ANNUAL REPORT
FOR THE HAMLET OF ARVIAT

YEAR BEING REPORTED: 2018

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	8,869.901	Same
February	7,917.038	Same
March	8,542.440	Same
April	8,310.513	Same
May	8,656.016	Same
June	8,287.099	Same
July	8,910.061	Same
August	9,041.572	Same
September	8,581.820	Same
October	8,880.961	Same
November	8,708.563	Same
December	8,814.934	Same
ANNUAL TOTAL	**103,520.918**	**103,520.918**

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 sea can. 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.
- The Solid Waste Site is improving drastically, and all waste is spread evenly within the fencing.
- A new water treatment plant and water reservoir is currently being constructed by Tower Construction.

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 2018:

Spill No.	Date	Site Description	Commodity	Quantity
2018277	2018-07-17	N/A	Petroleum – fuel oil	15 L
20188243	2018-06-20	N/A	Petroleum – fuel oil	100 L
2018229	2018-06-14	N/A	Petroleum – fuel oil	300 L
2018208	2018-05-31	N/A	Petroleum – fuel oil	75 L
2018195	2018-05-25	N/A	Petroleum – fuel oil	205 L

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 and water reservoir is currently being constructed by Tower Construction.

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

- Decanting of the old sewage lagoon was approved by INAC on August 3rd, 2018. They will decant, desludge, and expand their SWS in future years.

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 June 27th, 2018. 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 21, 2018– 16 pages
Appendix D: Certificate of Analysis July 17, 2018 – 16 pages
Appendix E: Certificate of Analysis August 14, 2018 – 20 pages
Appendix F: Certificate of Analysis September 10, 2018 – 9 pages
Appendix G: Hazardous Materials Spill Database, Arviat 2018 – 1 page
Appendix H: Arviat 2018 Sampling Summary – 4 pages
Appendix I: INAC Inspection Report – 2 pages

Appendix A

3AM-ARV1016 Arviat Monitoring Program Results 2018
Part D, Item 2; ARV-4 Effluent Quality limits

Parameter	Maximum Concentration of any grab sample	ARV-4			
		21-Jun-18	17-Jul-18	13-Aug-18	10-Sep-18
BOD_5	80 mg/L	5.0	30.6	18.9	7.2
Total Suspended Solids	100 mg/L	52.9	49.6	8.1	349.0
Fecal Coliforms	1 x 10^4 CFU/100mL	<10	>24200	11200	220
Oil & Grease	no visible sheen	<5.0	5.6	<5.0	<5.0
pH	between 6 and 9	7.29	7.25	7.21	7.00

Exceeds effluent quality limits

Appendix B

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	30-Apr-18			✓			✓			✓			✓	Laura
2	07-May-18			✓			✓			✓			✓	Laura
3	14-May-18			✓			✓			✓			✓	Laura
4	21-May-18			✓			✓			✓			✓	Laura
5	28-May-18			✓			✓			✓			✓	Laura
6	04-Jun-18			✓			✓			✓			✓	Laura
7	11-Jun-18			✓			✓			✓			✓	Laura
8	18-Jun-18	✓			✓			✓			✓			Laura
9	25-Jun-18	✓			✓			✓			✓			Laura
10	02-Jul-18	✓			✓			✓			✓			Laura
11	09-Jul-18	✓			✓			✓			✓			Laura
12	16-Jul-18	✓			✓			✓			✓			Laura
13	23-Jul-18	✓			✓			✓			✓			Laura
14	30-Jul-18	✓			✓			✓			✓			Laura
15	06-Aug-18	✓			✓			✓			✓			Laura
16	13-Aug-18	✓			✓			✓			✓			Laura
17	20-Aug-18	✓			✓			✓			✓			Laura
18	27-Aug-18	✓			✓			✓			✓			Laura

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) 645-8143

Appendix C

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

Date Received: 25-JUN-18
Report Date: 16-JUL-18 11:29 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L2118040

Project P.O. #: NOT SUBMITTED
Job Reference: HAMLET OF ARVIAT - WASTE WATER
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
L2118040-1 ARV - 2							
Sampled By: CLIENT on 21-JUN-18 @ 14:23							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		28-JUN-18	R4098476
Toluene	<0.0010		0.0010	mg/L		28-JUN-18	R4098476
Ethyl benzene	<0.00050		0.00050	mg/L		28-JUN-18	R4098476
o-Xylene	<0.00050		0.00050	mg/L		28-JUN-18	R4098476
m+p-Xylenes	<0.00040		0.00040	mg/L		28-JUN-18	R4098476
F1 (C6-C10)	<0.10		0.10	mg/L		28-JUN-18	R4098476
Surrogate: 4-Bromofluorobenzene (SS)	89.0		70-130	%		28-JUN-18	R4098476
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.15		0.10	mg/L	28-JUN-18	30-JUN-18	R4106588
F3 (C16-C34)	0.31		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
Surrogate: 2-Bromobenzotrifluoride	87.9		60-140	%	28-JUN-18	30-JUN-18	R4106588
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-18	
Total Hydrocarbons (C6-C50)	0.46		0.38	mg/L		04-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		03-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	460		1.2	mg/L		27-JUN-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		27-JUN-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		27-JUN-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	377		1.0	mg/L		26-JUN-18	R4097988
Ammonia by colour							
Ammonia, Total (as N)	9.2		1.0	mg/L		27-JUN-18	R4099627
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	17.5		6.0	mg/L		25-JUN-18	R4111150
Carbonaceous BOD							
BOD Carbonaceous	13.4		6.0	mg/L		25-JUN-18	R4111150
Chloride in Water by IC							
Chloride (Cl)	372		2.5	mg/L		25-JUN-18	R4099408
Conductivity							
Conductivity	2360		1.0	umhos/cm		26-JUN-18	R4097988
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	390	PEHR	10	MPN/100mL		25-JUN-18	R4097310
Hardness Calculated							
Hardness (as CaCO3)	709	HTC	0.20	mg/L		03-JUL-18	
Mercury Total							
Mercury (Hg)-Total	0.0000554		0.0000050	mg/L	28-JUN-18	29-JUN-18	R4105452
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		25-JUN-18	R4099408
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		28-JUN-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		25-JUN-18	R4099408
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		04-JUL-18	R4113449
Phenol (4AAP)							

* 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
L2118040-1 ARV - 2							
Sampled By: CLIENT on 21-JUN-18 @ 14:23							
Matrix: WASTE WATER							
Phenol (4AAP)							
Phenols (4AAP)	0.0057		0.0010	mg/L		29-JUN-18	R4110409
Phosphorus, Total							
Phosphorus (P)-Total	0.968		0.0010	mg/L		04-JUL-18	R4112349
Sulfate in Water by IC							
Sulfate (SO4)	384		1.5	mg/L		25-JUN-18	R4099408
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0379		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Arsenic (As)-Total	0.00468		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cadmium (Cd)-Total	0.000606		0.0000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Calcium (Ca)-Total	207		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Chromium (Cr)-Total	0.00157		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cobalt (Co)-Total	0.00308		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Copper (Cu)-Total	0.0666		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Iron (Fe)-Total	4.55		0.010	mg/L	29-JUN-18	29-JUN-18	R4108907
Lead (Pb)-Total	0.00901		0.000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Magnesium (Mg)-Total	46.4		0.0050	mg/L	29-JUN-18	29-JUN-18	R4108907
Manganese (Mn)-Total	0.972		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Nickel (Ni)-Total	0.00877		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Potassium (K)-Total	42.9		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Sodium (Na)-Total	234		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Zinc (Zn)-Total	0.311		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Total Organic Carbon by Combustion							
Total Organic Carbon	43.8		0.50	mg/L		13-JUL-18	R4126236
Total Suspended Solids							
Total Suspended Solids	21.6		2.0	mg/L		28-JUN-18	R4104155
pH							
pH	7.57		0.10	pH units		26-JUN-18	R4097988
L2118040-2 ARV - 4							
Sampled By: CLIENT on 21-JUN-18 @ 14:00							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
Toluene	<0.0010		0.0010	mg/L		26-JUN-18	R4098476
Ethyl benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
o-Xylene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
m+p-Xylenes	<0.00040		0.00040	mg/L		26-JUN-18	R4098476
F1 (C6-C10)	<0.10		0.10	mg/L		26-JUN-18	R4098476
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%		26-JUN-18	R4098476
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	28-JUN-18	30-JUN-18	R4106588
F3 (C16-C34)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
Surrogate: 2-Bromobenzotrifluoride	92.9		60-140	%	28-JUN-18	30-JUN-18	R4106588
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		28-JUN-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							

* 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
L2118040-2 ARV - 4							
Sampled By: CLIENT on 21-JUN-18 @ 14:00							
Matrix: WASTE WATER							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	155		1.2	mg/L		27-JUN-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		27-JUN-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		27-JUN-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	127		1.0	mg/L		26-JUN-18	R4097988
Ammonia by colour							
Ammonia, Total (as N)	8.56		0.20	mg/L		27-JUN-18	R4099627
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	10.0		2.0	mg/L		25-JUN-18	R4111150
Carbonaceous BOD							
BOD Carbonaceous	5.0		2.0	mg/L		25-JUN-18	R4111150
Chloride in Water by IC							
Chloride (Cl)	155		0.50	mg/L		25-JUN-18	R4099408
Conductivity							
Conductivity	782		1.0	umhos/cm		26-JUN-18	R4097988
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		25-JUN-18	R4097310
Hardness Calculated							
Hardness (as CaCO3)	85.7	HTC	0.20	mg/L		03-JUL-18	
Mercury Total							
Mercury (Hg)-Total	0.0000107		0.0000050	mg/L	28-JUN-18	29-JUN-18	R4105452
Nitrate in Water by IC							
Nitrate (as N)	0.498		0.020	mg/L		25-JUN-18	R4099408
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.620		0.070	mg/L		28-JUN-18	
Nitrite in Water by IC							
Nitrite (as N)	0.122		0.010	mg/L		25-JUN-18	R4099408
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		04-JUL-18	R4113449
Phenol (4AAP)							
Phenols (4AAP)	0.0011		0.0010	mg/L		29-JUN-18	R4110409
Phosphorus, Total							
Phosphorus (P)-Total	3.15		0.010	mg/L		04-JUL-18	R4112349
Sulfate in Water by IC							
Sulfate (SO4)	13.6		0.30	mg/L		25-JUN-18	R4099408
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.151		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Arsenic (As)-Total	0.0110		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cadmium (Cd)-Total	0.0000610		0.0000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Calcium (Ca)-Total	15.4		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Chromium (Cr)-Total	0.00114		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cobalt (Co)-Total	0.00487		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Copper (Cu)-Total	0.0188		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Iron (Fe)-Total	4.02		0.010	mg/L	29-JUN-18	29-JUN-18	R4108907
Lead (Pb)-Total	0.00140		0.000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Magnesium (Mg)-Total	11.5		0.0050	mg/L	29-JUN-18	29-JUN-18	R4108907
Manganese (Mn)-Total	0.341		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Nickel (Ni)-Total	0.0107		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Potassium (K)-Total	18.3		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Sodium (Na)-Total	107		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907

* 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
L2118040-2 ARV - 4							
Sampled By: CLIENT on 21-JUN-18 @ 14:00							
Matrix: WASTE WATER							
Total Metals in Water by CRC ICPMS							
Zinc (Zn)-Total	0.0079		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Total Organic Carbon by Combustion							
Total Organic Carbon	33.2		0.50	mg/L		13-JUL-18	R4126236
Total Suspended Solids							
Total Suspended Solids	52.9		2.0	mg/L		28-JUN-18	R4104155
pH							
pH	7.29		0.10	pH units		26-JUN-18	R4097988
L2118040-3 ARV - 5							
Sampled By: CLIENT on 21-JUN-18 @ 14:43							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
Toluene	<0.0010		0.0010	mg/L		26-JUN-18	R4098476
Ethyl benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
o-Xylene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
m+p-Xylenes	<0.00040		0.00040	mg/L		26-JUN-18	R4098476
F1 (C6-C10)	<0.10		0.10	mg/L		26-JUN-18	R4098476
Surrogate: 4-Bromofluorobenzene (SS)	91.0		70-130	%		26-JUN-18	R4098476
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	28-JUN-18	30-JUN-18	R4106588
F3 (C16-C34)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
Surrogate: 2-Bromobenzotrifluoride	92.6		60-140	%	28-JUN-18	30-JUN-18	R4106588
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		28-JUN-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	55.5		1.2	mg/L		27-JUN-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		27-JUN-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		27-JUN-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	45.5		1.0	mg/L		26-JUN-18	R4097988
Ammonia by colour							
Ammonia, Total (as N)	0.013		0.010	mg/L		27-JUN-18	R4099627
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		25-JUN-18	R4111150
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		25-JUN-18	R4111150
Chloride in Water by IC							
Chloride (Cl)	131		0.50	mg/L		25-JUN-18	R4099408
Conductivity							
Conductivity	537		1.0	umhos/cm		26-JUN-18	R4097988
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		25-JUN-18	R4097310
Hardness Calculated							

* 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
L2118040-3 ARV - 5							
Sampled By: CLIENT on 21-JUN-18 @ 14:43							
Matrix: WASTE WATER							
Hardness Calculated							
Hardness (as CaCO3)	81.6	HTC	0.20	mg/L		03-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	28-JUN-18	29-JUN-18	R4105452
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		25-JUN-18	R4099408
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		28-JUN-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		25-JUN-18	R4099408
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		04-JUL-18	R4113449
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		29-JUN-18	R4110409
Phosphorus, Total							
Phosphorus (P)-Total	0.0058		0.0010	mg/L		04-JUL-18	R4112349
Sulfate in Water by IC							
Sulfate (SO4)	13.2		0.30	mg/L		25-JUN-18	R4099408
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0158		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Arsenic (As)-Total	0.00040		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Calcium (Ca)-Total	14.8		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Chromium (Cr)-Total	0.00014		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Copper (Cu)-Total	0.00059		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Iron (Fe)-Total	0.514		0.010	mg/L	29-JUN-18	29-JUN-18	R4108907
Lead (Pb)-Total	0.000052		0.000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Magnesium (Mg)-Total	10.8		0.0050	mg/L	29-JUN-18	29-JUN-18	R4108907
Manganese (Mn)-Total	0.00856		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Nickel (Ni)-Total	0.00055		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Potassium (K)-Total	4.92		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Sodium (Na)-Total	72.2		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Zinc (Zn)-Total	0.0031		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Total Organic Carbon by Combustion							
Total Organic Carbon	7.76		0.50	mg/L		13-JUL-18	R4126236
Total Suspended Solids							
Total Suspended Solids	<2.0		2.0	mg/L		28-JUN-18	R4104155
pH							
pH	7.67		0.10	pH units		26-JUN-18	R4097988
L2118040-4 ARV - 6							
Sampled By: CLIENT on 21-JUN-18 @ 14:57							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
Toluene	0.0012		0.0010	mg/L		26-JUN-18	R4098476
Ethyl benzene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
o-Xylene	<0.00050		0.00050	mg/L		26-JUN-18	R4098476
m+p-Xylenes	<0.00040		0.00040	mg/L		26-JUN-18	R4098476
F1 (C6-C10)	<0.10		0.10	mg/L		26-JUN-18	R4098476
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%		26-JUN-18	R4098476
CCME PHC F2-F4 in Water							

