sample
- mg/kg l_wt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2309644

Report Date: 22-JUL-19

Page 1 of 4

Client: COLESTAR Environmental Inc.

178 Fincham Avenue

Markham ON L3P 4B3

Contact: Darren Coleman

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT		Water						
Batch	R4712567							
WG3105878-4	DUP	L2309644-1						
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-JUL-19
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-JUL-19
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	16-JUL-19
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	16-JUL-19
Toluene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	16-JUL-19
WG3105878-1	LCS							
Benzene			101.4		%		70-130	16-JUL-19
Ethylbenzene			101.7		%		70-130	16-JUL-19
m+p-Xylenes			97.1		%		70-130	16-JUL-19
o-Xylene			98.7		%		70-130	16-JUL-19
Toluene			94.2		%		70-130	16-JUL-19
WG3105878-2	MB							
Benzene			<0.50		ug/L		0.5	16-JUL-19
Ethylbenzene			<0.50		ug/L		0.5	16-JUL-19
m+p-Xylenes			<0.40		ug/L		0.4	16-JUL-19
o-Xylene			<0.30		ug/L		0.3	16-JUL-19
Toluene			<0.50		ug/L		0.5	16-JUL-19
Surrogate: 1,4-Difluorobenzene			97.6		%		70-130	16-JUL-19
Surrogate: 4-Bromofluorobenzene			97.6		%		70-130	16-JUL-19
WG3105878-5	MS	L2309644-1						
Benzene			101.5		%		50-140	16-JUL-19
Ethylbenzene			103.3		%		50-140	16-JUL-19
m+p-Xylenes			98.4		%		50-140	16-JUL-19
o-Xylene			100.1		%		50-140	16-JUL-19
Toluene			94.7		%		50-140	16-JUL-19
Batch	R4719633							
WG3110442-1	LCS							
Benzene			93.6		%		70-130	20-JUL-19
Ethylbenzene			92.8		%		70-130	20-JUL-19
m+p-Xylenes			87.9		%		70-130	20-JUL-19
o-Xylene			92.0		%		70-130	20-JUL-19
Toluene			91.6		%		70-130	20-JUL-19
WG3110442-2	MB							
Benzene			<0.50		ug/L		0.5	22-JUL-19
Ethylbenzene			<0.50		ug/L		0.5	22-JUL-19

Quality Control Report

Workorder: L2309644

Report Date: 22-JUL-19

Page 2 of 4

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT								
Water								
Batch R4719633								
WG3110442-2 MB								
m+p-Xylenes			<0.40		ug/L		0.4	22-JUL-19
o-Xylene			<0.30		ug/L		0.3	22-JUL-19
Toluene			<0.50		ug/L		0.5	22-JUL-19
Surrogate: 1,4-Difluorobenzene			98.4		%		70-130	22-JUL-19
Surrogate: 4-Bromofluorobenzene			96.3		%		70-130	22-JUL-19
Batch R4719940								
WG3111513-1 LCS								
Ethylbenzene			96.4		%		70-130	22-JUL-19
m+p-Xylenes			87.3		%		70-130	22-JUL-19
o-Xylene			94.6		%		70-130	22-JUL-19
WG3111513-2 MB								
Ethylbenzene			<0.50		ug/L		0.5	22-JUL-19
m+p-Xylenes			<0.40		ug/L		0.4	22-JUL-19
o-Xylene			<0.30		ug/L		0.3	22-JUL-19
F1-HS-511-WT								
Water								
Batch R4712567								
WG3105878-4 DUP		L2309644-1						
F1 (C6-C10)		<25	<25	RPD-NA	ug/L	N/A	30	16-JUL-19
WG3105878-1 LCS								
F1 (C6-C10)			95.0		%		80-120	16-JUL-19
WG3105878-2 MB								
F1 (C6-C10)			<25		ug/L		25	16-JUL-19
Surrogate: 3,4-Dichlorotoluene			99.8		%		60-140	16-JUL-19
WG3105878-5 MS		L2309644-1						
F1 (C6-C10)			89.4		%		60-140	16-JUL-19
Batch R4719633								
WG3110442-1 LCS								
F1 (C6-C10)			100.1		%		80-120	20-JUL-19
WG3110442-2 MB								
F1 (C6-C10)			<25		ug/L		25	22-JUL-19
Surrogate: 3,4-Dichlorotoluene			122.7		%		60-140	22-JUL-19
Batch R4719940								
WG3111513-1 LCS								
F1 (C6-C10)			107.6		%		80-120	22-JUL-19
WG3111513-2 MB								
F1 (C6-C10)			<25		ug/L		25	22-JUL-19

