

Project Photographs

Long Term Monitoring, 2017
PIN-D, Ross Point, Nunavut



Photo: 25

Date:

August 2, 2017

Description:

View newly identified settlement area in the foreground (Feature F) at the northeast corner of NHWL

Location:

Viewpoint 50 (Figure 2)

Direction Taken:

E



Photo: 26

Date:

August 2, 2017

Description:

View of southeast berm area. Newly identified mound (Feature G) visible in the foreground

Location:

Viewpoint 51 (Figure 2)

Direction Taken:

E

Project Photographs

Long Term Monitoring, 2017
PIN-D, Ross Point, Nunavut



Photo: 27

Date:

August 2, 2017

Description:

View of newly identified
pothole (Feature H) along the
southeast berm of the NHL

Location:

Viewpoint 52 (Figure 2)

Direction Taken:

E

APPENDIX C

Laboratory Reports and Chain of Custody Forms



Your Project #: 100347-002
Site#: PIN D
Your C.O.C. #: 529742-01-01

Attention:STEPHANIE JOYCE

ARCADIS Canada
329 CHURCHILL AVE NORTH
SUITE 2000
OTTAWA, ON
CANADA K1Z 5B8

Report Date: 2017/08/15
Report #: R2428421
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B766005

Received: 2017/08/04, 08:15

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2017/08/08	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	2	N/A	2017/08/09	AB SOP-00039	CCME CWS/EPA 8260C m
Cadmium - low level CCME - Dissolved	2	N/A	2017/08/12	AB WI-00065	Auto Calc
Cadmium - low level CCME (Total)	2	N/A	2017/08/10	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	2	N/A	2017/08/11	AB SOP-00020	SM 22 4500-Cl E m
Conductivity @25C	2	N/A	2017/08/08	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons (F2-F4 in water) (2)	1	2017/08/08	2017/08/09	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons (F2-F4 in water) (2)	1	2017/08/08	2017/08/10	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	2	N/A	2017/08/15	AB WI-00065	Auto Calc
Elements by ICP - Dissolved (3)	1	N/A	2017/08/12	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Dissolved (3)	1	N/A	2017/08/15	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	2	2017/08/08	2017/08/11	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS - Dissolved (3)	2	N/A	2017/08/11	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	2	2017/08/08	2017/08/08	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	2	N/A	2017/08/08	AB WI-00065	Auto Calc
Sum of cations, anions	2	N/A	2017/08/15	AB WI-00065	Auto Calc
Nitrate and Nitrite	2	N/A	2017/08/08	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	2	N/A	2017/08/08	AB WI-00065	Auto Calc
Nitrogen (Nitrite - Nitrate) by IC	2	N/A	2017/08/08	AB SOP-00023	SM 22 4110 B m
Polychlorinated Biphenyls (1)	2	2017/08/10	2017/08/11	CAL SOP-00149	EPA 8082A R1 m
pH @25°C (4)	2	N/A	2017/08/08	AB SOP-00005	SM 22 4500 H+ B m
Sulphate by Automated Colourimetry	2	N/A	2017/08/11	AB SOP-00018	SM 22 4500-SO ₄ E m
Total Dissolved Solids (Filt. Residue)	2	2017/08/09	2017/08/10	AB SOP-00065	SM 22 2540 C m
Total Dissolved Solids (Calculated)	2	N/A	2017/08/15	AB WI-00065	Auto Calc
Total Suspended Solids (NFR)	2	2017/08/08	2017/08/09	AB SOP-00061	SM 22 2540 D m

Your Project #: 100347-002
Site#: PIN D
Your C.O.C. #: 529742-01-01

Attention:STEPHANIE JOYCE

ARCADIS Canada
329 CHURCHILL AVE NORTH
SUITE 2000
OTTAWA, ON
CANADA K1Z 5B8

Report Date: 2017/08/15
Report #: R2428421
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B766005

Received: 2017/08/04, 08:15

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental

(2) Silica gel clean up employed.

(3) Dissolved > Total Imbalance: Whenever applicable, Dissolved >Total for any parameter that falls within method uncertainty for duplicates is likely equivalent. If RPD is >20% samples were reanalyzed and confirmed.

(4) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Maxxam endeavours to analyze samples as soon as possible after receipt.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parminder Virk, Project Manager