* 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
L2118040-4 ARV - 6							
Sampled By: CLIENT on 21-JUN-18 @ 14:57							
Matrix: WASTE WATER							
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	28-JUN-18	30-JUN-18	R4106588
F3 (C16-C34)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-18	30-JUN-18	R4106588
Surrogate: 2-Bromobenzotrifluoride	85.0		60-140	%	28-JUN-18	30-JUN-18	R4106588
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		04-JUL-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		04-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		03-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	98.7		1.2	mg/L		27-JUN-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		27-JUN-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		27-JUN-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	80.9		1.0	mg/L		26-JUN-18	R4097988
Ammonia by colour							
Ammonia, Total (as N)	0.122		0.010	mg/L		27-JUN-18	R4099627
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	11.4		2.0	mg/L		25-JUN-18	R4111150
Carbonaceous BOD							
BOD Carbonaceous	7.3		2.0	mg/L		25-JUN-18	R4111150
Chloride in Water by IC							
Chloride (Cl)	247		0.50	mg/L		25-JUN-18	R4099408
Conductivity							
Conductivity	944		1.0	umhos/cm		26-JUN-18	R4097988
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	PEHR	10	MPN/100mL		25-JUN-18	R4097310
Hardness Calculated							
Hardness (as CaCO3)	319	HTC	0.20	mg/L		04-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	28-JUN-18	29-JUN-18	R4105452
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		25-JUN-18	R4099408
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		28-JUN-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		25-JUN-18	R4099408
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		04-JUL-18	R4113449
Phenol (4AAP)							
Phenols (4AAP)	0.0145		0.0010	mg/L		29-JUN-18	R4110409
Phosphorus, Total							
Phosphorus (P)-Total	0.0433		0.0010	mg/L		04-JUL-18	R4112349
Sulfate in Water by IC							
Sulfate (SO4)	0.99		0.30	mg/L		25-JUN-18	R4099408
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0202		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Arsenic (As)-Total	0.00068		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907

* 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
L2118040-4 ARV - 6							
Sampled By: CLIENT on 21-JUN-18 @ 14:57							
Matrix: WASTE WATER							
Total Metals in Water by CRC ICPMS							
Cadmium (Cd)-Total	0.0000150		0.0000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Calcium (Ca)-Total	101		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Chromium (Cr)-Total	0.00024		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Cobalt (Co)-Total	0.00347		0.00010	mg/L	29-JUN-18	29-JUN-18	R4108907
Copper (Cu)-Total	0.00123		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Iron (Fe)-Total	8.93		0.010	mg/L	29-JUN-18	29-JUN-18	R4108907
Lead (Pb)-Total	0.000102		0.000050	mg/L	29-JUN-18	29-JUN-18	R4108907
Magnesium (Mg)-Total	16.3		0.0050	mg/L	29-JUN-18	29-JUN-18	R4108907
Manganese (Mn)-Total	3.91		0.010	mg/L	29-JUN-18	03-JUL-18	R4110907
Nickel (Ni)-Total	0.00419		0.00050	mg/L	29-JUN-18	29-JUN-18	R4108907
Potassium (K)-Total	9.58		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Sodium (Na)-Total	43.5		0.050	mg/L	29-JUN-18	29-JUN-18	R4108907
Zinc (Zn)-Total	0.0131		0.0030	mg/L	29-JUN-18	29-JUN-18	R4108907
Total Organic Carbon by Combustion							
Total Organic Carbon	16.3		0.50	mg/L		13-JUL-18	R4126236
Total Suspended Solids							
Total Suspended Solids	34.7		2.0	mg/L		28-JUN-18	R4104155
pH							
pH	6.92		0.10	pH units		26-JUN-18	R4097988

* 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.
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-L-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous 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.

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:

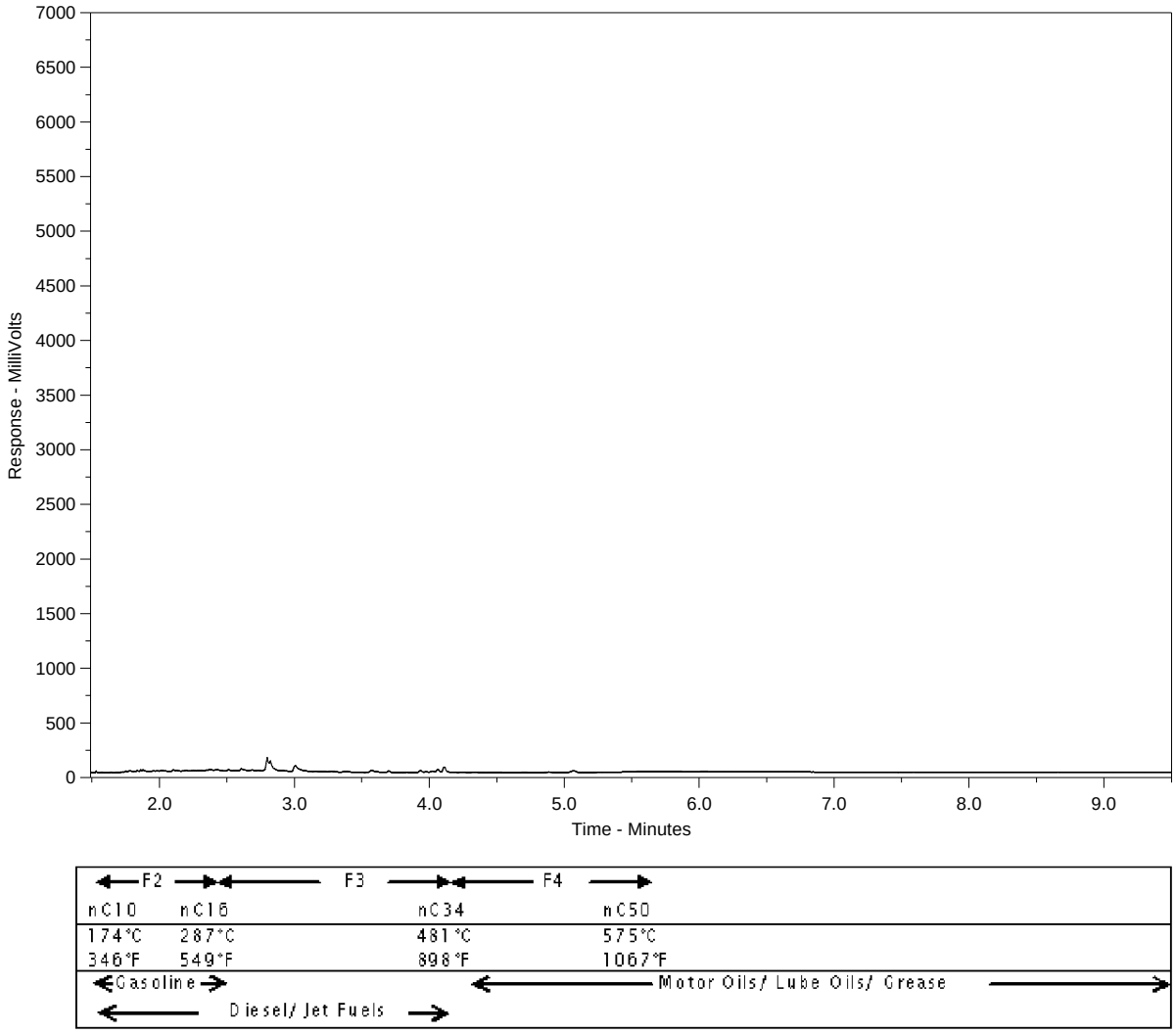
GLOSSARY OF REPORT TERMS

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: L2118040-1
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.

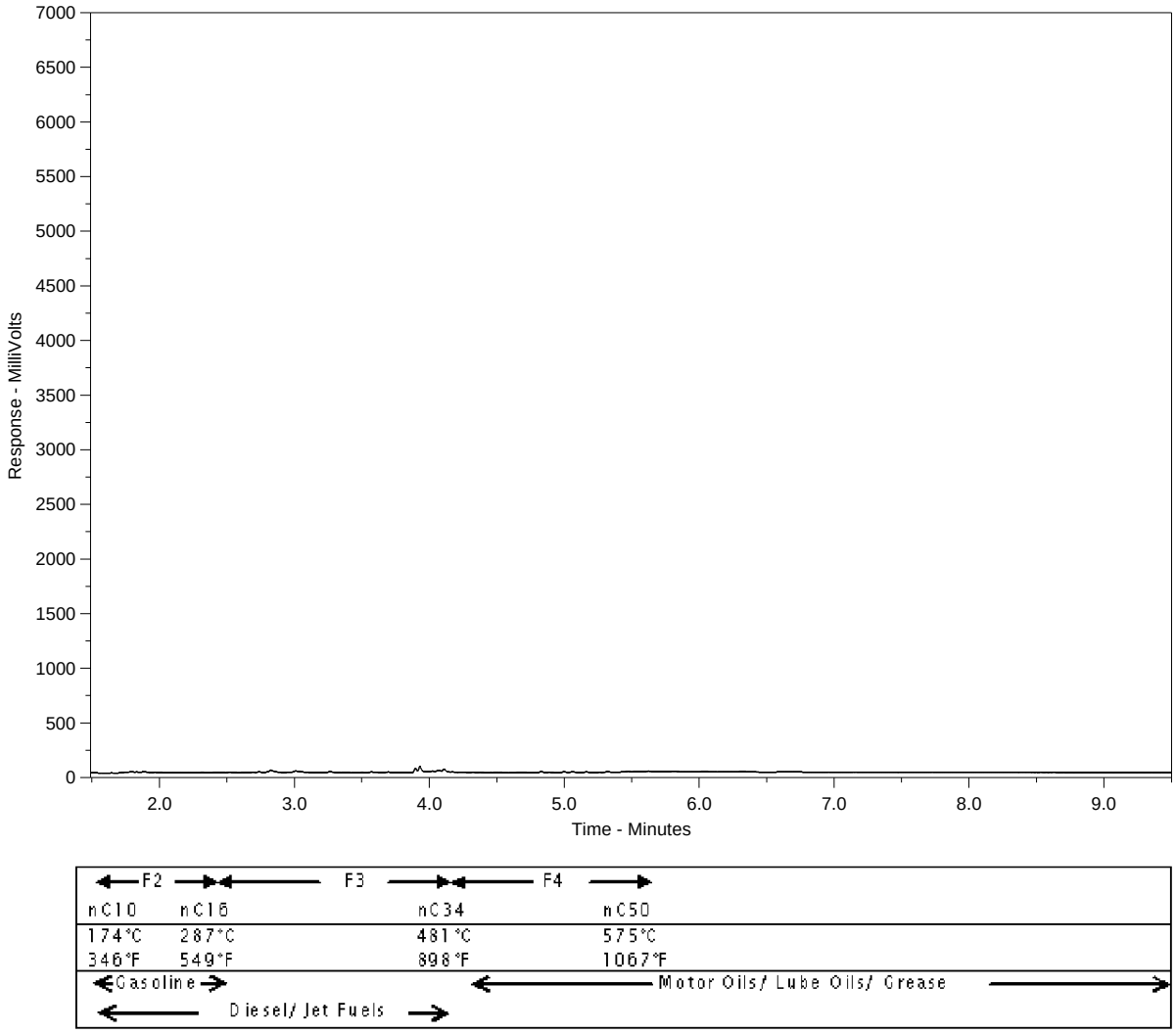
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2118040-2
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.

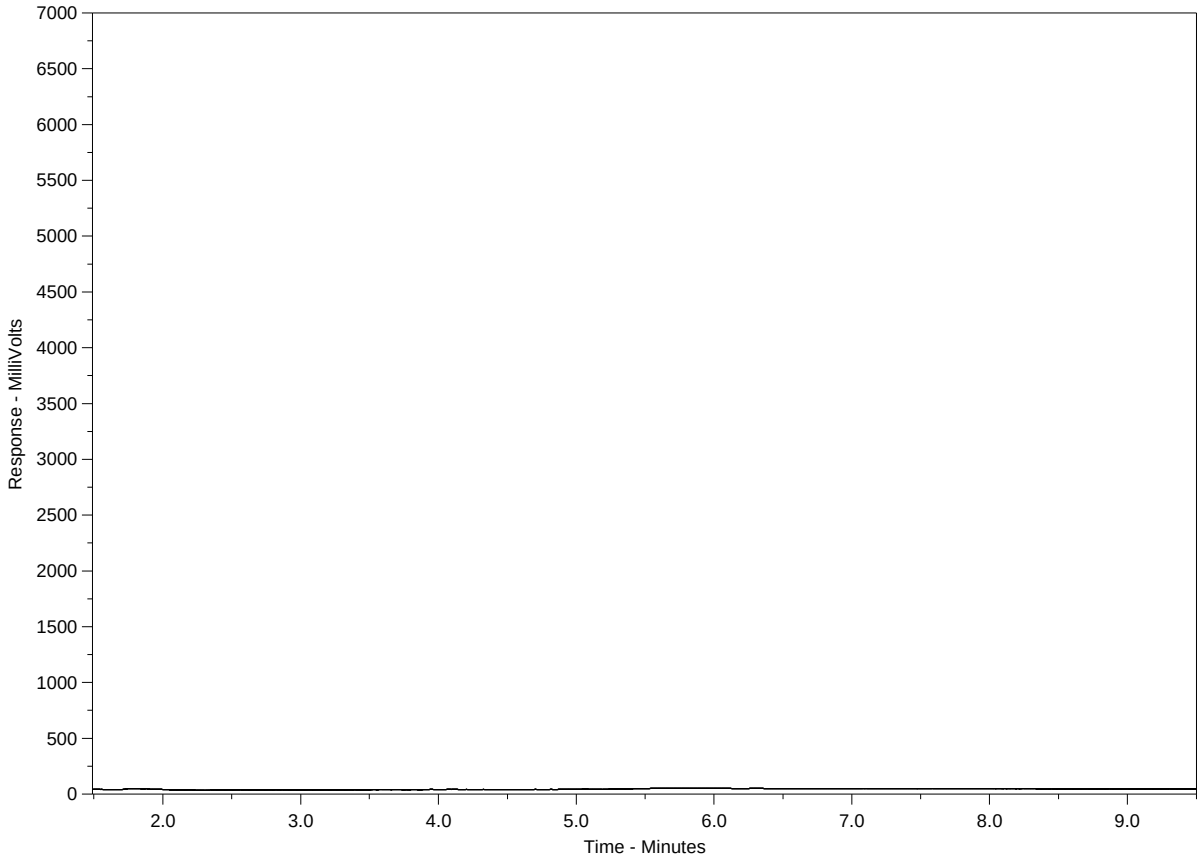
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

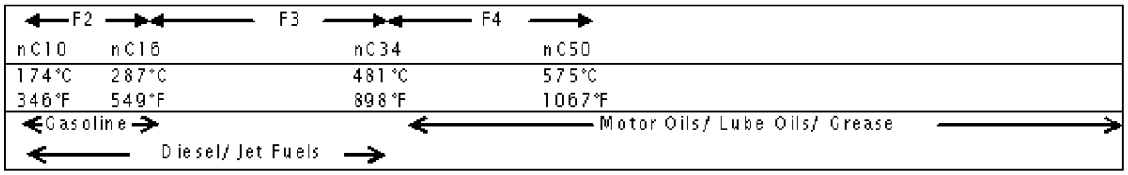
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2118040-3
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.