Quality Control Report

Workorder: L2309644

Report Date: 22-JUL-19

Page 3 of 4

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	Water							
Batch	R4719940							
WG3111513-2 MB								
Surrogate: 3,4-Dichlorotoluene			127.3		%		60-140	22-JUL-19
F2-F4-511-WT	Water							
Batch	R4712977							
WG3105398-2 LCS								
F2 (C10-C16)			94.7		%		70-130	16-JUL-19
F3 (C16-C34)			91.9		%		70-130	16-JUL-19
F4 (C34-C50)			102.1		%		70-130	16-JUL-19
WG3105398-1 MB								
F2 (C10-C16)			<100		ug/L		100	16-JUL-19
F3 (C16-C34)			<250		ug/L		250	16-JUL-19
F4 (C34-C50)			<250		ug/L		250	16-JUL-19
Surrogate: 2-Bromobenzotrifluoride			80.4		%		60-140	16-JUL-19

Quality Control Report

Workorder: L2309644

Report Date: 22-JUL-19

Page 4 of 4

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.

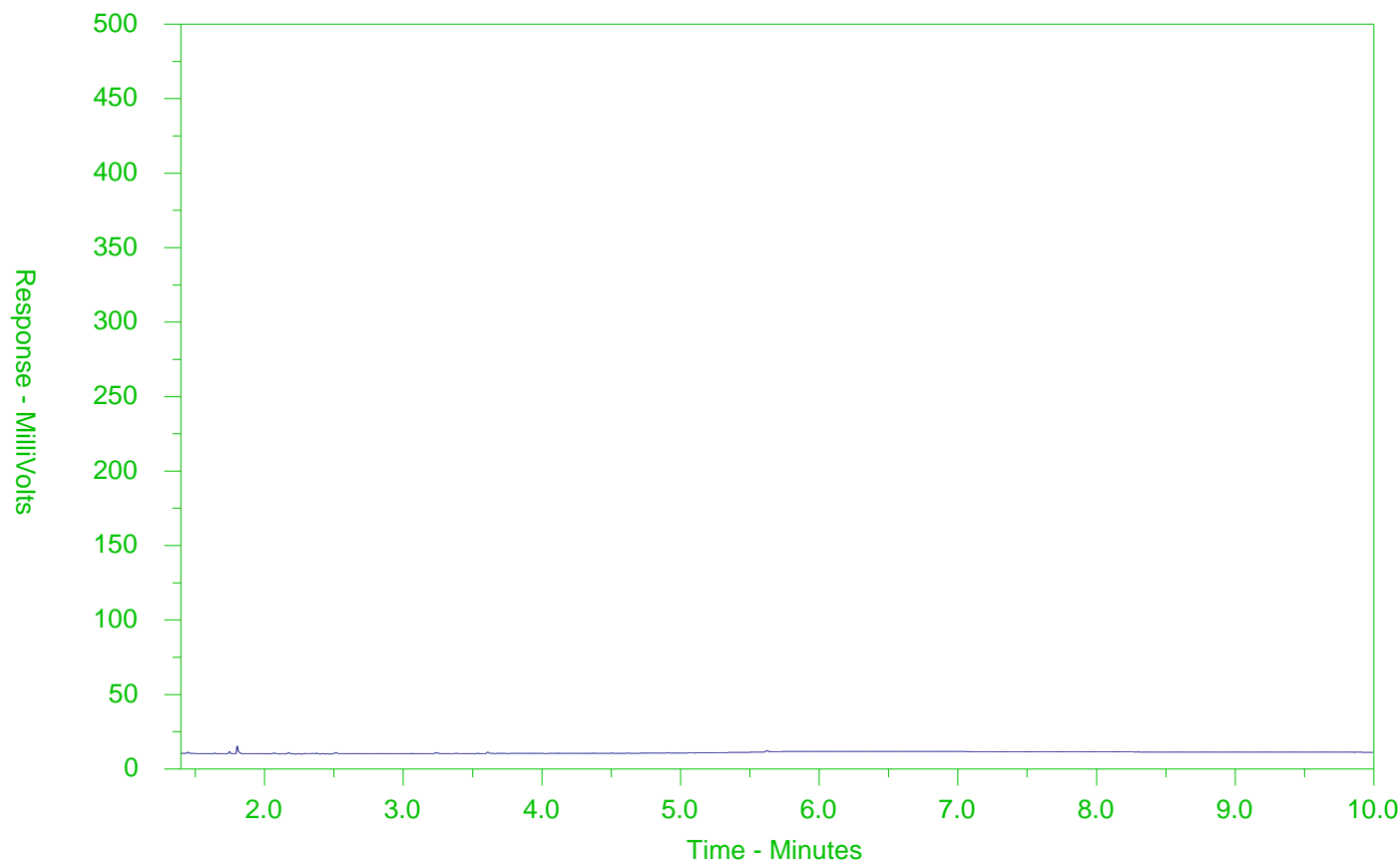
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide 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.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2309644-1
Client Sample ID: BH22