Email: PVirk@maxxam.ca

Phone# (403)735-2235

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		RR3195	RR3195	RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02 12:25	2017/08/02		
COC Number		529742-01-01	529742-01-01	529742-01-01		
	UNITS	MW3	MW3 Lab-Dup	DUP-1	RDL	QC Batch
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	8719143
F3 (C16-C34 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	8719143
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	8719143
Volatiles						
Benzene	ug/L	<0.40	N/A	<0.40	0.40	8719926
Toluene	ug/L	<0.40	N/A	<0.40	0.40	8719926
Ethylbenzene	ug/L	<0.40	N/A	<0.40	0.40	8719926
m & p-Xylene	ug/L	<0.80	N/A	<0.80	0.80	8719926
o-Xylene	ug/L	<0.40	N/A	<0.40	0.40	8719926
Xylenes (Total)	ug/L	<0.80	N/A	<0.80	0.80	8719926
F1 (C6-C10) - BTEX	ug/L	<100	N/A	<100	100	8719926
F1 (C6-C10)	ug/L	<100	N/A	<100	100	8719926
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	102	N/A	101	N/A	8719926
4-Bromofluorobenzene (sur.)	%	99	N/A	100	N/A	8719926
D4-1,2-Dichloroethane (sur.)	%	126	N/A	127	N/A	8719926
O-TERPHENYL (sur.)	%	91	92	92	N/A	8719143
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		RR3195	RR3195		RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02 12:25		2017/08/02		
COC Number		529742-01-01	529742-01-01		529742-01-01		
	UNITS	MW3	MW3 Lab-Dup	QC Batch	DUP-1	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	4.2	N/A	8718395	4.3	N/A	8718395
Cation Sum	meq/L	4.4	N/A	8718395	4.8	N/A	8718395
Hardness (CaCO ₃)	mg/L	210	N/A	8718528	220	0.50	8718528
Ion Balance (% Difference)	%	2.9	N/A	8718563	5.0	N/A	8718563
Dissolved Nitrate (NO ₃)	mg/L	7.9	N/A	8718548	8.4	0.044	8718548
Nitrate plus Nitrite (N)	mg/L	1.8	N/A	8718549	1.9	0.014	8718549
Dissolved Nitrite (NO ₂)	mg/L	<0.033	N/A	8718548	<0.033	0.033	8718548
Calculated Total Dissolved Solids	mg/L	220	N/A	8718397	240	10	8718397
Misc. Inorganics							
Conductivity	uS/cm	380	N/A	8719102	410	1.0	8719102
pH	pH	8.05	N/A	8719095	8.05	N/A	8719095
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	<0.020	N/A	8718403	<0.020	0.020	8718403
Anions							
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	N/A	8719101	<0.50	0.50	8719101
Alkalinity (Total as CaCO ₃)	mg/L	140	N/A	8719101	140	0.50	8719101
Bicarbonate (HCO ₃)	mg/L	170	N/A	8719101	170	0.50	8719101
Carbonate (CO ₃)	mg/L	<0.50	N/A	8719101	<0.50	0.50	8719101
Hydroxide (OH)	mg/L	<0.50	N/A	8719101	<0.50	0.50	8719101
Dissolved Sulphate (SO ₄)	mg/L	56	N/A	8719886	59	1.0	8719886
Dissolved Chloride (Cl)	mg/L	5.3	N/A	8719876	6.7	1.0	8719876
Nutrients							
Dissolved Nitrite (N)	mg/L	<0.010	N/A	8718665	<0.010	0.010	8718665
Dissolved Nitrate (N)	mg/L	1.8	N/A	8718665	1.9	0.010	8718665
Elements							
Dissolved Aluminum (Al)	mg/L	0.0047	N/A	8723467	0.0044	0.0030	8723467
Dissolved Antimony (Sb)	mg/L	<0.00060	N/A	8723467	<0.00060	0.00060	8723467
Dissolved Arsenic (As)	mg/L	<0.00020	N/A	8723467	<0.00020	0.00020	8723467
Dissolved Barium (Ba)	mg/L	0.015	0.015	8727256	0.017	0.010	8724453
Dissolved Beryllium (Be)	mg/L	<0.0010	N/A	8723467	<0.0010	0.0010	8723467
Dissolved Boron (B)	mg/L	0.031	0.033	8727256	0.034	0.020	8724453
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		RR3195	RR3195		RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02 12:25		2017/08/02		
COC Number		529742-01-01	529742-01-01		529742-01-01		
	UNITS	MW3	MW3 Lab-Dup	QC Batch	DUP-1	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	38	38	8727256	39	0.30	8724453
Dissolved Chromium (Cr)	mg/L	<0.0010	N/A	8723467	<0.0010	0.0010	8723467
Dissolved Cobalt (Co)	mg/L	<0.00030	N/A	8723467	<0.00030	0.00030	8723467
Dissolved Copper (Cu)	mg/L	0.0016	N/A	8723467	0.0019	0.00020	8723467
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	8727256	<0.060	0.060	8724453
Dissolved Lead (Pb)	mg/L	<0.00020	N/A	8723467	<0.00020	0.00020	8723467
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	8727256	<0.020	0.020	8724453
Dissolved Magnesium (Mg)	mg/L	28	28	8727256	30	0.20	8724453
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	8727256	<0.0040	0.0040	8724453
Dissolved Molybdenum (Mo)	mg/L	0.00084	N/A	8723467	0.00077	0.00020	8723467
Dissolved Nickel (Ni)	mg/L	0.0016	N/A	8723467	0.0030	0.00050	8723467
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	8727256	<0.10	0.10	8724453
Dissolved Potassium (K)	mg/L	1.7	1.8	8727256	3.1	0.30	8724453
Dissolved Selenium (Se)	mg/L	<0.00020	N/A	8723467	<0.00020	0.00020	8723467
Dissolved Silicon (Si)	mg/L	1.0	0.98	8727256	1.1	0.10	8724453
Dissolved Silver (Ag)	mg/L	<0.00010	N/A	8723467	<0.00010	0.00010	8723467
Dissolved Sodium (Na)	mg/L	4.4	4.3	8727256	6.3	0.50	8724453
Dissolved Strontium (Sr)	mg/L	0.028	0.028	8727256	0.032	0.020	8724453
Dissolved Sulphur (S)	mg/L	20	20	8727256	24	0.20	8724453
Dissolved Thallium (Tl)	mg/L	<0.00020	N/A	8723467	<0.00020	0.00020	8723467
Dissolved Tin (Sn)	mg/L	<0.0010	N/A	8723467	<0.0010	0.0010	8723467
Dissolved Titanium (Ti)	mg/L	<0.0010	N/A	8723467	<0.0010	0.0010	8723467
Dissolved Uranium (U)	mg/L	0.0015	N/A	8723467	0.0019	0.00010	8723467
Dissolved Vanadium (V)	mg/L	<0.0010	N/A	8723467	<0.0010	0.0010	8723467
Dissolved Zinc (Zn)	mg/L	0.033	N/A	8723467	0.040	0.0030	8723467
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		RR3195	RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02		
COC Number		529742-01-01	529742-01-01		
	UNITS	MW3	DUP-1	RDL	QC Batch
Low Level Elements					
Total Cadmium (Cd)	ug/L	<0.020	<0.020	0.020	8718562
Elements					
Total Aluminum (Al)	mg/L	0.11	0.037	0.0030	8719135
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	8719135
Total Arsenic (As)	mg/L	0.00057	0.00022	0.00020	8719135
Total Barium (Ba)	mg/L	0.016	0.017	0.010	8719093
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	8719135
Total Boron (B)	mg/L	0.033	0.031	0.020	8719093
Total Calcium (Ca)	mg/L	37	42	0.30	8719093
Total Chromium (Cr)	mg/L	0.0013	0.0035	0.0010	8719135
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00030	8719135
Total Copper (Cu)	mg/L	0.0027	0.0081	0.00020	8719135
Total Iron (Fe)	mg/L	0.57	0.15	0.060	8719093
Total Lead (Pb)	mg/L	0.0028	0.00051	0.00020	8719135
Total Lithium (Li)	mg/L	<0.020	<0.020	0.020	8719093
Total Magnesium (Mg)	mg/L	28	32	0.20	8719093
Total Manganese (Mn)	mg/L	0.0082	0.017	0.0040	8719093
Total Molybdenum (Mo)	mg/L	0.00096	0.00099	0.00020	8719135
Total Nickel (Ni)	mg/L	0.0023	0.0041	0.00050	8719135
Total Phosphorus (P)	mg/L	<0.10	<0.10	0.10	8719093
Total Potassium (K)	mg/L	1.0	3.4	0.30	8719093
Total Selenium (Se)	mg/L	<0.00020	<0.00020	0.00020	8719135
Total Silicon (Si)	mg/L	1.0	1.1	0.10	8719093
Total Silver (Ag)	mg/L	<0.00010	0.0013	0.00010	8719135
Total Sodium (Na)	mg/L	3.4	6.1	0.50	8719093
Total Strontium (Sr)	mg/L	0.027	0.033	0.020	8719093
Total Sulphur (S)	mg/L	18	24	0.20	8719093
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	8719135
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	8719135
Total Titanium (Ti)	mg/L	0.0032	0.0015	0.0010	8719135
Total Uranium (U)	mg/L	0.0015	0.0023	0.00010	8719135
Total Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	8719135
RDL = Reportable Detection Limit					

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		RR3195	RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02		
COC Number		529742-01-01	529742-01-01		
	UNITS	MW3	DUP-1	RDL	QC Batch
Total Zinc (Zn)	mg/L	0.037	0.067	0.0030	8719135
RDL = Reportable Detection Limit					

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RR3195	RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02		
COC Number		529742-01-01	529742-01-01		
	UNITS	MW3	DUP-1	RDL	QC Batch
Misc. Inorganics					
Total Dissolved Solids	mg/L	220	240	10	8720651
Total Suspended Solids	mg/L	4.0	3.3	1.0	8719862
RDL = Reportable Detection Limit					

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		RR3195	RR3196		
Sampling Date		2017/08/02 12:25	2017/08/02		
COC Number		529742-01-01	529742-01-01		
	UNITS	MW3	DUP-1	RDL	QC Batch
Polychlorinated Biphenyls					
Aroclor 1016	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1221	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1232	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1242	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1248	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1254	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1260	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1262	mg/L	<0.000050	<0.000050	0.000050	8721401
Aroclor 1268	mg/L	<0.000050	<0.000050	0.000050	8721401
Total Aroclors	mg/L	<0.000050	<0.000050	0.000050	8721401
Surrogate Recovery (%)					
NONACHLOROBIPHENYL (sur.)	%	83	87	N/A	8721401
RDL = Reportable Detection Limit					
N/A = Not Applicable					

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C
-----------	-------

Sample RR3195 [MW3] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample RR3196 [DUP-1] : Sample was analyzed past method specified hold time for Nitrogen (Nitrite - Nitrate) by IC. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.

Maxxam Job #: B766005
Report Date: 2017/08/15

QUALITY ASSURANCE REPORT

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8719143	O-TERPHENYL (sur.)	2017/08/09	103	60 - 130	90	60 - 130	103	%		
8719926	1,4-Difluorobenzene (sur.)	2017/08/09	96	70 - 130	98	70 - 130	103	%		
8719926	4-Bromofluorobenzene (sur.)	2017/08/09	100	70 - 130	101	70 - 130	100	%		
8719926	D4-1,2-Dichloroethane (sur.)	2017/08/09	121	70 - 130	120	70 - 130	119	%		
8721401	NONACHLOROBIPHENYL (sur.)	2017/08/11	82	50 - 130	83	50 - 130	81	%		
8718665	Dissolved Nitrate (N)	2017/08/07	101	80 - 120	102	80 - 120	<0.010	mg/L	2.2	20
8718665	Dissolved Nitrite (N)	2017/08/07	100	80 - 120	101	80 - 120	<0.010	mg/L	NC	20
8719093	Total Barium (Ba)	2017/08/11	94	80 - 120	94	80 - 120	<0.010	mg/L	0.20	20
8719093	Total Boron (B)	2017/08/11	98	80 - 120	97	80 - 120	<0.020	mg/L	NC	20
8719093	Total Calcium (Ca)	2017/08/11	94	80 - 120	93	80 - 120	<0.30	mg/L	0.30	20
8719093	Total Iron (Fe)	2017/08/11	102	80 - 120	100	80 - 120	<0.060	mg/L	NC	20
8719093	Total Lithium (Li)	2017/08/11	92	80 - 120	93	80 - 120	<0.020	mg/L	NC	20
8719093	Total Magnesium (Mg)	2017/08/11	101	80 - 120	103	80 - 120	<0.20	mg/L	0.65	20
8719093	Total Manganese (Mn)	2017/08/11	96	80 - 120	95	80 - 120	<0.0040	mg/L	NC	20
8719093	Total Phosphorus (P)	2017/08/11	96	80 - 120	96	80 - 120	<0.10	mg/L	NC	20
8719093	Total Potassium (K)	2017/08/11	99	80 - 120	102	80 - 120	<0.30	mg/L	0.26	20
8719093	Total Silicon (Si)	2017/08/11	103	80 - 120	100	80 - 120	<0.10	mg/L	2.9	20
8719093	Total Sodium (Na)	2017/08/11	96	80 - 120	100	80 - 120	<0.50	mg/L	1.1	20
8719093	Total Strontium (Sr)	2017/08/11	95	80 - 120	95	80 - 120	<0.020	mg/L	0.45	20
8719093	Total Sulphur (S)	2017/08/11					<0.20	mg/L	0.43	20
8719095	pH	2017/08/08			100	97 - 103			0.47	N/A
8719101	Alkalinity (PP as CaCO3)	2017/08/08					<0.50	mg/L	NC	20
8719101	Alkalinity (Total as CaCO3)	2017/08/08			102	80 - 120	<0.50	mg/L	0.72	20
8719101	Bicarbonate (HCO3)	2017/08/08					<0.50	mg/L	0.72	20
8719101	Carbonate (CO3)	2017/08/08					<0.50	mg/L	NC	20
8719101	Hydroxide (OH)	2017/08/08					<0.50	mg/L	NC	20
8719102	Conductivity	2017/08/08			100	90 - 110	<1.0	uS/cm	0.30	10
8719135	Total Aluminum (Al)	2017/08/09	NC	80 - 120	98	80 - 120	<0.0030	mg/L	31 (1)	20
8719135	Total Antimony (Sb)	2017/08/09	52 (1)	80 - 120	97	80 - 120	<0.00060	mg/L	NC	20
8719135	Total Arsenic (As)	2017/08/09	107	80 - 120	98	80 - 120	<0.00020	mg/L	4.6	20
8719135	Total Beryllium (Be)	2017/08/09	112	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20

Maxxam Job #: B766005
Report Date: 2017/08/15

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8719135	Total Chromium (Cr)	2017/08/09	109	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20
8719135	Total Cobalt (Co)	2017/08/09	104	80 - 120	97	80 - 120	<0.00030	mg/L	NC	20
8719135	Total Copper (Cu)	2017/08/09	NC	80 - 120	96	80 - 120	<0.00020	mg/L	2.7	20
8719135	Total Lead (Pb)	2017/08/09	98	80 - 120	97	80 - 120	<0.00020	mg/L	NC	20
8719135	Total Molybdenum (Mo)	2017/08/09	106	80 - 120	100	80 - 120	<0.00020	mg/L	12	20
8719135	Total Nickel (Ni)	2017/08/09	105	80 - 120	97	80 - 120	<0.00050	mg/L	2.4	20
8719135	Total Selenium (Se)	2017/08/09	105	80 - 120	98	80 - 120	<0.00020	mg/L	5.8	20
8719135	Total Silver (Ag)	2017/08/09	107	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20
8719135	Total Thallium (Tl)	2017/08/09	96	80 - 120	95	80 - 120	<0.00020	mg/L	NC	20
8719135	Total Tin (Sn)	2017/08/09	96	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20
8719135	Total Titanium (Ti)	2017/08/09	105	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20
8719135	Total Uranium (U)	2017/08/09	99	80 - 120	96	80 - 120	<0.00010	mg/L	4.8	20
8719135	Total Vanadium (V)	2017/08/09	110	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20
8719135	Total Zinc (Zn)	2017/08/09	111	80 - 120	98	80 - 120	<0.0030	mg/L	8.7	20
8719143	F2 (C10-C16 Hydrocarbons)	2017/08/09	113	60 - 130	97	70 - 130	<0.10	mg/L	NC	30
8719143	F3 (C16-C34 Hydrocarbons)	2017/08/09	113	60 - 130	96	70 - 130	<0.10	mg/L	NC	30
8719143	F4 (C34-C50 Hydrocarbons)	2017/08/09	107	60 - 130	92	70 - 130	<0.20	mg/L	NC	30
8719862	Total Suspended Solids	2017/08/09	103	80 - 120	94	80 - 120	<1.0	mg/L	NC	20
8719876	Dissolved Chloride (Cl)	2017/08/11	104	80 - 120	104	80 - 120	<1.0	mg/L	NC	20
8719886	Dissolved Sulphate (SO4)	2017/08/11	107	80 - 120	103	80 - 120	<1.0	mg/L	NC	20
8719926	Benzene	2017/08/09	97	70 - 130	98	70 - 130	<0.40	ug/L	NC	30
8719926	Ethylbenzene	2017/08/09	92	70 - 130	94	70 - 130	<0.40	ug/L	NC	30
8719926	F1 (C6-C10) - BTEX	2017/08/09					<100	ug/L	NC	30
8719926	F1 (C6-C10)	2017/08/09	106	70 - 130	97	70 - 130	<100	ug/L	NC	30
8719926	m & p-Xylene	2017/08/09	91	70 - 130	94	70 - 130	<0.80	ug/L	NC	30
8719926	o-Xylene	2017/08/09	93	70 - 130	95	70 - 130	<0.40	ug/L	NC	30
8719926	Toluene	2017/08/09	86	70 - 130	88	70 - 130	<0.40	ug/L	NC	30
8719926	Xylenes (Total)	2017/08/09					<0.80	ug/L	NC	30
8720651	Total Dissolved Solids	2017/08/10	99	80 - 120	100	80 - 120	<10	mg/L	2.9	20
8721401	Aroclor 1016	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1221	2017/08/11					<0.000050	mg/L	NC	30