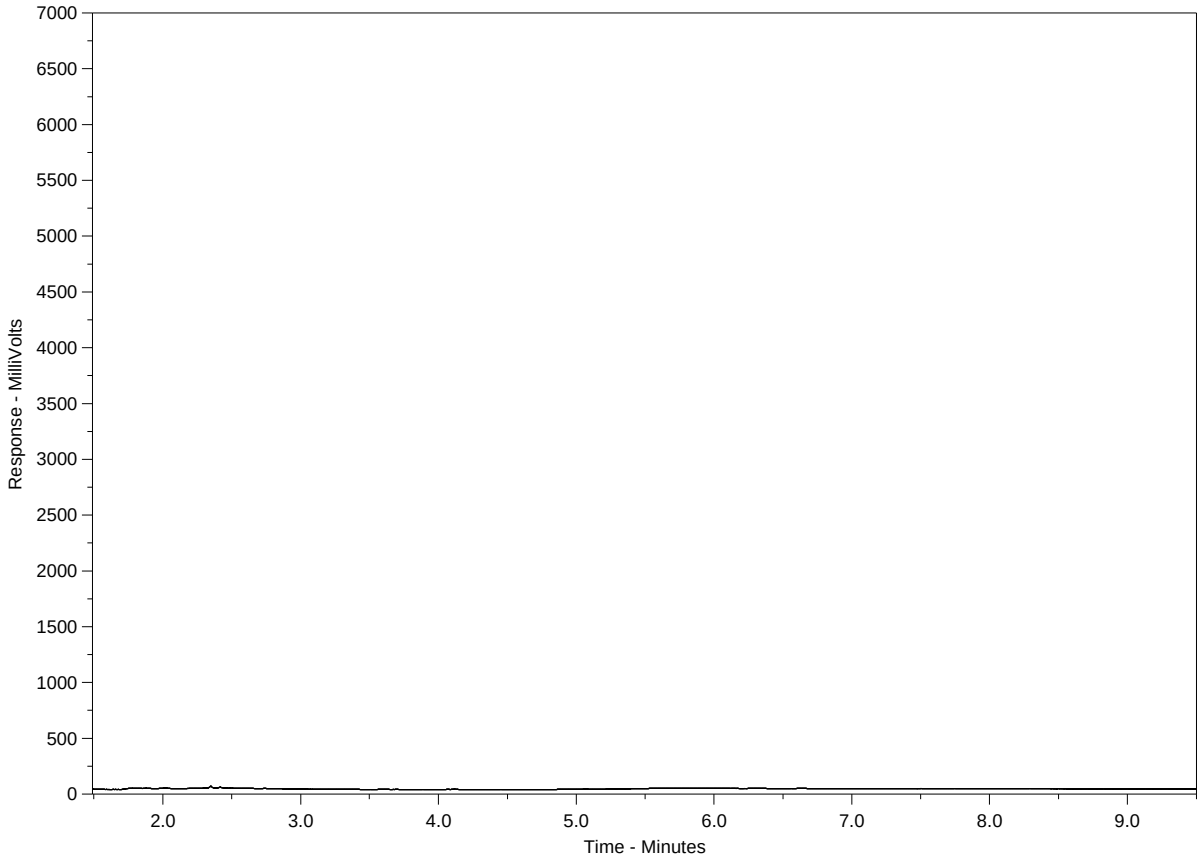
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

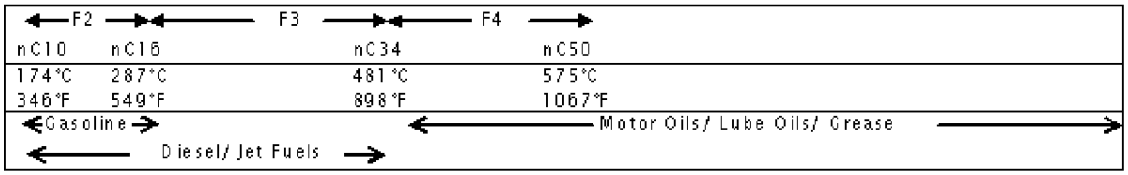
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2118040-4
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

L2118040-COFC

COC Number: 14 - 450477

Page 1 of ___

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@gn.gov.nu.ca	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	BOD	Routine Nitric Acid Preserved	Mercury	Oil & Grease	Sulfuric Acid	Phenols	F2/F4	Number of Containers
	ARV-2	21-06-18	2230		✓	✓	✓	✓	✓	✓	✓	
	ARV-4	21-06-18	2100		✓	✓	✓	✓	✓	✓	✓	
	ARV-5	21-06-18	243		✓	✓	✓	✓	✓	✓	✓	
	ARV-6	21-06-18	257		✓	✓	✓	✓	✓	✓	✓	

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		
					10°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:
Laura	21-06-18	3155		June 25/18	1000			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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.**

Appendix D

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

Date Received: 18-JUL-18
Report Date: 30-JUL-18 13:42 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L2131552

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
L2131552-1 ARV - 2							
Sampled By: CLIENT on 17-JUL-18 @ 08:43							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
Toluene	<0.0010		0.0010	mg/L		19-JUL-18	R4138287
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-18	R4138287
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-18	R4138287
Surrogate: 4-Bromofluorobenzene (SS)	101.1		70-130	%		19-JUL-18	R4138287
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.17		0.10	mg/L	19-JUL-18	19-JUL-18	R4130550
F3 (C16-C34)	0.30		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
Surrogate: 2-Bromobenzotrifluoride	95.9		60-140	%	19-JUL-18	19-JUL-18	R4130550
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		23-JUL-18	
Total Hydrocarbons (C6-C50)	0.48		0.38	mg/L		23-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		23-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	478		1.2	mg/L		20-JUL-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		20-JUL-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		20-JUL-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	391		1.0	mg/L		19-JUL-18	R4133573
Ammonia by colour							
Ammonia, Total (as N)	5.27		0.20	mg/L		24-JUL-18	R4140131
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	25.5		6.0	mg/L		19-JUL-18	R4141828
Carbonaceous BOD							
BOD Carbonaceous	20.5		6.0	mg/L		19-JUL-18	R4141828
Chloride in Water by IC							
Chloride (Cl)	691		10	mg/L		19-JUL-18	R4135773
Conductivity							
Conductivity	3580		1.0	umhos/cm		19-JUL-18	R4133573
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	30	MBHT	10	MPN/100mL		18-JUL-18	R4133088
Hardness Calculated							
Hardness (as CaCO3)	879	HTC	0.20	mg/L		25-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-18	20-JUL-18	R4134551
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		19-JUL-18	R4135773
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		25-JUL-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLM	0.20	mg/L		19-JUL-18	R4135773
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		25-JUL-18	R4145146
Phenol (4AAP)							

* 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
L2131552-1 ARV - 2							
Sampled By: CLIENT on 17-JUL-18 @ 08:43							
Matrix: WATER							
Phenol (4AAP)							
Phenols (4AAP)	0.0049		0.0010	mg/L		23-JUL-18	R4139243
Phosphorus, Total							
Phosphorus (P)-Total	0.363		0.0010	mg/L		24-JUL-18	R4139681
Sulfate in Water by IC							
Sulfate (SO4)	456		6.0	mg/L		19-JUL-18	R4135773
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0271		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Arsenic (As)-Total	0.00557		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cadmium (Cd)-Total	0.0000338		0.0000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Calcium (Ca)-Total	201		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Chromium (Cr)-Total	0.00215		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cobalt (Co)-Total	0.00124		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Copper (Cu)-Total	0.00960		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Iron (Fe)-Total	1.10		0.010	mg/L	20-JUL-18	20-JUL-18	R4136049
Lead (Pb)-Total	0.000967		0.000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Magnesium (Mg)-Total	91.8		0.0050	mg/L	20-JUL-18	20-JUL-18	R4136049
Manganese (Mn)-Total	0.213		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Nickel (Ni)-Total	0.00904		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Potassium (K)-Total	82.7		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Sodium (Na)-Total	473		5.0	mg/L	20-JUL-18	23-JUL-18	R4139615
Zinc (Zn)-Total	0.0151		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Total Organic Carbon by Combustion							
Total Organic Carbon	53.4		0.50	mg/L		27-JUL-18	R4146287
Total Suspended Solids							
Total Suspended Solids	8.1		2.0	mg/L		24-JUL-18	R4140196
pH							
pH	8.10		0.10	pH units		19-JUL-18	R4133573
L2131552-2 ARV - 4							
Sampled By: CLIENT on 17-JUL-18 @ 08:30							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
Toluene	0.0015		0.0010	mg/L		25-JUL-18	R4138287
Ethyl benzene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
o-Xylene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
m+p-Xylenes	<0.00040		0.00040	mg/L		25-JUL-18	R4138287
F1 (C6-C10)	<0.20	DLM	0.20	mg/L		25-JUL-18	R4138287
Surrogate: 4-Bromofluorobenzene (SS)	83.1		70-130	%		25-JUL-18	R4138287
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.13		0.10	mg/L	19-JUL-18	19-JUL-18	R4130550
F3 (C16-C34)	0.59		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
Surrogate: 2-Bromobenzotrifluoride	79.5		60-140	%	19-JUL-18	19-JUL-18	R4130550
CCME Total Hydrocarbons							
F1-BTEX	<0.20		0.20	mg/L		26-JUL-18	
Total Hydrocarbons (C6-C50)	0.72		0.42	mg/L		26-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							

* 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
L2131552-2 ARV - 4							
Sampled By: CLIENT on 17-JUL-18 @ 08:30							
Matrix: WATER							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	310		1.2	mg/L		20-JUL-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		20-JUL-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		20-JUL-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	254		1.0	mg/L		19-JUL-18	R4133573
Ammonia by colour							
Ammonia, Total (as N)	43.7		5.0	mg/L		24-JUL-18	R4140131
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	43		20	mg/L		19-JUL-18	R4141828
Carbonaceous BOD							
BOD Carbonaceous	30.6		6.0	mg/L		19-JUL-18	R4141828
Chloride in Water by IC							
Chloride (Cl)	194		2.5	mg/L		19-JUL-18	R4135773
Conductivity							
Conductivity	1120		1.0	umhos/cm		19-JUL-18	R4133573
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200	MBHT	10	MPN/100mL		18-JUL-18	R4133088
Hardness Calculated							
Hardness (as CaCO3)	123	HTC	0.20	mg/L		23-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.000025		0.000025	mg/L	19-JUL-18	20-JUL-18	R4134551
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		19-JUL-18	R4135773
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		25-JUL-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		19-JUL-18	R4135773
Oil & Grease - Gravimetric							
Oil and Grease	5.6		5.0	mg/L		25-JUL-18	R4145146
Phenol (4AAP)							
Phenols (4AAP)	0.0049		0.0010	mg/L		23-JUL-18	R4139243
Phosphorus, Total							
Phosphorus (P)-Total	7.80		0.010	mg/L		24-JUL-18	R4139681
Sulfate in Water by IC							
Sulfate (SO4)	6.9		1.5	mg/L		19-JUL-18	R4135773
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.156		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Arsenic (As)-Total	0.00758		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cadmium (Cd)-Total	0.0000524		0.0000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Calcium (Ca)-Total	21.7		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Chromium (Cr)-Total	0.00112		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cobalt (Co)-Total	0.00273		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Copper (Cu)-Total	0.0374		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Iron (Fe)-Total	4.58		0.010	mg/L	20-JUL-18	20-JUL-18	R4136049
Lead (Pb)-Total	0.00172		0.000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Magnesium (Mg)-Total	16.7		0.0050	mg/L	20-JUL-18	20-JUL-18	R4136049
Manganese (Mn)-Total	0.418		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Nickel (Ni)-Total	0.00772		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Potassium (K)-Total	24.0		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Sodium (Na)-Total	137		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049

* 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
L2131552-2 ARV - 4							
Sampled By: CLIENT on 17-JUL-18 @ 08:30							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Zinc (Zn)-Total	0.0225		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Total Organic Carbon by Combustion							
Total Organic Carbon	39.7		0.50	mg/L		27-JUL-18	R4146287
Total Suspended Solids							
Total Suspended Solids	49.6		6.0	mg/L		24-JUL-18	R4140196
pH							
pH	7.25		0.10	pH units		19-JUL-18	R4133573
L2131552-3 ARV - 5							
Sampled By: CLIENT on 17-JUL-18 @ 08:55							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
Toluene	<0.0010		0.0010	mg/L		19-JUL-18	R4138287
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-18	R4138287
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-18	R4138287
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-18	R4138287
Surrogate: 4-Bromofluorobenzene (SS)	95.4		70-130	%		19-JUL-18	R4138287
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	19-JUL-18	19-JUL-18	R4130550
F3 (C16-C34)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
Surrogate: 2-Bromobenzotrifluoride	103.2		60-140	%	19-JUL-18	19-JUL-18	R4130550
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		23-JUL-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		23-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		23-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	92.0		1.2	mg/L		20-JUL-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		20-JUL-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		20-JUL-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	75.4		1.0	mg/L		19-JUL-18	R4133573
Ammonia by colour							
Ammonia, Total (as N)	0.025		0.010	mg/L		21-JUL-18	R4139040
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		19-JUL-18	R4141828
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		19-JUL-18	R4141828
Chloride in Water by IC							
Chloride (Cl)	259		1.0	mg/L		19-JUL-18	R4135773
Conductivity							
Conductivity	953		1.0	umhos/cm		19-JUL-18	R4133573
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	30	MBHT	10	MPN/100mL		18-JUL-18	R4133088
Hardness Calculated							