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

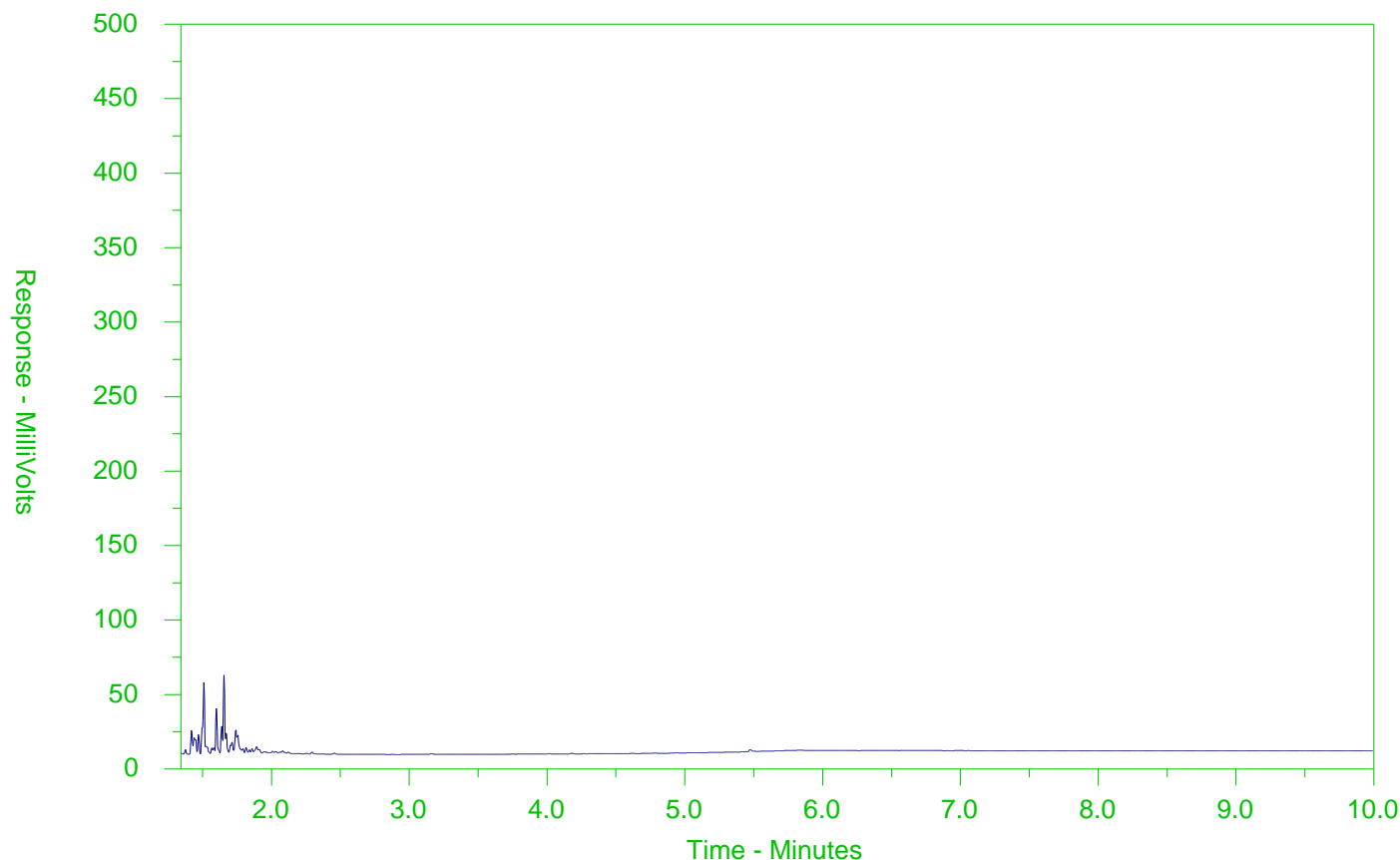
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2309644-2
Client Sample ID: BH23



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

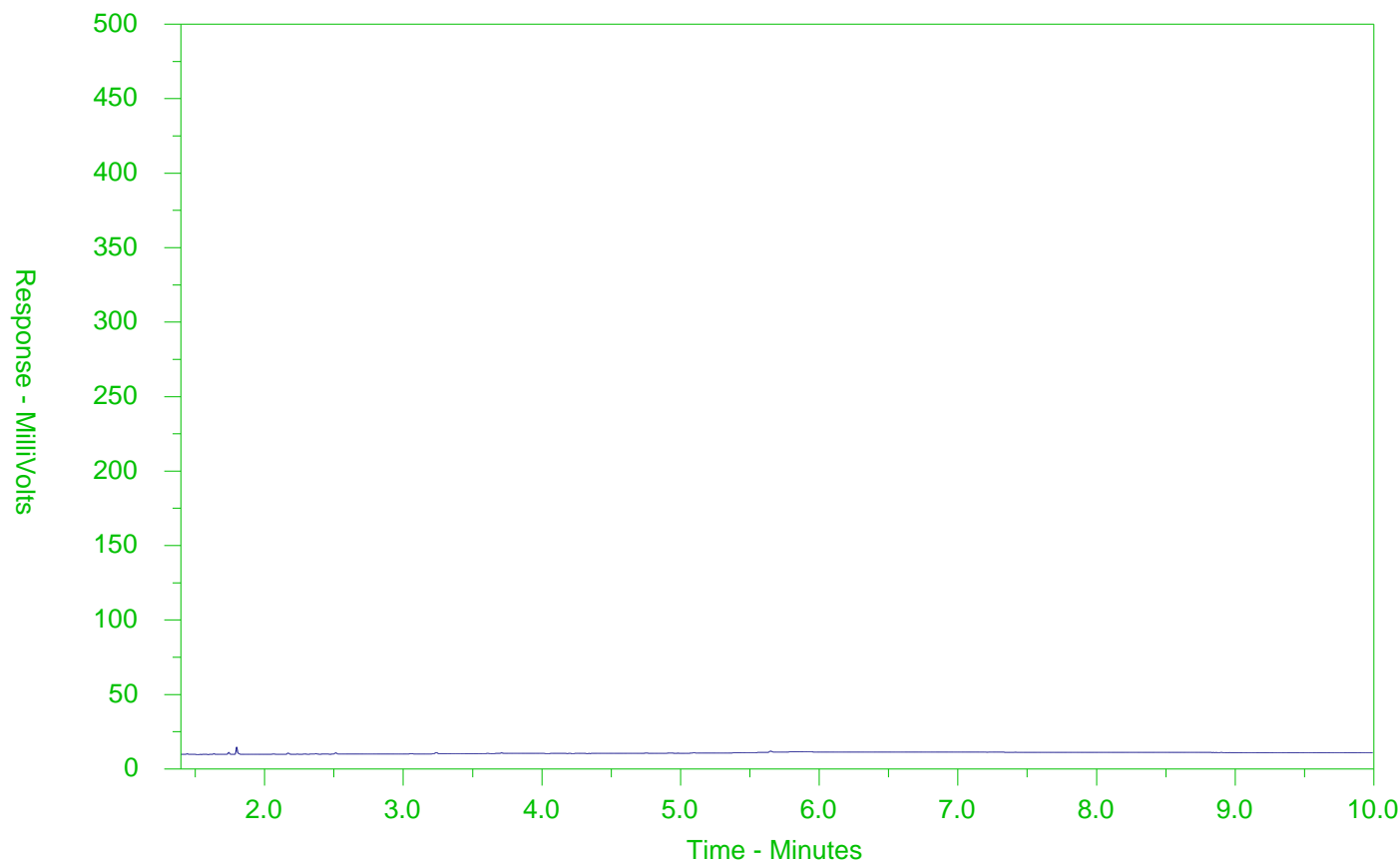
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2309644-3
Client Sample ID: BH24