Maxxam Job #: B766005
Report Date: 2017/08/15

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8721401	Aroclor 1232	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1242	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1248	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1254	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1260	2017/08/11	68	50 - 130	70	50 - 130	<0.000050	mg/L	NC	30
8721401	Aroclor 1262	2017/08/11					<0.000050	mg/L	NC	30
8721401	Aroclor 1268	2017/08/11					<0.000050	mg/L	NC	30
8721401	Total Aroclors	2017/08/11					<0.000050	mg/L	NC	30
8723467	Dissolved Aluminum (Al)	2017/08/11	96	80 - 120	100	80 - 120	<0.0030	mg/L	13	20
8723467	Dissolved Antimony (Sb)	2017/08/11	103	80 - 120	98	80 - 120	<0.00060	mg/L	NC	20
8723467	Dissolved Arsenic (As)	2017/08/11	NC	80 - 120	99	80 - 120	<0.00020	mg/L	0.64	20
8723467	Dissolved Beryllium (Be)	2017/08/11	103	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20
8723467	Dissolved Chromium (Cr)	2017/08/11	97	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20
8723467	Dissolved Cobalt (Co)	2017/08/11	95	80 - 120	99	80 - 120	<0.00030	mg/L	NC	20
8723467	Dissolved Copper (Cu)	2017/08/11	93	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
8723467	Dissolved Lead (Pb)	2017/08/11	96	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20
8723467	Dissolved Molybdenum (Mo)	2017/08/11	104	80 - 120	98	80 - 120	<0.00020	mg/L	15	20
8723467	Dissolved Nickel (Ni)	2017/08/11	92	80 - 120	98	80 - 120	<0.00050	mg/L	NC	20
8723467	Dissolved Selenium (Se)	2017/08/11	96	80 - 120	102	80 - 120	<0.00020	mg/L	1.0	20
8723467	Dissolved Silver (Ag)	2017/08/11	81	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20
8723467	Dissolved Thallium (Tl)	2017/08/11	96	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20
8723467	Dissolved Tin (Sn)	2017/08/11	100	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20
8723467	Dissolved Titanium (Ti)	2017/08/11	94	80 - 120	100	80 - 120	<0.0010	mg/L	9.9	20
8723467	Dissolved Uranium (U)	2017/08/11	96	80 - 120	96	80 - 120	<0.00010	mg/L	NC	20
8723467	Dissolved Vanadium (V)	2017/08/11	99	80 - 120	101	80 - 120	<0.0010	mg/L	1.1	20
8723467	Dissolved Zinc (Zn)	2017/08/11	96	80 - 120	99	80 - 120	<0.0030	mg/L	NC	20
8724453	Dissolved Barium (Ba)	2017/08/12	93	80 - 120	96	80 - 120	<0.010	mg/L		
8724453	Dissolved Boron (B)	2017/08/12	100	80 - 120	100	80 - 120	<0.020	mg/L		
8724453	Dissolved Calcium (Ca)	2017/08/12	NC	80 - 120	99	80 - 120	<0.30	mg/L		
8724453	Dissolved Iron (Fe)	2017/08/12	100	80 - 120	104	80 - 120	<0.060	mg/L	NC	20
8724453	Dissolved Lithium (Li)	2017/08/12	96	80 - 120	98	80 - 120	<0.020	mg/L		

Maxxam Job #: B766005
Report Date: 2017/08/15

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8724453	Dissolved Magnesium (Mg)	2017/08/12	NC	80 - 120	101	80 - 120	<0.20	mg/L		
8724453	Dissolved Manganese (Mn)	2017/08/12	91	80 - 120	96	80 - 120	<0.0040	mg/L	0.12	20
8724453	Dissolved Phosphorus (P)	2017/08/12	102	80 - 120	98	80 - 120	<0.10	mg/L		
8724453	Dissolved Potassium (K)	2017/08/12	102	80 - 120	105	80 - 120	<0.30	mg/L		
8724453	Dissolved Silicon (Si)	2017/08/12	99	80 - 120	104	80 - 120	<0.10	mg/L		
8724453	Dissolved Sodium (Na)	2017/08/12	93	80 - 120	105	80 - 120	<0.50	mg/L		
8724453	Dissolved Strontium (Sr)	2017/08/12	90	80 - 120	97	80 - 120	<0.020	mg/L		
8724453	Dissolved Sulphur (S)	2017/08/12					<0.20	mg/L		
8727256	Dissolved Barium (Ba)	2017/08/15	96	80 - 120	93	80 - 120	<0.010	mg/L	0.83	20
8727256	Dissolved Boron (B)	2017/08/15	103	80 - 120	97	80 - 120	<0.020	mg/L	4.9	20
8727256	Dissolved Calcium (Ca)	2017/08/15	99	80 - 120	97	80 - 120	<0.30	mg/L	0.29	20
8727256	Dissolved Iron (Fe)	2017/08/15	104	80 - 120	99	80 - 120	<0.060	mg/L	NC	20
8727256	Dissolved Lithium (Li)	2017/08/15	92	80 - 120	90	80 - 120	<0.020	mg/L	NC	20
8727256	Dissolved Magnesium (Mg)	2017/08/15	104	80 - 120	101	80 - 120	<0.20	mg/L	0.49	20
8727256	Dissolved Manganese (Mn)	2017/08/15	98	80 - 120	94	80 - 120	<0.0040	mg/L	NC	20
8727256	Dissolved Phosphorus (P)	2017/08/15	105	80 - 120	98	80 - 120	<0.10	mg/L	NC	20
8727256	Dissolved Potassium (K)	2017/08/15	105	80 - 120	101	80 - 120	<0.30	mg/L	1.3	20
8727256	Dissolved Silicon (Si)	2017/08/15	111	80 - 120	105	80 - 120	<0.10	mg/L	1.7	20
8727256	Dissolved Sodium (Na)	2017/08/15	101	80 - 120	99	80 - 120	<0.50	mg/L	1.7	20
8727256	Dissolved Strontium (Sr)	2017/08/15	95	80 - 120	93	80 - 120	<0.020	mg/L	0.25	20

Maxxam Job #: B766005
Report Date: 2017/08/15

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8727256	Dissolved Sulphur (S)	2017/08/15					<0.20	mg/L	0.84	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times \text{RDL}$).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Job #: B766005
Report Date: 2017/08/15

ARCADIS Canada
Client Project #: 100347-002
Sampler Initials: AW

VALIDATION SIGNATURE PAGE

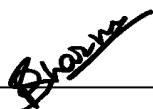
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



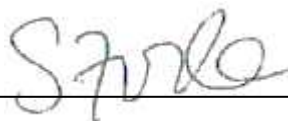
Dennis Ngondou, B.Sc., P.Chem., QP, Supervisor, Organics



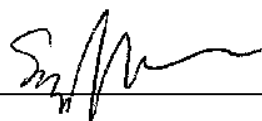
Justin Geisel, B.Sc., Organics Supervisor



Poonam Sharma, cCT, Organics Supervisor



Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

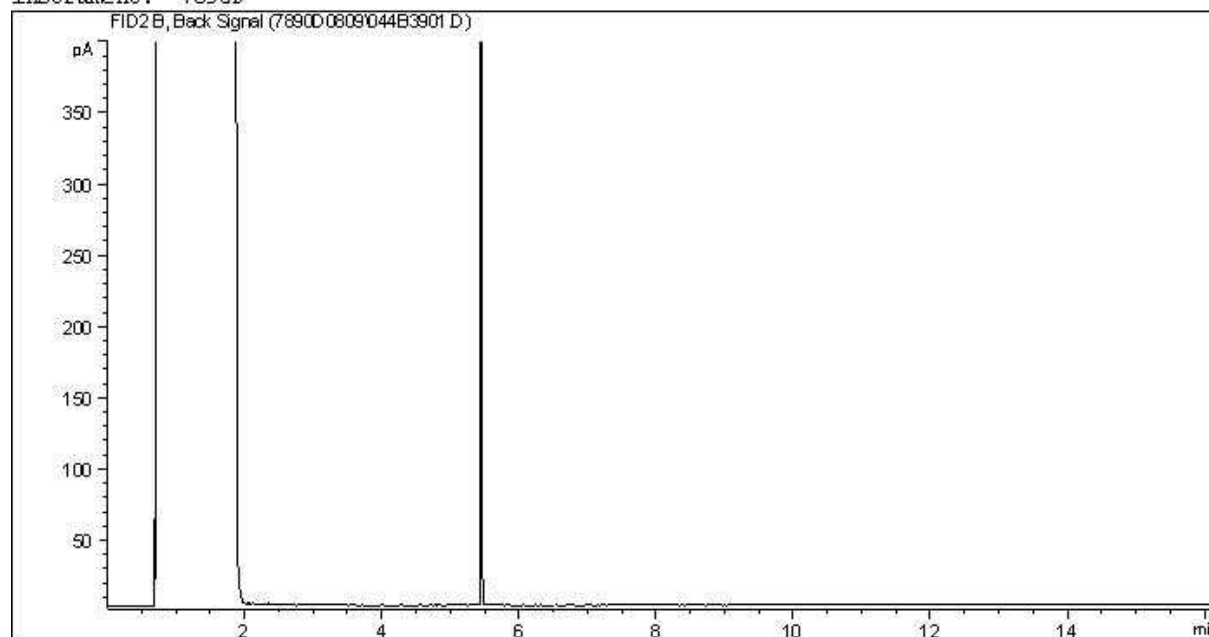


Sandy Yuan, M.Sc., Scientific Specialist

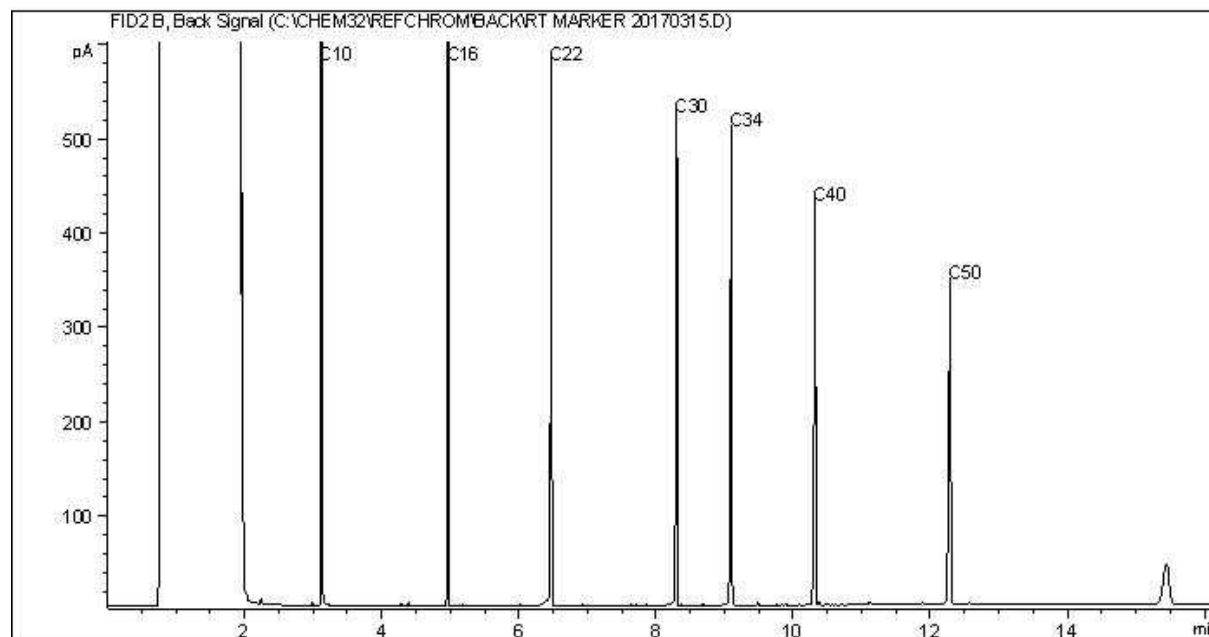
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