* 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
L2131552-3 ARV - 5							
Sampled By: CLIENT on 17-JUL-18 @ 08:55							
Matrix: WATER							
Hardness Calculated							
Hardness (as CaCO3)	138	HTC	0.20	mg/L		23-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-JUL-18	20-JUL-18	R4134551
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		19-JUL-18	R4135773
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		25-JUL-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		19-JUL-18	R4135773
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		26-JUL-18	R4147972
Phenol (4AAP)							
Phenols (4AAP)	0.0011		0.0010	mg/L		23-JUL-18	R4139243
Phosphorus, Total							
Phosphorus (P)-Total	0.0314		0.0010	mg/L		24-JUL-18	R4139681
Sulfate in Water by IC							
Sulfate (SO4)	5.40		0.60	mg/L		19-JUL-18	R4135773
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0157		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Arsenic (As)-Total	0.00076		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Calcium (Ca)-Total	21.7		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Chromium (Cr)-Total	0.00018		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cobalt (Co)-Total	0.00029		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Copper (Cu)-Total	0.00066		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Iron (Fe)-Total	1.79		0.010	mg/L	20-JUL-18	20-JUL-18	R4136049
Lead (Pb)-Total	0.000072		0.000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Magnesium (Mg)-Total	20.2		0.0050	mg/L	20-JUL-18	20-JUL-18	R4136049
Manganese (Mn)-Total	0.150		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Nickel (Ni)-Total	0.00077		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Potassium (K)-Total	6.81		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Sodium (Na)-Total	144		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Zinc (Zn)-Total	0.0052		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Total Organic Carbon by Combustion							
Total Organic Carbon	11.4		0.50	mg/L		27-JUL-18	R4146287
Total Suspended Solids							
Total Suspended Solids	3.1		2.0	mg/L		24-JUL-18	R4140196
pH							
pH	7.51		0.10	pH units		19-JUL-18	R4133573
L2131552-4 ARV - 6							
Sampled By: CLIENT on 17-JUL-18 @ 09:05							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
Toluene	0.0013		0.0010	mg/L		25-JUL-18	R4138287
Ethyl benzene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
o-Xylene	<0.00050		0.00050	mg/L		25-JUL-18	R4138287
m+p-Xylenes	<0.00040		0.00040	mg/L		25-JUL-18	R4138287
F1 (C6-C10)	<0.10		0.10	mg/L		25-JUL-18	R4138287
Surrogate: 4-Bromofluorobenzene (SS)	96.7		70-130	%		25-JUL-18	R4138287
CCME PHC F2-F4 in Water							

* 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
L2131552-4 ARV - 6							
Sampled By: CLIENT on 17-JUL-18 @ 09:05							
Matrix: WATER							
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.16		0.10	mg/L	19-JUL-18	19-JUL-18	R4130550
F3 (C16-C34)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
F4 (C34-C50)	<0.25		0.25	mg/L	19-JUL-18	19-JUL-18	R4130550
Surrogate: 2-Bromobenzotrifluoride	83.6		60-140	%	19-JUL-18	19-JUL-18	R4130550
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		26-JUL-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		26-JUL-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-JUL-18	
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	136		1.2	mg/L		20-JUL-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		20-JUL-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		20-JUL-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	111		1.0	mg/L		19-JUL-18	R4133573
Ammonia by colour							
Ammonia, Total (as N)	0.639		0.020	mg/L		24-JUL-18	R4140131
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<6		6.0	mg/L		19-JUL-18	R4141828
Carbonaceous BOD							
BOD Carbonaceous	<6		6.0	mg/L		19-JUL-18	R4141828
Chloride in Water by IC							
Chloride (Cl)	177		0.50	mg/L		19-JUL-18	R4135773
Conductivity							
Conductivity	767		1.0	umhos/cm		19-JUL-18	R4133573
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		18-JUL-18	R4133088
Hardness Calculated							
Hardness (as CaCO3)	272	HTC	0.20	mg/L		25-JUL-18	
Mercury Total							
Mercury (Hg)-Total	<0.000010		0.000010	mg/L	19-JUL-18	20-JUL-18	R4134551
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		19-JUL-18	R4135773
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		25-JUL-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		19-JUL-18	R4135773
Oil & Grease - Gravimetric							
Oil and Grease	6.5		5.0	mg/L		26-JUL-18	R4147972
Phenol (4AAP)							
Phenols (4AAP)	0.0043		0.0010	mg/L		23-JUL-18	R4139243
Phosphorus, Total							
Phosphorus (P)-Total	0.399		0.0010	mg/L		24-JUL-18	R4139681
Sulfate in Water by IC							
Sulfate (SO4)	0.59		0.30	mg/L		19-JUL-18	R4135773
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.132		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Arsenic (As)-Total	0.00321		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049

* 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
L2131552-4 ARV - 6							
Sampled By: CLIENT on 17-JUL-18 @ 09:05							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Cadmium (Cd)-Total	0.0000172		0.0000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Calcium (Ca)-Total	84.7		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Chromium (Cr)-Total	0.00097		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Cobalt (Co)-Total	0.00198		0.00010	mg/L	20-JUL-18	20-JUL-18	R4136049
Copper (Cu)-Total	0.00116		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Iron (Fe)-Total	34.0		0.010	mg/L	20-JUL-18	20-JUL-18	R4136049
Lead (Pb)-Total	0.000272		0.000050	mg/L	20-JUL-18	20-JUL-18	R4136049
Magnesium (Mg)-Total	14.7		0.0050	mg/L	20-JUL-18	20-JUL-18	R4136049
Manganese (Mn)-Total	1.60		0.010	mg/L	20-JUL-18	23-JUL-18	R4139615
Nickel (Ni)-Total	0.00189		0.00050	mg/L	20-JUL-18	20-JUL-18	R4136049
Potassium (K)-Total	9.17		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Sodium (Na)-Total	35.0		0.050	mg/L	20-JUL-18	20-JUL-18	R4136049
Zinc (Zn)-Total	0.0173		0.0030	mg/L	20-JUL-18	20-JUL-18	R4136049
Total Organic Carbon by Combustion							
Total Organic Carbon	17.9		0.50	mg/L		27-JUL-18	R4146287
Total Suspended Solids							
Total Suspended Solids	132		6.0	mg/L		24-JUL-18	R4140196
pH							
pH	6.77		0.10	pH units		19-JUL-18	R4133573

* 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).
MBHT	The APHA 30 hour hold time was exceeded for microbiological testing. Samples processed within 48 hours from time of sampling may be valid in some cases (refer to Health Canada guidance).
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-L-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous 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.

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:

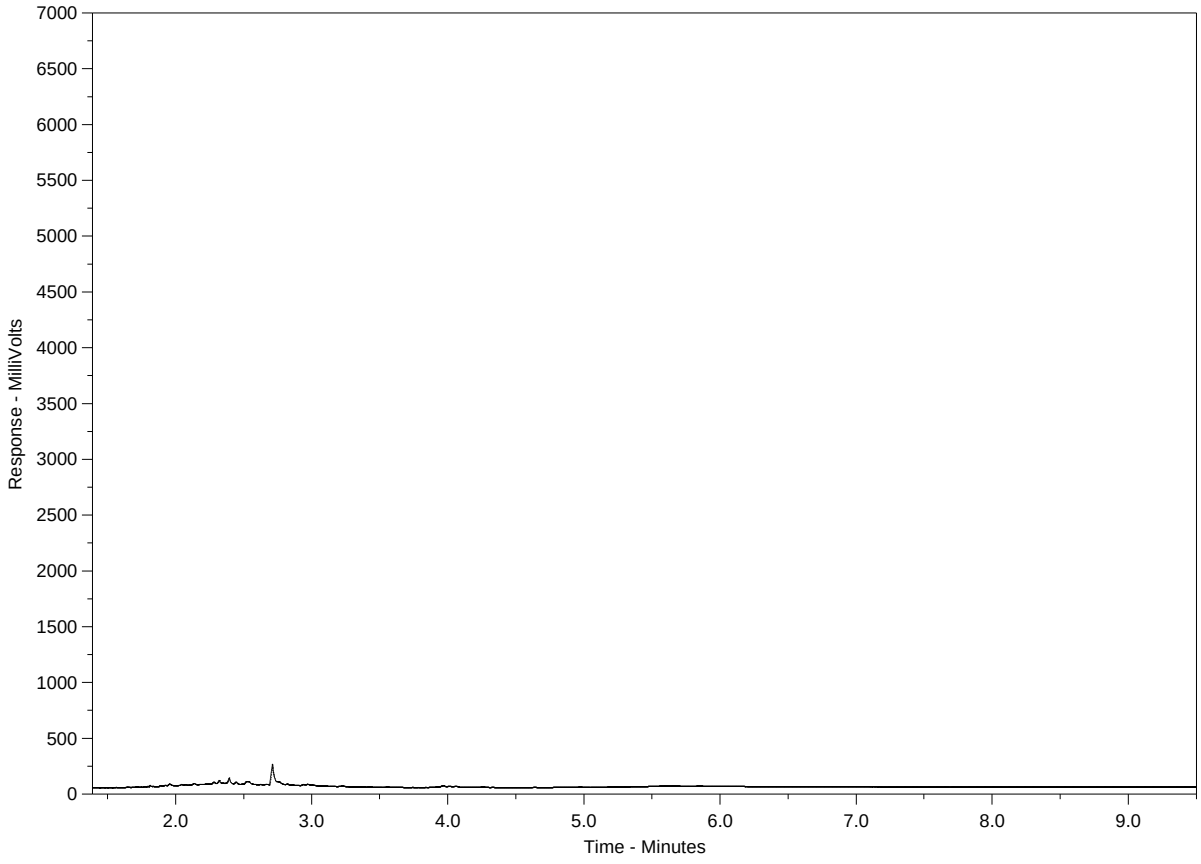
GLOSSARY OF REPORT TERMS

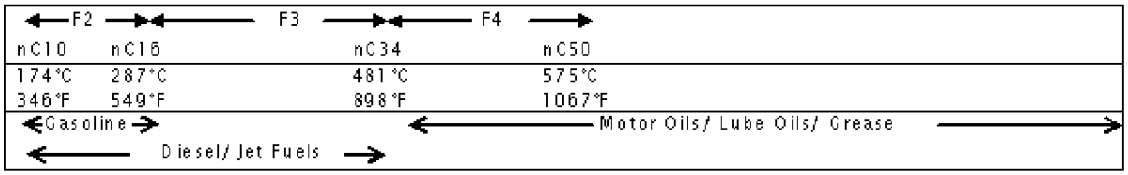
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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: L2131552-1
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.

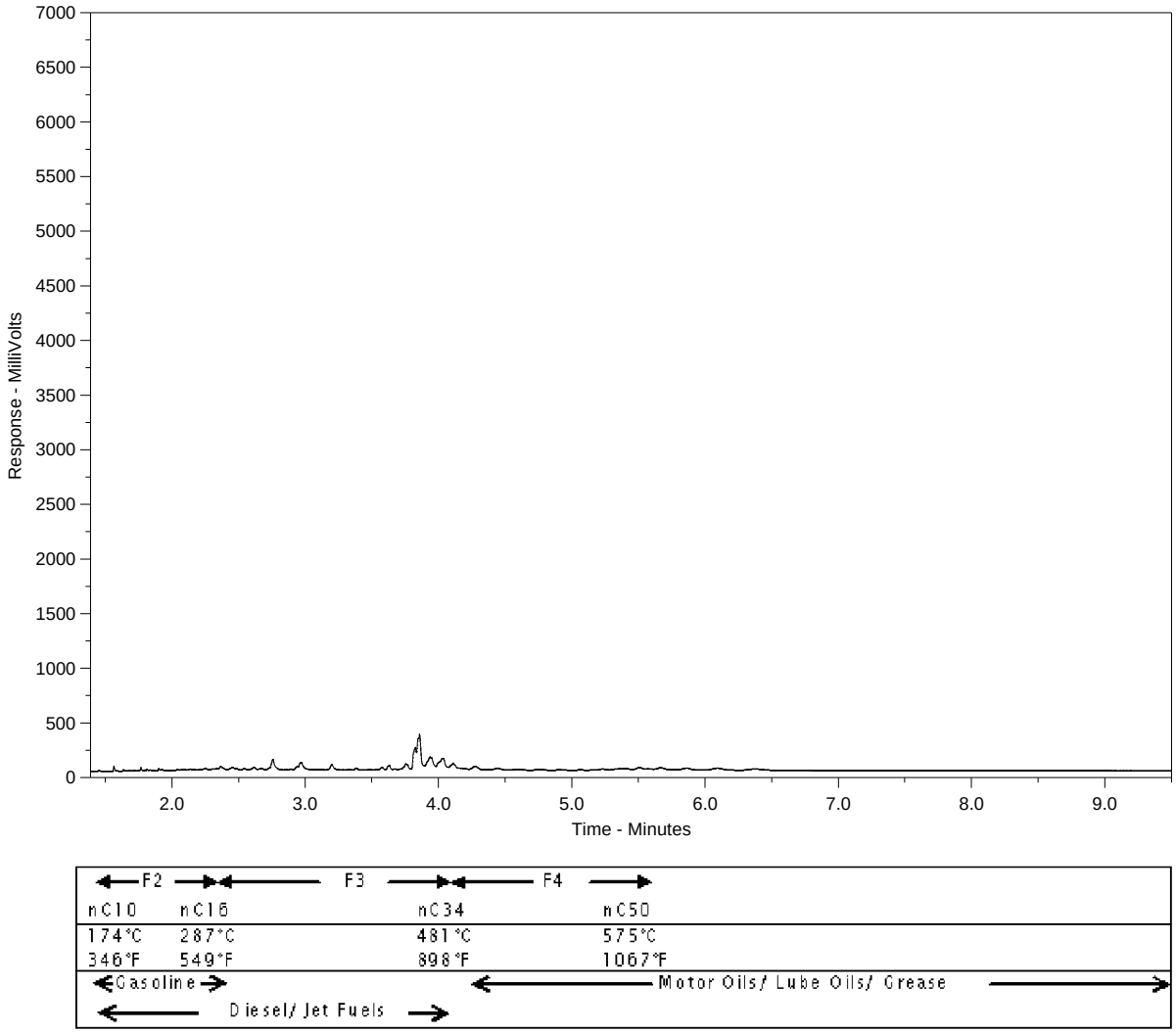
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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: L2131552-2
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.

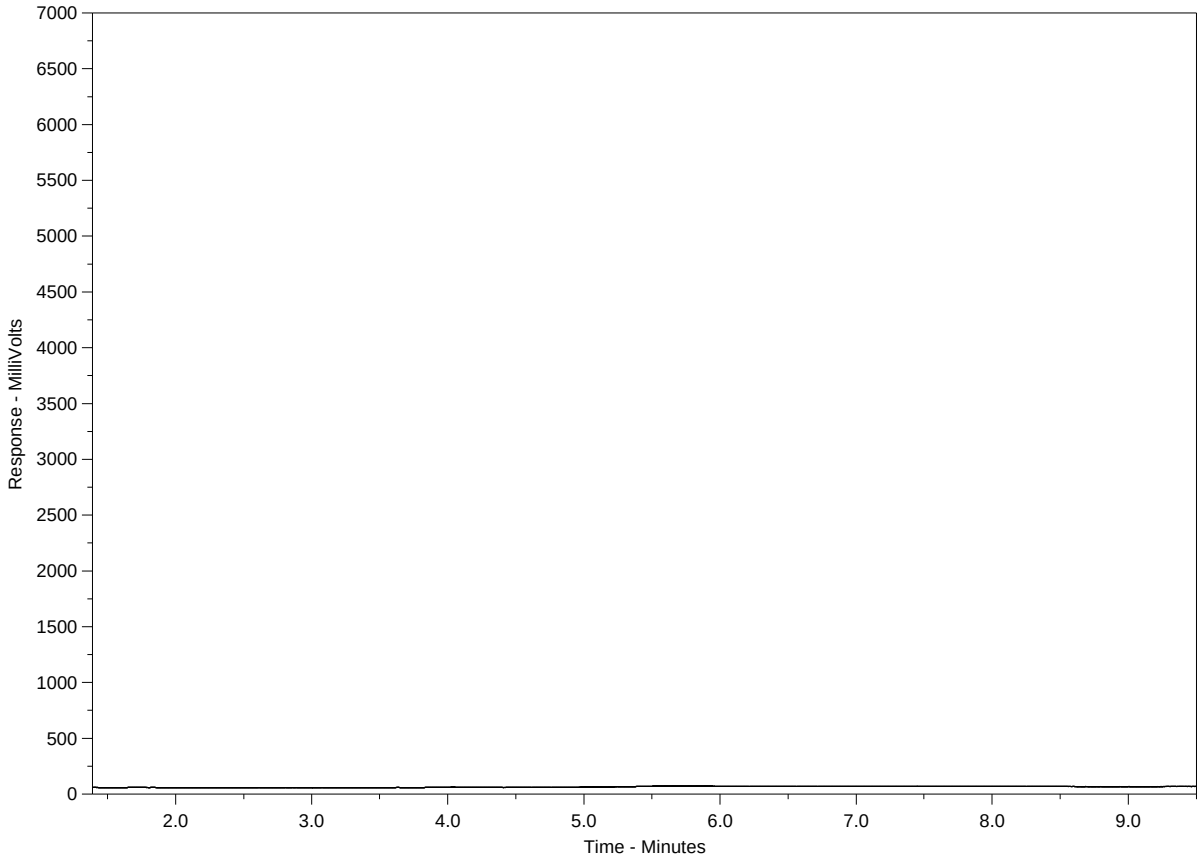
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

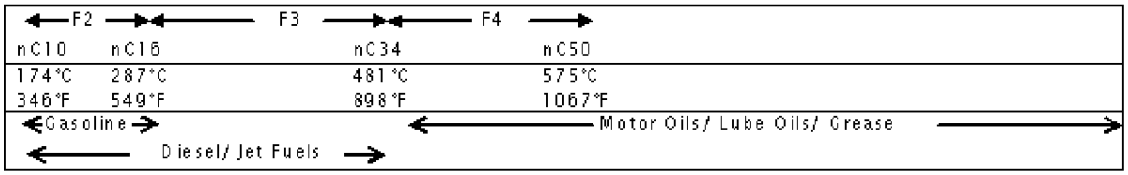
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2131552-3
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.

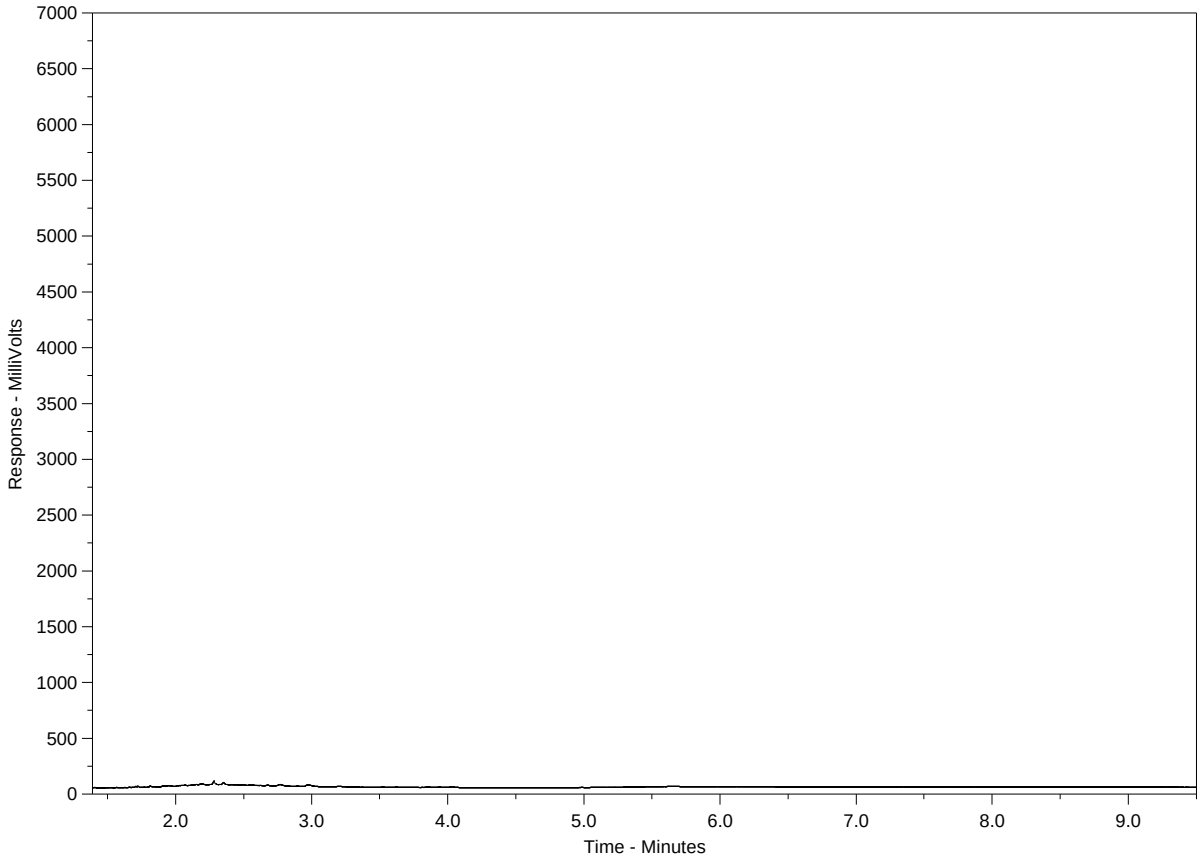
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

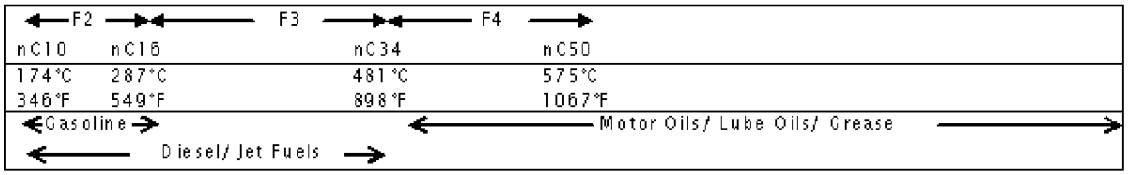
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2131552-4
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) / Analyti... Request Form

Canada Toll Free: 1 800 668 9878

L2131552-COFC

COC Number: 14 - 450473

Page ____ of ____

Report To		Report Format / Distribution		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	arviatsae@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	Boteng	Mercury	Oil & Grease	Sulfuric Acid	Phenols	F2/F4	Number of Containers
	ARV-2	17/07/18	843am	Laura	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	17/07/18	830am	Laura	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	17/07/18	855am	La	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	17/07/18	905am	La	✓	✓	✓	✓	✓	✓	✓	✓	✓	

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		
					10

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	July 17/18	9:22am					JUN 18 2018	BD

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0328a v08 Front03 October 2013

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.**

Appendix E

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

Date Received: 14-AUG-18
Report Date: 28-AUG-18 07:31 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L2146326

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
L2146326-1 ARV-2							
Sampled By: CLIENT on 13-AUG-18 @ 08:45							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
Toluene	<0.0010		0.0010	mg/L		15-AUG-18	R4175024
Ethyl benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
o-Xylene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
m+p-Xylenes	<0.00040		0.00040	mg/L		15-AUG-18	R4175024
F1 (C6-C10)	<0.10		0.10	mg/L		15-AUG-18	R4175024
Surrogate: 4-Bromofluorobenzene (SS)	92.2		70-130	%		15-AUG-18	R4175024
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.13		0.10	mg/L	17-AUG-18	17-AUG-18	R4176931
F3 (C16-C34)	0.36		0.25	mg/L	17-AUG-18	17-AUG-18	R4176931
F4 (C34-C50)	<0.25		0.25	mg/L	17-AUG-18	17-AUG-18	R4176931
Surrogate: 2-Bromobenzotrifluoride	102.6		60-140	%	17-AUG-18	17-AUG-18	R4176931
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		22-AUG-18	
F2-Naphth	0.13		0.10	mg/L		22-AUG-18	
F3-PAH	0.36		0.25	mg/L		22-AUG-18	
Total Hydrocarbons (C6-C50)	0.50		0.38	mg/L		22-AUG-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		17-AUG-18	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Acenaphthene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Acenaphthylene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Anthracene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Acridine	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Benzo(a)anthracene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	18-AUG-18	20-AUG-18	R4180385
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Chrysene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	18-AUG-18	20-AUG-18	R4180385
Fluoranthene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Fluorene	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Naphthalene	<0.000050		0.000050	mg/L	18-AUG-18	20-AUG-18	R4180385
Phenanthrene	<0.000050		0.000050	mg/L	18-AUG-18	20-AUG-18	R4180385
Pyrene	<0.000010		0.000010	mg/L	18-AUG-18	20-AUG-18	R4180385
Quinoline	<0.000020		0.000020	mg/L	18-AUG-18	20-AUG-18	R4180385
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	18-AUG-18	20-AUG-18	R4180385
Surrogate: Acenaphthene d10	85.5		40-130	%	18-AUG-18	20-AUG-18	R4180385
Surrogate: Acridine d9	85.8		40-130	%	18-AUG-18	20-AUG-18	R4180385
Surrogate: Chrysene d12	63.4		40-130	%	18-AUG-18	20-AUG-18	R4180385
Surrogate: Naphthalene d8	78.5		40-130	%	18-AUG-18	20-AUG-18	R4180385
Surrogate: Phenanthrene d10	80.8		40-130	%	18-AUG-18	20-AUG-18	R4180385
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	479		1.2	mg/L		16-AUG-18	
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
L2146326-1 ARV-2							
Sampled By: CLIENT on 13-AUG-18 @ 08:45							
Matrix: WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	393		1.0	mg/L		15-AUG-18	R4171247
Ammonia by colour							
Ammonia, Total (as N)	5.45		0.20	mg/L		17-AUG-18	R4177036
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	32		20	mg/L		15-AUG-18	R4179083
Carbonaceous BOD							
BOD Carbonaceous	42.2	BODP	6.0	mg/L		15-AUG-18	R4179083
Chloride in Water by IC							
Chloride (Cl)	732		10	mg/L		14-AUG-18	R4172673
Conductivity							
Conductivity	3820		1.0	umhos/cm		15-AUG-18	R4171247
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	200	MBHT	10	MPN/100mL		14-AUG-18	R4169687
Hardness Calculated							
Hardness (as CaCO3)	1180	HTC	0.20	mg/L		25-AUG-18	
Mercury Total							
Mercury (Hg)-Total	0.0000050		0.0000050	mg/L	14-AUG-18	15-AUG-18	R4171819
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		14-AUG-18	R4172673
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		17-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLM	0.20	mg/L		14-AUG-18	R4172673
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-18	R4180460
Phenol (4AAP)							
Phenols (4AAP)	0.0034		0.0010	mg/L		17-AUG-18	R4178686
Phosphorus, Total							
Phosphorus (P)-Total	0.552		0.0010	mg/L		22-AUG-18	R4181330
Sulfate in Water by IC							
Sulfate (SO4)	664		6.0	mg/L		14-AUG-18	R4172673
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0168		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Arsenic (As)-Total	0.00618		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cadmium (Cd)-Total	0.0000134		0.0000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Calcium (Ca)-Total	311		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Chromium (Cr)-Total	0.00083		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cobalt (Co)-Total	0.00098		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Copper (Cu)-Total	0.00428		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Iron (Fe)-Total	0.663		0.010	mg/L	23-AUG-18	23-AUG-18	R4182884
Lead (Pb)-Total	0.000224		0.000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Magnesium (Mg)-Total	98.6		0.0050	mg/L	23-AUG-18	23-AUG-18	R4182884
Manganese (Mn)-Total	0.640		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Nickel (Ni)-Total	0.00765		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Potassium (K)-Total	68.6		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Sodium (Na)-Total	460		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Zinc (Zn)-Total	0.0156		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
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
L2146326-1 ARV-2							
Sampled By: CLIENT on 13-AUG-18 @ 08:45							
Matrix: WATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	55.5		5.0	mg/L		22-AUG-18	R4181416
Total Suspended Solids							
Total Suspended Solids	71.7		2.0	mg/L		20-AUG-18	R4179298
pH							
pH	7.76		0.10	pH units		15-AUG-18	R4171247
L2146326-2 ARV-4							
Sampled By: CLIENT on 13-AUG-18 @ 08:20							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
Toluene	<0.0010		0.0010	mg/L		15-AUG-18	R4175024
Ethyl benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
o-Xylene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
m+p-Xylenes	<0.00040		0.00040	mg/L		15-AUG-18	R4175024
F1 (C6-C10)	<0.10		0.10	mg/L		15-AUG-18	R4175024
Surrogate: 4-Bromofluorobenzene (SS)	88.5		70-130	%		15-AUG-18	R4175024
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.12		0.10	mg/L	20-AUG-18	23-AUG-18	R4181389
F3 (C16-C34)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
F4 (C34-C50)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
Surrogate: 2-Bromobenzotrifluoride	86.4		60-140	%	20-AUG-18	23-AUG-18	R4181389
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		23-AUG-18	
F2-Naphth	0.12		0.10	mg/L		23-AUG-18	
F3-PAH	<0.25		0.25	mg/L		23-AUG-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		23-AUG-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		17-AUG-18	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
2-Methyl Naphthalene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthylene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Anthracene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Acridine	0.000042	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)anthracene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)pyrene	<0.000010	DLM	0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(b&j)fluoranthene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(g,h,i)perylene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(k)fluoranthene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Chrysene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Dibenzo(a,h)anthracene	<0.000010	DLM	0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluoranthene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluorene	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385
Indeno(1,2,3-cd)pyrene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Naphthalene	<0.00010	DLM	0.00010	mg/L	18-AUG-18	21-AUG-18	R4180385
Phenanthrene	<0.00010	DLM	0.00010	mg/L	18-AUG-18	21-AUG-18	R4180385
Pyrene	<0.000020	DLM	0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Quinoline	<0.000040	DLM	0.000040	mg/L	18-AUG-18	21-AUG-18	R4180385

* 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
L2146326-2 ARV-4							
Sampled By: CLIENT on 13-AUG-18 @ 08:20							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acenaphthene d10	84.5		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acridine d9	92.1		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Chrysene d12	78.3		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Naphthalene d8	80.1		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Phenanthrene d10	83.9		40-130	%	18-AUG-18	21-AUG-18	R4180385
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	247		1.2	mg/L		16-AUG-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	202		1.0	mg/L		15-AUG-18	R4171247
Ammonia by colour							
Ammonia, Total (as N)	22.8		2.0	mg/L		17-AUG-18	R4177036
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	36.1		6.0	mg/L		15-AUG-18	R4179083
Carbonaceous BOD							
BOD Carbonaceous	18.9		6.0	mg/L		15-AUG-18	R4179083
Chloride in Water by IC							
Chloride (Cl)	416		2.5	mg/L		14-AUG-18	R4172673
Conductivity							
Conductivity	1770		1.0	umhos/cm		15-AUG-18	R4171247
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	11200	MBHT	10	MPN/100mL		14-AUG-18	R4169687
Hardness Calculated							
Hardness (as CaCO3)	243	HTC	0.20	mg/L		25-AUG-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	14-AUG-18	15-AUG-18	R4171819
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		14-AUG-18	R4172673
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		17-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		14-AUG-18	R4172673
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-18	R4180460
Phenol (4AAP)							
Phenols (4AAP)	0.0029		0.0010	mg/L		17-AUG-18	R4178686
Phosphorus, Total							
Phosphorus (P)-Total	22.4		0.10	mg/L		22-AUG-18	R4181330
Sulfate in Water by IC							
Sulfate (SO4)	23.4		1.5	mg/L		14-AUG-18	R4172673
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0492		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Arsenic (As)-Total	0.00476		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cadmium (Cd)-Total	0.0000122		0.0000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Calcium (Ca)-Total	38.5		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Chromium (Cr)-Total	0.00059		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cobalt (Co)-Total	0.00179		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884

* 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
L2146326-2 ARV-4							
Sampled By: CLIENT on 13-AUG-18 @ 08:20							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Copper (Cu)-Total	0.00244		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Iron (Fe)-Total	3.57		0.010	mg/L	23-AUG-18	23-AUG-18	R4182884
Lead (Pb)-Total	0.000148		0.000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Magnesium (Mg)-Total	35.6		0.0050	mg/L	23-AUG-18	23-AUG-18	R4182884
Manganese (Mn)-Total	0.790		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Nickel (Ni)-Total	0.00537		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Potassium (K)-Total	22.1		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Sodium (Na)-Total	232		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Total Organic Carbon by Combustion							
Total Organic Carbon	38.0		5.0	mg/L		22-AUG-18	R4181416
Total Suspended Solids							
Total Suspended Solids	8.1		2.0	mg/L		20-AUG-18	R4179298
pH							
pH	7.21		0.10	pH units		15-AUG-18	R4171247
L2146326-3 ARV-5							
Sampled By: CLIENT on 13-AUG-18 @ 09:00							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
Toluene	<0.0010		0.0010	mg/L		15-AUG-18	R4175024
Ethyl benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
o-Xylene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
m+p-Xylenes	<0.00040		0.00040	mg/L		15-AUG-18	R4175024
F1 (C6-C10)	<0.10		0.10	mg/L		15-AUG-18	R4175024
Surrogate: 4-Bromofluorobenzene (SS)	91.7		70-130	%		15-AUG-18	R4175024
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	20-AUG-18	23-AUG-18	R4181389
F3 (C16-C34)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
F4 (C34-C50)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
Surrogate: 2-Bromobenzotrifluoride	83.0		60-140	%	20-AUG-18	23-AUG-18	R4181389
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		23-AUG-18	
F2-Naphth	<0.10		0.10	mg/L		23-AUG-18	
F3-PAH	<0.25		0.25	mg/L		23-AUG-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		23-AUG-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		17-AUG-18	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthylene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Anthracene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Acridine	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)anthracene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385

* 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
L2146326-3 ARV-5							
Sampled By: CLIENT on 13-AUG-18 @ 09:00							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Chrysene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluoranthene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluorene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Naphthalene	<0.000050		0.000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Phenanthrene	<0.000050		0.000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Pyrene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Quinoline	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acenaphthene d10	54.4		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acridine d9	64.4		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Chrysene d12	54.2		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Naphthalene d8	50.5		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Phenanthrene d10	57.3		40-130	%	18-AUG-18	21-AUG-18	R4180385
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	94.4		1.2	mg/L		16-AUG-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	77.4		1.0	mg/L		15-AUG-18	R4171247
Ammonia by colour							
Ammonia, Total (as N)	0.019		0.010	mg/L		16-AUG-18	R4175387
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		15-AUG-18	R4179083
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		15-AUG-18	R4179083
Chloride in Water by IC							
Chloride (Cl)	372		2.5	mg/L		14-AUG-18	R4172673
Conductivity							
Conductivity	1340		1.0	umhos/cm		15-AUG-18	R4171247
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	20	MBHT	10	MPN/100mL		14-AUG-18	R4169687
Hardness Calculated							
Hardness (as CaCO3)	212	HTC	0.20	mg/L		25-AUG-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	14-AUG-18	15-AUG-18	R4171819
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		14-AUG-18	R4172673
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		17-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		14-AUG-18	R4172673
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		21-AUG-18	R4180460
Phenol (4AAP)							
Phenols (4AAP)	0.0015		0.0010	mg/L		17-AUG-18	R4178686
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
L2146326-3 ARV-5							
Sampled By: CLIENT on 13-AUG-18 @ 09:00							
Matrix: WATER							
Phosphorus, Total							
Phosphorus (P)-Total	0.0275		0.0010	mg/L		22-AUG-18	R4181330
Sulfate in Water by IC							
Sulfate (SO4)	2.8		1.5	mg/L		14-AUG-18	R4172673
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0420		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Arsenic (As)-Total	0.00077		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Calcium (Ca)-Total	34.5		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Chromium (Cr)-Total	0.00025		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cobalt (Co)-Total	0.00050		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Copper (Cu)-Total	<0.00050		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Iron (Fe)-Total	3.54		0.010	mg/L	23-AUG-18	23-AUG-18	R4182884
Lead (Pb)-Total	0.000070		0.000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Magnesium (Mg)-Total	30.7		0.0050	mg/L	23-AUG-18	23-AUG-18	R4182884
Manganese (Mn)-Total	0.536		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Nickel (Ni)-Total	0.00052		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Potassium (K)-Total	7.08		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Sodium (Na)-Total	191		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Zinc (Zn)-Total	0.0058		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Total Organic Carbon by Combustion							
Total Organic Carbon	11.0		0.50	mg/L		22-AUG-18	R4181416
Total Suspended Solids							
Total Suspended Solids	22.5		2.0	mg/L		20-AUG-18	R4179298
pH							
pH	7.18		0.10	pH units		15-AUG-18	R4171247
L2146326-4 ARV-6							
Sampled By: CLIENT on 13-AUG-18 @ 09:20							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
Toluene	<0.0010		0.0010	mg/L		15-AUG-18	R4175024
Ethyl benzene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
o-Xylene	<0.00050		0.00050	mg/L		15-AUG-18	R4175024
m+p-Xylenes	<0.00040		0.00040	mg/L		15-AUG-18	R4175024
F1 (C6-C10)	<0.10		0.10	mg/L		15-AUG-18	R4175024
Surrogate: 4-Bromofluorobenzene (SS)	89.1		70-130	%		15-AUG-18	R4175024
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.14		0.10	mg/L	20-AUG-18	23-AUG-18	R4181389
F3 (C16-C34)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
F4 (C34-C50)	<0.25		0.25	mg/L	20-AUG-18	23-AUG-18	R4181389
Surrogate: 2-Bromobenzotrifluoride	84.5		60-140	%	20-AUG-18	23-AUG-18	R4181389
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		23-AUG-18	
F2-Naphth	0.14		0.10	mg/L		23-AUG-18	
F3-PAH	<0.25		0.25	mg/L		23-AUG-18	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		23-AUG-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		17-AUG-18	
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
L2146326-4 ARV-6							
Sampled By: CLIENT on 13-AUG-18 @ 09:20							
Matrix: WATER							
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000025		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Acenaphthylene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Anthracene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Acridine	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)anthracene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Chrysene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluoranthene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Fluorene	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Naphthalene	<0.000050		0.000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Phenanthrene	<0.000050		0.000050	mg/L	18-AUG-18	21-AUG-18	R4180385
Pyrene	<0.000010		0.000010	mg/L	18-AUG-18	21-AUG-18	R4180385
Quinoline	<0.000020		0.000020	mg/L	18-AUG-18	21-AUG-18	R4180385
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acenaphthene d10	60.1		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Acridine d9	77.8		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Chrysene d12	60.5		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Naphthalene d8	54.3		40-130	%	18-AUG-18	21-AUG-18	R4180385
Surrogate: Phenanthrene d10	78.5		40-130	%	18-AUG-18	21-AUG-18	R4180385
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	79.3		1.2	mg/L		16-AUG-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	65.0		1.0	mg/L		15-AUG-18	R4171247
Ammonia by colour							
Ammonia, Total (as N)	0.038		0.010	mg/L		16-AUG-18	R4175387
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		15-AUG-18	R4179083
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		15-AUG-18	R4179083
Chloride in Water by IC							
Chloride (Cl)	238		1.0	mg/L		14-AUG-18	R4172673
Conductivity							
Conductivity	894		1.0	umhos/cm		15-AUG-18	R4171247
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	20	MBHT	10	MPN/100mL		14-AUG-18	R4169687
Hardness Calculated							
Hardness (as CaCO3)	223	HTC	0.20	mg/L		28-AUG-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	14-AUG-18	15-AUG-18	R4171819
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
L2146326-4 ARV-6							
Sampled By: CLIENT on 13-AUG-18 @ 09:20							
Matrix: WATER							
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		14-AUG-18	R4172673
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		17-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		14-AUG-18	R4172673
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		22-AUG-18	R4181614
Phenol (4AAP)							
Phenols (4AAP)	0.0014		0.0010	mg/L		17-AUG-18	R4178687
Phosphorus, Total							
Phosphorus (P)-Total	0.0280		0.0010	mg/L		22-AUG-18	R4181330
Sulfate in Water by IC							
Sulfate (SO4)	<0.60	DLM	0.60	mg/L		14-AUG-18	R4172673
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0305		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Arsenic (As)-Total	0.00045		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Calcium (Ca)-Total	60.1		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Chromium (Cr)-Total	0.00047		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cobalt (Co)-Total	0.00100		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Copper (Cu)-Total	<0.00050		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Iron (Fe)-Total	11.5		0.010	mg/L	23-AUG-18	23-AUG-18	R4182884
Lead (Pb)-Total	0.000196		0.000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Magnesium (Mg)-Total	17.7		0.0050	mg/L	23-AUG-18	23-AUG-18	R4182884
Manganese (Mn)-Total	1.66		0.010	mg/L	23-AUG-18	27-AUG-18	R4186849
Nickel (Ni)-Total	0.00062		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Potassium (K)-Total	5.09		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Sodium (Na)-Total	84.5		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Zinc (Zn)-Total	0.0135		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Total Organic Carbon by Combustion							
Total Organic Carbon	7.99		0.50	mg/L		22-AUG-18	R4181416
Total Suspended Solids							
Total Suspended Solids	30.0		2.0	mg/L		20-AUG-18	R4179298
pH							
pH	6.66		0.10	pH units		15-AUG-18	R4171247
L2146326-5 OLD LAGOON							
Sampled By: CLIENT							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	83.8		1.2	mg/L		16-AUG-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	68.7		1.0	mg/L		15-AUG-18	R4171247
Ammonia by colour							
Ammonia, Total (as N)	3.45		0.10	mg/L		16-AUG-18	R4175387
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	5.2		2.0	mg/L		15-AUG-18	R4179083

* 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
L2146326-5 OLD LAGOON							
Sampled By: CLIENT							
Matrix: WATER							
Carbonaceous BOD							
BOD Carbonaceous	2.9		2.0	mg/L		15-AUG-18	R4179083
Chloride in Water by IC							
Chloride (Cl)	66.2		0.50	mg/L		14-AUG-18	R4172673
Conductivity							
Conductivity	365		1.0	umhos/cm		15-AUG-18	R4171247
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	80		10	MPN/100mL		14-AUG-18	R4169687
Hardness Calculated							
Hardness (as CaCO3)	60.1	HTC	0.20	mg/L		25-AUG-18	
Mercury Total							
Mercury (Hg)-Total	0.0000090		0.0000050	mg/L	14-AUG-18	15-AUG-18	R4171819
Nitrate in Water by IC							
Nitrate (as N)	0.279		0.020	mg/L		14-AUG-18	R4172673
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.510		0.070	mg/L		17-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	0.231		0.010	mg/L		14-AUG-18	R4172673
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		22-AUG-18	R4181614
Phosphorus, Total							
Phosphorus (P)-Total	1.93		0.0020	mg/L		22-AUG-18	R4181330
Sulfate in Water by IC							
Sulfate (SO4)	3.84		0.30	mg/L		14-AUG-18	R4172673
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.246		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Arsenic (As)-Total	0.00183		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cadmium (Cd)-Total	0.0000200		0.0000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Calcium (Ca)-Total	12.6		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Chromium (Cr)-Total	0.00041		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Cobalt (Co)-Total	0.00034		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Copper (Cu)-Total	0.00837		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Iron (Fe)-Total	1.68		0.010	mg/L	23-AUG-18	23-AUG-18	R4182884
Lead (Pb)-Total	0.000939		0.000050	mg/L	23-AUG-18	23-AUG-18	R4182884
Magnesium (Mg)-Total	6.96		0.0050	mg/L	23-AUG-18	23-AUG-18	R4182884
Manganese (Mn)-Total	0.0677		0.00010	mg/L	23-AUG-18	23-AUG-18	R4182884
Nickel (Ni)-Total	0.00181		0.00050	mg/L	23-AUG-18	23-AUG-18	R4182884
Potassium (K)-Total	7.60		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Sodium (Na)-Total	41.8		0.050	mg/L	23-AUG-18	23-AUG-18	R4182884
Zinc (Zn)-Total	0.0117		0.0030	mg/L	23-AUG-18	23-AUG-18	R4182884
Total Organic Carbon by Combustion							
Total Organic Carbon	17.6		0.50	mg/L		22-AUG-18	R4181416
Total Suspended Solids							
Total Suspended Solids	3.9		2.0	mg/L		20-AUG-18	R4179298
pH							
pH	7.77		0.10	pH units		15-AUG-18	R4171247

* 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).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MBHT	The APHA 30 hour hold time was exceeded for microbiological testing. Samples processed within 48 hours from time of sampling may be valid in some cases (refer to Health Canada guidance).
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,

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous 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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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:

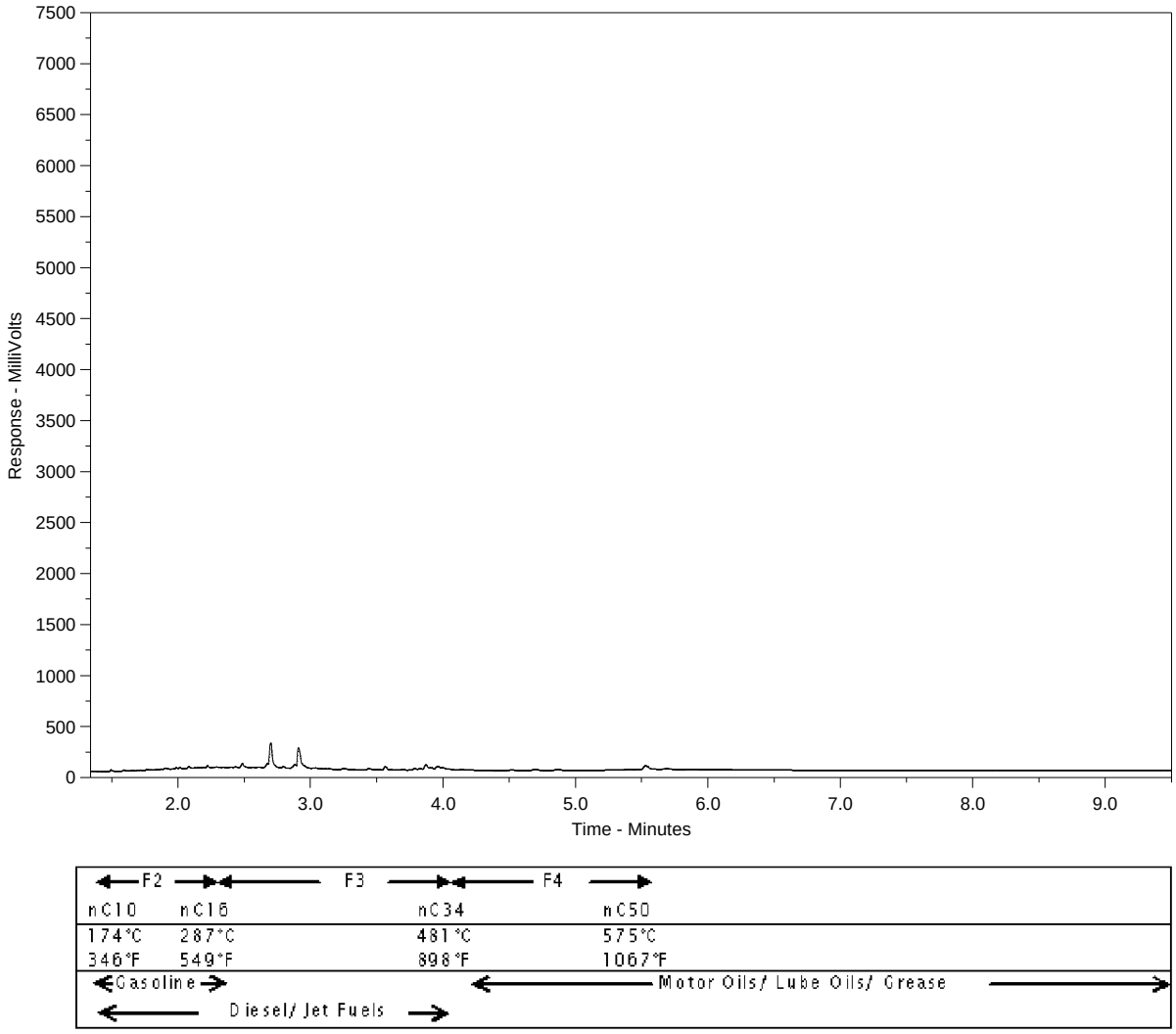
GLOSSARY OF REPORT TERMS

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: L2146326-1
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.

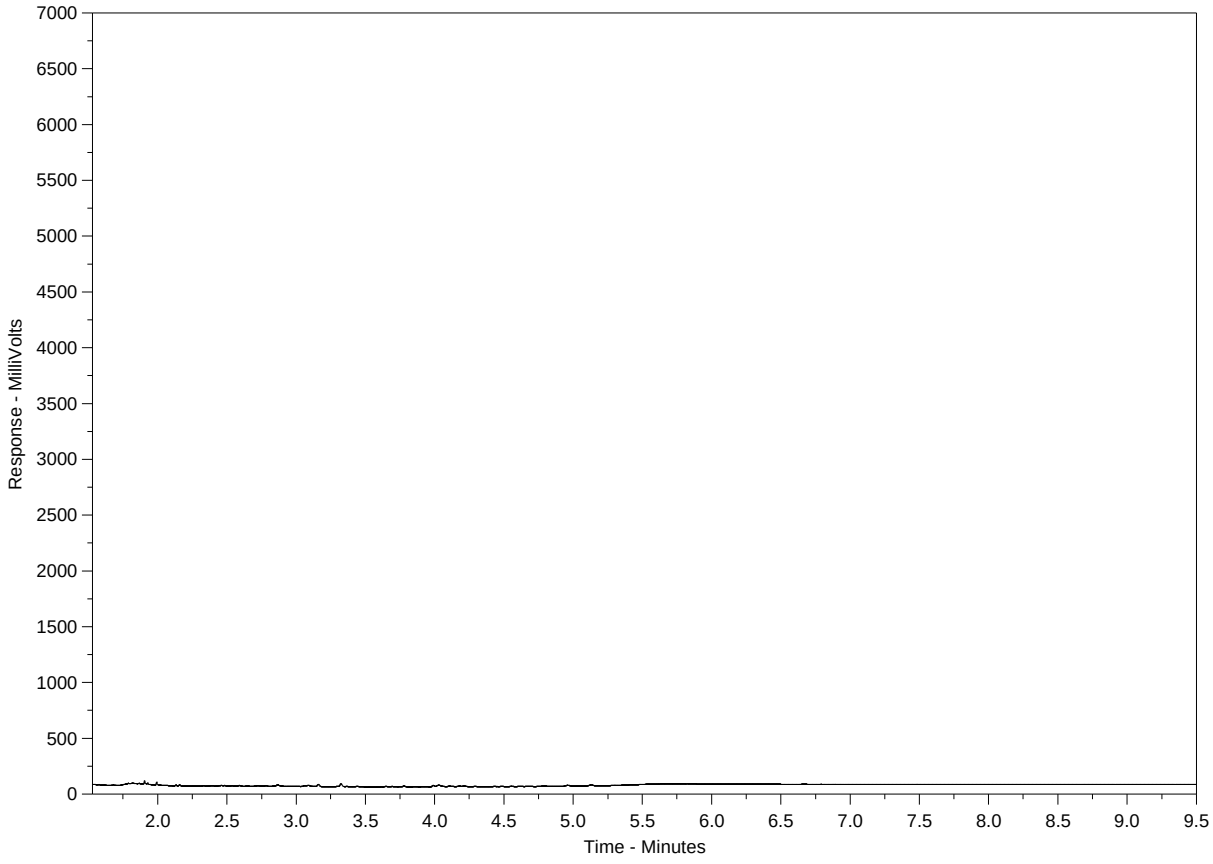
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

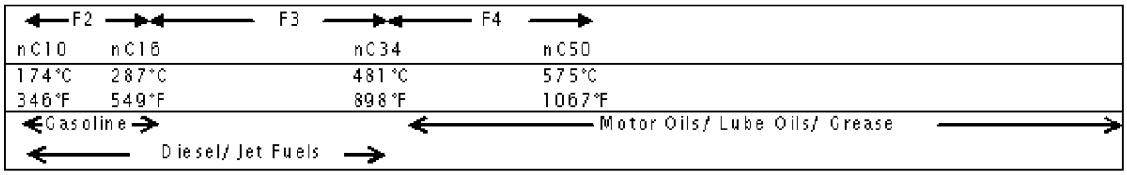
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2146326-2
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.

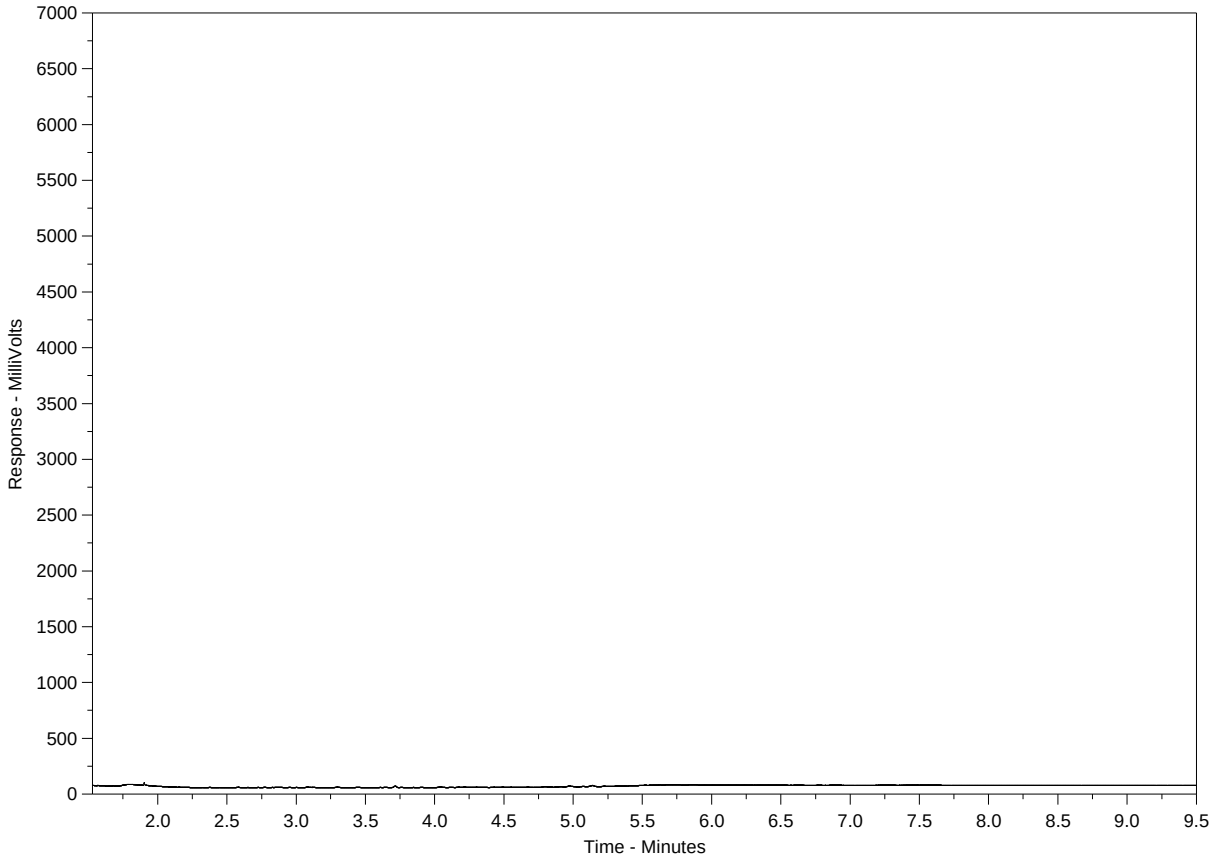
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

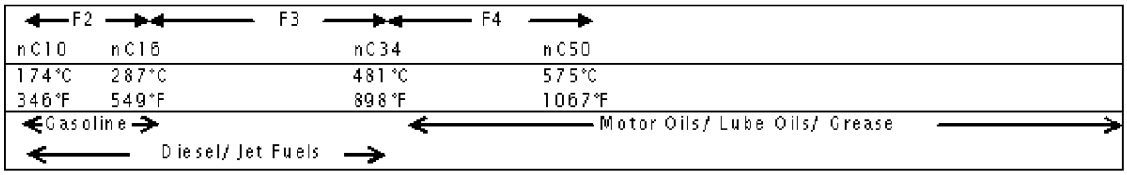
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2146326-3
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.

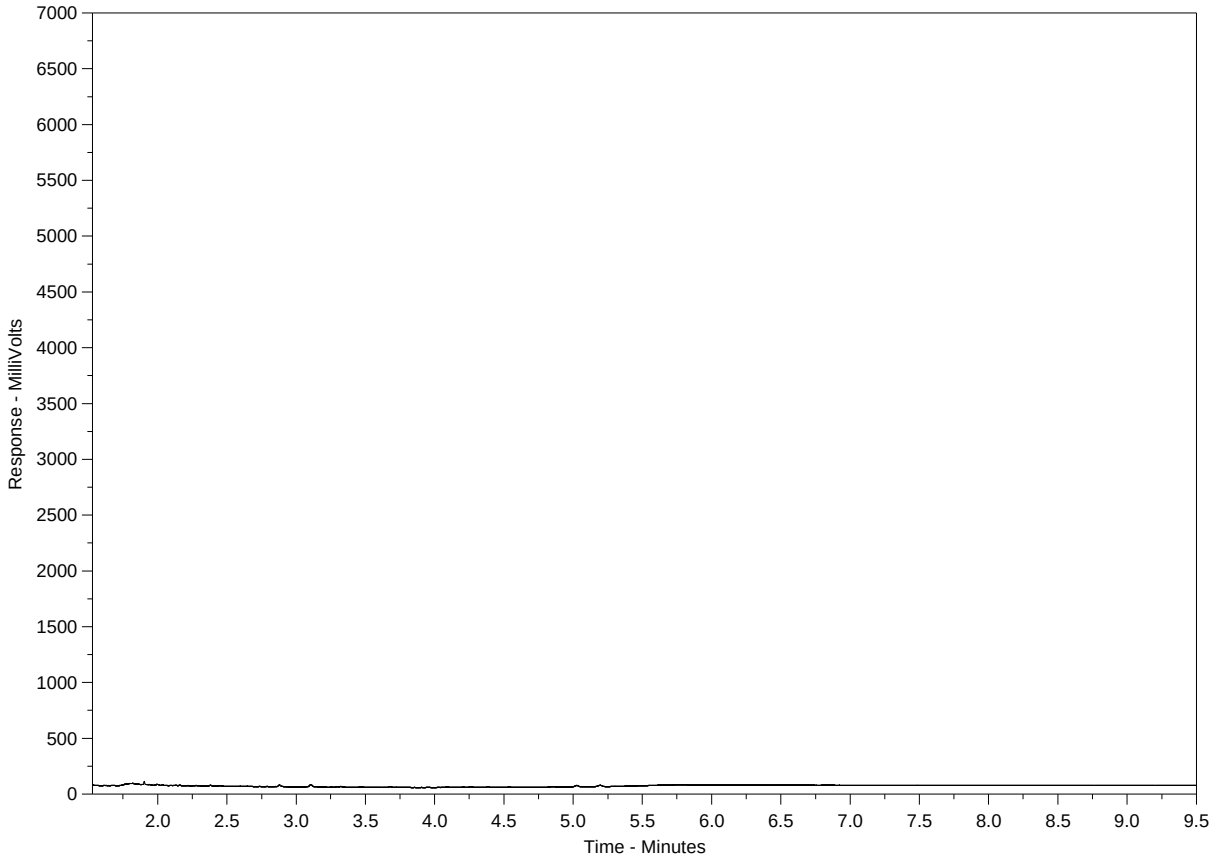
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

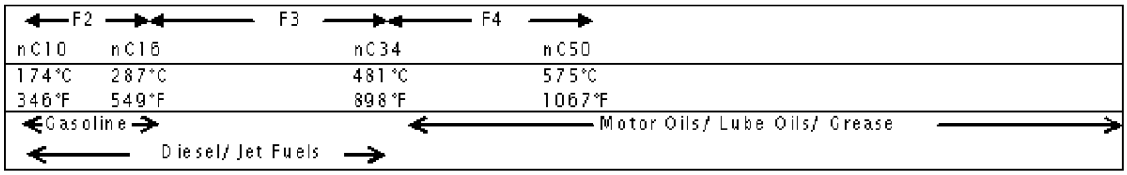
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2146326-4
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) / Analyti... Request Form

Canada Toll Free: 1 800 668 9878

L2146326-COFC

COC Number: 14 - 454531

Page ____ of ____

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@[illegible].com	Specify Date Required for E2,E or P:
		Email 2	mlisty@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~~	Email 1 or Fax	
Company:		Email 2	
Contact:			

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	Metals	Mercury	Bacteria	Oil & Grease	Sulfuric Acid	Phenols	PAH/PH	BTEX/VOC	F2/F4	Number of Containers
	ARV-2	Aug 13, 18	8:45am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	Aug 13 18	8:20am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	Aug 13 18	9:00am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	Aug 13 18	9:20am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Old Lagoon				✓	✓	✓		✓	✓	✓		8			

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		
					14°

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 13 18	9145a		AUG 14 2018	1230			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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**.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2146326-COFC

COC Number: 14 - 454531

Page ____ of ____

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@[illegible]	Specify Date Required for E2,E or P:	
		Email 2	mlistu@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	Metals	Mercury	Bacteria	Oil & Grease	Sulfuric Acid	Phenols	PAH's	BTEX/VOC	E2/F4	Number of Containers
	ARV-2	Aug 13, 18	8:45am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	ARV-4	Aug 13 18	8:20am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	ARV-5	Aug 13 18	9:00am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	ARV-6	Aug 13 18	9:20am	Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Old Lagoon				✓	✓	✓	✓	✓	✓	✓	✓	✓			

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		
					14°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:
Laura	Aug 13 18	9:45a		AUG 14 2018	1230			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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**.

Appendix F

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

Date Received: 11-SEP-18
Report Date: 21-SEP-18 09:45 (MT)
Version: FINAL

Client Phone: 867-857-2841

Certificate of Analysis

Lab Work Order #: L2162085

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
L2162085-1 ARV-2							
Sampled By: CLIENT on 10-SEP-18 @ 08:56							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	548		1.2	mg/L		13-SEP-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		13-SEP-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		13-SEP-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	449		1.0	mg/L		12-SEP-18	R4215222
Ammonia by colour							
Ammonia, Total (as N)	6.07		0.20	mg/L		12-SEP-18	R4215354
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	27.6		6.0	mg/L		12-SEP-18	R4217784
Carbonaceous BOD							
BOD Carbonaceous	26.1		6.0	mg/L		12-SEP-18	R4217784
Chloride in Water by IC							
Chloride (Cl)	650		10	mg/L		12-SEP-18	R4228350
Conductivity							
Conductivity	3670		1.0	umhos/cm		12-SEP-18	R4215222
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	140		10	MPN/100mL		11-SEP-18	R4214107
Hardness Calculated							
Hardness (as CaCO3)	1140	HTC	0.20	mg/L		19-SEP-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-SEP-18	17-SEP-18	R4217950
Nitrate in Water by IC							
Nitrate (as N)	<0.40	DLM	0.40	mg/L		12-SEP-18	R4228350
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.45		0.45	mg/L		21-SEP-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.20	DLM	0.20	mg/L		12-SEP-18	R4228350
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		18-SEP-18	R4218890
Phenol (4AAP)							
Phenols (4AAP)	0.0015		0.0010	mg/L		17-SEP-18	R4216347
Phosphorus, Total							
Phosphorus (P)-Total	0.429		0.0010	mg/L		18-SEP-18	R4221654
Sulfate in Water by IC							
Sulfate (SO4)	625		6.0	mg/L		12-SEP-18	R4228350
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0088		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Arsenic (As)-Total	0.00574		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cadmium (Cd)-Total	0.0000113		0.0000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Calcium (Ca)-Total	310		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Chromium (Cr)-Total	0.00076		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cobalt (Co)-Total	0.00086		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Copper (Cu)-Total	0.00343		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Iron (Fe)-Total	0.650		0.010	mg/L	17-SEP-18	17-SEP-18	R4223052
Lead (Pb)-Total	0.000250		0.000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Magnesium (Mg)-Total	88.9		0.0050	mg/L	17-SEP-18	17-SEP-18	R4223052
Manganese (Mn)-Total	0.761		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Nickel (Ni)-Total	0.00695		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052

* 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
L2162085-1 ARV-2							
Sampled By: CLIENT on 10-SEP-18 @ 08:56							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Potassium (K)-Total	61.4		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Sodium (Na)-Total	419		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Zinc (Zn)-Total	0.0067		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Total Organic Carbon by Combustion							
Total Organic Carbon	47.7		5.0	mg/L		13-SEP-18	R4216018
Total Suspended Solids							
Total Suspended Solids	24.1		2.0	mg/L		14-SEP-18	R4217517
pH							
pH	8.00		0.10	pH units		12-SEP-18	R4215222
L2162085-2 ARV-4							
Sampled By: CLIENT on 10-SEP-18 @ 08:42							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	192		1.2	mg/L		13-SEP-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		13-SEP-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		13-SEP-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	158		1.0	mg/L		12-SEP-18	R4215222
Ammonia by colour							
Ammonia, Total (as N)	18.5		2.0	mg/L		14-SEP-18	R4216996
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	12.3		6.0	mg/L		12-SEP-18	R4217784
Carbonaceous BOD							
BOD Carbonaceous	7.2		2.0	mg/L		12-SEP-18	R4217784
Chloride in Water by IC							
Chloride (Cl)	465		5.0	mg/L		12-SEP-18	R4228350
Conductivity							
Conductivity	1880		1.0	umhos/cm		12-SEP-18	R4215222
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	220		10	MPN/100mL		11-SEP-18	R4214107
Hardness Calculated							
Hardness (as CaCO3)	246	HTC	0.20	mg/L		19-SEP-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-SEP-18	17-SEP-18	R4217950
Nitrate in Water by IC							
Nitrate (as N)	0.25		0.20	mg/L		12-SEP-18	R4228350
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.25		0.22	mg/L		21-SEP-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.10	DLM	0.10	mg/L		12-SEP-18	R4228350
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		18-SEP-18	R4218890
Phenol (4AAP)							
Phenols (4AAP)	0.0025		0.0010	mg/L		17-SEP-18	R4216347
Phosphorus, Total							
Phosphorus (P)-Total	13.8		0.020	mg/L		18-SEP-18	R4221654
Sulfate in Water by IC							
Sulfate (SO4)	42.7		3.0	mg/L		12-SEP-18	R4228350

* 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
L2162085-2 ARV-4							
Sampled By: CLIENT on 10-SEP-18 @ 08:42							
Matrix: WATER							
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0327		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Arsenic (As)-Total	0.00398		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cadmium (Cd)-Total	0.0000092		0.0000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Calcium (Ca)-Total	37.3		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Chromium (Cr)-Total	0.00042		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cobalt (Co)-Total	0.00119		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Copper (Cu)-Total	0.00221		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Iron (Fe)-Total	3.86		0.010	mg/L	17-SEP-18	17-SEP-18	R4223052
Lead (Pb)-Total	0.000113		0.000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Magnesium (Mg)-Total	37.3		0.0050	mg/L	17-SEP-18	17-SEP-18	R4223052
Manganese (Mn)-Total	0.794		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Nickel (Ni)-Total	0.00380		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Potassium (K)-Total	20.1		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Sodium (Na)-Total	261		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Zinc (Zn)-Total	0.0066		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Total Organic Carbon by Combustion							
Total Organic Carbon	34.5		5.0	mg/L		13-SEP-18	R4216018
Total Suspended Solids							
Total Suspended Solids	349		2.7	mg/L		14-SEP-18	R4217517
pH							
pH	7.00		0.10	pH units		12-SEP-18	R4215222
L2162085-3 ARV-5							
Sampled By: CLIENT on 10-SEP-18 @ 09:21							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	88.2		1.2	mg/L		13-SEP-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		13-SEP-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		13-SEP-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	72.3		1.0	mg/L		12-SEP-18	R4215222
Ammonia by colour							
Ammonia, Total (as N)	0.021		0.010	mg/L		12-SEP-18	R4215354
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	2.3		2.0	mg/L		12-SEP-18	R4217784
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		12-SEP-18	R4217784
Chloride in Water by IC							
Chloride (Cl)	441		2.5	mg/L		12-SEP-18	R4228350
Conductivity							
Conductivity	1570		1.0	umhos/cm		12-SEP-18	R4215222
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	30		10	MPN/100mL		11-SEP-18	R4214107
Hardness Calculated							
Hardness (as CaCO3)	226	HTC	0.20	mg/L		19-SEP-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-SEP-18	17-SEP-18	R4217950
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLM	0.10	mg/L		12-SEP-18	R4228350

* 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
L2162085-3 ARV-5							
Sampled By: CLIENT on 10-SEP-18 @ 09:21							
Matrix: WATER							
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.11		0.11	mg/L		21-SEP-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLM	0.050	mg/L		12-SEP-18	R4228350
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		18-SEP-18	R4218890
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		17-SEP-18	R4216347
Phosphorus, Total							
Phosphorus (P)-Total	0.0236		0.0010	mg/L		18-SEP-18	R4221654
Sulfate in Water by IC							
Sulfate (SO4)	11.2		1.5	mg/L		12-SEP-18	R4228350
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0094		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Arsenic (As)-Total	0.00055		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Calcium (Ca)-Total	36.0		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Chromium (Cr)-Total	0.00016		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cobalt (Co)-Total	0.00015		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Copper (Cu)-Total	0.00061		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Iron (Fe)-Total	0.721		0.010	mg/L	17-SEP-18	17-SEP-18	R4223052
Lead (Pb)-Total	0.000066		0.000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Magnesium (Mg)-Total	33.1		0.0050	mg/L	17-SEP-18	17-SEP-18	R4223052
Manganese (Mn)-Total	0.0619		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Nickel (Ni)-Total	0.00052		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Potassium (K)-Total	7.64		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Sodium (Na)-Total	222		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Zinc (Zn)-Total	0.0611		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Total Organic Carbon by Combustion							
Total Organic Carbon	10.6		0.50	mg/L		13-SEP-18	R4216018
Total Suspended Solids							
Total Suspended Solids	146		2.0	mg/L		14-SEP-18	R4217517
pH							
pH	7.24		0.10	pH units		12-SEP-18	R4215222
L2162085-4 ARV-6							
Sampled By: CLIENT on 10-SEP-18 @ 09:30							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	96.0		1.2	mg/L		13-SEP-18	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		13-SEP-18	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		13-SEP-18	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	78.7		1.0	mg/L		12-SEP-18	R4215222
Ammonia by colour							
Ammonia, Total (as N)	0.052		0.010	mg/L		12-SEP-18	R4215354
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	2.1		2.0	mg/L		12-SEP-18	R4217784
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		12-SEP-18	R4217784

* 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
L2162085-4 ARV-6							
Sampled By: CLIENT on 10-SEP-18 @ 09:30							
Matrix: WATER							
Chloride in Water by IC							
Chloride (Cl)	224		1.0	mg/L		12-SEP-18	R4228350
Conductivity							
Conductivity	892		1.0	umhos/cm		12-SEP-18	R4215222
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10		10	MPN/100mL		11-SEP-18	R4214107
Hardness Calculated							
Hardness (as CaCO3)	207	HTC	0.20	mg/L		19-SEP-18	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-SEP-18	17-SEP-18	R4217950
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLM	0.040	mg/L		12-SEP-18	R4228350
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		21-SEP-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		12-SEP-18	R4228350
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		18-SEP-18	R4218890
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		17-SEP-18	R4216347
Phosphorus, Total							
Phosphorus (P)-Total	0.0638		0.0010	mg/L		18-SEP-18	R4221654
Sulfate in Water by IC							
Sulfate (SO4)	1.65		0.60	mg/L		12-SEP-18	R4228350
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.152		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Arsenic (As)-Total	0.00054		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cadmium (Cd)-Total	0.0000332		0.0000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Calcium (Ca)-Total	54.3		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Chromium (Cr)-Total	0.00073		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Cobalt (Co)-Total	0.00126		0.00010	mg/L	17-SEP-18	17-SEP-18	R4223052
Copper (Cu)-Total	0.00140		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Iron (Fe)-Total	7.69		0.010	mg/L	17-SEP-18	17-SEP-18	R4223052
Lead (Pb)-Total	0.000370		0.000050	mg/L	17-SEP-18	17-SEP-18	R4223052
Magnesium (Mg)-Total	17.4		0.0050	mg/L	17-SEP-18	17-SEP-18	R4223052
Manganese (Mn)-Total	2.13		0.010	mg/L	17-SEP-18	17-SEP-18	R4223052
Nickel (Ni)-Total	0.00134		0.00050	mg/L	17-SEP-18	17-SEP-18	R4223052
Potassium (K)-Total	5.72		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Sodium (Na)-Total	85.7		0.050	mg/L	17-SEP-18	17-SEP-18	R4223052
Zinc (Zn)-Total	0.0234		0.0030	mg/L	17-SEP-18	17-SEP-18	R4223052
Total Organic Carbon by Combustion							
Total Organic Carbon	7.20		0.50	mg/L		13-SEP-18	R4216018
Total Suspended Solids							
Total Suspended Solids	24.3		2.0	mg/L		14-SEP-18	R4217517
pH							
pH	6.66		0.10	pH units		12-SEP-18	R4215222

* 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.

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-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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-L-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous 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.			
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:

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

L2162085-COFC

COC Number: 14 - 450478

Page 1 of 1

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	sao@arviat.ca	Specify Date Required for E2,E or P:
		Email 2	mlusty@qiaa.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	PAH/EPH/FEPH	Bacteria	Oil & Grease	Sulfuric Acid	Sulfuric Acid	Metals	Mercury	Number of Containers
	ARV-2	10/09/18	856am	water	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-4	10/09/18	842am	water	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-5	10/09/18	921am	water	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ARV-6	10/09/18	930am	water	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
e samples taken from a Regulated DW System? ☐ Yes ☐ No	
amples 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		
					5C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
ed by: Laura	Date: Sept 10/18	Time: 945am	Received by:	Date: SEP 11 2018	Time: 830	Received by:	Date:	Time:

SACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v08 Front03 October 2013

lete 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.

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

Appendix G

Spills

Occurance Date

Start date

Jan | 1 | 2018

End date

Dec | 31 | 2018

Spill Region

- Any -

Spill Location

--Arviat

Spill Location Description

Report Number

Items per page

100

Go | Reset

Spill	Occurance Date	Spill Region	Location	Location Description	Product Spilled	Quantity	Spill Cause	Lead Agency
spill-2018277	July 17, 2018	Keewatin	Arviat, Community, Nunavut		Petroleum - fuel oil (jet A, diesel, turbo A, heat)	15.00	Breakage	GN - Government of Nunavut
spill-2018243	June 20, 2018	Keewatin	Arviat, Community, Nunavut		Petroleum - fuel oil (jet A, diesel, turbo A, heat)	100.00	Breakage	GN - Government of Nunavut
spill-2018229	June 14, 2018	Keewatin	Arviat, Community, Nunavut		Petroleum - fuel oil (jet A, diesel, turbo A, heat)	300.00	Fitting Leak	GN - Government of Nunavut
spill-2018208	May 31, 2018	Keewatin	Arviat, Community, Nunavut		Petroleum - fuel oil (jet A, diesel, turbo A, heat)	75.00	Breakage	GN - Government of Nunavut
spill-2018195	May 25, 2018	Keewatin	Arviat, Community, