ANNUAL REPORT
FOR THE HAMLET OF ARVIAT

YEAR BEING REPORTED: 2017

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence No. **3AM-ARV1016** issued to the **Hamlet of Arviat**.

i)- iii) tabular summaries of all data generated under the "Monitoring Program"; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

Attached are results for Monitoring Stations ARV-1, as well as detailed chemical, physical and biological analysis required at ARV-2a, ARV-4, ARV-5 and ARV-6 (for the months of July to September).

Month Reported	Quantity of Water Obtained from all sources (m^3)	Quantity of Sewage Waste Discharged (m^3)
January	8,551,359.00	Same
February	7,526,912.30	Same
March	7,706,508.10	Same
April	8,006,221.60	Same
May	8,215,996.30	Same
June	8,085,839.80	Same
July	8,500,348.20	Same
August	8,537,761.00	Same
September	8,352,867.00	Same
October	8,552,732.30	Same
November	8,283,353.50	Same
December	8,430,645.40	Same
ANNUAL TOTAL	**98,750,554.50**	**98,750,554.50**

Note: No meter exists to measure the sewage discharge volume, therefore water consumption volume is considered as equal volume to the Sewage discharge volume.

iv. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;

- Vehicles were shredded for disposal by a metals shredder bought by the Hamlet of Arviat.
- Segregation continues to improve at the Solid Waste Site and Bulky Metals Site. Batteries are collected and being stored in a seacan. Non-metals have been removed from the Bulky Metals Dump and brought to the Solid Waste Site. A wood recycling area is in use as well as an area for old tires.

v. a list of unauthorized discharges and summary of follow-up action taken;

The following spills were reported to the NT-NU Spill Report Line and are listed on the Hazardous Materials Spills Database for Arviat in 2016:

Spill No.	Date	Site Description	Commodity
2017053	2017-02-23	New water treatment plant	Fuel
2017146	2017-05-04	700 E - 9th Ave / 385 E	Heating Fuel P-40
2017163	2017-05-15	Alliance Church	Heating Fuel P-50
2017177	2017-05-26	QEC Arviat Power Plant	Diesel P-50
2017192	2017-06-01	Arviat Health Centre Fuel Tank	Heating Fuel P-50
2017193	2017-06-01	John Arnalukuaq High School Fuel Tank	Heating Fuel P-50
2017194	2017-06-02	Aviat Health Centre Heat Trace	Dowfrost Heat Transfer Fluid
2017211	2017-06-16	Arviat Paolei Hotel	Heating Fuel P-50
2017227	2017-06-28	Shoreline by RCMP	Fuel
2017229	2017-06-29	Arviat	Heating Fuel P-50
2017302	2017-08-17	Arviat, 701 1st Avenue	Heating Fuel P-50
2017304	2017-08-18	Aviat, Fuel deliver staging area	Gasoline
2017315	2017-08-29	Unit 614, 407 6th Avenue, Arviat, NT, 61 06 31.05N 94 03 55.82W	Heating Fuel P-50
2017422	2017-11-10	Arviat Health Center exterior fuel tank asset #113635	Heating Fuel P-50

vi. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

- A new water treatment plant is currently in the design phase, to be constructed during the summer, 2018.

vii. a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;

- none

viii. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported; and

- none

ix. updates or revisions to the approved Operation and Maintenance Plans.

- New Water Treatment Plant O&M Manual will be submitted following construction completion.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- The Hamlet is working with the Water Compliance Working Group to implement the Solid Waste Workplan goals.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- The 3AM-ARV1016 INAC Inspection took place on August 09, 2017. A copy of the inspection report can be found in Appendix K.

Appendix A: ARV-4 Effluent Quality Limits – 1 page
Appendix B: Weekly Inspections at Monitoring Program Stations – 1 page
Appendix C: Certificate of Analysis June 19, 2017– 18 pages
Appendix D: Certificate of Analysis July 12, 2017 – 18 pages
Appendix E: Certificate of Analysis August 10, 2017 – 15 pages
Appendix F: Certificate of Analysis September 19, 2017 – 14 pages
Appendix G: Old Sewage Lagoon Effluent Quality Limits – 1 page
Appendix H: Certificate of Analysis August 10, 2017 – 8 pages
Appendix I: Hazardous Materials Spill Database, Arviat 2017 – 1 page
Appendix J: Arviat 2017 Sampling Summary – 6 pages
Appendix K: 2017 INAC Inspection Report – 1 page

3AM-ARV1016 Arviat Monitoring Program Results 2017
Part D, Item 2; ARV-4 Effluent Quality limits

Parameter	Maximum Concentration of any grab sample	ARV-4			
		19-Jun-17	12-Jul-18	10-Aug-17	19-Sep-17
BOD_5	80 mg/L	27.2	215	50	5.6
Total Suspended Solids	100 mg/L	28	1670	272	13.0
Fecal Coliforms	1×10^4 CFU/100mL	990	2050	230	190
Oil & Grease	no visible sheen	5	5	5	5.5
pH	between 6 and 9	7.49	6.76	8.82	7.18

Exceeds effluent quality limits

ARV 2 - Near Garbage
ARV-4 - Beyond Lagoon
ARV-5 - Near Metal Dump
ARV-6 - Near Garage

Nunavut Water Board Licence No. 3AM-ARV1016
Arviat, NU
Part H, Item 8: Weekly Inspections at Monitoring Program Sations, May to August

Week	Starting Date	ARV-2a Water Present (check)			ARV-4 Water Present (check)			ARV-5 Water Present (check)			ARV-6 Water Present (check)			Checked By
		Yes	No	Frozen	Yes	No	Frozen	Yes	No	Frozen	Yes	No	Frozen	
1	01-May-17			✓			✓			✓			✓	Laura
2	08-May-17			✓			✓			✓			✓	Laura
3	15-May-17			✓			✓			✓			✓	Laura
4	22-May-17			✓			✓			✓			✓	Laura
5	29-May-17	✓					✓	✓					✓	Laura
6	05-Jun-17	✓					✓	✓					✓	Laura
7	12-Jun-17	✓			✓			✓			✓			Laura
8	19-Jun-17	✓			✓			✓			✓			Laura
9	26-Jun-17	✓			✓			✓			✓			Laura
10	03-Jul-17	✓			✓			✓			✓			Laura
11	10-Jul-17	✓			✓			✓			✓			Laura
12	17-Jul-17	✓			✓			✓			✓			Laura
13	24-Jul-17	✓			✓			✓			✓			Laura
14	31-Jul-17	✓			✓			✓			✓	✓		Laura
15	07-Aug-17	✓			✓			✓			✓	✓		Laura
16	14-Aug-17	✓			✓	less water		less water				✓		Laura
17	21-Aug-17	✓				✓					✓		✓	Laura
18	28-Aug-17													

Monitoring Program Station Locations:

ARV-2a: Effluent discharge from the Discharge Point of the Solid Waste Disposal Facility
ARV-4: Effluent from the discharge point of the Sewage Disposal Facility (end of wetland)
ARV-5: Discharge from the Bulky Metal Waste Area
ARV-6: Discharge from the Hazardous Waste Storage Area

* Fax Sheets Weekly to Connor Faulkner at CGS- Rankin Inlet. Fax: (867) 645-8141

Hamlet of Arviat
ATTN: STEVE ENGLAND
PO Box 150
Arviat NU X0C 0E0

Date Received: 20-JUN-17
Report Date: 07-JUL-17 14:14 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L1945016

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1945016-1 ARV-2							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
Toluene	<0.0010		0.0010	mg/L		22-JUN-17	R3756363
Ethyl benzene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
o-Xylene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
m+p-Xylenes	<0.00040		0.00040	mg/L		22-JUN-17	R3756363
F1 (C6-C10)	<0.10		0.10	mg/L		22-JUN-17	R3756363
Surrogate: 4-Bromofluorobenzene (SS)	97.7		70-130	%		22-JUN-17	R3756363
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	21-JUN-17	22-JUN-17	R3752853
F3 (C16-C34)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
F4 (C34-C50)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
Surrogate: 2-Bromobenzotrifluoride	83.0		60-140	%	21-JUN-17	22-JUN-17	R3752853
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-17	
F2-Naphth	<0.10		0.10	mg/L		04-JUL-17	
F3-PAH	<0.25		0.25	mg/L		04-JUL-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Acridine	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Chrysene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluoranthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluorene	0.000021		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Naphthalene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Phenanthrene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Quinoline	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acenaphthene d10	78.0		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acridine d9	92.9		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Chrysene d12	70.1		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Naphthalene d8	75.3		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Phenanthrene d10	73.6		40-130	%	21-JUN-17	29-JUN-17	R3758825
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	243		1.2	mg/L		21-JUN-17	
Alkalinity, Carbonate							

* 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
L1945016-1 ARV-2							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		21-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		21-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	199		1.0	mg/L		20-JUN-17	R3751986
Ammonia by colour							
Ammonia, Total (as N)	0.90		0.10	mg/L		27-JUN-17	R3757609
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	51		20	mg/L		21-JUN-17	R3756636
Carbonaceous BOD							
BOD Carbonaceous	46		20	mg/L		21-JUN-17	R3756636
Chloride in Water by IC							
Chloride (Cl)	422		5.0	mg/L		21-JUN-17	R3756435
Conductivity							
Conductivity	1920		1.0	umhos/cm		20-JUN-17	R3751986
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	50		10	MPN/100mL		20-JUN-17	R3752033
Hardness Calculated							
Hardness (as CaCO3)	520	HTC	0.25	mg/L		23-JUN-17	
Mercury Total							
Mercury (Hg)-Total	0.0000122		0.0000050	mg/L	21-JUN-17	21-JUN-17	R3752879
Nitrate in Water by IC							
Nitrate (as N)	0.25		0.20	mg/L		21-JUN-17	R3756435
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.25		0.22	mg/L		27-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLM	0.10	mg/L		21-JUN-17	R3756435
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		23-JUN-17	R3755066
Phenol (4AAP)							
Phenols (4AAP)	0.0041		0.0010	mg/L		29-JUN-17	R3761744
Phosphorus, Total							
Phosphorus (P)-Total	0.71		0.10	mg/L		22-JUN-17	R3755005
Sulfate in Water by IC							
Sulfate (SO4)	322		3.0	mg/L		21-JUN-17	R3756435
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0252		0.0050	mg/L	22-JUN-17	22-JUN-17	R3753846
Arsenic (As)-Total	0.00403		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Cadmium (Cd)-Total	0.000154		0.000010	mg/L	22-JUN-17	22-JUN-17	R3753846
Calcium (Ca)-Total	133		0.10	mg/L	22-JUN-17	22-JUN-17	R3753846
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-JUN-17	22-JUN-17	R3753846
Cobalt (Co)-Total	0.00173		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Copper (Cu)-Total	0.0216		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Iron (Fe)-Total	1.91		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Lead (Pb)-Total	0.00319		0.000090	mg/L	22-JUN-17	22-JUN-17	R3753846
Magnesium (Mg)-Total	45.5		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Manganese (Mn)-Total	0.348		0.00030	mg/L	22-JUN-17	22-JUN-17	R3753846
Nickel (Ni)-Total	0.0077		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Potassium (K)-Total	44.9		0.020	mg/L	22-JUN-17	22-JUN-17	R3753846
Sodium (Na)-Total	259		0.030	mg/L	22-JUN-17	22-JUN-17	R3753846
Zinc (Zn)-Total	0.0782		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Total Organic Carbon by Combustion							

* 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
L1945016-1 ARV-2							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	38.4		0.50	mg/L		25-JUN-17	R3756206
Total Suspended Solids							
Total Suspended Solids	48		20	mg/L		26-JUN-17	R3756788
pH							
pH	8.11		0.10	pH units		20-JUN-17	R3751986
L1945016-2 ARV-4							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
Toluene	<0.0010		0.0010	mg/L		22-JUN-17	R3756363
Ethyl benzene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
o-Xylene	<0.00050		0.00050	mg/L		22-JUN-17	R3756363
m+p-Xylenes	<0.00040		0.00040	mg/L		22-JUN-17	R3756363
F1 (C6-C10)	<0.10		0.10	mg/L		22-JUN-17	R3756363
Surrogate: 4-Bromofluorobenzene (SS)	94.0		70-130	%		22-JUN-17	R3756363
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	21-JUN-17	22-JUN-17	R3752853
F3 (C16-C34)	0.34		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
F4 (C34-C50)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
Surrogate: 2-Bromobenzotrifluoride	83.3		60-140	%	21-JUN-17	22-JUN-17	R3752853
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-17	
F2-Naphth	<0.10		0.10	mg/L		04-JUL-17	
F3-PAH	0.34		0.25	mg/L		04-JUL-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Acridine	0.000042		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Chrysene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluoranthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluorene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Naphthalene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Phenanthrene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Quinoline	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825

* 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
L1945016-2 ARV-4							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acenaphthene d10	71.1		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acridine d9	80.0		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Chrysene d12	55.9		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Naphthalene d8	66.9		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Phenanthrene d10	66.8		40-130	%	21-JUN-17	29-JUN-17	R3758825
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	224		1.2	mg/L		21-JUN-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		21-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		21-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	183		1.0	mg/L		20-JUN-17	R3751986
Ammonia by colour							
Ammonia, Total (as N)	19.1		2.0	mg/L		27-JUN-17	R3757609
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	27.2		6.0	mg/L		21-JUN-17	R3756636
Carbonaceous BOD							
BOD Carbonaceous	21.9		6.0	mg/L		21-JUN-17	R3756636
Chloride in Water by IC							
Chloride (Cl)	146		1.0	mg/L		21-JUN-17	R3756435
Conductivity							
Conductivity	817		1.0	umhos/cm		20-JUN-17	R3751986
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	990		10	MPN/100mL		20-JUN-17	R3752033
Hardness Calculated							
Hardness (as CaCO3)	87.6	HTC	0.25	mg/L		23-JUN-17	
Mercury Total							
Mercury (Hg)-Total	0.0000052		0.0000050	mg/L	21-JUN-17	21-JUN-17	R3752879
Nitrate in Water by IC							
Nitrate (as N)	0.494		0.040	mg/L		21-JUN-17	R3756435
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.540		0.070	mg/L		27-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	0.047		0.020	mg/L		21-JUN-17	R3756435
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		23-JUN-17	R3755066
Phenol (4AAP)							
Phenols (4AAP)	0.0040		0.0010	mg/L		29-JUN-17	R3761744
Phosphorus, Total							
Phosphorus (P)-Total	3.91		0.10	mg/L		22-JUN-17	R3755005
Sulfate in Water by IC							
Sulfate (SO4)	8.78		0.60	mg/L		21-JUN-17	R3756435
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.104		0.0050	mg/L	22-JUN-17	22-JUN-17	R3753846
Arsenic (As)-Total	0.00590		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Cadmium (Cd)-Total	0.000052		0.000010	mg/L	22-JUN-17	22-JUN-17	R3753846
Calcium (Ca)-Total	15.8		0.10	mg/L	22-JUN-17	22-JUN-17	R3753846
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-JUN-17	22-JUN-17	R3753846
Cobalt (Co)-Total	0.00256		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846

* 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
L1945016-2 ARV-4							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Total Metals by ICP-MS							
Copper (Cu)-Total	0.0213		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Iron (Fe)-Total	3.51		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Lead (Pb)-Total	0.000993		0.000090	mg/L	22-JUN-17	22-JUN-17	R3753846
Magnesium (Mg)-Total	11.7		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Manganese (Mn)-Total	0.324		0.00030	mg/L	22-JUN-17	22-JUN-17	R3753846
Nickel (Ni)-Total	0.0072		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Potassium (K)-Total	19.6		0.020	mg/L	22-JUN-17	22-JUN-17	R3753846
Sodium (Na)-Total	96.2		0.030	mg/L	22-JUN-17	22-JUN-17	R3753846
Zinc (Zn)-Total	0.0115		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Total Organic Carbon by Combustion							
Total Organic Carbon	34.7		0.50	mg/L		25-JUN-17	R3756206
Total Suspended Solids							
Total Suspended Solids	28		20	mg/L		26-JUN-17	R3756788
pH							
pH	7.49		0.10	pH units		20-JUN-17	R3751986
L1945016-3 ARV-5							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
Toluene	<0.0010		0.0010	mg/L		23-JUN-17	R3754956
Ethyl benzene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
o-Xylene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
m+p-Xylenes	<0.00040		0.00040	mg/L		23-JUN-17	R3754956
F1 (C6-C10)	<0.10		0.10	mg/L		23-JUN-17	R3754956
Surrogate: 4-Bromofluorobenzene (SS)	99.1		70-130	%		23-JUN-17	R3754956
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	21-JUN-17	22-JUN-17	R3752853
F3 (C16-C34)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
F4 (C34-C50)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
Surrogate: 2-Bromobenzotrifluoride	92.2		60-140	%	21-JUN-17	22-JUN-17	R3752853
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-17	
F2-Naphth	<0.10		0.10	mg/L		04-JUL-17	
F3-PAH	<0.25		0.25	mg/L		04-JUL-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		23-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Acridine	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825

* 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
L1945016-3 ARV-5							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Chrysene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluoranthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluorene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Naphthalene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Phenanthrene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Quinoline	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acenaphthene d10	83.9		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acridine d9	93.2		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Chrysene d12	62.6		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Naphthalene d8	78.9		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Phenanthrene d10	82.7		40-130	%	21-JUN-17	29-JUN-17	R3758825
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	78.7		1.2	mg/L		21-JUN-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		21-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		21-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	64.5		1.0	mg/L		20-JUN-17	R3751986
Ammonia by colour							
Ammonia, Total (as N)	0.020		0.010	mg/L		27-JUN-17	R3757609
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		21-JUN-17	R3756636
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		21-JUN-17	R3756636
Chloride in Water by IC							
Chloride (Cl)	746		5.0	mg/L		21-JUN-17	R3756435
Conductivity							
Conductivity	2200		1.0	umhos/cm		20-JUN-17	R3751986
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10		10	MPN/100mL		20-JUN-17	R3752033
Hardness Calculated							
Hardness (as CaCO3)	390	HTC	0.25	mg/L		23-JUN-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	21-JUN-17	21-JUN-17	R3752879
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLM	0.20	mg/L		21-JUN-17	R3756435
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.22		0.22	mg/L		27-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLM	0.10	mg/L		21-JUN-17	R3756435
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		23-JUN-17	R3755066
Phenol (4AAP)							
Phenols (4AAP)	0.0033		0.0010	mg/L		29-JUN-17	R3761744
Phosphorus, Total							

* 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
L1945016-3 ARV-5							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Phosphorus, Total							
Phosphorus (P)-Total	0.038		0.010	mg/L		22-JUN-17	R3755005
Sulfate in Water by IC							
Sulfate (SO4)	14.4		3.0	mg/L		21-JUN-17	R3756435
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0576		0.0050	mg/L	22-JUN-17	22-JUN-17	R3753846
Arsenic (As)-Total	0.00068		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-JUN-17	22-JUN-17	R3753846
Calcium (Ca)-Total	40.6		0.10	mg/L	22-JUN-17	22-JUN-17	R3753846
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-JUN-17	22-JUN-17	R3753846
Cobalt (Co)-Total	0.00030		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Copper (Cu)-Total	0.00067		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Iron (Fe)-Total	3.45		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Lead (Pb)-Total	0.000091		0.000090	mg/L	22-JUN-17	22-JUN-17	R3753846
Magnesium (Mg)-Total	70.0		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Manganese (Mn)-Total	0.226		0.00030	mg/L	22-JUN-17	22-JUN-17	R3753846
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Potassium (K)-Total	14.5		0.020	mg/L	22-JUN-17	22-JUN-17	R3753846
Sodium (Na)-Total	442		0.030	mg/L	22-JUN-17	22-JUN-17	R3753846
Zinc (Zn)-Total	0.0050		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Total Organic Carbon by Combustion							
Total Organic Carbon	8.95		0.50	mg/L		25-JUN-17	R3756206
Total Suspended Solids							
Total Suspended Solids	<20		20	mg/L		26-JUN-17	R3756788
pH							
pH	7.07		0.10	pH units		20-JUN-17	R3751986
L1945016-4 ARV-6							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
Toluene	0.0035		0.0010	mg/L		23-JUN-17	R3754956
Ethyl benzene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
o-Xylene	<0.00050		0.00050	mg/L		23-JUN-17	R3754956
m+p-Xylenes	<0.00040		0.00040	mg/L		23-JUN-17	R3754956
F1 (C6-C10)	<0.10		0.10	mg/L		23-JUN-17	R3754956
Surrogate: 4-Bromofluorobenzene (SS)	95.5		70-130	%		23-JUN-17	R3754956
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	21-JUN-17	22-JUN-17	R3752853
F3 (C16-C34)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
F4 (C34-C50)	<0.25		0.25	mg/L	21-JUN-17	22-JUN-17	R3752853
Surrogate: 2-Bromobenzotrifluoride	86.2		60-140	%	21-JUN-17	22-JUN-17	R3752853
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-17	
F2-Naphth	<0.10		0.10	mg/L		04-JUL-17	
F3-PAH	<0.25		0.25	mg/L		04-JUL-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		23-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							

* 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
L1945016-4 ARV-6							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000054		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
2-Methyl Naphthalene	0.000047		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Acenaphthylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Acridine	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)anthracene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Chrysene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluoranthene	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Fluorene	0.000024		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Naphthalene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Phenanthrene	<0.000050		0.000050	mg/L	21-JUN-17	29-JUN-17	R3758825
Pyrene	<0.000010		0.000010	mg/L	21-JUN-17	29-JUN-17	R3758825
Quinoline	<0.000020		0.000020	mg/L	21-JUN-17	29-JUN-17	R3758825
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acenaphthene d10	84.4		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Acridine d9	98.3		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Chrysene d12	61.0		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Naphthalene d8	83.8		40-130	%	21-JUN-17	29-JUN-17	R3758825
Surrogate: Phenanthrene d10	83.1		40-130	%	21-JUN-17	29-JUN-17	R3758825
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	76.9		1.2	mg/L		21-JUN-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		21-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		21-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	63.0		1.0	mg/L		20-JUN-17	R3751986
Ammonia by colour							
Ammonia, Total (as N)	0.070		0.010	mg/L		27-JUN-17	R3757609
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	8.2		2.0	mg/L		21-JUN-17	R3756636
Carbonaceous BOD							
BOD Carbonaceous	6.6		2.0	mg/L		21-JUN-17	R3756636
Chloride in Water by IC							
Chloride (Cl)	66.9		0.50	mg/L		21-JUN-17	R3756435
Conductivity							
Conductivity	333		1.0	umhos/cm		20-JUN-17	R3751986
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10		10	MPN/100mL		20-JUN-17	R3752033
Hardness Calculated							
Hardness (as CaCO3)	99.6	HTC	0.25	mg/L		26-JUN-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	21-JUN-17	21-JUN-17	R3752879
Nitrate in Water by IC							

* 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
L1945016-4 ARV-6							
Sampled By: CLIENT on 19-JUN-17 @ 09:35							
Matrix: WATER							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		21-JUN-17	R3756435
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		27-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		21-JUN-17	R3756435
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		23-JUN-17	R3755066
Phenol (4AAP)							
Phenols (4AAP)	0.0141		0.0010	mg/L		06-JUL-17	R3767369
Phosphorus, Total							
Phosphorus (P)-Total	0.065		0.010	mg/L		22-JUN-17	R3755005
Sulfate in Water by IC							
Sulfate (SO4)	<0.30		0.30	mg/L		21-JUN-17	R3756435
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0867		0.0050	mg/L	22-JUN-17	22-JUN-17	R3753846
Arsenic (As)-Total	0.00065		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-JUN-17	22-JUN-17	R3753846
Calcium (Ca)-Total	28.7		0.10	mg/L	22-JUN-17	22-JUN-17	R3753846
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-JUN-17	22-JUN-17	R3753846
Cobalt (Co)-Total	0.00209		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Copper (Cu)-Total	0.00073		0.00020	mg/L	22-JUN-17	22-JUN-17	R3753846
Iron (Fe)-Total	15.5		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Lead (Pb)-Total	0.000197		0.000090	mg/L	22-JUN-17	22-JUN-17	R3753846
Magnesium (Mg)-Total	6.76		0.010	mg/L	22-JUN-17	22-JUN-17	R3753846
Manganese (Mn)-Total	2.32		0.030	mg/L	22-JUN-17	23-JUN-17	R3755816
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Potassium (K)-Total	3.99		0.020	mg/L	22-JUN-17	22-JUN-17	R3753846
Sodium (Na)-Total	23.8		0.030	mg/L	22-JUN-17	22-JUN-17	R3753846
Zinc (Zn)-Total	0.0050		0.0020	mg/L	22-JUN-17	22-JUN-17	R3753846
Total Organic Carbon by Combustion							
Total Organic Carbon	14.6		0.50	mg/L		25-JUN-17	R3756206
Total Suspended Solids							
Total Suspended Solids	36		20	mg/L		26-JUN-17	R3756788
pH							
pH	6.95		0.10	pH units		20-JUN-17	R3751986

* 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).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.

ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L

ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.

ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B

Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-WP	Water	Conductivity	APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97

Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0

Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.

MET-T-L-MS-WP	Water	Total Metals by ICP-MS	APHA 3030E/EPA 6020A-TL

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F

Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)

Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.

P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Water is spiked with a surrogate spike mix and extracted using solvent extraction techniques. Analysis is performed by GC/MS in the selected ion monitoring (SIM) mode.

PH-WP	Water	pH	APHA 4500H

The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

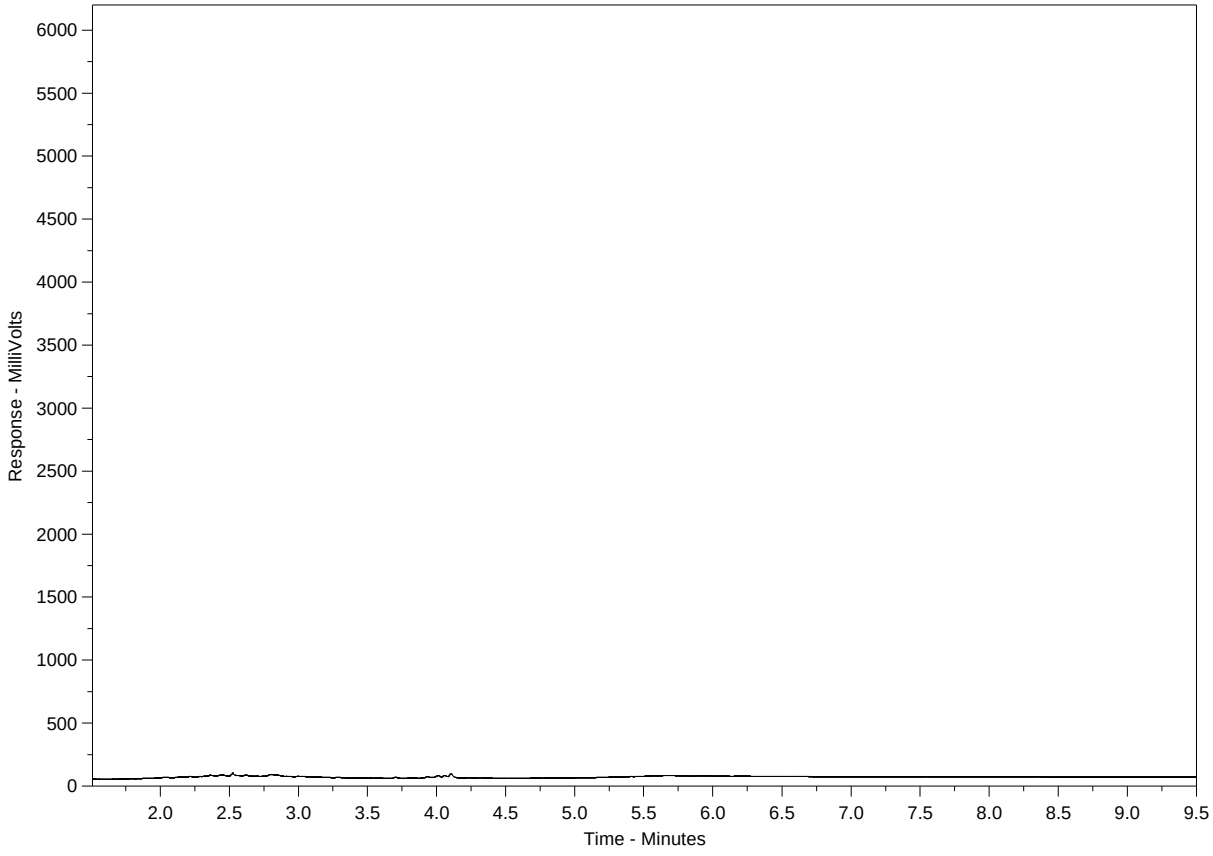
GLOSSARY OF REPORT TERMS

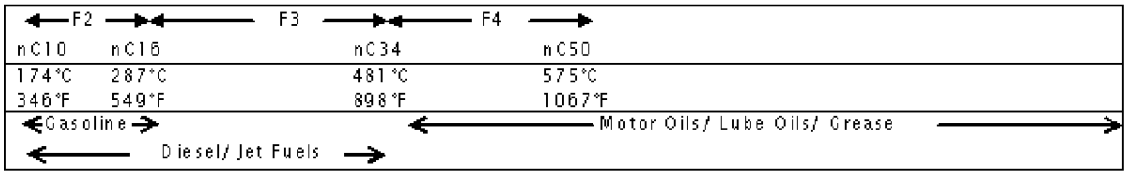
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1945016-1
Client Sample ID: ARV-2





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

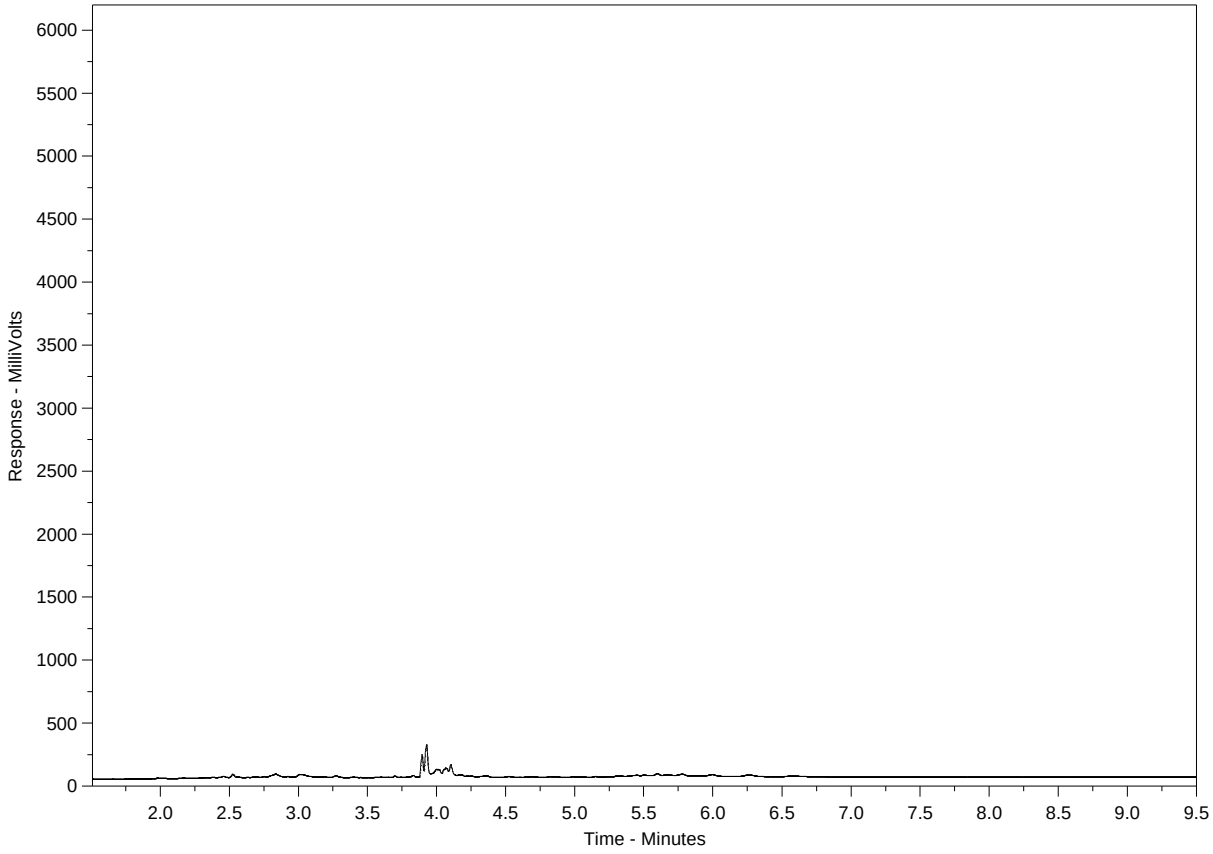
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

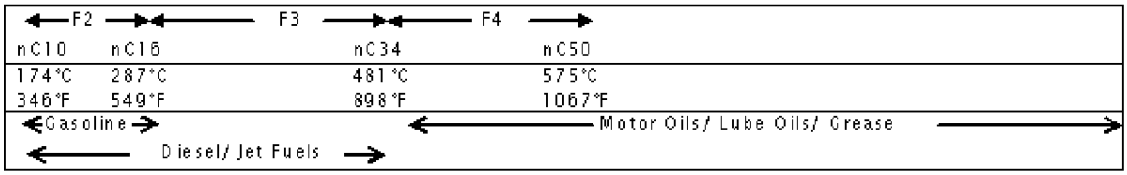
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1945016-2
Client Sample ID: ARV-4





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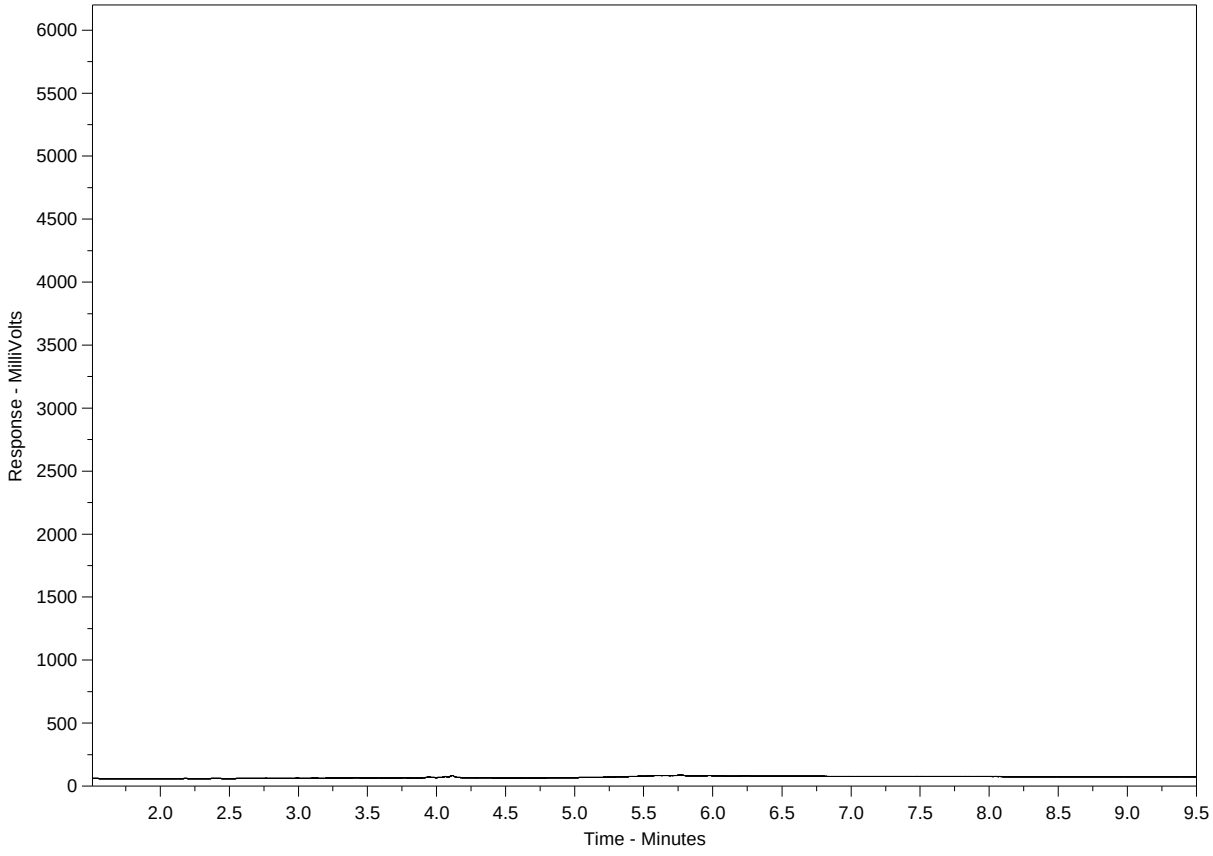
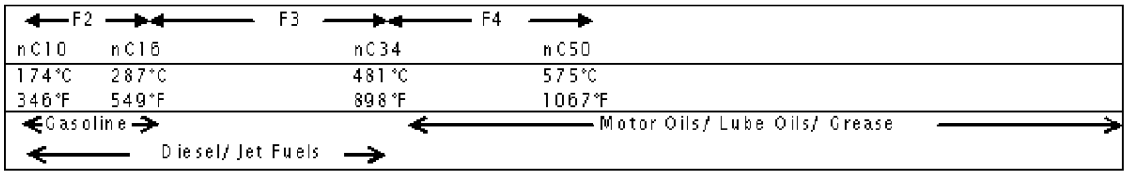
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1945016-3
Client Sample ID: ARV-5





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

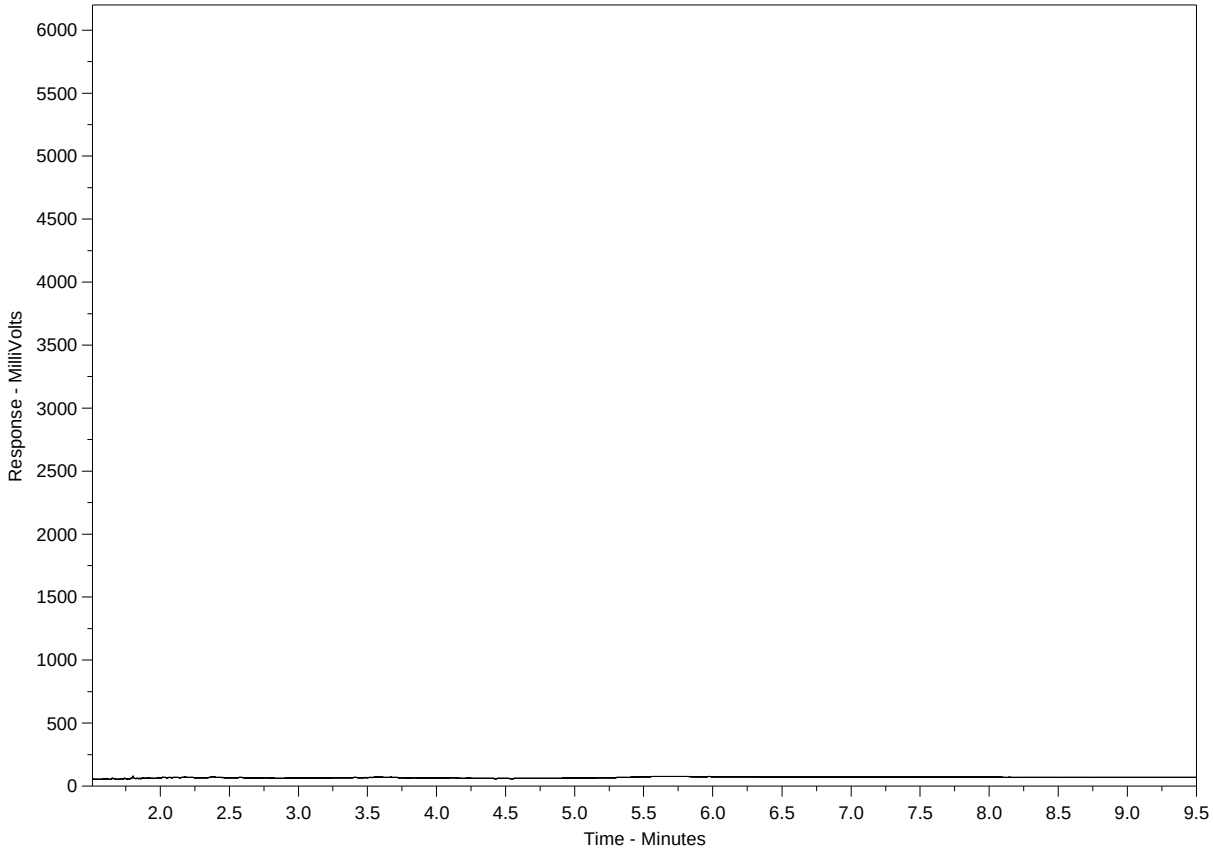
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

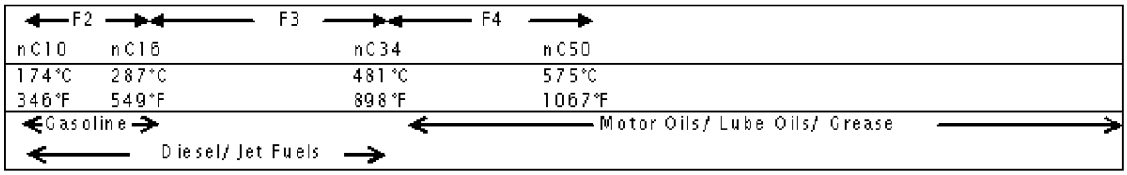
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1945016-4
Client Sample ID: ARV-6





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 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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1945016-COFC

COC Number: 14 - 503444

Page 1 of 1

L1945016

Report To		Report Format / Distribution		Turnaround Time (TAT) (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hamlet of Arviat	Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐ Regular (Standard TAT if received by 3pm)
Contact:	Steve England	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 business days if received by 3pm)
Address:	Box 150 Arviat, NU X0C-0E0	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 business days if received by 3pm)
		Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	867-857-2841	Email 1 or Fax	arviatsao@qiniq.com	Specify Date Required for E2, E or P:
		Email 2	mlusty@gov.nu.ca	

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☐ No		
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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	Routine	BOD	Nitric Acid	Bacteria	Mercury	Oil & Grease	Sulfuric Acid	Phenols	Number of Containers
	ARV-2	19-06-17	9:35	Water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	19-06-17	9:18	Water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	19-06-17	9:50	Water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	19-06-17	10:20 am	Water	✓	✓	✓	✓	✓	✓	✓	✓	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		3.4	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Laura	June 19/17		CM	20-6-17	12:30			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326a v06 Front04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

Hamlet of Arviat
ATTN: STEVE ENGLAND
PO Box 150
Arviat NU X0C 0E0

Date Received: 14-JUL-17
Report Date: 27-JUL-17 09:09 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L1958854

Project P.O. #: NOT SUBMITTED
Job Reference: HAMLET OF ARVIAT
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1958854-1 ARV-2							
Sampled By: CLIENT on 12-JUL-17 @ 08:45							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
Toluene	<0.0010		0.0010	mg/L		19-JUL-17	R3777882
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-17	R3777882
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-17	R3777882
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%		19-JUL-17	R3777882
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.15		0.10	mg/L	19-JUL-17	22-JUL-17	R3781771
F3 (C16-C34)	0.46		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
Surrogate: 2-Bromobenzotrifluoride	117.6		60-140	%	19-JUL-17	22-JUL-17	R3781771
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		26-JUL-17	
F2-Naphth	0.15		0.10	mg/L		26-JUL-17	
F3-PAH	0.46		0.25	mg/L		26-JUL-17	
Total Hydrocarbons (C6-C50)	0.62		0.38	mg/L		26-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		21-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Acenaphthene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Acenaphthylene	0.000026	EMPC	0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Anthracene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Acridine	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Benzo(a)anthracene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	25-JUL-17	26-JUL-17	R3782469
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Chrysene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	25-JUL-17	26-JUL-17	R3782469
Fluoranthene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Fluorene	<0.000020		0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Naphthalene	<0.000050		0.000050	mg/L	25-JUL-17	26-JUL-17	R3782469
Phenanthrene	<0.000050		0.000050	mg/L	25-JUL-17	26-JUL-17	R3782469
Pyrene	<0.000010		0.000010	mg/L	25-JUL-17	26-JUL-17	R3782469
Quinoline	0.000092	EMPC	0.000020	mg/L	25-JUL-17	26-JUL-17	R3782469
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	25-JUL-17	26-JUL-17	R3782469
Surrogate: Acenaphthene d10	82.5		40-130	%	25-JUL-17	26-JUL-17	R3782469
Surrogate: Acridine d9	100.6		40-130	%	25-JUL-17	26-JUL-17	R3782469
Surrogate: Chrysene d12	67.3		40-130	%	25-JUL-17	26-JUL-17	R3782469
Surrogate: Naphthalene d8	84.4		40-130	%	25-JUL-17	26-JUL-17	R3782469
Surrogate: Phenanthrene d10	76.4		40-130	%	25-JUL-17	26-JUL-17	R3782469
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	356		1.2	mg/L		19-JUL-17	
Alkalinity, Carbonate							

* 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
L1958854-1 ARV-2							
Sampled By: CLIENT on 12-JUL-17 @ 08:45							
Matrix: WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	292		1.0	mg/L		15-JUL-17	R3776864
Ammonia by colour							
Ammonia, Total (as N)	2.85		0.10	mg/L		19-JUL-17	R3778206
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	35.2		6.0	mg/L		15-JUL-17	R3779171
Carbonaceous BOD							
BOD Carbonaceous	21.2		6.0	mg/L		15-JUL-17	R3779171
Chloride in Water by IC							
Chloride (Cl)	836		10	mg/L		14-JUL-17	R3775969
Conductivity							
Conductivity	3310		1.0	umhos/cm		15-JUL-17	R3776864
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		14-JUL-17	R3773109
Hardness Calculated							
Hardness (as CaCO3)	839	HTC	0.20	mg/L		20-JUL-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-17	19-JUL-17	R3778219
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		14-JUL-17	R3775969
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		18-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	0.27		0.20	mg/L		14-JUL-17	R3775969
Oil & Grease - Gravimetric							
Oil and Grease	11.0		5.0	mg/L		24-JUL-17	R3781360
Phenol (4AAP)							
Phenols (4AAP)	0.0021		0.0010	mg/L		21-JUL-17	R3780437
Phosphorus, Total							
Phosphorus (P)-Total	0.665		0.050	mg/L		18-JUL-17	R3776714
Sulfate in Water by IC							
Sulfate (SO4)	431		6.0	mg/L		14-JUL-17	R3775969
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0283		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Arsenic (As)-Total	0.00541		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cadmium (Cd)-Total	0.0000342		0.0000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Calcium (Ca)-Total	181		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Chromium (Cr)-Total	0.00096		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cobalt (Co)-Total	0.00110		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Copper (Cu)-Total	0.00573		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Iron (Fe)-Total	0.775		0.010	mg/L	18-JUL-17	18-JUL-17	R3777311
Lead (Pb)-Total	0.000650		0.000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Magnesium (Mg)-Total	94.0		0.0050	mg/L	18-JUL-17	18-JUL-17	R3777311
Manganese (Mn)-Total	0.588		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Nickel (Ni)-Total	0.00693		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Potassium (K)-Total	78.1		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Sodium (Na)-Total	572		0.50	mg/L	18-JUL-17	19-JUL-17	R3778394
Zinc (Zn)-Total	0.0265		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Total Organic Carbon by Combustion							

* 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
L1958854-1 ARV-2							
Sampled By: CLIENT on 12-JUL-17 @ 08:45							
Matrix: WATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	54.1		2.5	mg/L		20-JUL-17	R3779075
Total Suspended Solids							
Total Suspended Solids	90		10	mg/L		17-JUL-17	R3775869
pH							
pH	7.63		0.10	pH units		15-JUL-17	R3776864
L1958854-2 ARV-4							
Sampled By: CLIENT on 12-JUL-17 @ 08:30							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
Toluene	<0.0010		0.0010	mg/L		19-JUL-17	R3777882
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-17	R3777882
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-17	R3777882
Surrogate: 4-Bromofluorobenzene (SS)	100.3		70-130	%		19-JUL-17	R3777882
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.16		0.10	mg/L	19-JUL-17	22-JUL-17	R3781771
F3 (C16-C34)	1.72		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
F4 (C34-C50)	0.64		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
Surrogate: 2-Bromobenzotrifluoride	91.0		60-140	%	19-JUL-17	22-JUL-17	R3781771
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		26-JUL-17	
F2-Naphth	0.16		0.10	mg/L		26-JUL-17	
F3-PAH	1.72		0.25	mg/L		26-JUL-17	
Total Hydrocarbons (C6-C50)	2.53		0.38	mg/L		26-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		21-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
2-Methyl Naphthalene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthylene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Anthracene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Acridine	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)anthracene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)pyrene	<0.000050	DLM	0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(b&j)fluoranthene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(k)fluoranthene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Chrysene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Dibenzo(a,h)anthracene	<0.000050	DLM	0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluoranthene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluorene	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Naphthalene	<0.00050	DLM	0.00050	mg/L	25-JUL-17	25-JUL-17	R3782469
Phenanthrene	<0.00050	DLM	0.00050	mg/L	25-JUL-17	25-JUL-17	R3782469
Pyrene	<0.00010	DLM	0.00010	mg/L	25-JUL-17	25-JUL-17	R3782469
Quinoline	<0.00020	DLM	0.00020	mg/L	25-JUL-17	25-JUL-17	R3782469

* 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
L1958854-2 ARV-4							
Sampled By: CLIENT on 12-JUL-17 @ 08:30							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
B(a)P Total Potency Equivalent	<0.000072		0.000072	mg/L	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acenaphthene d10	53.8		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acridine d9	57.9		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Chrysene d12	52.6		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Naphthalene d8	48.6		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Phenanthrene d10	49.6		40-130	%	25-JUL-17	25-JUL-17	R3782469
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	354		1.2	mg/L		19-JUL-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	290		1.0	mg/L		15-JUL-17	R3776864
Ammonia by colour							
Ammonia, Total (as N)	27.9		1.0	mg/L		19-JUL-17	R3778206
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	215		50	mg/L		15-JUL-17	R3779171
Carbonaceous BOD							
BOD Carbonaceous	154		50	mg/L		15-JUL-17	R3779171
Chloride in Water by IC							
Chloride (Cl)	167		1.0	mg/L		14-JUL-17	R3775969
Conductivity							
Conductivity	1090		1.0	umhos/cm		15-JUL-17	R3776864
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	2050	PEHR	10	MPN/100mL		14-JUL-17	R3773109
Hardness Calculated							
Hardness (as CaCO3)	117	HTC	1.3	mg/L		19-JUL-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-17	19-JUL-17	R3778219
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		14-JUL-17	R3775969
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		18-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		14-JUL-17	R3775969
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		24-JUL-17	R3781360
Phenol (4AAP)							
Phenols (4AAP)	0.0022		0.0010	mg/L		21-JUL-17	R3780437
Phosphorus, Total							
Phosphorus (P)-Total	6.88		0.25	mg/L		18-JUL-17	R3776714
Sulfate in Water by IC							
Sulfate (SO4)	3.87		0.60	mg/L		14-JUL-17	R3775969
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	1.26	DLM	0.030	mg/L	18-JUL-17	18-JUL-17	R3777311
Arsenic (As)-Total	0.0101	DLM	0.0010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cadmium (Cd)-Total	0.000266	DLM	0.000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Calcium (Ca)-Total	22.1	DLM	0.50	mg/L	18-JUL-17	18-JUL-17	R3777311
Chromium (Cr)-Total	0.0047	DLM	0.0010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cobalt (Co)-Total	0.0047	DLM	0.0010	mg/L	18-JUL-17	18-JUL-17	R3777311

* 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
L1958854-2 ARV-4							
Sampled By: CLIENT on 12-JUL-17 @ 08:30							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Copper (Cu)-Total	0.103	DLM	0.0050	mg/L	18-JUL-17	18-JUL-17	R3777311
Iron (Fe)-Total	19.6	DLM	0.10	mg/L	18-JUL-17	18-JUL-17	R3777311
Lead (Pb)-Total	0.00571	DLM	0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Magnesium (Mg)-Total	15.0	DLM	0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Manganese (Mn)-Total	0.731	DLM	0.0010	mg/L	18-JUL-17	18-JUL-17	R3777311
Nickel (Ni)-Total	0.0115	DLM	0.0050	mg/L	18-JUL-17	18-JUL-17	R3777311
Potassium (K)-Total	23.9	DLM	0.50	mg/L	18-JUL-17	18-JUL-17	R3777311
Sodium (Na)-Total	116	DLM	0.50	mg/L	18-JUL-17	18-JUL-17	R3777311
Zinc (Zn)-Total	0.061	DLM	0.030	mg/L	18-JUL-17	18-JUL-17	R3777311
Total Organic Carbon by Combustion							
Total Organic Carbon	48.5		2.5	mg/L		20-JUL-17	R3779075
Total Suspended Solids							
Total Suspended Solids	1670		50	mg/L		17-JUL-17	R3775869
pH							
pH	6.76		0.10	pH units		15-JUL-17	R3776864
L1958854-3 ARV-5							
Sampled By: CLIENT on 12-JUL-17 @ 09:00							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
Toluene	<0.0010		0.0010	mg/L		19-JUL-17	R3777882
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-17	R3777882
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-17	R3777882
Surrogate: 4-Bromofluorobenzene (SS)	108.0		70-130	%		19-JUL-17	R3777882
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	19-JUL-17	22-JUL-17	R3781771
F3 (C16-C34)	<0.25		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
Surrogate: 2-Bromobenzotrifluoride	82.7		60-140	%	19-JUL-17	22-JUL-17	R3781771
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		26-JUL-17	
F2-Naphth	<0.10		0.10	mg/L		26-JUL-17	
F3-PAH	<0.25		0.25	mg/L		26-JUL-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		26-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		21-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthylene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Anthracene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Acridine	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)anthracene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469

* 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
L1958854-3 ARV-5							
Sampled By: CLIENT on 12-JUL-17 @ 09:00							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Chrysene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluoranthene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluorene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Naphthalene	<0.000050		0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Phenanthrene	<0.000050		0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Pyrene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Quinoline	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acenaphthene d10	85.0		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acridine d9	95.4		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Chrysene d12	78.0		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Naphthalene d8	81.2		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Phenanthrene d10	81.1		40-130	%	25-JUL-17	25-JUL-17	R3782469
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	135		1.2	mg/L		19-JUL-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	110		1.0	mg/L		15-JUL-17	R3776864
Ammonia by colour							
Ammonia, Total (as N)	0.025		0.010	mg/L		19-JUL-17	R3778206
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		15-JUL-17	R3779171
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		15-JUL-17	R3779171
Chloride in Water by IC							
Chloride (Cl)	1300		10	mg/L		14-JUL-17	R3775969
Conductivity							
Conductivity	3890		1.0	umhos/cm		15-JUL-17	R3776864
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		14-JUL-17	R3773109
Hardness Calculated							
Hardness (as CaCO3)	744	HTC	0.20	mg/L		20-JUL-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-17	19-JUL-17	R3778219
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		14-JUL-17	R3775969
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		18-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLM	0.20	mg/L		14-JUL-17	R3775969
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		24-JUL-17	R3781360
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		21-JUL-17	R3780437
Phosphorus, Total							

* 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
L1958854-3 ARV-5							
Sampled By: CLIENT on 12-JUL-17 @ 09:00							
Matrix: WATER							
Phosphorus, Total							
Phosphorus (P)-Total	0.043		0.010	mg/L		18-JUL-17	R3776714
Sulfate in Water by IC							
Sulfate (SO4)	119		6.0	mg/L		14-JUL-17	R3775969
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0220		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Arsenic (As)-Total	0.00050		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Calcium (Ca)-Total	79.7		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Chromium (Cr)-Total	0.00022		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cobalt (Co)-Total	0.00021		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Copper (Cu)-Total	0.00058		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Iron (Fe)-Total	1.17		0.010	mg/L	18-JUL-17	18-JUL-17	R3777311
Lead (Pb)-Total	<0.000050		0.000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Magnesium (Mg)-Total	132		0.0050	mg/L	18-JUL-17	18-JUL-17	R3777311
Manganese (Mn)-Total	0.137		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Potassium (K)-Total	23.6		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Sodium (Na)-Total	765		0.50	mg/L	18-JUL-17	19-JUL-17	R3778394
Zinc (Zn)-Total	0.0031		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Total Organic Carbon by Combustion							
Total Organic Carbon	9.84		0.50	mg/L		20-JUL-17	R3779075
Total Suspended Solids							
Total Suspended Solids	31.0		5.0	mg/L		17-JUL-17	R3775869
pH							
pH	8.05		0.10	pH units		15-JUL-17	R3776864
L1958854-4 ARV-6							
Sampled By: CLIENT on 12-JUL-17 @ 09:10							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
Toluene	<0.0010		0.0010	mg/L		19-JUL-17	R3777882
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-17	R3777882
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-17	R3777882
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-17	R3777882
Surrogate: 4-Bromofluorobenzene (SS)	100.9		70-130	%		19-JUL-17	R3777882
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.17		0.10	mg/L	19-JUL-17	22-JUL-17	R3781771
F3 (C16-C34)	1.25		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-17	22-JUL-17	R3781771
Surrogate: 2-Bromobenzotrifluoride	86.3		60-140	%	19-JUL-17	22-JUL-17	R3781771
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		26-JUL-17	
F2-Naphth	0.17		0.10	mg/L		26-JUL-17	
F3-PAH	1.25		0.25	mg/L		26-JUL-17	
Total Hydrocarbons (C6-C50)	1.41		0.38	mg/L		26-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		21-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							

* 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
L1958854-4 ARV-6							
Sampled By: CLIENT on 12-JUL-17 @ 09:10							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000084		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
2-Methyl Naphthalene	0.000069		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Acenaphthylene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Anthracene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Acridine	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)anthracene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Chrysene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluoranthene	<0.000020		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Fluorene	0.000035		0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Naphthalene	0.000077	EMPC	0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Phenanthrene	<0.000050		0.000050	mg/L	25-JUL-17	25-JUL-17	R3782469
Pyrene	<0.000010		0.000010	mg/L	25-JUL-17	25-JUL-17	R3782469
Quinoline	0.000087	EMPC	0.000020	mg/L	25-JUL-17	25-JUL-17	R3782469
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acenaphthene d10	81.3		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Acridine d9	93.4		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Chrysene d12	80.3		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Naphthalene d8	87.0		40-130	%	25-JUL-17	25-JUL-17	R3782469
Surrogate: Phenanthrene d10	78.4		40-130	%	25-JUL-17	25-JUL-17	R3782469
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	94.6		1.2	mg/L		19-JUL-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	77.5		1.0	mg/L		15-JUL-17	R3776864
Ammonia by colour							
Ammonia, Total (as N)	0.251		0.010	mg/L		19-JUL-17	R3778206
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	2.1		2.0	mg/L		15-JUL-17	R3779171
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		15-JUL-17	R3779171
Chloride in Water by IC							
Chloride (Cl)	196		0.50	mg/L		14-JUL-17	R3775969
Conductivity							
Conductivity	737		1.0	umhos/cm		15-JUL-17	R3776864
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		14-JUL-17	R3773109
Hardness Calculated							
Hardness (as CaCO3)	209	HTC	0.20	mg/L		20-JUL-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-17	19-JUL-17	R3778219
Nitrate in Water by IC							

* 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
L1958854-4 ARV-6							
Sampled By: CLIENT on 12-JUL-17 @ 09:10							
Matrix: WATER							
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		14-JUL-17	R3775969
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		18-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		14-JUL-17	R3775969
Oil & Grease - Gravimetric							
Oil and Grease	9.5		5.0	mg/L		24-JUL-17	R3781360
Phenol (4AAP)							
Phenols (4AAP)	0.0018		0.0010	mg/L		21-JUL-17	R3780437
Phosphorus, Total							
Phosphorus (P)-Total	0.082		0.010	mg/L		18-JUL-17	R3776714
Sulfate in Water by IC							
Sulfate (SO4)	0.81		0.30	mg/L		14-JUL-17	R3775969
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.245		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Arsenic (As)-Total	0.00102		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cadmium (Cd)-Total	0.0000054		0.0000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Calcium (Ca)-Total	56.9		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Chromium (Cr)-Total	0.00130		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Cobalt (Co)-Total	0.00201		0.00010	mg/L	18-JUL-17	18-JUL-17	R3777311
Copper (Cu)-Total	0.00142		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Iron (Fe)-Total	24.7		0.010	mg/L	18-JUL-17	18-JUL-17	R3777311
Lead (Pb)-Total	0.000352		0.000050	mg/L	18-JUL-17	18-JUL-17	R3777311
Magnesium (Mg)-Total	16.1		0.0050	mg/L	18-JUL-17	18-JUL-17	R3777311
Manganese (Mn)-Total	2.78		0.0010	mg/L	18-JUL-17	19-JUL-17	R3778394
Nickel (Ni)-Total	0.00126		0.00050	mg/L	18-JUL-17	18-JUL-17	R3777311
Potassium (K)-Total	5.36		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Sodium (Na)-Total	82.7		0.050	mg/L	18-JUL-17	18-JUL-17	R3777311
Zinc (Zn)-Total	0.0075		0.0030	mg/L	18-JUL-17	18-JUL-17	R3777311
Total Organic Carbon by Combustion							
Total Organic Carbon	11.2		0.50	mg/L		20-JUL-17	R3779075
Total Suspended Solids							
Total Suspended Solids	41.0		5.0	mg/L		17-JUL-17	R3775869
pH							
pH	6.64		0.10	pH units		15-JUL-17	R3776864

* 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).
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.

ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L

ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.

ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B

Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-WP	Water	Conductivity	APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97

Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0

Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.

MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod.)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F

Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)

Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.

P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Water is spiked with a surrogate spike mix and extracted using solvent extraction techniques. Analysis is performed by GC/MS in the selected ion monitoring (SIM) mode.

PH-WP	Water	pH	APHA 4500H

The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

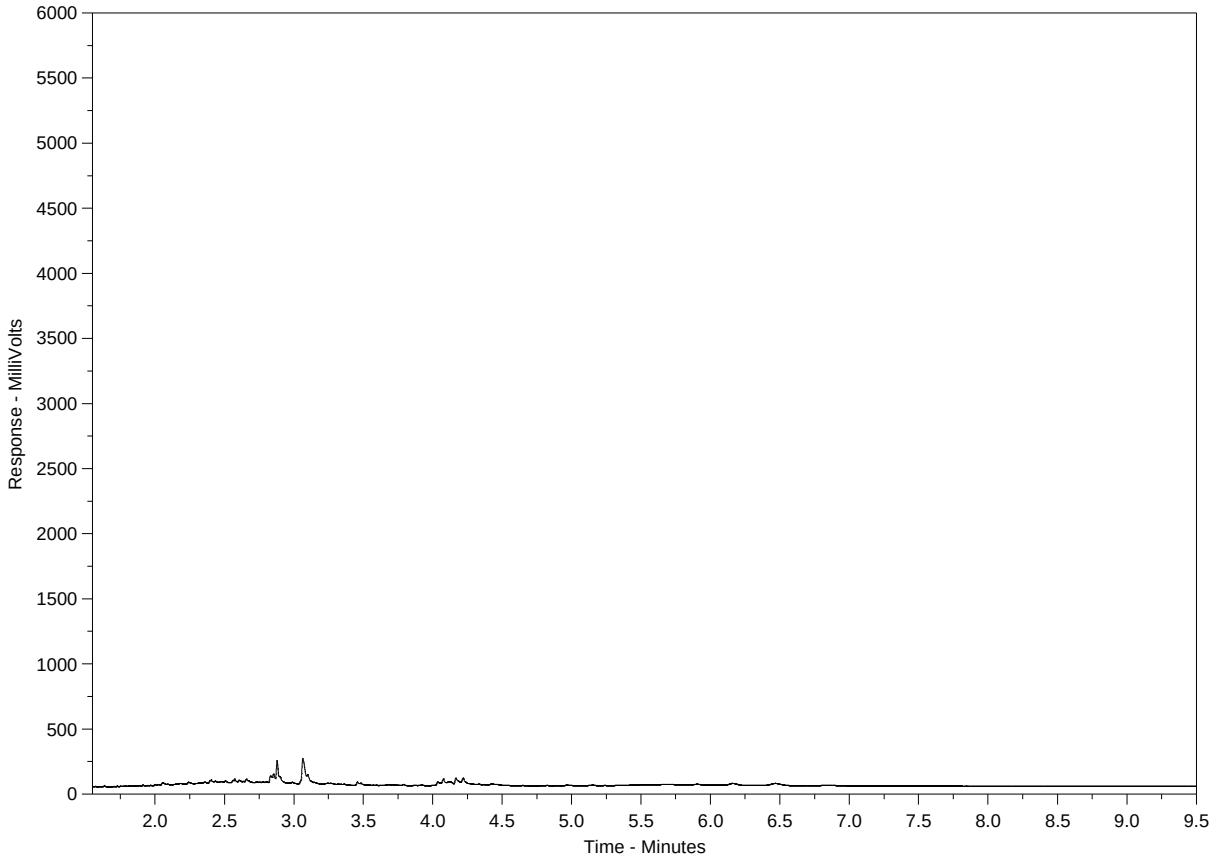
GLOSSARY OF REPORT TERMS

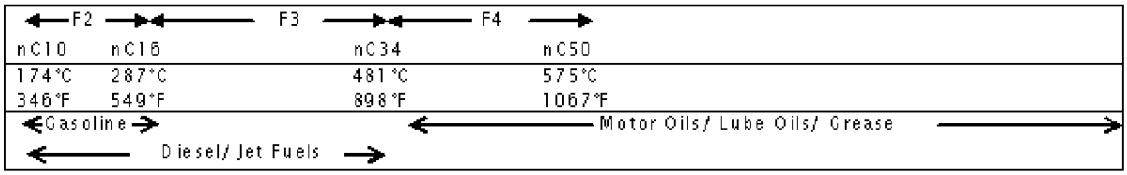
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1958854-1
Client Sample ID: ARV-2





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

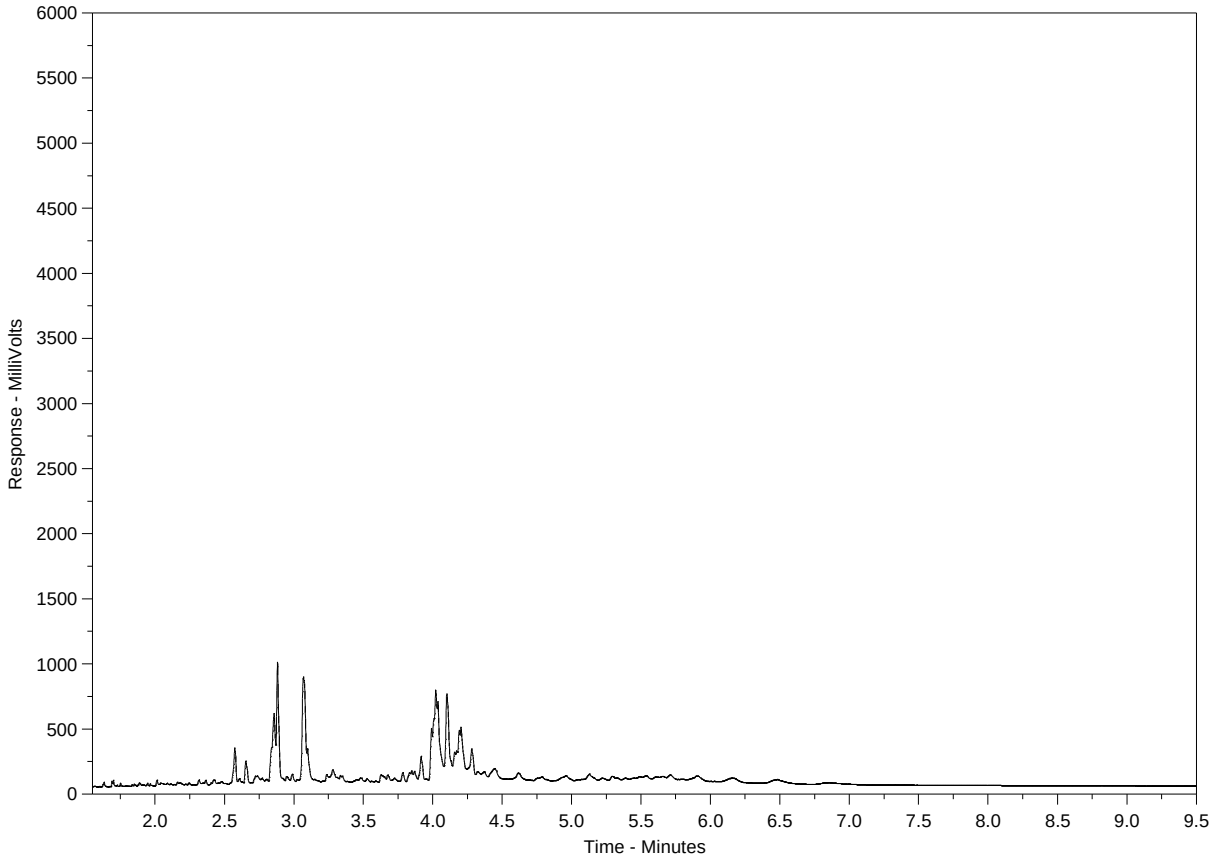
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

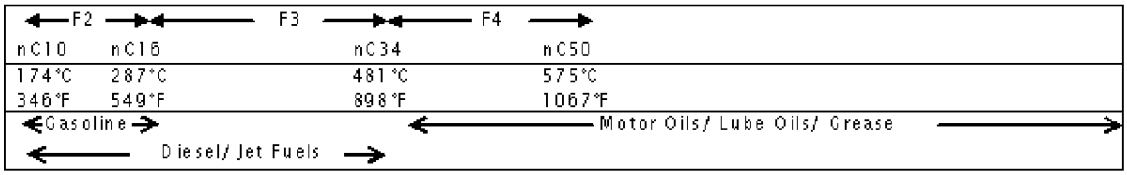
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1958854-2
Client Sample ID: ARV-4





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

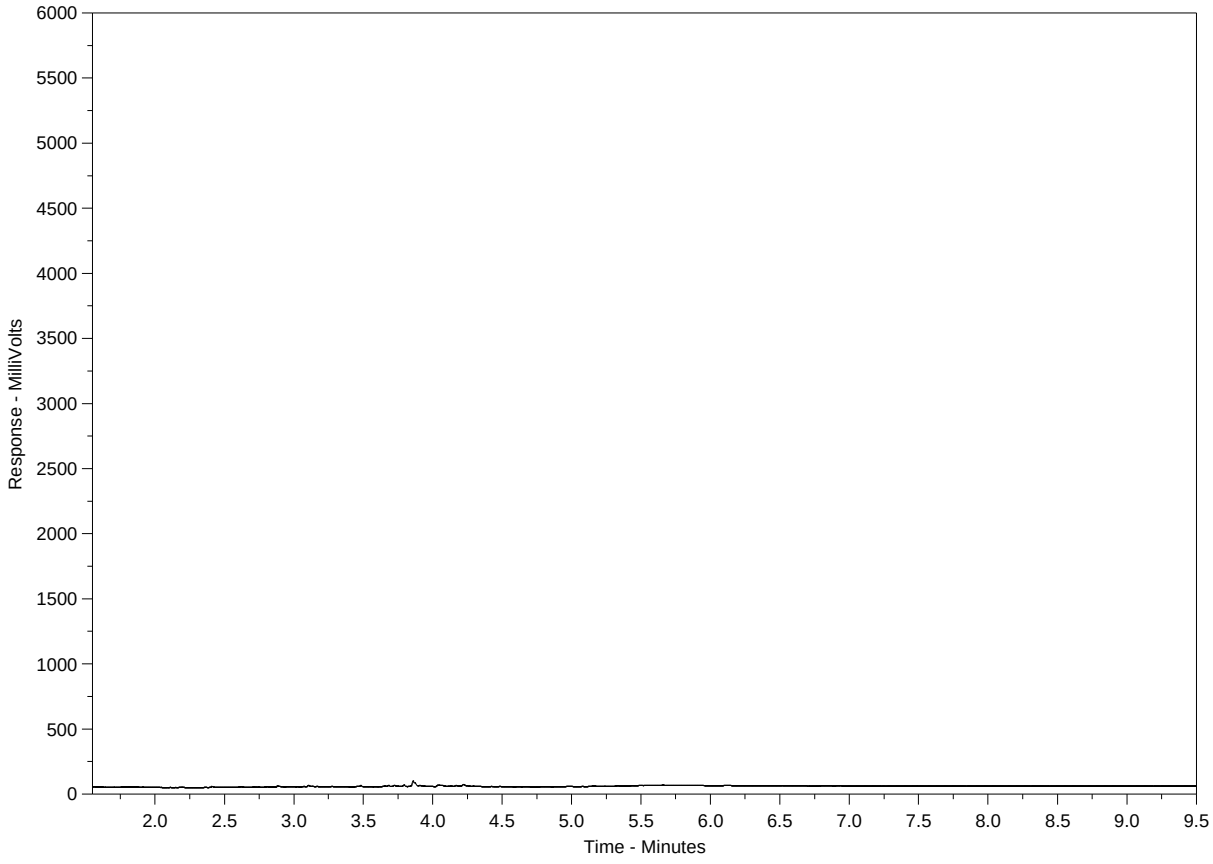
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

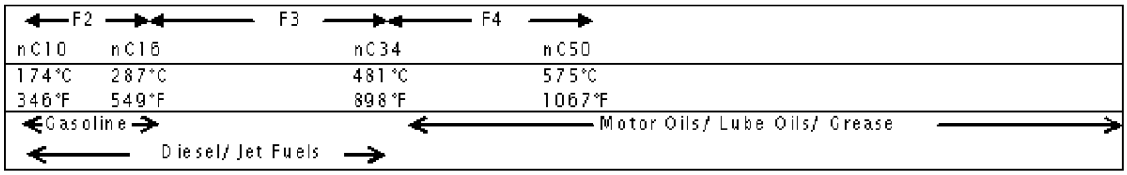
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1958854-3
Client Sample ID: ARV-5





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

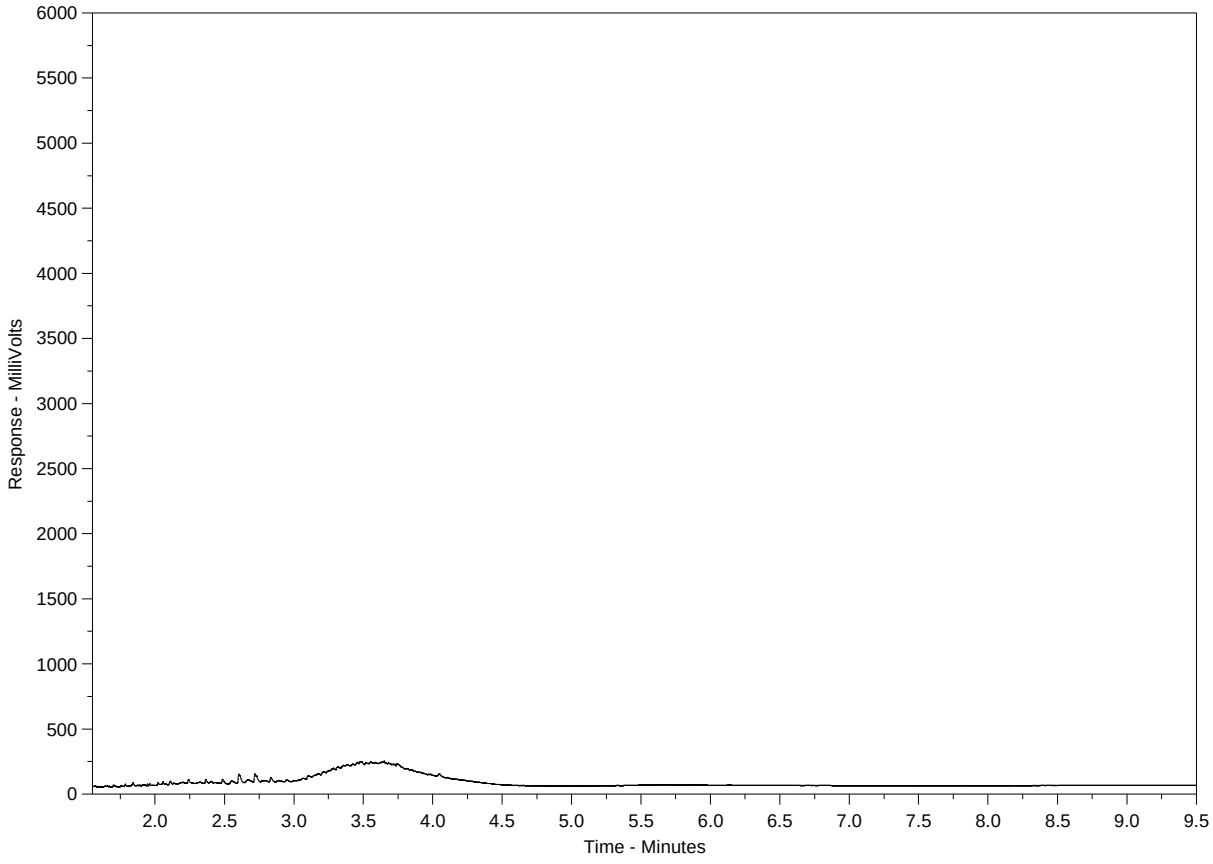
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

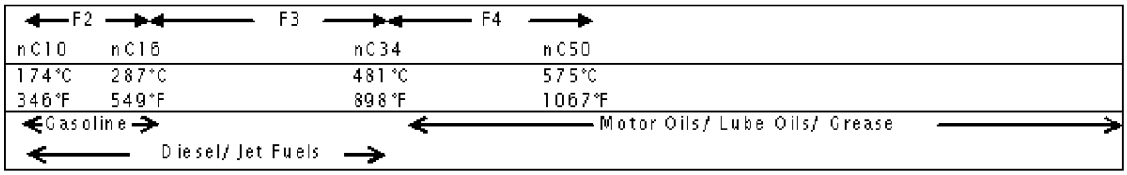
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1958854-4
Client Sample ID: ARV-6





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 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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1958854-COFC

COC Number: 14 - 503443

Page 1 of ___

L1958854

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hamlet of Arviat	Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐ Regular (Standard TAT if received by 3pm)
Contact:	Steve England	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 business days if received by 3pm)
Address:	Box 150 Arviat, NU X0C-0E0	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 business days if received by 3pm)
		Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	867-857-2841	Email 1 or Fax	arviatsao@qiniq.com	Specify Date Required for E2,E or P:
		Email 2	mlusty@gov.nu.ca	

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No		
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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	Routine	BOD	Nitric Acid	Bacteria	Mercury	Oil & Grease	Sulfuric Acid	Phenols	Number of Containers
	ARV-2	July12/17	8:45	water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	July12/17	8:30a	water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	July12/17	9am	water	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	July12/17	910m	water	✓	✓	✓	✓	✓	✓	✓	✓	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	July 12/17	9:27	AG	July 14/17	12:35			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v06 Front 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

14.5°C

Hamlet of Arviat
ATTN: STEVE ENGLAND
PO Box 150
Arviat NU X0C 0E0

Date Received: 15-AUG-17
Report Date: 28-AUG-17 09:20 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L1974918

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1974918-1 ARV-2							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
Toluene	<0.0010		0.0010	mg/L		18-AUG-17	R3806443
Ethyl benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
o-Xylene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
m+p-Xylenes	<0.00040		0.00040	mg/L		18-AUG-17	R3806443
F1 (C6-C10)	<0.10		0.10	mg/L		18-AUG-17	R3806443
Surrogate: 4-Bromofluorobenzene (SS)	97.0		70-130	%		18-AUG-17	R3806443
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.15		0.10	mg/L	16-AUG-17	18-AUG-17	R3804002
F3 (C16-C34)	0.39		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
F4 (C34-C50)	<0.25		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
Surrogate: 2-Bromobenzotrifluoride	122.1		60-140	%	16-AUG-17	18-AUG-17	R3804002
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-AUG-17	
F2-Naphth	0.15		0.10	mg/L		28-AUG-17	
F3-PAH	0.39		0.25	mg/L		28-AUG-17	
Total Hydrocarbons (C6-C50)	0.54		0.38	mg/L		28-AUG-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		22-AUG-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
2-Methyl Naphthalene	<0.000050	DLM	0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Acridine	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Chrysene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluoranthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluorene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Naphthalene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Phenanthrene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Pyrene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Quinoline	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acenaphthene d10	80.3		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acridine d9	105.7		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Chrysene d12	90.2		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Naphthalene d8	79.7		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Phenanthrene d10	78.8		40-130	%	17-AUG-17	22-AUG-17	R3807592
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	366		1.2	mg/L		16-AUG-17	
Alkalinity, Carbonate							

* 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
L1974918-1 ARV-2							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	300		1.0	mg/L		15-AUG-17	R3801408
Ammonia by colour							
Ammonia, Total (as N)	2.75		0.20	mg/L		24-AUG-17	R3808778
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	38		20	mg/L		16-AUG-17	R3804913
Carbonaceous BOD							
BOD Carbonaceous	29.5		6.0	mg/L		16-AUG-17	R3804913
Chloride in Water by IC							
Chloride (Cl)	869		10	mg/L		15-AUG-17	R3801595
Conductivity							
Conductivity	3500		1.0	umhos/cm		15-AUG-17	R3801408
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	130		10	MPN/100mL		15-AUG-17	R3801179
Hardness Calculated							
Hardness (as CaCO3)	1010	HTC	0.20	mg/L		26-AUG-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807514
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		15-AUG-17	R3801595
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		16-AUG-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLM	0.20	mg/L		15-AUG-17	R3801595
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-17	R3804941
Phenol (4AAP)							
Phenols (4AAP)	0.0016		0.0010	mg/L		21-AUG-17	R3805171
Phosphorus, Total							
Phosphorus (P)-Total	0.694		0.010	mg/L		18-AUG-17	R3803232
Sulfate in Water by IC							
Sulfate (SO4)	565		6.0	mg/L		15-AUG-17	R3801595
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0203		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Arsenic (As)-Total	0.00753		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cadmium (Cd)-Total	0.0000104		0.0000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Calcium (Ca)-Total	238		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Chromium (Cr)-Total	0.00093		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cobalt (Co)-Total	0.00095		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Copper (Cu)-Total	0.00352		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Iron (Fe)-Total	0.596		0.010	mg/L	17-AUG-17	24-AUG-17	R3812221
Lead (Pb)-Total	0.000332		0.000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Magnesium (Mg)-Total	100		0.0050	mg/L	17-AUG-17	24-AUG-17	R3812221
Manganese (Mn)-Total	0.496		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Nickel (Ni)-Total	0.00728		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Potassium (K)-Total	78.5		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Sodium (Na)-Total	567		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Zinc (Zn)-Total	0.0129		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Total Organic Carbon by Combustion							

* 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
L1974918-1 ARV-2							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Total Organic Carbon by Combustion							
Total Organic Carbon	46.3		5.0	mg/L		15-AUG-17	R3801141
Total Suspended Solids							
Total Suspended Solids	68		20	mg/L		16-AUG-17	R3802487
pH							
pH	7.40		0.10	pH units		15-AUG-17	R3801408
L1974918-2 ARV-4							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
Toluene	0.0187		0.0010	mg/L		18-AUG-17	R3806443
Ethyl benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
o-Xylene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
m+p-Xylenes	<0.00040		0.00040	mg/L		18-AUG-17	R3806443
F1 (C6-C10)	<0.10		0.10	mg/L		18-AUG-17	R3806443
Surrogate: 4-Bromofluorobenzene (SS)	96.0		70-130	%		18-AUG-17	R3806443
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.16		0.10	mg/L	16-AUG-17	18-AUG-17	R3804002
F3 (C16-C34)	2.85		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
F4 (C34-C50)	0.92		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
Surrogate: 2-Bromobenzotrifluoride	110.8		60-140	%	16-AUG-17	18-AUG-17	R3804002
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-AUG-17	
F2-Naphth	0.16		0.10	mg/L		28-AUG-17	
F3-PAH	2.85		0.25	mg/L		28-AUG-17	
Total Hydrocarbons (C6-C50)	3.93		0.38	mg/L		28-AUG-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		22-AUG-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
2-Methyl Naphthalene	<0.000050	DLM	0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Acridine	<0.00010	DLM	0.00010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Chrysene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluoranthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluorene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Naphthalene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Phenanthrene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Pyrene	<0.00020	DLM	0.00020	mg/L	17-AUG-17	22-AUG-17	R3807592
Quinoline	<0.00010	DLM	0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592

* 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
L1974918-2 ARV-4							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Polyaromatic Hydrocarbons (PAHs)							
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acenaphthene d10	80.1		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acridine d9	98.2		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Chrysene d12	88.5		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Naphthalene d8	75.0		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Phenanthrene d10	76.8		40-130	%	17-AUG-17	22-AUG-17	R3807592
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	168		1.2	mg/L		16-AUG-17	
Alkalinity, Carbonate							
Carbonate (CO3)	13.2		0.60	mg/L		16-AUG-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	159		1.0	mg/L		15-AUG-17	R3801408
Ammonia by colour							
Ammonia, Total (as N)	8.68		0.20	mg/L		24-AUG-17	R3808778
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	50		20	mg/L		16-AUG-17	R3804913
Carbonaceous BOD							
BOD Carbonaceous	43		20	mg/L		16-AUG-17	R3804913
Chloride in Water by IC							
Chloride (Cl)	146		0.50	mg/L		15-AUG-17	R3801595
Conductivity							
Conductivity	761		1.0	umhos/cm		15-AUG-17	R3801408
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	230		10	MPN/100mL		15-AUG-17	R3801179
Hardness Calculated							
Hardness (as CaCO3)	93.7	HTC	0.20	mg/L		26-AUG-17	
Mercury Total							
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807514
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		15-AUG-17	R3801595
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.182		0.070	mg/L		16-AUG-17	
Nitrite in Water by IC							
Nitrite (as N)	0.182		0.010	mg/L		15-AUG-17	R3801595
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-17	R3804941
Phenol (4AAP)							
Phenols (4AAP)	<0.010	DLM	0.010	mg/L		18-AUG-17	R3802986
Phosphorus, Total							
Phosphorus (P)-Total	8.65		0.25	mg/L		18-AUG-17	R3803232
Sulfate in Water by IC							
Sulfate (SO4)	18.6		0.30	mg/L		15-AUG-17	R3801595
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.344		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Arsenic (As)-Total	0.0110		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cadmium (Cd)-Total	0.0000669		0.0000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Calcium (Ca)-Total	18.3		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Chromium (Cr)-Total	0.00165		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cobalt (Co)-Total	0.00219		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221

* 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
L1974918-2 ARV-4							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Total Metals in Water by CRC ICPMS							
Copper (Cu)-Total	0.0438		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Iron (Fe)-Total	4.14		0.010	mg/L	17-AUG-17	24-AUG-17	R3812221
Lead (Pb)-Total	0.00213		0.000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Magnesium (Mg)-Total	11.6		0.0050	mg/L	17-AUG-17	24-AUG-17	R3812221
Manganese (Mn)-Total	0.331		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Nickel (Ni)-Total	0.00879		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Potassium (K)-Total	37.4		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Sodium (Na)-Total	112		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Zinc (Zn)-Total	0.0397		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Total Organic Carbon by Combustion							
Total Organic Carbon	175		5.0	mg/L		15-AUG-17	R3801141
Total Suspended Solids							
Total Suspended Solids	272		20	mg/L		16-AUG-17	R3802487
pH							
pH	8.82		0.10	pH units		15-AUG-17	R3801408
L1974918-3 ARV-5							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
Toluene	<0.0010		0.0010	mg/L		18-AUG-17	R3806443
Ethyl benzene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
o-Xylene	<0.00050		0.00050	mg/L		18-AUG-17	R3806443
m+p-Xylenes	<0.00040		0.00040	mg/L		18-AUG-17	R3806443
F1 (C6-C10)	<0.10		0.10	mg/L		18-AUG-17	R3806443
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%		18-AUG-17	R3806443
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	16-AUG-17	18-AUG-17	R3804002
F3 (C16-C34)	<0.25		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
F4 (C34-C50)	<0.25		0.25	mg/L	16-AUG-17	18-AUG-17	R3804002
Surrogate: 2-Bromobenzotrifluoride	134.8		60-140	%	16-AUG-17	18-AUG-17	R3804002
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-AUG-17	
F2-Naphth	<0.10		0.10	mg/L		28-AUG-17	
F3-PAH	<0.25		0.25	mg/L		28-AUG-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		28-AUG-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		22-AUG-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
2-Methyl Naphthalene	<0.000050	DLM	0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Acenaphthylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Acridine	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)anthracene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592

* 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
L1974918-3 ARV-5							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Chrysene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluoranthene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Fluorene	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Naphthalene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Phenanthrene	<0.000050		0.000050	mg/L	17-AUG-17	22-AUG-17	R3807592
Pyrene	<0.000010		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807592
Quinoline	<0.000020		0.000020	mg/L	17-AUG-17	22-AUG-17	R3807592
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acenaphthene d10	79.5		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Acridine d9	91.7		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Chrysene d12	72.7		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Naphthalene d8	71.4		40-130	%	17-AUG-17	22-AUG-17	R3807592
Surrogate: Phenanthrene d10	78.9		40-130	%	17-AUG-17	22-AUG-17	R3807592
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	135		1.2	mg/L		16-AUG-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	110		1.0	mg/L		15-AUG-17	R3801408
Ammonia by colour							
Ammonia, Total (as N)	0.025		0.010	mg/L		23-AUG-17	R3807456
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	2.3		2.0	mg/L		16-AUG-17	R3804913
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		16-AUG-17	R3804913
Chloride in Water by IC							
Chloride (Cl)	868		5.0	mg/L		15-AUG-17	R3801595
Conductivity							
Conductivity	2790		1.0	umhos/cm		15-AUG-17	R3801408
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	60		10	MPN/100mL		15-AUG-17	R3801179
Hardness Calculated							
Hardness (as CaCO3)	412	HTC	0.20	mg/L		26-AUG-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807514
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLM	0.20	mg/L		15-AUG-17	R3801595
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.22		0.22	mg/L		16-AUG-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLM	0.10	mg/L		15-AUG-17	R3801595
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-17	R3804941
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-AUG-17	R3802986
Phosphorus, Total							

* 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
L1974918-3 ARV-5							
Sampled By: CLIENT on 10-AUG-17 @ 09:25							
Matrix:							
Phosphorus, Total							
Phosphorus (P)-Total	0.135		0.010	mg/L		18-AUG-17	R3803232
Sulfate in Water by IC							
Sulfate (SO4)	39.7		3.0	mg/L		15-AUG-17	R3801595
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0744		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Arsenic (As)-Total	0.00090		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Calcium (Ca)-Total	55.1		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Chromium (Cr)-Total	0.00047		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cobalt (Co)-Total	0.00023		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Copper (Cu)-Total	<0.00050		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Iron (Fe)-Total	4.25		0.010	mg/L	17-AUG-17	24-AUG-17	R3812221
Lead (Pb)-Total	0.000164		0.000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Magnesium (Mg)-Total	66.6		0.0050	mg/L	17-AUG-17	24-AUG-17	R3812221
Manganese (Mn)-Total	0.214		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Nickel (Ni)-Total	0.00060		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Potassium (K)-Total	16.2		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Sodium (Na)-Total	415		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Total Organic Carbon by Combustion							
Total Organic Carbon	12.3		0.50	mg/L		15-AUG-17	R3801141
Total Suspended Solids							
Total Suspended Solids	32		20	mg/L		16-AUG-17	R3802487
pH							
pH	7.45		0.10	pH units		15-AUG-17	R3801408

* 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).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRQC	Refer to report remarks for information regarding this QC result.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.

ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L

ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.

ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B

Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-WP	Water	Conductivity	APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97

Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0

Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.

MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod.)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F

Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)

Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.

P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Water is spiked with a surrogate spike mix and extracted using solvent extraction techniques. Analysis is performed by GC/MS in the selected ion monitoring (SIM) mode.

PH-WP	Water	pH	APHA 4500H

The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

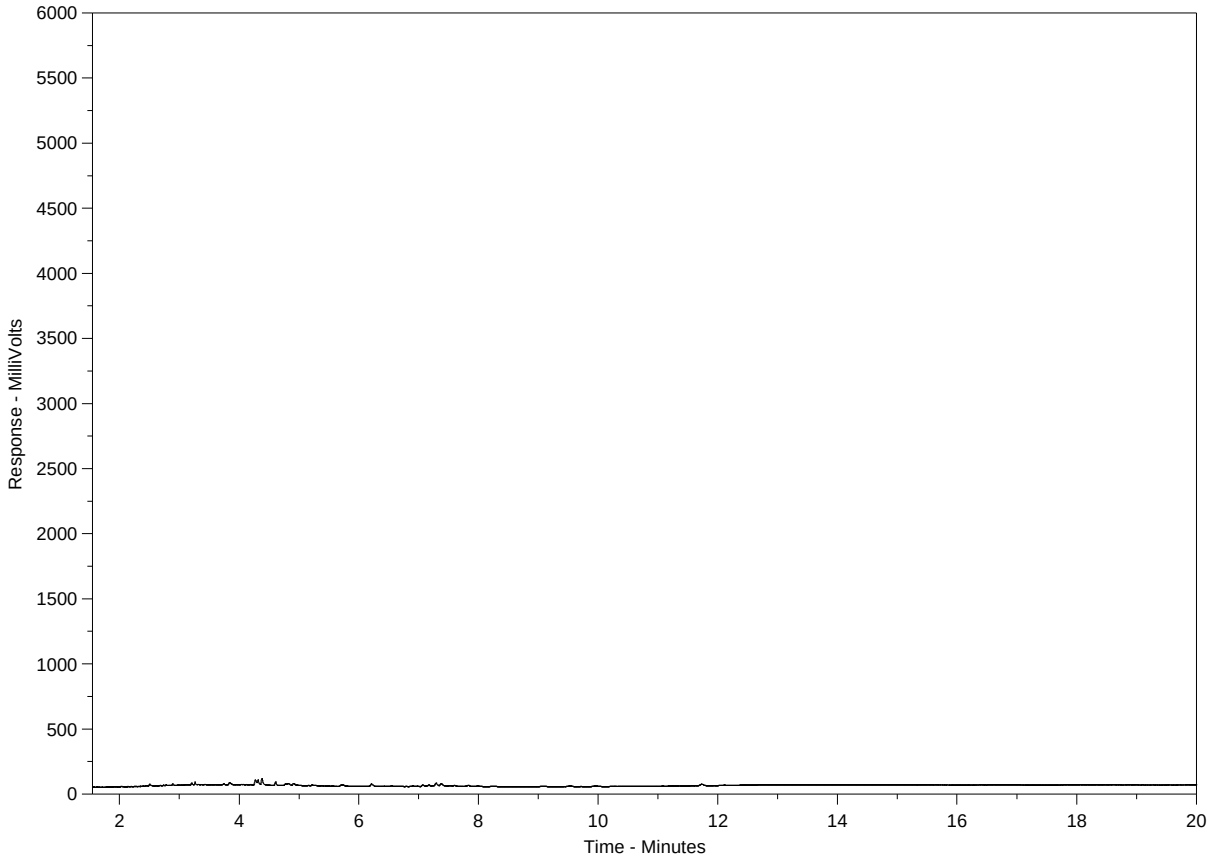
GLOSSARY OF REPORT TERMS

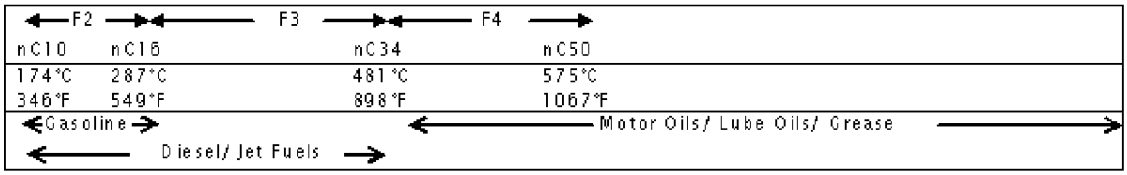
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1974918-1
Client Sample ID: ARV-2





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

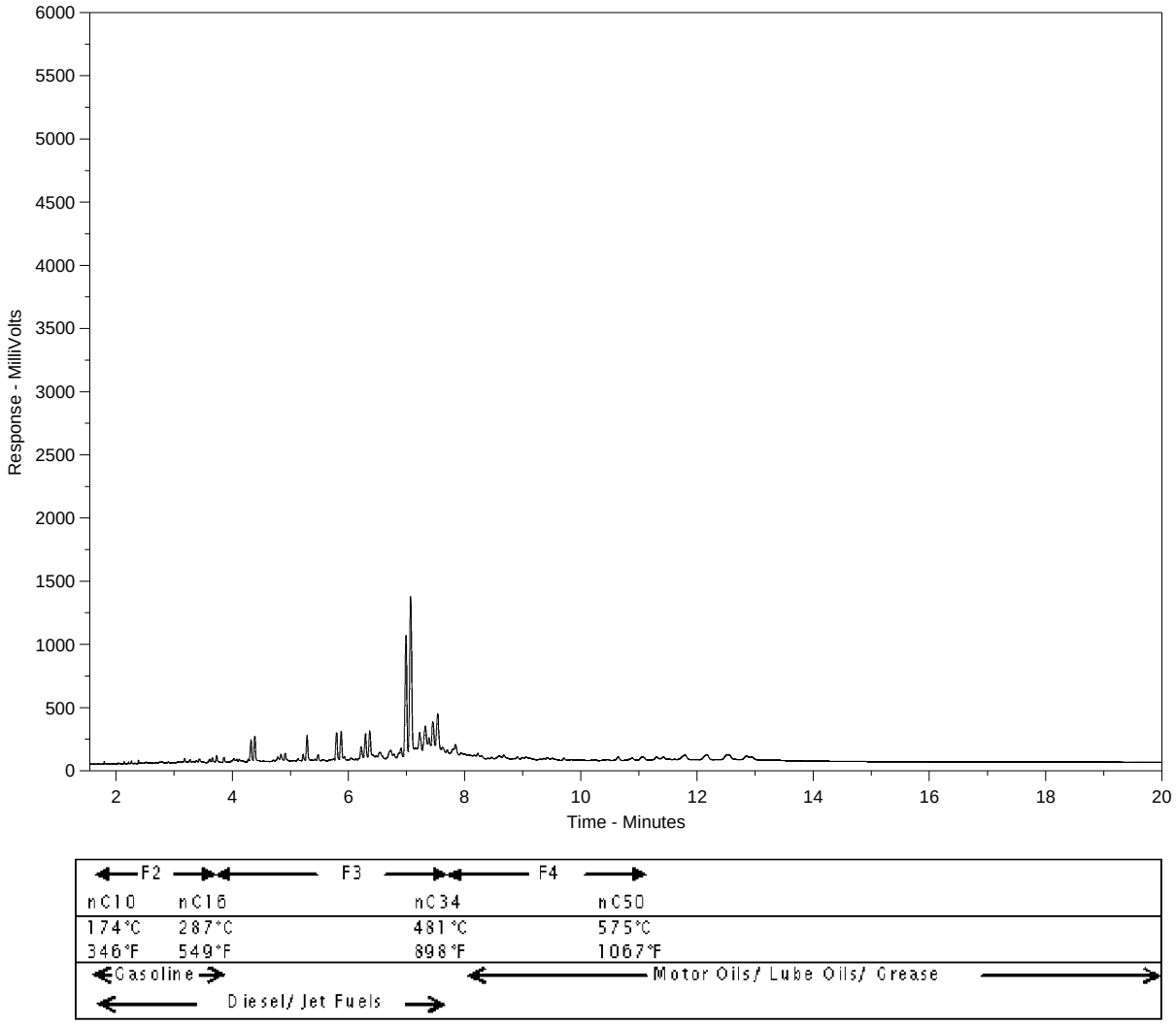
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at 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: L1974918-2
Client Sample ID: ARV-4



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

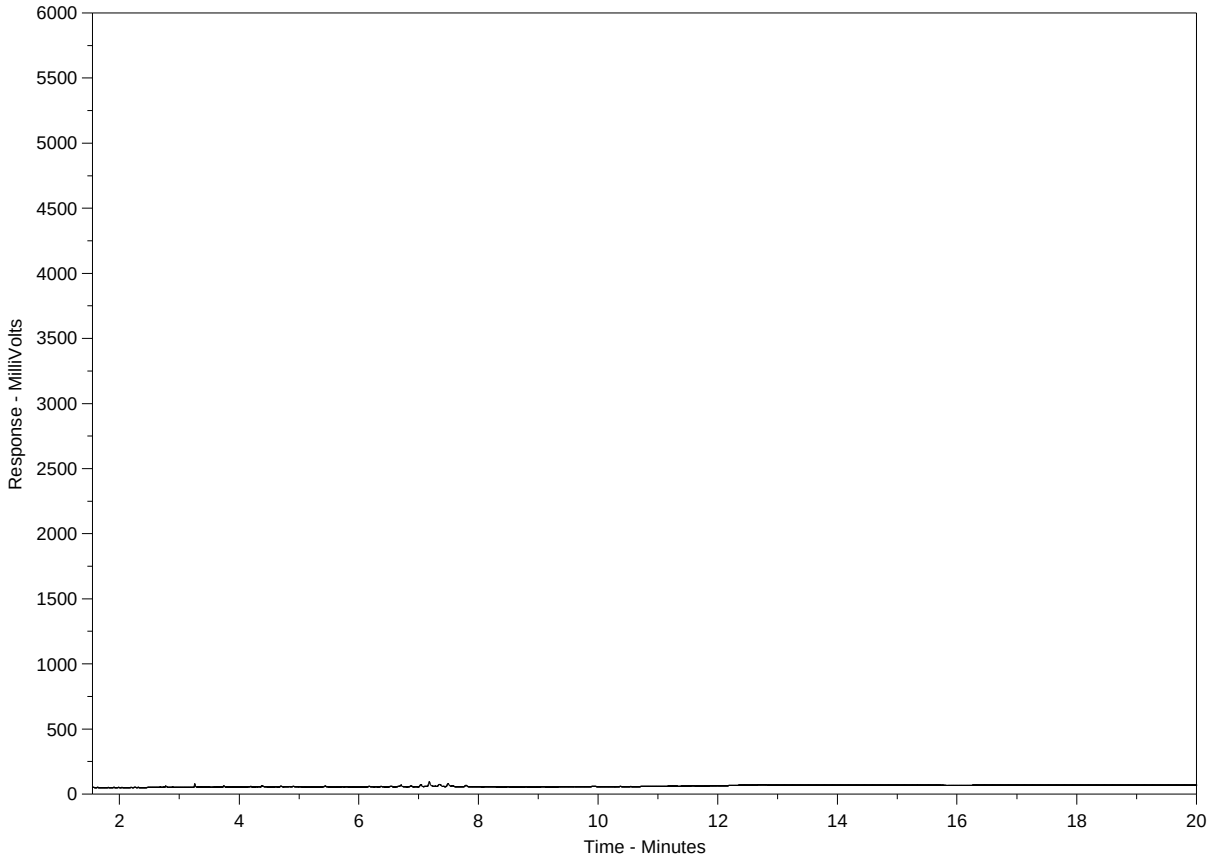
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

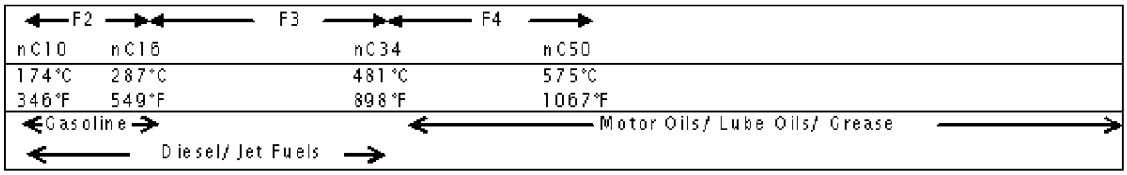
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1974918-3
Client Sample ID: ARV-5





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 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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1974918-COFC

COC Number: 14 - 503439

Page 1 of ___

L1974918

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Hamlet of Arviat	Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐ Regular (Standard TAT if received by 3pm)
Contact:	Steve England	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 business days if received by 3pm)
Address:	Box 150 Arviat, NU X0C-0E0	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 business days if received by 3pm)
		Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	867-857-2861	Email 1 or Fax	arviatsao@qiniq.com	Specify Date Required for E2,E or P:
		Email 2	mlusty@gov.nu.ca	

Invoice To	Same as Report To	☐ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report	☐ Yes ☐ No	Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Company:			Email 1 or Fax	
Contact:			Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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	Routine	BOD	Nitric Acid	Bacteria	Mercury	Oil & Grease	Sulfuric Acid	Phenols	BTX, F1	F2-F4	PAH	Number of Containers
	ARV-2	Aug10/17	9:25am		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	Aug10/17	9am		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	Aug10/17	9:51am		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	Aug10/17	NO WATER		✓	✓	✓	✓	✓	✓	✓	✓	—	—	—	

Drinking Water (DW) Samples' (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			13.5		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Aug 10/17	10 AM	CM	13-8-17	11:45			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA FM 0329e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

Hamlet of Arviat
ATTN: STEVE ENGLAND
PO Box 150
Arviat NU X0C 0E0

Date Received: 21-SEP-17
Report Date: 04-OCT-17 11:29 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L1995391

Project P.O. #: NOT SUBMITTED
Job Reference: ARVIAT
C of C Numbers:
Legal Site Desc:

Craig Riddell, B.Sc.Ag
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1995391-1 ARV-2							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		22-SEP-17	R3835402
Toluene	<0.0010		0.0010	mg/L		22-SEP-17	R3835402
Ethyl benzene	<0.00050		0.00050	mg/L		22-SEP-17	R3835402
o-Xylene	0.00082		0.00050	mg/L		22-SEP-17	R3835402
m+p-Xylenes	0.00139		0.00040	mg/L		22-SEP-17	R3835402
F1 (C6-C10)	<0.10		0.10	mg/L		22-SEP-17	R3835402
Surrogate: 4-Bromofluorobenzene (SS)	95.9		70-130	%		22-SEP-17	R3835402
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.21		0.10	mg/L	25-SEP-17	25-SEP-17	R3838933
F3 (C16-C34)	0.46		0.25	mg/L	25-SEP-17	25-SEP-17	R3838933
F4 (C34-C50)	<0.25		0.25	mg/L	25-SEP-17	25-SEP-17	R3838933
Surrogate: 2-Bromobenzotrifluoride	101.4		60-140	%	25-SEP-17	25-SEP-17	R3838933
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		02-OCT-17	
F2-Naphth	0.21		0.10	mg/L		02-OCT-17	
F3-PAH	0.46		0.25	mg/L		02-OCT-17	
Total Hydrocarbons (C6-C50)	0.67		0.38	mg/L		02-OCT-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00221		0.00064	mg/L		29-SEP-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthylene	0.000041	EMPC	0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Acridine	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(a)anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Chrysene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluoranthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluorene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Naphthalene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Phenanthrene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Quinoline	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acenaphthene d10	89.3		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acridine d9	110.7		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Chrysene d12	73.6		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Naphthalene d8	86.2		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Phenanthrene d10	83.4		40-130	%	28-SEP-17	01-OCT-17	R3843371
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	776		1.2	mg/L		26-SEP-17	
Alkalinity, Carbonate							

* 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
L1995391-1 ARV-2							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		26-SEP-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		26-SEP-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	636		1.0	mg/L		22-SEP-17	R3838056
Ammonia by colour							
Ammonia, Total (as N)	9.0		2.0	mg/L		25-SEP-17	R3837944
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	23.8		6.0	mg/L		22-SEP-17	R3839889
Carbonaceous BOD							
BOD Carbonaceous	17.1		6.0	mg/L		22-SEP-17	R3839889
Chloride in Water by IC							
Chloride (Cl)	430		5.0	mg/L		22-SEP-17	R3838328
Conductivity							
Conductivity	2410		1.0	umhos/cm		22-SEP-17	R3838056
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	20		10	MPN/100mL		21-SEP-17	R3835993
Note: Result may be biased high							
Hardness Calculated							
Hardness (as CaCO3)	1130	HTC	0.20	mg/L		02-OCT-17	
Mercury Total							
Mercury (Hg)-Total	0.0000057		0.0000050	mg/L	25-SEP-17	25-SEP-17	R3838518
Nitrate in Water by IC							
Nitrate (as N)	<0.20	DLM	0.20	mg/L		22-SEP-17	R3838328
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.22		0.22	mg/L		26-SEP-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLM	0.10	mg/L		22-SEP-17	R3838328
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		28-SEP-17	R3840262
Phenol (4AAP)							
Phenols (4AAP)	0.0042		0.0010	mg/L		28-SEP-17	R3840625
Phosphorus, Total							
Phosphorus (P)-Total	1.01		0.010	mg/L		25-SEP-17	R3837200
Sulfate in Water by IC							
Sulfate (SO4)	536		3.0	mg/L		22-SEP-17	R3838328
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0147		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272
Arsenic (As)-Total	0.00853		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Cadmium (Cd)-Total	0.0000912		0.0000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Calcium (Ca)-Total	343		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Chromium (Cr)-Total	0.00127		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Cobalt (Co)-Total	0.00098		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Copper (Cu)-Total	0.00677		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Iron (Fe)-Total	1.84		0.010	mg/L	25-SEP-17	27-SEP-17	R3840272
Lead (Pb)-Total	0.00134		0.000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Magnesium (Mg)-Total	66.9		0.0050	mg/L	25-SEP-17	27-SEP-17	R3840272
Manganese (Mn)-Total	0.804		0.0010	mg/L	25-SEP-17	29-SEP-17	R3842217
Nickel (Ni)-Total	0.00672		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Potassium (K)-Total	59.5		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Sodium (Na)-Total	307		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Zinc (Zn)-Total	0.0312		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272

* 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
L1995391-1 ARV-2							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Total Organic Carbon by Combustion							
Total Organic Carbon	37.3		0.50	mg/L		28-SEP-17	R3841020
Total Suspended Solids							
Total Suspended Solids	35.0		5.0	mg/L		26-SEP-17	R3838862
pH							
pH	7.78		0.10	pH units		22-SEP-17	R3838056
L1995391-2 ARV-4							
Sampled By: CLIENT on 19-SEP-17 @ 09:26							
Matrix:							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	237		1.2	mg/L		26-SEP-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		26-SEP-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		26-SEP-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	194		1.0	mg/L		22-SEP-17	R3838056
Ammonia by colour							
Ammonia, Total (as N)	19.4		2.0	mg/L		25-SEP-17	R3837944
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	5.6		2.0	mg/L		22-SEP-17	R3839889
Carbonaceous BOD							
BOD Carbonaceous	2.2		2.0	mg/L		22-SEP-17	R3839889
Chloride in Water by IC							
Chloride (Cl)	517		5.0	mg/L		22-SEP-17	R3838328
Conductivity							
Conductivity	1830		1.0	umhos/cm		22-SEP-17	R3838056
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	190		10	MPN/100mL		21-SEP-17	R3835993
Note: Result may be biased high							
Hardness Calculated							
Hardness (as CaCO3)	254	HTC	0.20	mg/L		28-SEP-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	25-SEP-17	25-SEP-17	R3838518
Nitrate in Water by IC							
Nitrate (as N)	1.94		0.20	mg/L		22-SEP-17	R3838328
Nitrate+Nitrite							
Nitrate and Nitrite as N	2.15		0.22	mg/L		26-SEP-17	
Nitrite in Water by IC							
Nitrite (as N)	0.21		0.10	mg/L		22-SEP-17	R3838328
Oil & Grease - Gravimetric							
Oil and Grease	5.5		5.0	mg/L		29-SEP-17	R3841172
Phenol (4AAP)							
Phenols (4AAP)	0.0033		0.0010	mg/L		28-SEP-17	R3840625
Phosphorus, Total							
Phosphorus (P)-Total	0.918		0.010	mg/L		25-SEP-17	R3837200
Sulfate in Water by IC							
Sulfate (SO4)	66.0		3.0	mg/L		22-SEP-17	R3838328
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0259		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272
Arsenic (As)-Total	0.00335		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272

* 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
L1995391-2 ARV-4							
Sampled By: CLIENT on 19-SEP-17 @ 09:26							
Matrix:							
Total Metals in Water by CRC ICPMS							
Cadmium (Cd)-Total	0.0000191		0.0000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Calcium (Ca)-Total	44.1		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Chromium (Cr)-Total	0.00038		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Cobalt (Co)-Total	0.00113		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Copper (Cu)-Total	0.00448		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Iron (Fe)-Total	1.72		0.010	mg/L	25-SEP-17	27-SEP-17	R3840272
Lead (Pb)-Total	0.000142		0.000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Magnesium (Mg)-Total	34.8		0.0050	mg/L	25-SEP-17	27-SEP-17	R3840272
Manganese (Mn)-Total	0.708		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Nickel (Ni)-Total	0.00419		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Potassium (K)-Total	24.2		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Sodium (Na)-Total	315		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Zinc (Zn)-Total	0.0051		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272
Total Organic Carbon by Combustion							
Total Organic Carbon	17.6		0.50	mg/L		28-SEP-17	R3841020
Total Suspended Solids							
Total Suspended Solids	13.0		5.0	mg/L		26-SEP-17	R3838862
pH							
pH	7.18		0.10	pH units		22-SEP-17	R3838056
L1995391-3 ARV-5							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		22-SEP-17	R3835402
Toluene	<0.0010		0.0010	mg/L		22-SEP-17	R3835402
Ethyl benzene	<0.00050		0.00050	mg/L		22-SEP-17	R3835402
o-Xylene	<0.00050		0.00050	mg/L		22-SEP-17	R3835402
m+p-Xylenes	<0.00040		0.00040	mg/L		22-SEP-17	R3835402
F1 (C6-C10)	<0.10		0.10	mg/L		22-SEP-17	R3835402
Surrogate: 4-Bromofluorobenzene (SS)	90.1		70-130	%		22-SEP-17	R3835402
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	22-SEP-17	25-SEP-17	R3838933
F3 (C16-C34)	<0.25		0.25	mg/L	22-SEP-17	25-SEP-17	R3838933
F4 (C34-C50)	<0.25		0.25	mg/L	22-SEP-17	25-SEP-17	R3838933
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	22-SEP-17	25-SEP-17	R3838933
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		02-OCT-17	
F2-Naphth	<0.10		0.10	mg/L		02-OCT-17	
F3-PAH	<0.25		0.25	mg/L		02-OCT-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		02-OCT-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-SEP-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthylene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Acridine	0.000031		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371

* 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
L1995391-3 ARV-5							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(a)anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Chrysene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluoranthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluorene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Naphthalene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Phenanthrene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Quinoline	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acenaphthene d10	96.6		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acridine d9	111.7		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Chrysene d12	54.3		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Naphthalene d8	91.0		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Phenanthrene d10	91.1		40-130	%	28-SEP-17	01-OCT-17	R3843371
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	42.5		1.2	mg/L		26-SEP-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		26-SEP-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		26-SEP-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	34.8		1.0	mg/L		22-SEP-17	R3838056
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		22-SEP-17	R3837049
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		22-SEP-17	R3839889
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		22-SEP-17	R3839889
Chloride in Water by IC							
Chloride (Cl)	277		1.0	mg/L		22-SEP-17	R3838328
Conductivity							
Conductivity	1010		1.0	umhos/cm		22-SEP-17	R3838056
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	10		10	MPN/100mL		21-SEP-17	R3835993
Note: Result may be biased high							
Hardness Calculated							
Hardness (as CaCO3)	204	HTC	0.20	mg/L		28-SEP-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	25-SEP-17	25-SEP-17	R3838518
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		22-SEP-17	R3838328
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-SEP-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		22-SEP-17	R3838328

* 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
L1995391-3 ARV-5							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		29-SEP-17	R3841172
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		28-SEP-17	R3840625
Phosphorus, Total							
Phosphorus (P)-Total	0.013		0.010	mg/L		25-SEP-17	R3837200
Sulfate in Water by IC							
Sulfate (SO4)	80.1		0.60	mg/L		22-SEP-17	R3838328
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0096		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272
Arsenic (As)-Total	0.00029		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Calcium (Ca)-Total	40.6		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Chromium (Cr)-Total	0.00014		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Copper (Cu)-Total	0.00058		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Iron (Fe)-Total	0.207		0.010	mg/L	25-SEP-17	27-SEP-17	R3840272
Lead (Pb)-Total	0.000064		0.000050	mg/L	25-SEP-17	27-SEP-17	R3840272
Magnesium (Mg)-Total	25.0		0.0050	mg/L	25-SEP-17	27-SEP-17	R3840272
Manganese (Mn)-Total	0.0322		0.00010	mg/L	25-SEP-17	27-SEP-17	R3840272
Nickel (Ni)-Total	0.00058		0.00050	mg/L	25-SEP-17	27-SEP-17	R3840272
Potassium (K)-Total	7.72		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Sodium (Na)-Total	140		0.050	mg/L	25-SEP-17	27-SEP-17	R3840272
Zinc (Zn)-Total	0.0084		0.0030	mg/L	25-SEP-17	27-SEP-17	R3840272
Total Organic Carbon by Combustion							
Total Organic Carbon	7.23		0.50	mg/L		28-SEP-17	R3841020
Total Suspended Solids							
Total Suspended Solids	5.0		5.0	mg/L		26-SEP-17	R3838862
pH							
pH	6.96		0.10	pH units		22-SEP-17	R3838056
L1995391-4 ARV-6 (PAH'S ONLY)							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Acenaphthylene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Acridine	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(a)anthracene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Chrysene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluoranthene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Fluorene	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Naphthalene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371

* 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
L1995391-4 ARV-6 (PAH'S ONLY)							
Sampled By: CLIENT on 19-SEP-17 @ 09:46							
Matrix:							
Polyaromatic Hydrocarbons (PAHs)							
Phenanthrene	<0.000050		0.000050	mg/L	28-SEP-17	01-OCT-17	R3843371
Pyrene	<0.000010		0.000010	mg/L	28-SEP-17	01-OCT-17	R3843371
Quinoline	<0.000020		0.000020	mg/L	28-SEP-17	01-OCT-17	R3843371
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acenaphthene d10	95.6		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Acridine d9	111.1		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Chrysene d12	103.3		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Naphthalene d8	86.1		40-130	%	28-SEP-17	01-OCT-17	R3843371
Surrogate: Phenanthrene d10	96.5		40-130	%	28-SEP-17	01-OCT-17	R3843371

* 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).
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.

ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L

ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION

The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.

ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B

Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.

BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP

Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.

CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-WP	Water	Conductivity	APHA 2510B

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97

Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0

Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.

MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod.)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F

Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)

Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.

P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Water is spiked with a surrogate spike mix and extracted using solvent extraction techniques. Analysis is performed by GC/MS in the selected ion monitoring (SIM) mode.

PH-WP	Water	pH	APHA 4500H

The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

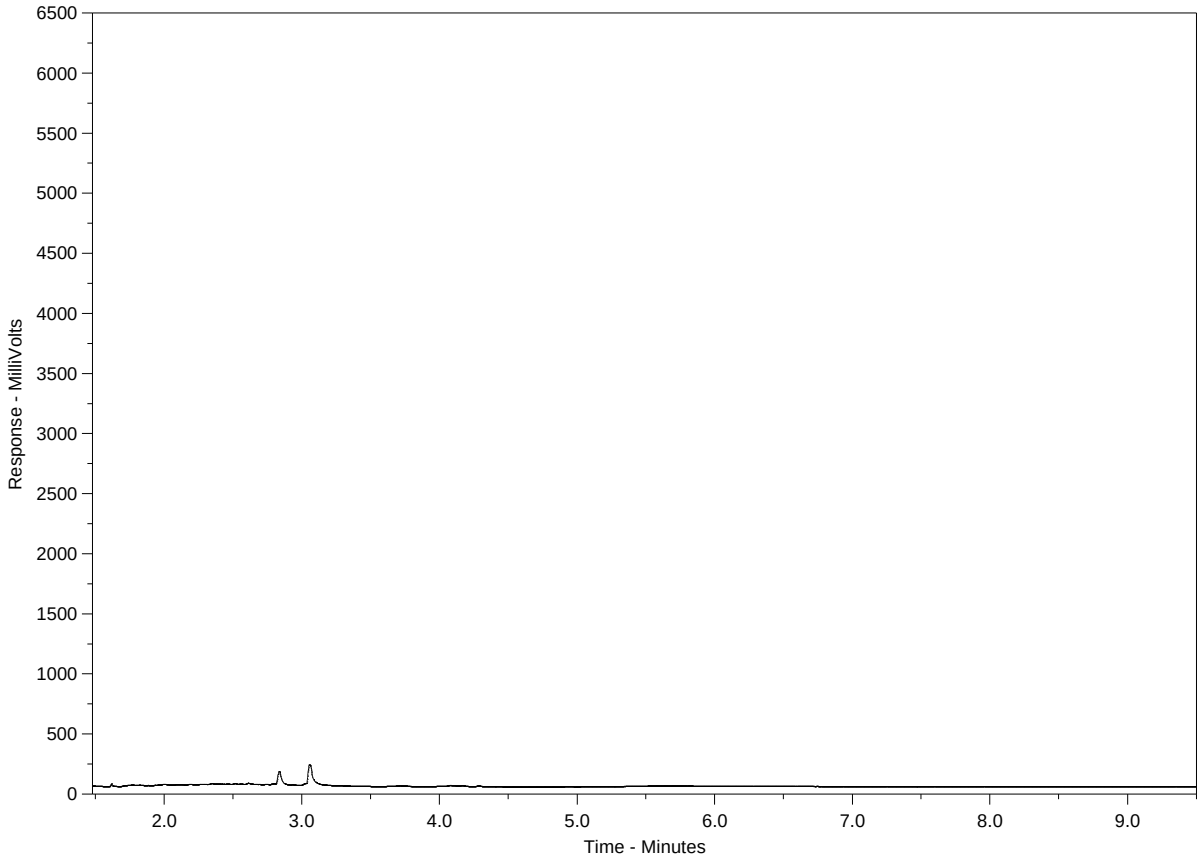
GLOSSARY OF REPORT TERMS

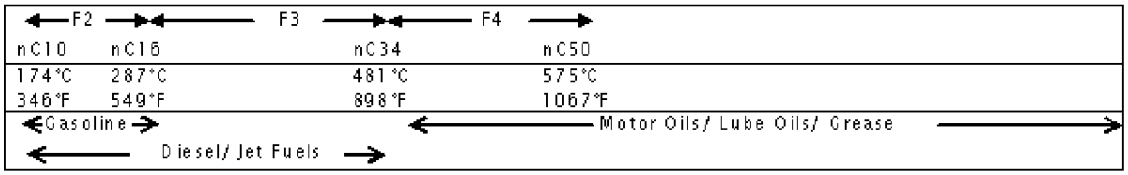
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1995391-1
Client Sample ID: ARV-2





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

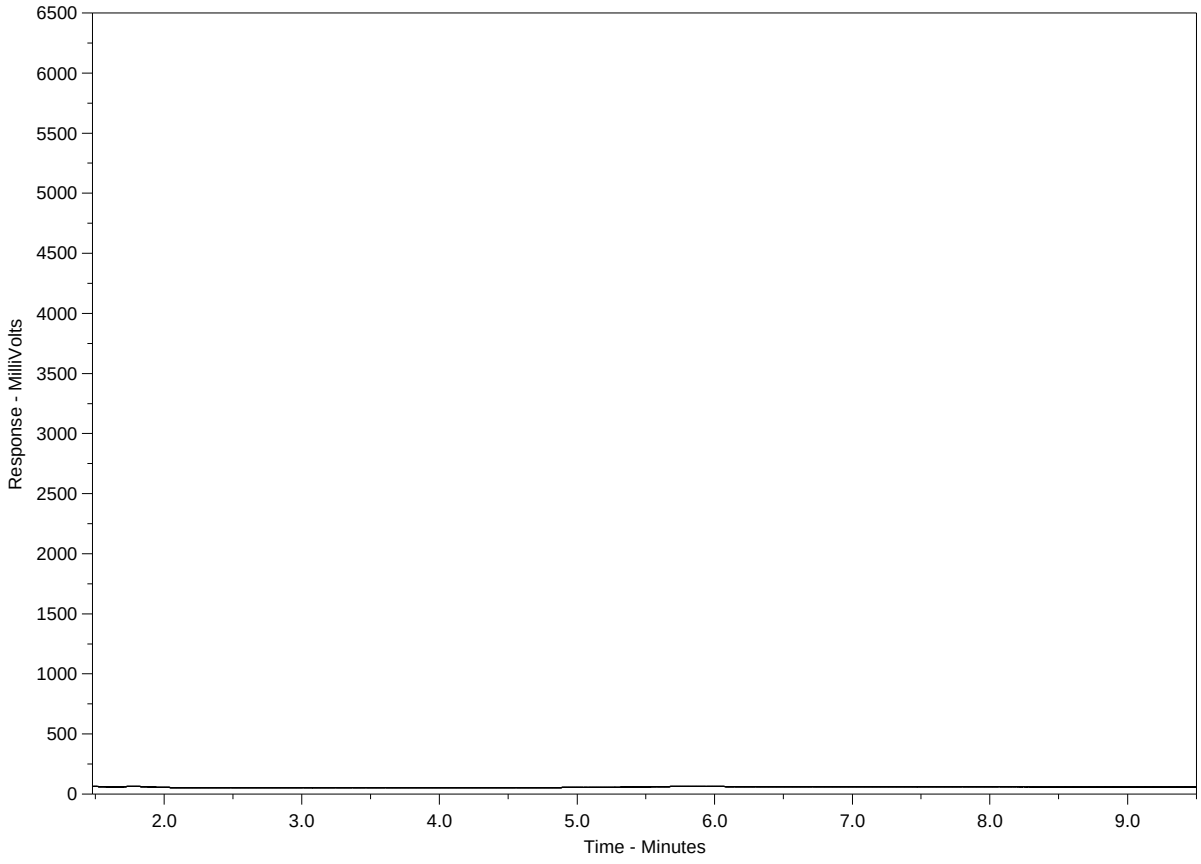
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

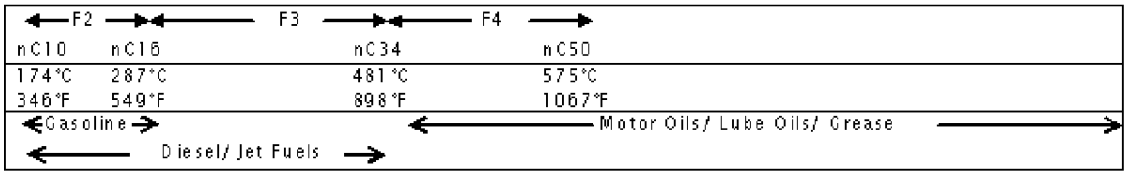
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1995391-3
Client Sample ID: ARV-5





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 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.

ALS Environmental
www.alsglobal.com

Chain of Custody

L1995391-COFC

x ALS barcode label here
(lab use only)

COC Number: 14 - 503445

Page 1 of 1

L1995391

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)	
Company:	Hamlet of Arviat	Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐	Regular (Standard TAT if received by 3pm)
Contact:	Steve England	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐	Priority (2-4 business days if received by 3pm)
Address:	Box 150 Arviat, NU X0C-0E0	☐ Criteria on Report - provide details below if box checked		E ☐	Emergency (1-2 business days if received by 3pm)
Phone:	867-857-2841	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐	Same day or weekend emergency if received by 10am – contact ALS for surcharge.
		Email 1 or Fax	arviatsao@qiniq.com	Specify Date Required for E2,E or P:	
		Email 2	mlusty@qiniq.ca		

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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	Routine	BOD	Nitric Acid	Bacteria	Mercury	Oil & Grease	Sulfuric Acid	Phenols	Number of Containers
	ARV-2	Sept 19/17	946		✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	Sept 19/17	926		✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	Sept 19/17	946		✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6 – NO WATER	~~Sept 19/17~~	~~945~~		~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐		SIF Observations	Yes	☐	No	☐
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes	☐	No	☐
Cooling Initiated	☐						

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Lauren	Sept 19/17	1021	AG	Sept 21	1345			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

Arviat Old Sewage Lagoon Sampling Results
Part D, Item 2; ARV-4 Effluent Quality limits

Parameter	Maximum Concentration of any grab sample	10-Aug-17
BOD	80 mg/L	2.8
Total Suspended Solids	100 mg/L	10
Fecal Coliforms	1 x 10^4 CFU/100mL	30
Oil & Grease	no visible sheen	5
pH	between 6 and 9	8.84

Hamlet of Arviat
ATTN: STEVE ENGLAND
PO Box 150
Arviat NU X0C 0E0

Date Received: 15-AUG-17
Report Date: 28-AUG-17 06:58 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L1974928

Project P.O. #: NOT SUBMITTED
Job Reference: HAMLET OF ARVIAT LAGOON
C of C Numbers:
Legal Site Desc:

Comments: NOTE: Frac -2 Active Sewage Lagoon - Lab Error - BOD analysis not processed.

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1974928-1 OLD SEWAGE LAGOON							
Sampled By: CLIENT on 10-AUG-17 @ 10:26							
Matrix: WW							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	69.9		1.2	mg/L		16-AUG-17	
Alkalinity, Carbonate							
Carbonate (CO3)	5.04		0.60	mg/L		16-AUG-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	65.7		1.0	mg/L		15-AUG-17	R3801408
Ammonia by colour							
Ammonia, Total (as N)	0.54		0.10	mg/L		24-AUG-17	R3808778
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	2.8		2.0	mg/L		16-AUG-17	R3804913
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		16-AUG-17	R3804913
Chloride in Water by IC							
Chloride (Cl)	57.1		0.50	mg/L		15-AUG-17	R3801595
Conductivity							
Conductivity	304		1.0	umhos/cm		15-AUG-17	R3801408
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	30		10	MPN/100mL		15-AUG-17	R3801179
Hardness Calculated							
Hardness (as CaCO3)	61.1	HTC	0.20	mg/L		26-AUG-17	
Mercury Total							
Mercury (Hg)-Total	0.0000091		0.0000050	mg/L	17-AUG-17	22-AUG-17	R3807514
Nitrate in Water by IC							
Nitrate (as N)	0.111		0.020	mg/L		15-AUG-17	R3801595
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.178		0.070	mg/L		16-AUG-17	
Nitrite in Water by IC							
Nitrite (as N)	0.067		0.010	mg/L		15-AUG-17	R3801595
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-17	R3804941
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-AUG-17	R3802986
Phosphorus, Total							
Phosphorus (P)-Total	2.03		0.050	mg/L		18-AUG-17	R3803232
Sulfate in Water by IC							
Sulfate (SO4)	1.07		0.30	mg/L		15-AUG-17	R3801595
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.233		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Arsenic (As)-Total	0.00188		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Calcium (Ca)-Total	13.9		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Chromium (Cr)-Total	0.00038		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cobalt (Co)-Total	0.00037		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Copper (Cu)-Total	0.00830		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Iron (Fe)-Total	1.73		0.010	mg/L	17-AUG-17	24-AUG-17	R3812221
Lead (Pb)-Total	0.000823		0.000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Magnesium (Mg)-Total	6.41		0.0050	mg/L	17-AUG-17	24-AUG-17	R3812221
Manganese (Mn)-Total	0.0695		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Nickel (Ni)-Total	0.00200		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221

* 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
L1974928-1 OLD SEWAGE LAGOON							
Sampled By: CLIENT on 10-AUG-17 @ 10:26							
Matrix: WW							
Total Metals in Water by CRC ICPMS							
Potassium (K)-Total	4.85		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Sodium (Na)-Total	38.1		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Zinc (Zn)-Total	0.0098		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Total Organic Carbon by Combustion							
Total Organic Carbon	165		5.0	mg/L		15-AUG-17	R3801141
Total Suspended Solids							
Total Suspended Solids	<10		10	mg/L		16-AUG-17	R3802487
pH							
pH	8.84		0.10	pH units		15-AUG-17	R3801408
L1974928-2 ACTIVE SEWAGE LAGOON							
Sampled By: CLIENT on 10-AUG-17 @ 10:38							
Matrix: WW							
Miscellaneous Parameters							
Sample Comment	See Reference Information					23-AUG-17	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	391		1.2	mg/L		16-AUG-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	321		1.0	mg/L		15-AUG-17	R3801408
Ammonia by colour							
Ammonia, Total (as N)	76		10	mg/L		24-AUG-17	R3808778
Carbonaceous BOD							
BOD Carbonaceous	182	BODP	50	mg/L		16-AUG-17	R3804913
Chloride in Water by IC							
Chloride (Cl)	59.5		1.0	mg/L		15-AUG-17	R3801595
Conductivity							
Conductivity	911		1.0	umhos/cm		15-AUG-17	R3801408
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		15-AUG-17	R3801179
Hardness Calculated							
Hardness (as CaCO3)	42.4	HTC	0.20	mg/L		26-AUG-17	
Mercury Total							
Mercury (Hg)-Total	0.000017		0.000010	mg/L	17-AUG-17	22-AUG-17	R3807514
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		15-AUG-17	R3801595
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		16-AUG-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		15-AUG-17	R3801595
Oil & Grease - Gravimetric							
Oil and Grease	43.9		5.0	mg/L		21-AUG-17	R3804941
Phenol (4AAP)							
Phenols (4AAP)	1.19	DLM	0.010	mg/L		18-AUG-17	R3802986
Phosphorus, Total							
Phosphorus (P)-Total	9.60		0.25	mg/L		18-AUG-17	R3803232
Sulfate in Water by IC							
Sulfate (SO4)	<0.60	DLM	0.60	mg/L		15-AUG-17	R3801595

* 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
L1974928-2 ACTIVE SEWAGE LAGOON							
Sampled By: CLIENT on 10-AUG-17 @ 10:38							
Matrix: WW							
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.711		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Arsenic (As)-Total	0.00069		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cadmium (Cd)-Total	0.000159		0.0000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Calcium (Ca)-Total	9.28		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Chromium (Cr)-Total	0.00157		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Cobalt (Co)-Total	0.00076		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Copper (Cu)-Total	0.144		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Iron (Fe)-Total	0.737		0.010	mg/L	17-AUG-17	24-AUG-17	R3812221
Lead (Pb)-Total	0.00224		0.000050	mg/L	17-AUG-17	24-AUG-17	R3812221
Magnesium (Mg)-Total	4.67		0.0050	mg/L	17-AUG-17	24-AUG-17	R3812221
Manganese (Mn)-Total	0.0573		0.00010	mg/L	17-AUG-17	24-AUG-17	R3812221
Nickel (Ni)-Total	0.00377		0.00050	mg/L	17-AUG-17	24-AUG-17	R3812221
Potassium (K)-Total	26.4		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Sodium (Na)-Total	54.5		0.050	mg/L	17-AUG-17	24-AUG-17	R3812221
Zinc (Zn)-Total	0.136		0.0030	mg/L	17-AUG-17	24-AUG-17	R3812221
Total Organic Carbon by Combustion							
Total Organic Carbon	15.3		0.50	mg/L		15-AUG-17	R3801141
Total Suspended Solids							
Total Suspended Solids	64		20	mg/L		16-AUG-17	R3802487
pH							
pH	7.40		0.10	pH units		15-AUG-17	R3801408

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BODP	BOD dilution results differed by more than 30% RPD. Precision of reported BOD result may be less than usual.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0
Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod.)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
RESULT-NOT-REP-WP	Misc.	Result not reported	RESULT NOT REPORTED
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			

** 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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1974928-COFC

COC Number: 15 - 571749

Page 1 of 1

L1974928

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 will apply)
Company:	Hamlet of Arviat	Select Report Format: PDF EXCEL EDD (DIGITAL)	Regular [R]
Contact:	Steve England	Quality Control (QC) Report with Report: YES NO	Priority (Business Days): 4 day [P4] / 3 day [P3] / 2 day [P2]
Phone:	867-857-2841	Compare Results to Criteria on Report - provide details below if box checked	Emergency (Business Days): Business day [E1] / Same Day, Weekend or Statutory holiday [E0]
	Company address below will appear on the final report	Select Distribution: EMAIL MAIL FAX	Date and Time Required for all E&P TATs:
Street:		Email 1 or Fax: arviatsao@qiniq.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	ARVIAT, NU	Email 2: kmlusty@gn.nu.ca	
Postal Code:	X0C 0E0	Email 3:	
Invoice To	Same as Report To: YES NO	Invoice Distribution	Analysis Request
	Copy of Invoice with Report: YES NO	Select Invoice Distribution: EMAIL MAIL FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below
Company:		Email 1 or Fax	Routine BOD Metals Mercury Bacteria Sulphur Phenol
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		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	Routine	BOD	Metals	Mercury	Bacteria	Sulphur	Phenol
	OLD SEWAGE LAGOON	Aug 10/17	10:20		✓	✓	✓	✓	✓	✓	✓
	ACTIVE SEWAGE LAGOON	Aug 10/17	10:39		✓	✓	✓	✓	✓	✓	✓

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? YES NO		Frozen / SIF Observations: Yes / No
Are samples for human drinking water use? YES NO		Ice Packs / Ice Cubes / Custody seal intact: Yes / No
		Cooling Initiated
		INITIAL COOLER TEMPERATURES °C: 13.3

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Laura	Aug 10/17	1055	CM	15-8-17	11:45			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

Hazardous Materials Spill Database

Environment Division of ENR
Scotia 6, 5102-50th Avenue; Yellowknife, NT X1A 3S8
Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: SpillNo for the year(s): 2017

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
2017053	2017-02-23	NU	KEE	Arviat	New water treatment plant	Fuel	14 L	ST<	GN
2017146	2017-05-04	NU	KEE	Arviat	700 E - 9th Ave / 385 E	Heating Fuel P-40	100 L	PL	GN
2017163	2017-05-15	NU	KEE	Arviat	Alliance Church	Heating Fuel P-50	0 L	ST<	GN
2017177	2017-05-26	NU	KEE	Arviat	QEC Arviat Power Plant	Diesel P-50	0 L	PL	GN
2017192	2017-06-01	NU	KEE	Arviat	Arviat Health Centre Fuel Tank	Heating Fuel P-50	100 L	TRU	GN
2017193	2017-06-01	NU	KEE	Arviat	John Arnalukuaq High School Fuel Tank	Heating Fuel P-50	100 L	TRU	GN
2017194	2017-06-02	NU	KEE	Arviat	Aviat Health Centre Heat Trace	Dowfrost Heat Transfer Fluid	0 L	PL	GN
2017211	2017-06-16	NU	KEE	Arviat	Arviat Paolei Hotel	Heating Fuel P-50	0 L	ST<	GN
2017227	2017-06-28	NU	KEE	Arviat	Shoreline by RCMP	Fuel	13 L	ST<	GN
2017229	2017-06-29	NU	KEE	Arviat	Arviat	Heating Fuel P-50	70 L	PL	GN
2017302	2017-08-17	NU	KEE	Arviat	Arviat, 701 1st Avenue	Heating Fuel P-50	100 L	PL	GN
2017304	2017-08-18	NU	KEE	Arviat	Aviat, Fuel deliver staging area	Gasoline	200 L	PL	GN
2017315	2017-08-29	NU	KEE	Arviat	Unit 614, 407 6th Avenue, Arviat, NT, 61 06 31.05N 94 03 55.82W	Heating Fuel P-50	300 L	PL	GN
2017422	2017-11-10	NU	KEE	Arviat	Arviat Health Center exterior fuel tank asset #113635	Heating Fuel P-50	100 L	UK	GN

Total Spills on this Report: 14

This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board

Arviat
ARV-2a

			2014			2015				2016				2017				Statistics		
Parameter	**Unit**	**DL**	**15-Jul-14**	**01-Aug-14**	**12-Sep-14**	**15-Jun-15**	**21-Jul-15**	**18-Aug-15**	**16-Sep-15**	**22-Jun-16**	**12-Jul-16**	**25-Aug-16**	**16-Sep-16**	**19-Jun-17**	**12-Jul-17**	**10-Aug-17**	**19-Sep-17**	**Min**	**Max**	**Average**
Alkalinity																				
Bicarbonate (HCO3)	mg/L	1.2	800	/	628	/	934	722	634	490	429	537	704	243	356	366	776	243	934	586.08
Carbonate (CO3)	mg/L	0.60	12	/	12	/	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.6	12	2.35
Hydroxide (OH)	mg/L	0.34	6.8	/	6.8	/	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	6.8	1.33
Total (as CaCO3)	mg/L	1.0	656	/	515	/	766	592	520	401	352	440	577	199	292	300	636	199	766	480.46
Ammonia by Colour																				
Total (as N)	mg/L	0.010	12.0	12.1	5.6	0.119	14.0	8.6	5.6	9.2	6.16	5.0	15.2	0.90	2.85	2.75	9.00	0.119	15.2	7.27
Biochemical Oxygen Demand (BOD)																				
Biochemical Oxygen Demand	mg/L	20	37.4	37.2	41.2	2.2	79	34.1	17.8	20.3	31.8	28.1	18.1	51	35.2	38	23.8	2.2	79	33.01
Carbonaceous BOD																				
BOD Carbonaceous	mg/L	20	34.1	/	20.0	/	40	14.6	9.9	17.5	21.4	25.9	15.7	46	21.2	29.5	17.1	9.9	46	24.07
Chloride in Water by IC																				
Chloride (Cl)	mg/L	10	291	/	301	/	409	380	408	414	450	399	371	422	836	869	430	291	869	460.00
Conductivity																				
Conductivity	umhos/cm	1.0	2530	2990	2330	272	3340	2910	2720	2460	2670	2790	2760	1920	3310	3500	2410	272	3500	2594.13
Fecal Coliforms																				
Fecal Coliforms	MPN/100mL	3	24000	150	23	4	36	15	9	110	23	3	9	50	10	130	20	3	24000	1639.47
Hardness Calculated																				
Hardness (as CaCO3)	mg/L	0.30	997	/	954	/	1160	1000	831	726	791	994	1040	520	839	1010	1130	520	1160	922.46
Mercury Total																				
Mercury (Hg)	mg/L	0.000200	0.000027	0.00020	0.00020	0.000020	0.00020	0.00020	0.00020	0.000029	0.000020	0.000020	0.000020	0.0000122	0.0000050	0.0000050	0.0000057	0.000005	0.0002	0.00008
Nitrate in Water by IC																				
Nitrate (as N)	mg/L	0.020	0.25	/	0.31	0.267	0.40	0.10	0.381	0.20	0.40	0.40	0.40	0.25	0.40	0.40	0.20	0.1	0.4	0.31
Nitrate + Nitrite																				
Nitrate and Nitrite as N	mg/L	0.070	0.35	0.35	0.35	0.267	0.45	0.11	0.479	0.22	0.45	0.45	0.45	0.25	0.45	0.45	0.22	0.11	0.479	0.35
Nitrite in Water by IC																				
Nitrite (as N)	mg/L	0.010	0.25	/	0.25	0.010	0.20	0.050	0.098	0.10	0.20	0.20	0.20	0.10	0.27	0.20	0.10	0.01	0.27	0.16
Oil & Grease - Gravimetric																				
Oil and Grease	mg/L	2.00	/	5.7	2.0	2.0	4.5	2.0	2.0	5.0	5.0	5.0	5.0	5.0	11.0	5.0	5.0	2	11	4.59
Phenol																				
Phenols	mg/L	0.0010	0.0055	0.0106	0.010	0.0010	0.0295	0.0049	0.0061	0.0083	0.0043	0.0074	0.0063	0.0041	0.0021	0.0016	0.0042	0.001	0.0295	0.01
Phosphorus, Total																				
Phosphorus (P)	mg/L	0.10	2.21	/	0.700	0.10	1.65	0.907	0.756	1.09	0.704	0.746	1.06	0.71	0.665	0.694	1.01	0.1	2.21	0.93
Sulfate in Water by IC																				
Sulfate (SO4)	mg/L	0.30	419	466	490	50.1	469	539	466	297	445	501	515	322	431	565	536	50.1	565	434.07
Total Metals by ICP-MS																				
Aluminium (Al)	mg/L	0.0050	0.305	/	0.050	0.0689	0.0934	0.0195	0.0105	0.0353	0.0425	0.0216	0.0264	0.0252	0.0283	0.0203	0.0147	0.0105	0.305	0.05
Arsenic (As)	mg/L	0.00020	0.00743	0.00651	0.0061	0.00038	0.00631	0.00766	0.00843	0.00396	0.00459	0.00596	0.00584	0.00403	0.00541	0.00753	0.00853	0.00038	0.00853	0.01
Cadmium (Cd)	mg/L	0.000010	0.000336	0.000074	0.00010	0.000010	0.000199	0.000068	0.000023	0.000258	0.000082	0.000061	0.000077	0.000154	0.0000342	0.0000104	0.0000912	0.00001	0.000336	0.0001
Calcium (Ca)	mg/L	0.10	323	356	298	36.1	353	307	245	217	217	297	325	133	181	238	343	36.1	356	257.94
Chromium (Cr)	mg/L	0.0010	0.0045	0.0022	0.010	0.0010	0.0027	0.0014	0.0010	0.0015	0.0018	0.0010	0.0010	0.0010	0.00096	0.00093	0.00127	0.00093	0.01	0.0022
Cobalt (Co)	mg/L	0.00020	0.00396	/	0.0020	0.00047	0.00167	0.00136	0.00094	0.00202	0.00128	0.00096	0.00087	0.00173	0.00110	0.00095	0.00098	0.00047	0.00396	0.0014
Copper (Cu)	mg/L	0.00020	0.0434	0.0184	0.0173	0.00282	0.0274	0.0110	0.00401	0.0364	0.0164	0.00779	0.00894	0.0216	0.00573	0.00352	0.00677	0.00282	0.0434	0.02
Iron (Fe)	mg/L	0.010	3.26	0.56	1.0	0.34	1.72	0.83	0.36	5.13	1.43	0.995	1.15	1.91	0.775	0.596	1.84	0.34	5.13	1.46
Lead (Pb)	mg/L	0.000090	0.0111	0.00278	0.00217	0.000174	0.00662	0.00186	0.000456	0.00546	0.00250	0.000813	0.000973	0.00319	0.000650	0.000332	0.001340	0.000174	0.0111	0.0027
Magnesium (Mg)	mg/L	0.010	45.9	59.2	51.3	3.66	67.3	57.2	53.3	44.7	60.6	61.5	56.1	45.5	94.0	100	66.9	3.66	100	57.81
Manganese (Mn)	mg/L	0.00030	1.69	/	0.724	0.197	1.28	0.787	0.380	0.964	0.547	0.550	0.917	0.348	0.588	0.496	0.804	0.197	1.69	0.73
Nickel (Ni)	mg/L	0.0020	0.0131	0.011	0.020	0.0020	0.0089	0.0085	0.0062	0.0072	0.0074	0.0074	0.0063	0.0077	0.00693	0.00728	0.00672	0.002	0.02	0.01
Potassium (K)	mg/L	0.020	56.2	68.8	55.0	4.00	75.1	66.4	53.0	41.4	67.6	55.8	48.8	44.9	78.1	78.5	59.5	4	78.5	56.87
Sodium (Na)	mg/L	0.030	233	302	248	7.84	327	282	263	248	305	281	246	259	572	567	307	7.84	572	296.52
Zinc (Zn)	mg/L	0.0020	0.64	0.0464	0.055	0.0119	0.121	0.0280	0.0087	0.143	0.0436	0.0219	0.0218	0.0782	0.0265	0.0129	0.0312	0.0087	0.64	0.086
Total Organic Carbon by Combustion																				
Total Organic Carbon	mg/L	0.50	/	/	45.9	/	58.5	67	39.2	30.3	56.0	46.3	32.9	38.4	54.1	46.3	37.3	30.3	67	46.02
Total Suspended Solids																				
Total Suspended Solids	mg/L	5.0	78.0	33.0	62.0	5.0	5.0	39.0	34.0	26.0	98	143	26	48	90	68	35	5	143	52.67
pH																				
pH	pH Units	0.10	7.79	8.05	8.01	8.00	7.98	7.90	7.99	7.57	7.56	7.89	8.00	8.11	7.63	7.40	7.78	7.4	8.11	7.84
Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00050	0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	0.0010	/	/	/	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	/	0.0010	0.0010	0.0010	0.0010	0.001	0.001	0.001
Ethyl Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00050	0.0005	0.0005	0.0005
o-Xylene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00082	0.0005	0.00082	0.0005
F1 (C6-C10)	mg/L	0.10	0.10	/	/	/	0.10	0.10	0.10	0.10	0.10	0.10	/	0.10	0.10	0.10	0.10	0.1	0.1	0.10
F2 (C10-C16)	mg/L	0.25	0.50	/	/	/	0.38	0.25	0.25	0.17	0.17	0.13	/	0.10	0.15	0.15	0.21	0.1	0.5	0.22
F3 (C16-C34)	mg/L	0.25	0.52	/	/	/	0.69	0.58	0.47	0.37	0.47	0.47	/	0.25	0.46	0.39	0.46	0.25	0.69	0.47
F4 (C34-C50)	mg/L	0.25	0.50	/	/	/	0.25	0.30	0.25	0.25	0.25	0.25	/	0.25	0.25	0.25	0.25	0.25	0.5	0.28
Total Hydrocarbons (C6-C50)	mg/L	0.44	0.87	/	/	/	1.07	0.88	0.47	0.54	0.65	0.60	/	0.38	0.62	0.54	0.67	0.38	1.07	0.66

Arviat
ARV-4

			2014			2015				2016				2017				Statistics		
Parameter	**Unit**	**DL**	**15-Jul-14**	**03-Aug-14**	**12-Sep-14**	**15-Jun-15**	**21-Jul-15**	**18-Aug-15**	**16-Sep-15**	**22-Jun-16**	**12-Jul-16**	**25-Aug-16**	**16-Sep-16**	**19-Jun-17**	**12-Jul-17**	**10-Aug-17**	**19-Sep-17**	**Min**	**Max**	**Average**
Alkalinity																				
Bicarbonate (HCO3)	mg/L	1.2	332	/	82	/	205	202	227	203	238	206	192	224	354	168	237	82.00	354.00	220.77
Carbonate (CO3)	mg/L	0.60	12	/	12	/	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	13.2	0.6	0.60	13.20	3.32
Hydroxide (OH)	mg/L	0.34	6.80	/	6.80	/	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	6.80	1.33
Total (as CaCO3)	mg/L	1.0	272	/	67	/	168	166	186	167	195	169	157	183	290	159	194	67.00	290.00	182.54
Ammonia by Colour																				
Total (as N)	mg/L	0.20	39.9	9.4	12.5	37.8	13.6	14.8	15.6	17.0	25.2	17.0	16.7	19.1	27.9	8.68	19.40	8.68	39.90	19.64
Biochemical Oxygen Demand (BOD)																				
Biochemical Oxygen Demand	mg/L	20	28.4	50.1	69.1	67	30.2	112	7.7	15.4	34.6	6.0	6.3	27.2	215	50	5.6	5.60	215.00	48.31
Carbonaceous BOD																				
BOD Carbonaceous	mg/L	20	17.0	/	40.2	/	16.1	77	2.0	14.0	20.6	2.4	3.5	21.9	154	43	2.2	2.00	154.00	31.84
Chloride in Water by IC																				
Chloride (Cl)	mg/L	10	83.5	/	183	/	161	233	300	188	291	381	318	146	167	146	517	83.50	517.00	239.58
Conductivity																				
Conductivity	umhos/cm	1.0	868	570	750	809	903	1100	1350	968	1370	1640	1360	817	1090	761	1830	570.00	1830.00	1079.07
Fecal Coliforms																				
Fecal Coliforms	MPN/100mL	3	9300	4	640	24000	930	300	150	93	430	93	240	990	2050	230	190	4.00	24000.00	2642.67
Hardness Calculated																				
Hardness (as CaCO3)	mg/L	0.30	88.2	/	81.2	/	114	158	187	124	174	204	142	87.6	117	93.7	254	81.20	254.00	140.36
Mercury Total																				
Mercury (Hg)	mg/L	0.00020	0.000020	0.0002	0.00020	0.00020	0.00040	0.00020	0.00020	0.000020	0.00020	0.000020	0.000020	0.0000052	0.0000050	0.000050	0.000005	0.000005	0.00040	0.00012
Nitrate in Water by IC																				
Nitrate (as N)	mg/L	0.020	0.502	/	0.563	0.049	0.040	0.378	0.569	0.10	0.10	0.41	0.48	0.494	0.040	0.020	1.940	0.02	1.94	0.41
Nitrate + Nitrite																				
Nitrate and Nitrite as N	mg/L	0.070	0.868	1.44	0.859	0.070	0.070	0.416	0.594	0.11	0.11	0.47	0.48	0.540	0.070	0.182	2.15	0.07	2.15	0.56
Nitrite in Water by IC																				
Nitrite (as N)	mg/L	0.010	0.367	/	0.296	0.015	0.020	0.037	0.025	0.050	0.050	0.061	0.050	0.047	0.020	0.182	0.21	0.02	0.37	0.102
Oil & Grease - Gravimetric																				
Oil and Grease	mg/L	2.0	0.0350	2.0	2.0	2.0	2.0	18.5	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.5	0.04	18.50	4.60
Phenol																				
Phenols	mg/L	0.0010	0.0350	0.0050	0.0010	0.0018	0.0054	0.0031	0.0040	0.0015	0.0018	0.0052	0.0045	0.0040	0.022	0.010	0.003	0.00	0.04	0.007
Phosphorus, Total																				
Phosphorus (P)	mg/L	0.10	9.55	/	6.00	5.63	6.60	3.32	4.81	5.15	4.60	4.12	2.18	3.91	6.88	8.65	0.92	0.92	9.55	5.17
Sulfate in Water by IC																				
Sulfate (SO4)	mg/L	6.0	5.15	2.18	4.98	8.97	5.60	10.40	27.2	7.2	14.6	21.6	26.7	8.78	3.87	18.6	66	2.18	66.00	15.46
Total Metals by ICP-MS																				
Aluminium (Al)	mg/L	0.0050	0.169	/	0.211	0.0934	0.128	1.18	0.255	0.0818	0.138	0.0436	0.0375	0.104	1.26	0.344	0.0259	0.03	1.26	0.29
Arsenic (As)	mg/L	0.00020	0.00627	0.00844	0.00789	0.00433	0.00523	0.00870	0.00725	0.00647	0.00665	0.00443	0.00364	0.00590	0.0101	0.0110	0.0034	0.00	0.01	0.00664
Cadmium (Cd)	mg/L	0.000010	0.000070	0.000079	0.000088	0.000147	0.000048	0.000214	0.000073	0.000027	0.000059	0.000010	0.000014	0.000052	0.000266	0.0000669	0.0000191	0.00	0.00	0.00008
Calcium (Ca)	mg/L	0.10	20.7	17	16.6	18.5	20.8	27.9	36.6	23.1	31.5	36.0	23.9	15.8	22.1	18.3	44.1	15.80	44.10	24.86
Chromium (Cr)	mg/L	0.0010	0.0013	/	0.0013	0.0011	0.0010	0.0037	0.0013	0.0010	0.0010	0.0010	0.0010	0.0010	0.0047	0.00165	0.00038	0.00	0.00	0.0015
Cobalt (Co)	mg/L	0.00020	0.00234	/	0.00204	0.00323	0.00231	0.00423	0.00230	0.00286	0.00286	0.00255	0.00118	0.00256	0.0047	0.00219	0.00113	0.00	0.00	0.0026
Copper (Cu)	mg/L	0.00020	0.0437	0.044	0.0283	0.0608	0.0190	0.0601	0.0180	0.00843	0.0213	0.00309	0.00403	0.0213	0.103	0.0438	0.00448	0.00	0.10	0.032
Iron (Fe)	mg/L	0.010	3.22	4.56	3.47	2.59	3.91	13.4	13.1	4.04	4.80	2.21	1.59	3.51	19.6	4.14	1.72	1.59	19.60	5.72
Lead (Pb)	mg/L	0.000090	0.00162	0.0015	0.00159	0.00136	0.00251	0.00452	0.00161	0.000452	0.000972	0.000151	0.000188	0.000993	0.00571	0.00213	0.000142	0.00	0.01	0.0017
Magnesium (Mg)	mg/L	0.010	8.88	8.85	9.68	11.3	15.1	21.3	23.2	16.1	23.1	27.7	20.1	11.7	15.0	11.6	34.8	8.85	34.80	17.23
Manganese (Mn)	mg/L	0.00030	0.245	/	0.279	0.294	0.449	0.891	0.842	0.550	0.622	0.817	0.451	0.324	0.731	0.331	0.708	0.25	0.89	0.54
Nickel (Ni)	mg/L	0.0020	0.0084	0.009	0.0074	0.0076	0.0061	0.0097	0.0063	0.0067	0.0076	0.0071	0.0041	0.0072	0.0115	0.00879	0.00419	0.00	0.01	0.007
Potassium (K)	mg/L	0.020	25.3	28.1	23.4	20.6	18.6	19.6	19.3	21.3	27.3	25.3	19.4	19.6	23.9	37.4	24.2	18.60	37.40	23.55
Sodium (Na)	mg/L	0.030	66.5	73.9	76.2	66.8	103	135	156	111	175	239	181	96.2	116	112	315	66.50	315.00	134.84
Zinc (Zn)	mg/L	0.0020	0.0383	0.0402	0.0214	0.0322	0.0173	0.0554	0.0141	0.0054	0.0141	0.0023	0.0027	0.0115	0.061	0.0397	0.0051	0.00	0.06	0.024
Total Organic Carbon by Combustion																				
Total Organic Carbon	mg/L	0.50	/	/	89.2	/	50.0	26.3	23.5	26.0	37.5	20.0	18.0	34.7	48.5	175	17.6	17.60	175.00	47.19
Total Suspended Solids																				
Total Suspended Solids	mg/L	13	52.0	167	156	68.0	20.0	67.0	19.0	30.0	73	20	10	28	1670	272	13	10.00	1670.00	177.67
pH																				
pH	pH Units	0.10	7.51	8.96	6.77	8.11	7.35	7.22	7.50	7.16	7.24	7.32	7.41	7.49	6.76	8.82	7.18	6.76	8.96	7.52
Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	/	0.00050	/	0.00050	/	0.00050	0.00050	0.00050		0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	0.0010	/	/	/	0.0010	0.0029	/	0.0010	/	0.0010	/	0.0010	0.0010	0.0187		0.001	0.019	0.0035
Ethyl Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	/	0.00050	/	0.00050	/	0.00050	0.00050	0.00050		0.0005	0.0005	0.0005
o-Xylene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	/	0.00050	/	0.00050	/	0.00050	0.00050	0.00050		0.0005	0.0005	0.0005
F1 (C6-C10)	mg/L	0.10	0.1	/	/	/	0.10	0.10	/	0.10	/	0.10	/	0.10	0.10	0.10		0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	0.5	/	/	/	0.25	0.25	/	0.10	/	0.10	/	0.10	0.16	0.16		0.10	0.50	0.20
F3 (C16-C34)	mg/L	0.25	4.09	/	/	/	0.71	0.65	/	0.28	/	0.25	/	0.34	1.72	2.85		0.25	4.09	1.36
F4 (C34-C50)	mg/L	0.25	1.44	/	/	/	0.31	0.33	/	0.25	/	0.25	/	0.25	0.64	0.92		0.25	1.44	0.55
Total Hydrocarbons (C6-C50)	mg/L	0.44	5.53	/	/	/	1.02	0.98	/	0.38	/	0.38	/	0.38	2.53	3.93		0.38	5.53	1.89

Arviat
ARV-5

			2014			2015				2016				2017				Statistics		
Parameter	**Unit**	**DL**	**15-Jul-14**	**01-Aug-14**	**12-Sep-14**	**15-Jun-15**	**21-Jul-15**	**18-Aug-15**	**16-Sep-15**	**22-Jun-16**	**12-Jul-16**	**25-Aug-16**	**16-Sep-16**	**19-Jun-17**	**12-Jul-17**	**10-Aug-17**	**19-Sep-17**	**Min**	**Max**	**Average**
Alkalinity																				
Bicarbonate (HCO3)	mg/L	1.2	50	/	93	/	93.9	133	87.0	38.4	73.2	107	78.2	78.7	135	135	42.5	38.40	135.00	88.07
Carbonate (CO3)	mg/L	0.60	12.00	/	12.00	/	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	12.00	2.35
Hydroxide (OH)	mg/L	0.34	6.80	/	6.80	/	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	6.80	1.33
Total (as CaCO3)	mg/L	1.0	41	/	76	/	77.0	109	71.3	31.5	60.0	87.7	64.1	64.5	110	110	34.8	31.50	110.00	72.07
Ammonia by Colour																				
Total (as N)	mg/L	0.20	0.085	0.01	0.01	0.015	0.021	0.037	0.020	0.01	0.029	0.013	0.054	0.020	0.025	0.025	0.010	0.01	0.09	0.03
Biochemical Oxygen Demand (BOD)																				
Biochemical Oxygen Demand	mg/L	6.0	6.0	6.0	6.0	2.0	2.0	2.0	2.0	2.3	3.1	2.0	3.0	2.0	2.0	2.3	2	2.00	6.00	2.98
Carbonaceous BOD																				
BOD Carbonaceous	mg/L	6.0	6.0	/	6.0	/	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.00	6.00	2.69
Chloride in Water by IC																				
Chloride (Cl)	mg/L	10	513	/	311	/	901	517	361	94.5	846	290	185	746	1300	868	277	94.50	1300.00	554.58
Conductivity																				
Conductivity	umhos/cm	1.0	1730	2700	1100	305	2990	1920	1280	386	2670	1130	735	2200	3890	2790	1010	305.00	3890.00	1789.07
Fecal Coliforms																				
Fecal Coliforms	MPN/100mL	3	9	43	3	4	4	7500	4	3	3	15	43	10	10	60	10	3.00	7500.00	514.73
Hardness Calculated																				
Hardness (as CaCO3)	mg/L	0.30	373	/	162	/	466	273.00	214	64.3	399	185	120	390	744	412	204	64.30	744.00	308.18
Mercury Total																				
Mercury (Hg)	mg/L	0.00020	0.000020	0.00020	0.000024	0.000020	0.000020	0.00020	0.00020	0.000020	0.000020	0.000020	0.000020	0.0000050	0.0000050	0.0000050	0.0000050	0.000005	0.00020	0.00005
Nitrate in Water by IC																				
Nitrate (as N)	mg/L	0.020	0.25	/	0.050	0.020	0.40	0.10	0.020	0.020	0.40	0.040	0.020	0.20	0.40	0.20	0.04	0.02	0.40	0.15
Nitrate + Nitrite																				
Nitrate and Nitrite as N	mg/L	0.070	0.35	0.35	0.071	0.070	0.45	0.11	0.070	0.070	0.45	0.070	0.070	0.22	0.45	0.22	0.07	0.07	0.45	0.21
Nitrite in Water by IC																				
Nitrite (as N)	mg/L	0.010	0.25	/	0.050	0.010	0.20	0.050	0.010	0.010	0.20	0.020	0.010	0.10	0.20	0.10	0.02	0.01	0.25	0.09
Oil & Grease - Gravimetric																				
Oil and Grease	mg/L	5.0	/	2.0	2.0	2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.00	5.00	3.71
Phenol																				
Phenols	mg/L	0.0010	0.0010	0.0010	0.0010	0.0010	0.0138	0.0027	0.0013	0.001	0.0038	0.0033	0.0014	0.0033	0.0010	0.0010	0.0010	0.0010	0.014	0.0025
Phosphorus, Total																				
Phosphorus (P)	mg/L	0.010	0.028	/	0.050	0.10	0.044	0.043	0.034	0.06	0.170	0.045	0.137	0.0038	0.043	0.135	0.013	0.0038	0.17	0.065
Sulfate in Water by IC																				
Sulfate (SO4)	mg/L	6.0	30.5	16	8.42	7.18	53.0	10.0	7.13	7.51	30.4	4.90	11.8	14.4	119	39.7	80.1	4.90	119.00	29.34
Total Metals by ICP-MS																				
Aluminium (Al)	mg/L	0.0050	0.282	/	0.0319	0.0124	0.0779	0.0536	0.0471	0.352	0.463	0.326	0.0237	0.0576	0.0220	0.0744	0.0096	0.01	0.46	0.13
Arsenic (As)	mg/L	0.00020	0.00051	0.00087	0.00047	0.00020	0.00050	0.00076	0.00057	0.00051	0.00085	0.00062	0.00036	0.00068	0.00050	0.00090	0.00029	0.0002	0.0009	0.0006
Cadmium (Cd)	mg/L	0.000010	0.000074	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000016	0.000010	0.000010	0.000010	0.0000050	0.0000050	0.0000050	0.000005	0.000074	0.000014
Calcium (Ca)	mg/L	0.10	78	53.4	28.9	8.98	47.2	37.7	39.5	11.7	47.0	35.0	22.5	40.6	79.9	55.1	40.6	8.98	79.90	41.74
Chromium (Cr)	mg/L	0.0010	0.0016	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0014	0.0010	0.0010	0.0010	0.00022	0.00047	0.00014	0.0001	0.0016	0.0009
Cobalt (Co)	mg/L	0.00020	0.00021	/	0.00020	0.00020	0.00020	0.00033	0.00020	0.00040	0.00057	0.00035	0.00020	0.00030	0.00021	0.00023	0.0001	0.0001	0.0006	0.0003
Copper (Cu)	mg/L	0.00020	0.00095	0.00056	0.00120	0.00054	0.00043	0.00032	0.00048	0.00123	0.00152	0.00097	0.00040	0.00067	0.00058	<0.00050	0.00058	0.0003	0.0015	0.0007
Iron (Fe)	mg/L	0.010	1.16	3.16	0.96	0.33	1.83	4.19	3.61	3.75	7.56	1.45	0.882	3.45	1.17	4.25	0.207	0.21	7.56	2.53
Lead (Pb)	mg/L	0.000090	0.000504	0.000139	0.000090	0.000090	0.000560	0.000090	0.000090	0.000439	0.000611	0.000358	0.000090	0.000091	0.000050	0.000164	0.000064	0.0001	0.0006	0.0002
Magnesium (Mg)	mg/L	0.010	43.3	61	21.8	6.27	84.5	43.4	28.0	8.54	68.5	23.7	15.6	70.0	132	66.6	25	6.27	132.00	46.55
Manganese (Mn)	mg/L	0.00030	0.188	/	0.0463	0.00699	0.0366	0.253	0.0645	0.144	0.26	0.0629	0.0253	0.226	0.137	0.214	0.0322	0.01	0.26	0.12
Nickel (Ni)	mg/L	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.00050	0.00060	0.00058	0.0005	0.0020	0.0017
Potassium (K)	mg/L	0.020	9.79	16.7	6.04	2.90	16.3	12.6	8.10	3.33	14.0	7.13	6.27	14.5	23.6	16.2	7.72	2.90	23.60	11.01
Sodium (Na)	mg/L	0.030	246	419	164	41.6	486	287	190	50.3	430	149	95.2	442	765	415	140	41.60	765.00	288.01
Zinc (Zn)	mg/L	0.0020	0.417	0.0034	0.0035	0.0077	0.0020	0.0033	0.0037	0.0098	0.0113	0.0056	0.0032	0.0050	0.0031	0.0030	0.0084	0.0020	0.42	0.033
Total Organic Carbon by Combustion																				
Total Organic Carbon	mg/L	0.50	/	/	9.0	/	9.1	13.2	8.8	7.46	7.52	10.8	8.46	8.95	9.84	12.3	7.23	7.23	13.20	9.39
Total Suspended Solids																				
Total Suspended Solids	mg/L	13	6.0	20.0	6.0	5.0	8.0	13.0	5.0	124	53.8	69.0	7.0	20	31.0	32.0	5.0	5.00	124.00	26.99
pH																				
pH	pH Units	0.10	7.04	8.01	7.63	7.71	7.90	7.74	7.25	7.02	7.53	7.65	7.63	7.07	8.05	7.45	6.96	6.96	8.05	7.51
Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00050	0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	0.0010	/	/	/	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	/	0.0010	0.0010	0.0010	0.0010	0.001	0.001	0.001
Ethyl Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00050	0.0005	0.0005	0.0005
o-Xylene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	0.00050	0.00050	0.0005	0.0005	0.0005
F1 (C6-C10)	mg/L	0.10	0.10	/	/	/	0.10	0.10	0.10	0.10	0.10	0.10	/	0.10	0.10	0.10	0.10	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	0.50	/	/	/	0.25	0.25	0.25	0.10	0.10	0.10	/	0.10	0.10	0.10	0.10	0.10	0.50	0.18
F3 (C16-C34)	mg/L	0.25	0.50	/	/	/	0.25	0.25	0.25	0.25	0.25	0.25	/	0.25	0.25	0.25	0.25	0.25	0.50	0.27
F4 (C34-C50)	mg/L	0.25	0.50	/	/	/	0.25	0.25	0.25	0.25	0.25	0.25	/	0.25	0.25	0.25	0.25	0.25	0.50	0.27
Total Hydrocarbons (C6-C50)	mg/L	0.44	0.87	/	/	/	0.44	0.44	0.44	0.38	0.38	0.38	/	0.38	0.38	0.38	0.38	0.38	0.87	0.44

Arviat
ARV-6

			2014			2015				2016				2017				Statistics		
Parameter	**Unit**	**DL**	**15-Jul-14**	**01-Aug-14**	**12-Sep-14**	**15-Jun-15**	**21-Jul-15**	**18-Aug-15**	**16-Sep-15**	**22-Jun-16**	**12-Jul-16**	**25-Aug-16**	**16-Sep-16**	**19-Jun-17**	**12-Jul-17**	**10-Aug-17**	**19-Sep-17**	**Min**	**Max**	**Average**
Alkalinity																				
Bicarbonate (HCO3)	mg/L	1.2	90	/	126	/	138	128	118	31.0	112	118	97.7	76.9	94.6	/	/	31.00	138.00	102.75
Carbonate (CO3)	mg/L	0.60	12	/	12	/	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	/	/	0.60	12.00	2.67
Hydroxide (OH)	mg/L	0.34	6.8	/	6.8	/	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	/	/	0.34	6.80	1.51
Total (as CaCO3)	mg/L	1.0	74	/	103	/	113	105	96.8	25.4	91.5	97.0	80.1	63.0	77.5	/	/	25.40	113.00	84.21
Ammonia by Colour																				
Total (as N)	mg/L	0.20	0.010	0.289	0.075	/	0.256	0.330	0.435	0.010	0.452	0.138	0.83	0.070	0.251	/	/	0.01	0.83	0.26
Biochemical Oxygen Demand (BOD)																				
Biochemical Oxygen Demand	mg/L	6.0	6.0	29.3	6.0	70.1	6.3	8.0	6.0	3.1	7.3	5.1	5.1	8.2	2.1	/	/	2.10	70.10	12.51
Carbonaceous BOD																				
BOD Carbonaceous	mg/L	6.0	6.0	/	6.0	/	5.9	3.1	2.0	2.3	4.7	2.0	2.2	6.6	2.0	/	/	2.00	6.60	3.89
Chloride in Water by IC																				
Chloride (Cl)	mg/L	10	149	/	155	/	45.1	99.8	176	112	159	267	215	66.9	196	/	/	45.10	267.00	149.16
Conductivity																				
Conductivity	umhos/cm	1.0	655	749	669	198	691	693	712	427	685	1070	834	333	737	/	/	198.00	1070.00	650.23
Fecal Coliforms																				
Fecal Coliforms	MPN/100mL	3	3	23	3	4	3	3	430	3	3	3	3	10	10	/	/	3.00	430.00	38.54
Hardness Calculated																				
Hardness (as CaCO3)	mg/L	0.30	167	/	149	/	205	152	172	139	205	253	221	99.6	209	/	/	99.60	253.00	179.24
Mercury Total																				
Mercury (Hg)	mg/L	0.00020	0.000020	0.00020	0.000020	0.00020	0.00020	0.00020	0.00040	0.000020	0.00020	0.000020	0.000020	0.0000050	0.0000050	/	/	0.000005	0.00040	0.00012
Nitrate in Water by IC																				
Nitrate (as N)	mg/L	0.40	0.050	/	0.050	0.030	0.020	0.020	0.020	0.020	0.020	0.159	0.040	0.020	0.020	/	/	0.02	0.16	0.04
Nitrate + Nitrite																				
Nitrate and Nitrite as N	mg/L	0.45	0.071	0.071	0.071	0.070	0.070	0.070	0.070	0.070	0.070	0.159	0.070	0.070	0.070	/	/	0.07	0.16	0.08
Nitrite in Water by IC																				
Nitrite (as N)	mg/L	0.20	0.050	/	0.050	0.010	0.010	0.010	0.010	0.010	0.010	0.020	0.020	0.010	0.010	/	/	0.01	0.05	0.02
Oil & Grease - Gravimetric																				
Oil and Grease	mg/L	5.0	/	2.0	2.0	2.0	2.0	2.0	4.4	5.0	33.0	5.0	5.0	5.0	5.0	/	/	2.00	33.00	6.03
Phenol																				
Phenols	mg/L	0.0010	0.0010	0.0193	0.0013	0.0028	0.0102	0.0055	0.0027	0.0031	0.0036	0.0037	0.0030	0.0141	0.0018	/	/	0.0010	0.019	0.006
Phosphorus, Total																				
Phosphorus (P)	mg/L	0.010	0.069	/	0.059	0.10	0.407	0.063	0.433	0.122	0.119	0.305	0.043	0.065	0.082	/	/	0.04	0.43	0.16
Sulfate in Water by IC																				
Sulfate (SO4)	mg/L	6.0	8.83	0.50	0.50	1.75	2.64	0.30	1.11	0.46	0.30	3.22	0.60	0.30	0.81	/	/	0.30	8.83	1.64
Total Metals by ICP-MS																				
Aluminium (Al)	mg/L	0.0050	0.237	/	0.0369	0.680	1.36	0.0310	0.627	0.120	0.995	1.69	0.0246	0.0867	0.245	/	/	0.025	1.690	0.511
Arsenic (As)	mg/L	0.00020	0.00052	0.00584	0.00081	0.00036	0.00319	0.00082	0.00137	0.00052	0.00156	0.00127	0.00101	0.00065	0.00102	/	/	0.00036	0.00584	0.00146
Cadmium (Cd)	mg/L	0.000010	0.000019	0.000032	0.000010	0.000047	0.000020	0.000010	0.000017	0.000032	0.000089	0.000091	0.000010	0.000010	0.0000054	/	/	0.000005	0.000091	0.000030
Calcium (Ca)	mg/L	0.10	43.9	44.9	37.6	17.4	52.6	39.6	47.0	45.8	58.2	74.2	64.5	28.7	56.9	/	/	17.40	74.20	47.02
Chromium (Cr)	mg/L	0.0010	0.317	0.0098	0.0010	0.0010	0.0048	0.0011	0.0035	0.0010	0.0032	0.0036	0.0010	0.0010	0.00130	/	/	0.0010	0.32	0.027
Cobalt (Co)	mg/L	0.00020	0.00149	/	0.00165	0.00141	0.00480	0.00238	0.00265	0.00194	0.00384	0.00361	0.00092	0.00209	0.00201	/	/	0.0009	0.0048	0.0024
Copper (Cu)	mg/L	0.00020	0.00098	0.00561	0.00086	0.00266	0.00318	0.00033	0.00230	0.00114	0.00601	0.00403	0.00028	0.00073	0.00142	/	/	0.0003	0.0060	0.0023
Iron (Fe)	mg/L	0.010	7.52	147	19.0	2.81	129	31.2	54.1	6.73	59.7	17.7	24.0	15.5	24.7	/	/	2.81	147.00	41.46
Lead (Pb)	mg/L	0.000090	0.000407	0.00172	0.000115	0.00101	0.00131	0.000090	0.000875	0.000220	0.00153	0.00198	0.000090	0.000197	0.000352	/	/	0.00009	0.00198	0.00076
Magnesium (Mg)	mg/L	0.010	14.0	15.7	13.5	4.13	17.8	13.0	13.3	6.08	14.6	16.4	14.5	6.76	16.1	/	/	4.13	17.80	12.76
Manganese (Mn)	mg/L	0.00030	2.14	/	1.91	1.07	3.89	2.64	2.49	1.14	2.85	2.48	2.02	2.32	2.78	/	/	1.07	3.89	2.31
Nickel (Ni)	mg/L	0.0020	0.0020	0.0043	0.0020	0.0020	0.0034	0.0020	0.0030	0.0020	0.0026	0.0039	0.0020	0.0020	0.00126	/	/	0.00126	0.00430	0.00250
Potassium (K)	mg/L	0.020	6.91	7.3	5.52	3.23	6.88	4.62	5.80	3.72	6.67	8.30	6.34	3.99	5.36	/	/	3.23	8.30	5.74
Sodium (Na)	mg/L	0.030	68.7	79.9	64.7	10.0	70.3	66.7	71.1	10.4	66.4	71.1	54.2	23.8	82.7	/	/	10.00	82.70	56.92
Zinc (Zn)	mg/L	0.0020	0.0656	0.302	0.0227	0.0523	0.0251	0.0020	0.0251	0.0391	0.0335	0.0433	0.0031	0.0050	0.0075	/	/	0.0020	0.30	0.048
Total Organic Carbon by Combustion																				
Total Organic Carbon	mg/L	0.50	/	/	1.0	/	28.2	14.3	25.7	8.54	16.0	11.0	8.61	14.6	11.2	/	/	1.00	28.20	13.92
Total Suspended Solids																				
Total Suspended Solids	mg/L	13	34.0	268	102	18.0	105	61.0	1500	23.0	144	228	58	36	41.0	/	/	18.00	1500.00	201.38
pH																				
pH	pH Units	0.10	7.21	6.82	7.07	7.67	7.05	7.05	6.98	6.56	6.45	6.87	6.61	6.95	6.64	/	/	6.45	7.67	6.92
Benzene	mg/L	0.00050	0.00050	/	/	/	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	/	0.00050	0.00050	/	/	0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	0.0010	/	/	/	0.0042	0.0021	0.0010	0.0030	0.0023	0.0010	/	0.0035	0.0010	/	/	0.0010	0.0042	0.0021
Ethyl Benzene	mg/L	0.00050	0.00050	/	/	/	0.00051	0.00050	0.00050	0.00240	0.00077	0.00050	/	0.00050	0.00050	/	/	0.0005	0.0024	0.0007
o-Xylene	mg/L	0.00050	0.00050	/	/	/	0.00095	0.00050	0.00050	0.00614	0.00216	0.00098	/	0.00050	0.00050	/	/	0.001	0.006	0.0014
F1 (C6-C10)	mg/L	0.10	0.10	/	/	/	0.10	0.10	0.10	0.10	0.10	0.10	/	0.10	0.10	/	/	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	0.50	/	/	/	0.25	0.25	0.25	0.12	2.47	0.10	/	0.10	0.17	/	/	0.10	2.47	0.47
F3 (C16-C34)	mg/L	0.25	0.67	/	/	/	0.57	0.25	1.77	0.69	13.9	0.32	/	0.25	1.25	/	/	0.25	13.90	2.19
F4 (C34-C50)	mg/L	0.25	0.50	/	/	/	0.25	0.25	0.61	0.25	0.72	0.25	/	0.25	0.25	/	/	0.25	0.72	0.37
Total Hydrocarbons (C6-C50)	mg/L	0.44	0.87	/	/	/	0.57	0.44	2.38	0.81	17.2	0.38	/	0.38	1.41	/	/	0.38	17.20	2.72

Arviat
ARV-Active Sewage Lagoon

			2017	Statistics		
Parameter	**Unit**	**DL**	**10-Aug-17**	**Min**	**Max**	**Average**
Alkalinity						
Bicarbonate (HCO3)	mg/L	1.2	391	391	391	391
Carbonate (CO3)	mg/L	0.60	0.60	0.60	0.60	0.60
Hydroxide (OH)	mg/L	0.34	0.34	0.34	0.34	0.34
Total (as CaCO3)	mg/L	1.0	321	321	321	321
Ammonia by Colour						
Total (as N)	mg/L	0.20	76	76	76	76
Biochemical Oxygen Demand (BOD)						
Biochemical Oxygen Demand	mg/L	6.0	298.4	298.4	298.4	298.4
Carbonaceous BOD						
BOD Carbonaceous	mg/L	6.0	182	182	182	182
Chloride in Water by IC						
Chloride (Cl)	mg/L	10	59.5	59.5	59.5	59.5
Conductivity						
Conductivity	umhos/cm	1.0	911	911	911	911
Fecal Coliforms						
Fecal Coliforms	MPN/100mL	3	24200	24200	24200	24200
Hardness Calculated						
Hardness (as CaCO3)	mg/L	0.30	42.4	42.4	42.4	42.4
Mercury Total						
Mercury (Hg)	mg/L	0.00020	0.000017	0.000017	0.000017	0.000017
Nitrate in Water by IC						
Nitrate (as N)	mg/L	0.40	0.040	0.040	0.040	0.040
Nitrate + Nitrite						
Nitrate and Nitrite as N	mg/L	0.45	0.070	0.070	0.070	0.070
Nitrite in Water by IC						
Nitrite (as N)	mg/L	0.20	0.020	0.020	0.020	0.020
Oil & Grease - Gravimetric						
Oil and Grease	mg/L	5.0	43.9	43.9	43.9	43.9
Phenol						
Phenols	mg/L	0.0010	1.19	1.19	1.19	1.19
Phosphorus, Total						
Phosphorus (P)	mg/L	0.010	9.60	9.60	9.60	9.60
Sulfate in Water by IC						
Sulfate (SO4)	mg/L	6.0	0.60	0.60	0.60	0.60
Total Metals by ICP-MS						
Aluminium (Al)	mg/L	0.0050	0.711	0.711	0.711	0.711
Arsenic (As)	mg/L	0.00020	0.00069	0.00069	0.00069	0.00069
Cadmium (Cd)	mg/L	0.000010	0.000159	0.000159	0.000159	0.000159
Calcium (Ca)	mg/L	0.10	9.28	9.28	9.28	9.28
Chromium (Cr)	mg/L	0.0010	0.00157	0.00157	0.00157	0.00157
Cobalt (Co)	mg/L	0.00020	0.00076	0.00076	0.00076	0.00076
Copper (Cu)	mg/L	0.00020	0.144	0.144	0.144	0.144
Iron (Fe)	mg/L	0.010	0.737	0.737	0.737	0.737
Lead (Pb)	mg/L	0.000090	0.00224	0.00224	0.00224	0.00224
Magnesium (Mg)	mg/L	0.010	4.67	4.67	4.67	4.67
Manganese (Mn)	mg/L	0.00030	0.0573	0.0573	0.0573	0.0573
Nickel (Ni)	mg/L	0.0020	0.00377	0.00377	0.00377	0.00377
Potassium (K)	mg/L	0.020	26.4	26.4	26.4	26.4
Sodium (Na)	mg/L	0.030	54.5	54.5	54.5	54.5
Zinc (Zn)	mg/L	0.0020	0.136	0.136	0.136	0.136
Total Organic Carbon by Combustion						
Total Organic Carbon	mg/L	0.50	15.3	15.3	15.3	15.3
Total Suspended Solids						
Total Suspended Solids	mg/L	13	64	64	64	64
pH						
pH	pH Units	0.10	7.40	7.40	7.40	7.40
Benzene	mg/L	0.00050	/	0	0	0
Toluene	mg/L	0.0010	/	0	0	0
Ethyl Benzene	mg/L	0.00050	/	0	0	0
o-Xylene	mg/L	0.00050	/	0	0	0
F1 (C6-C10)	mg/L	0.10	/	0	0	0
F2 (C10-C16)	mg/L	0.25	/	0	0	0
F3 (C16-C34)	mg/L	0.25	/	0	0	0
F4 (C34-C50)	mg/L	0.25	/	0	0	0
Total Hydrocarbons (C6-C50)	mg/L	0.44	/	0	0	0

*BOD is an approximation due to no analysis performed. Approximation done by an average ratio between CBOD and BOD.

Arviat
ARV-Old Sewage Lagoon

			2015	2016	2017	Statistics		
Parameter	**Unit**	**DL**	**21-Jun-15**	**22-Jun-16**	**10-Aug-17**	**Min**	**Max**	**Average**
Alkalinity								
Bicarbonate (HCO3)	mg/L	1.2	/	/	69.9	69.9	69.9	69.9
Carbonate (CO3)	mg/L	0.60	/	/	5.04	5.04	5.04	5.04
Hydroxide (OH)	mg/L	0.34	/	/	0.3	0.34	0.34	0.34
Total (as CaCO3)	mg/L	1.0	/	/	65.7	65.7	65.7	65.7
Ammonia by Colour								
Total (as N)	mg/L	0.20	0.278	5	0.54	0.278	5.0	1.9
Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	mg/L	6.0	6.6	12	2.8	2.8	12.0	7.1
Carbonaceous BOD								
BOD Carbonaceous	mg/L	6.0	/	/	2.0	2.0	2.0	2.0
Chloride in Water by IC								
Chloride (Cl)	mg/L	10	/	/	57.1	57.1	57.1	57.1
Conductivity								
Conductivity	umhos/cm	1.0	299	374	304	299.0	374.0	325.7
Fecal Coliforms								
Fecal Coliforms	MPN/100mL	3	3	4	30	3.0	30.0	12.3
Hardness Calculated								
Hardness (as CaCO3)	mg/L	0.30	/	/	61.1	61.1	61.1	61.1
Mercury Total								
Mercury (Hg)	mg/L	0.00020	0.00020	0.000022	0.0000091	0.000009	0.000200	0.000077
Nitrate in Water by IC								
Nitrate (as N)	mg/L	0.40	/	/	0.111	0.111	0.111	0.111
Nitrate + Nitrite								
Nitrate and Nitrite as N	mg/L	0.45	0.012	0.507	0.178	0.0120	0.5070	0.2323
Nitrite in Water by IC								
Nitrite (as N)	mg/L	0.20	/	/	0.067	0.067	0.067	0.067
Oil & Grease - Gravimetric								
Oil and Grease	mg/L	5.0	2.0	5.0	5.0	2.0	5.0	4.0
Phenol								
Phenols	mg/L	0.0010	0.0010	0.0011	0.0010	0.0010	0.0011	0.0010
Phosphorus, Total								
Phosphorus (P)	mg/L	0.010	1.19	1.63	2.03	1.19	2.03	1.62
Sulfate in Water by IC								
Sulfate (SO4)	mg/L	6.0	3.37	2.67	1.07	1.07	3.37	2.37
Total Metals by ICP-MS								
Aluminium (Al)	mg/L	0.0050	/	/	0.233	0.233	0.233	0.233
Arsenic (As)	mg/L	0.00020	0.00159	0.00168	0.00188	0.0016	0.00188	0.00172
Cadmium (Cd)	mg/L	0.000010	0.000017	0.000023	0.0000050	0.000005	0.000023	0.000015
Calcium (Ca)	mg/L	0.10	11.3	16.8	13.9	11.3	16.8	14.0
Chromium (Cr)	mg/L	0.0010	0.0010	0.0010	0.00038	0.00038	0.00100	0.00079
Cobalt (Co)	mg/L	0.00020	/	/	0.00037	0.00037	0.00037	0.00037
Copper (Cu)	mg/L	0.00020	0.00589	0.00737	0.00830	0.00589	0.00830	0.00719
Iron (Fe)	mg/L	0.010	0.31	0.899	1.73	0.31	1.73	0.98
Lead (Pb)	mg/L	0.000090	0.000252	0.000423	0.000823	0.000252	0.000823	0.000499
Magnesium (Mg)	mg/L	0.010	4.48	7.04	6.41	4.48	7.04	5.98
Manganese (Mn)	mg/L	0.00030	/	/	0.0695	0.0695	0.0695	0.0695
Nickel (Ni)	mg/L	0.0020	0.002	0.0027	0.00200	0.0020	0.0027	0.00223
Potassium (K)	mg/L	0.020	7.52	10	4.85	4.85	10.00	7.46
Sodium (Na)	mg/L	0.030	36.2	36.5	38.1	36.20	38.10	36.93
Zinc (Zn)	mg/L	0.0020	0.0032	0.0074	0.0098	0.0032	0.0098	0.0068
Total Organic Carbon by Combustion								
Total Organic Carbon	mg/L	0.50	/	/	165	165.0	165.0	165.0
Total Suspended Solids								
Total Suspended Solids	mg/L	13	25.0	10.0	10.0	10.0	25.0	15.0
pH								
pH	pH Units	0.10	8.09	8.05	8.84	8.05	8.84	8.33
Benzene	mg/L	0.00050	/	/	/	0.0	0.0	0.0
Toluene	mg/L	0.0010	/	/	/	0.0	0.0	0.0
Ethyl Benzene	mg/L	0.00050	/	/	/	0.0	0.0	0.0
o-Xylene	mg/L	0.00050	/	/	/	0.0	0.0	0.0
F1 (C6-C10)	mg/L	0.10	/	/	/	0.0	0.0	0.0
F2 (C10-C16)	mg/L	0.25	/	/	/	0.0	0.0	0.0
F3 (C16-C34)	mg/L	0.25	/	/	/	0.0	0.0	0.0
F4 (C34-C50)	mg/L	0.25	/	/	/	0.0	0.0	0.0
Total Hydrocarbons (C6-C50)	mg/L	0.44	/	/	/	0.0	0.0	0.0

Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Arviat	Steve England
Licence No. / Expiry	**Representative's Title**
3AM-ARV1016	Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
	--
Date of Inspection	**Inspector**
August 9th 2017	Atuat Shouldice

Activities Inspected

☐ Camp ☐ Drilling ☐ Mining ☐ Construction ☐ Reclamation ☒ Fuel Storage
☐ Roads/Hauling ☒ Other: Municipality ☐ Other:

SECTION 1 ☒ **Comments (s.1)** ☐ Non-Compliance with Act or Licence (s.__) ☐ Action Required (s.__)

Summary

On August 9th, 2017 Indigenous and Northern Affairs Canada's Water Resource Officer, Atuat Shouldice completed an annual Community inspection of the hamlet of Arviat permit 3AM-ARV1016. The inspection was conducted in the presence of Megan Lusty, Municipal Planning Engineer and Steve England Senior Administrative Office. During the writing of this report the Hamlet of Arviat was in the process of renewing their water licence.

SECTION 2 ☒ Comments (s.__) ☐ **Non-Compliance with Act or Licence (s.2)** ☐ Action Required (s.__)

Observations

LANDFILL

The landfill in Arviat is very organized and well maintained; signage is posted to segregate Hazardous waste from entering the landfill. Recycling is an active project, segregating lumber and building materials to be reused.

WASTE METAL DUMP

The Hamlet of Arviat recently purchased a crusher to shred bulk items. During the inspection, the hamlet had on-going program to depollute automotive vehicles and recreational vehicles. During the course of the inspection, no waste was seen leaving the landfill and metal dump sites.

Hazardous Waste

Hazardous waste is regularly collect and stored in seacans. The Hamlet of Arivat runs programs and informs community on how hazardous waste should be store and places before collected.

SEWAGE DISPOSAL

The sewage lagoon was inspected during the site visit. The lagoon appeared to be in good repair and adequate freeboard was observed. Sewage samples taken by the Hamlet indicate that effluent was within water license criteria.

WATER USE

The drinking water pumphouse was visited during the inspection and water use records were made available for review. The water is being recorded as required at wolf creek and also by truck loads filled from resolver. No water license compliance issues were noted.

SECTION 3 ☐ Comments (s.__) ☐ Non-Compliance with Act or Licence, (s.__) ☒ **Action Required (s.3)**

The Hamlet of Arviat is currently using water without the authorization of a valid water licence. This is in contravention of the Nunavut Waters and Nunavut Surface Rights Tribunal Act, section 11. In order for Arviat to be authorized for their current activities they must hold a water licence for the use of water and deposit of waste. This includes the use of drinking water from Wolf Creek and the discharge of waste from the sewage lagoon. The Hamlet needs to continue demonstrating progress towards obtaining a water license.

Licensee or Representative	Inspector's Name
	WRO A Shouldice
Signature	**Signature**
Date	**Date**
	4/19/2018

Office Use Only: Follow-up report to be issued by Inspector ☒ Yes ☐ No

Canada