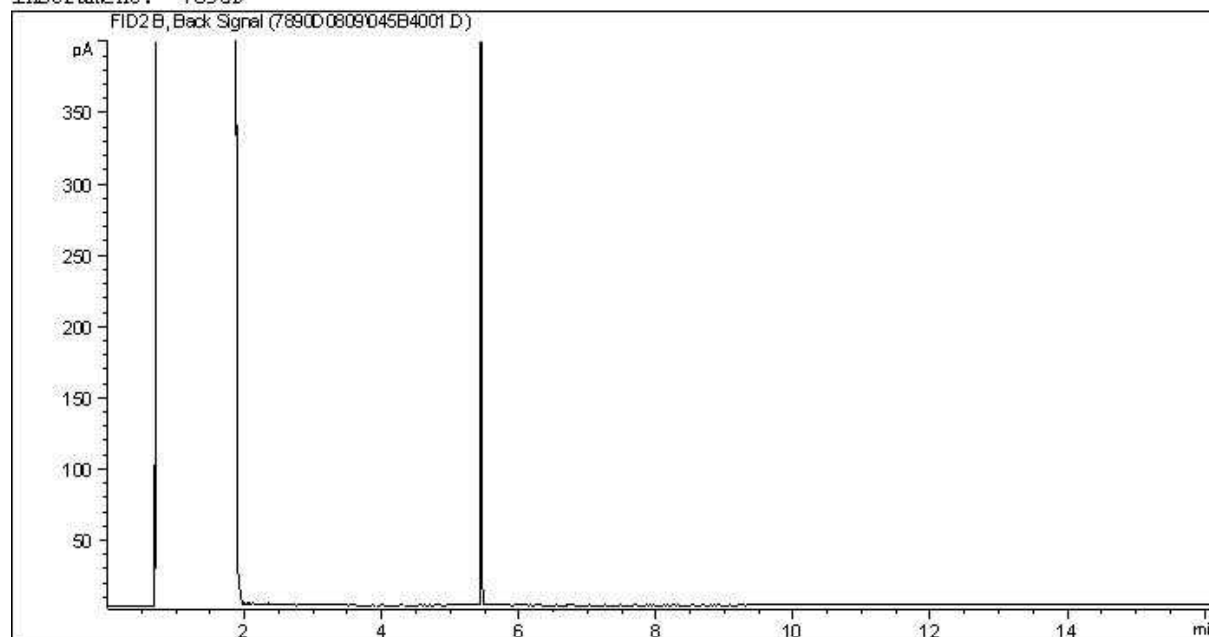
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

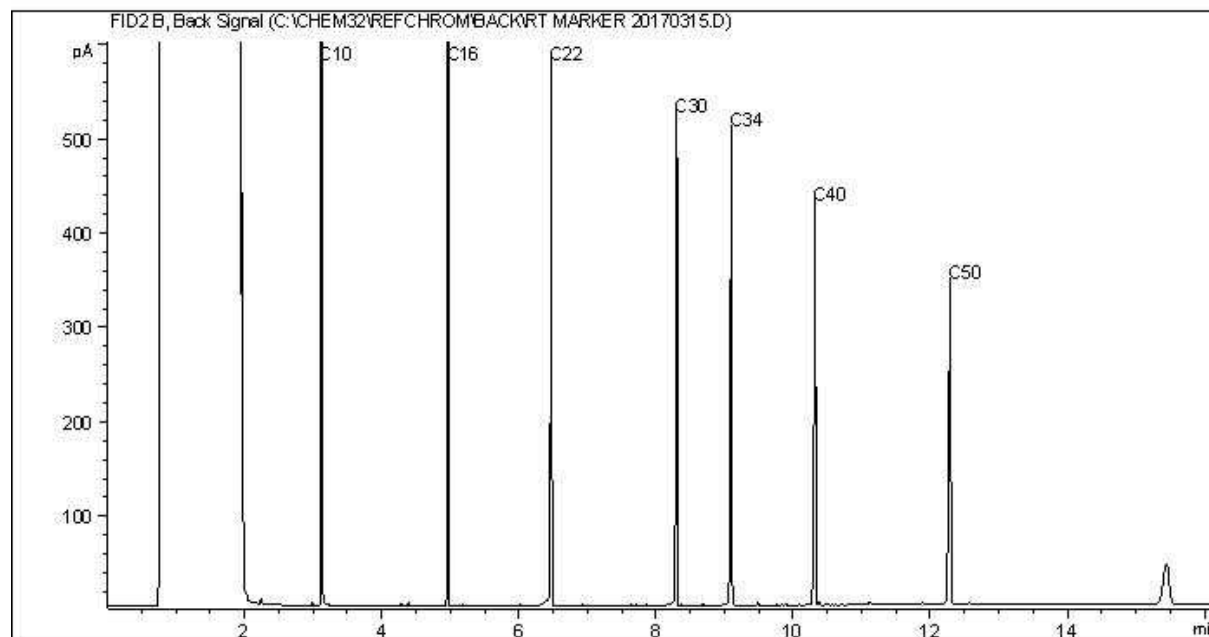
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



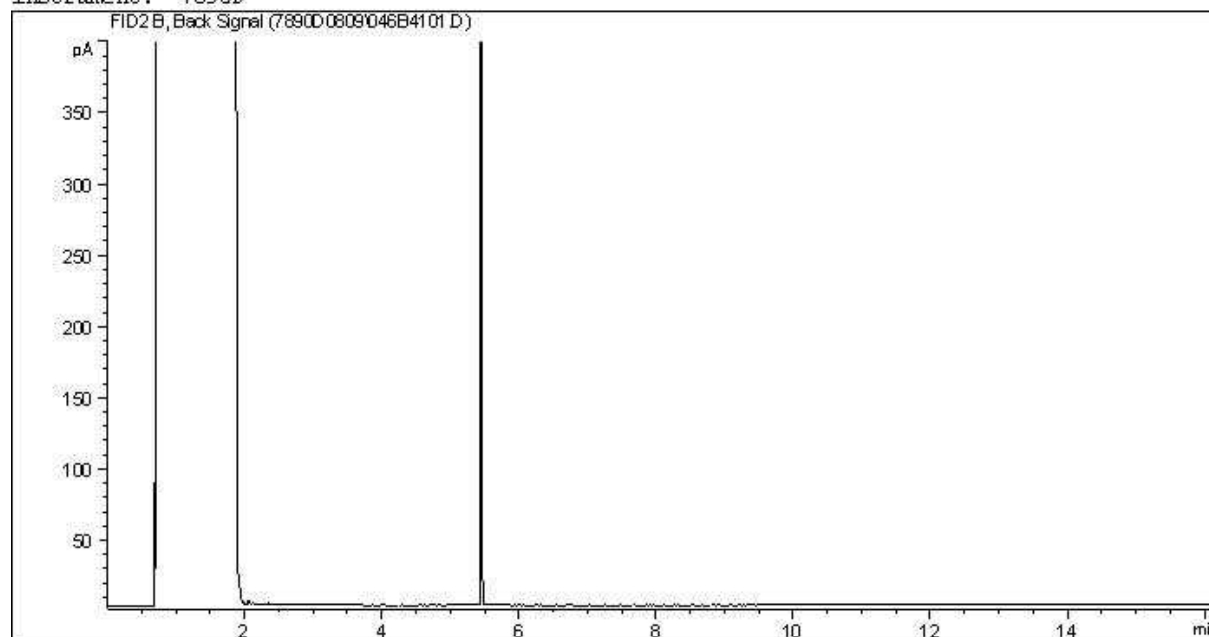
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

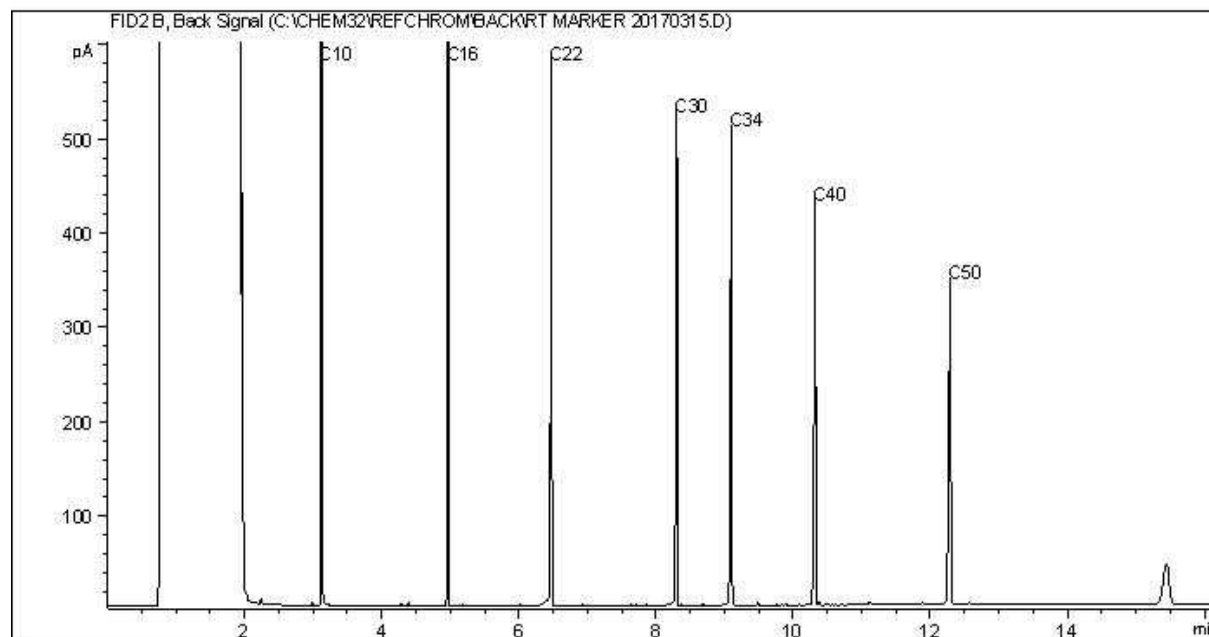
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

Ottawa, Ontario K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

www.arcadis-canada.com