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

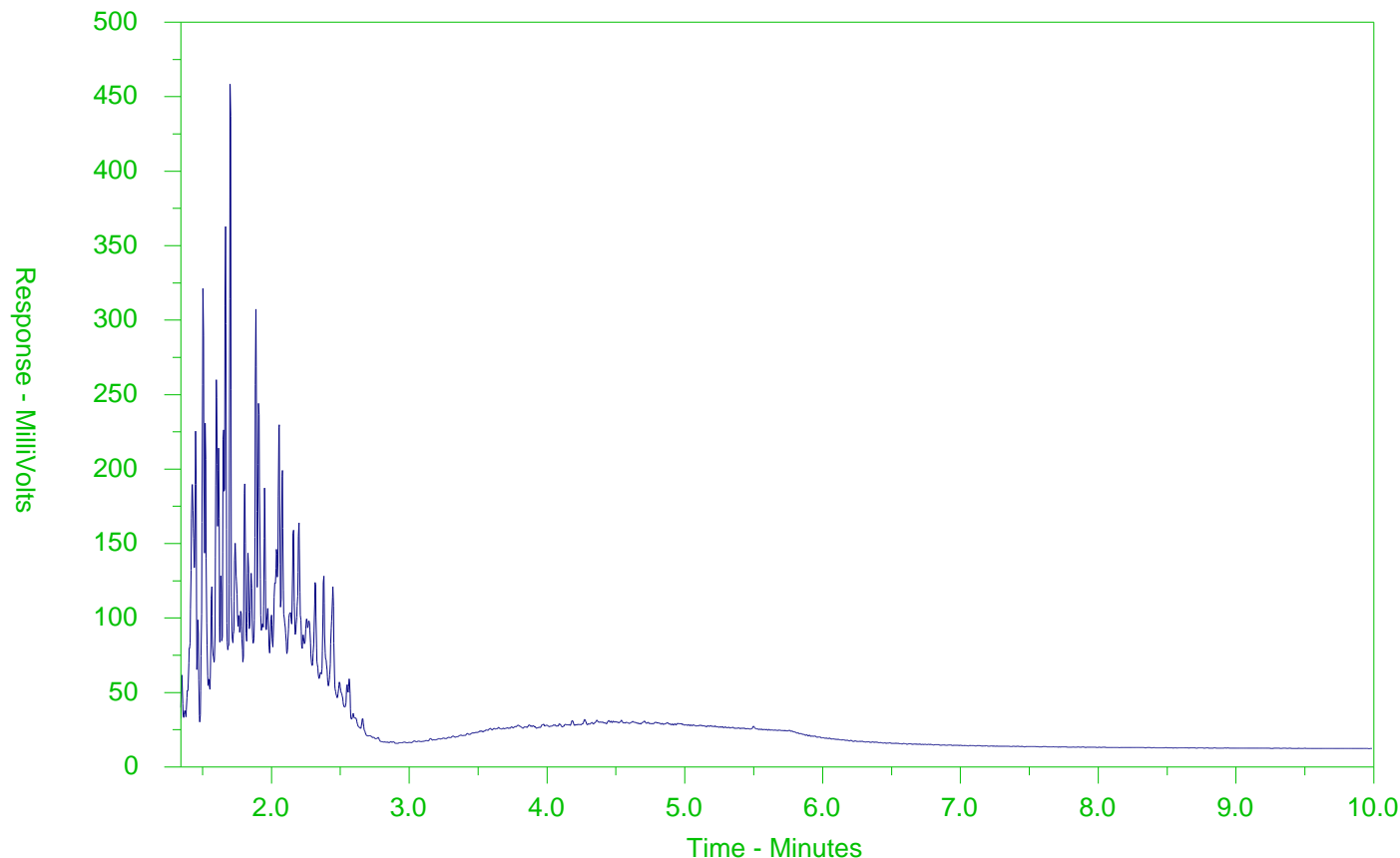
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2309644-4
Client Sample ID: BH25



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

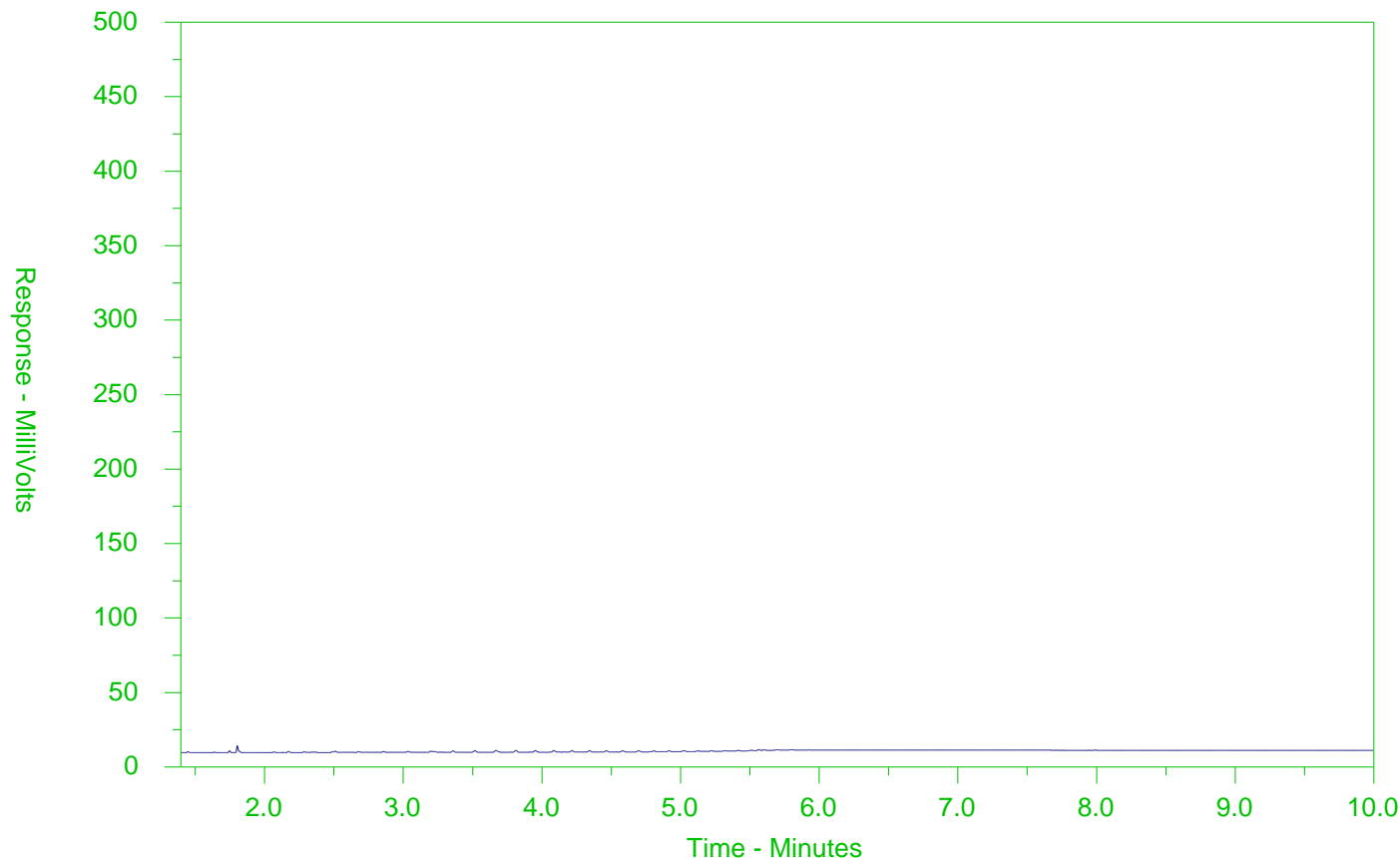
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2309644-5
Client Sample ID: DUP-W1



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.



www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L2309644-COFC

COC Number: 17 - 825511

Page 1 of 1

Report To Contact and company name below will appear on the final report		Report Format / Distribution		Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)	
Company: COLESTAR		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)		Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply	
Contact: Darren Coleman		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		4 day [P4-20%] <input type="checkbox"/> 1 Business day [E - 100%] <input type="checkbox"/>	
Phone: 905-554-4156		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3-25%] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E2 -200%] <input type="checkbox"/>	
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		2 day [P2-50%] <input type="checkbox"/> (Laboratory opening fees may apply) <input type="checkbox"/>	
Street: 178 Fincham Avenue		Email 1 or Fax: dcoleman@colestar		Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm	
City/Province: Markham, Ontario		Email 2: environmental.com		For tests that can not be performed according to the service level selected, you will be contacted.	
Postal Code: L3P 4B3		Email 3:		Analysis Request	
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		NUMBER OF CONTAINERS	
Company:		Email 1 or Fax:		SAMPLES ON HOLD	
Contact:		Email 2:			
Project Information		Oil and Gas Required Fields (client use)			
ALS Account # / Quote #: Colestar Rates		AFE/Cost Center: PO#			
Job #: 0100-06		Major/Minor Code: Routing Code:		SUSPECTED HAZARD (see Special Instructions)	
PO / AFE:		Requisitioner:			
LSD:		Location:			
ALS Lab Work Order # (lab use only): L2309644		ALS Contact: Sampler:			
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	
	BH22	July 10/19	11:30	GW	
	BH23		11:45		
	BH24		12:00		
	BH25		12:30		
	DUP-W1		11:30		
Drinking Water (DW) Samples' (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		SAMPLE CONDITION AS RECEIVED (lab use only)	
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		BH25 is highly impacted w fuel; please analyze best or separately		Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>	
Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				Ice Packs <input type="checkbox"/> Ice Cubes <input checked="" type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>	
				Cooling initiated <input type="checkbox"/>	
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)	
Released by: Darren Coleman Date: July 10/19 Time:		Received by: Date: Time:		Received by: July 15/19 Time: 12:00	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

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JUNE 2018 FORT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.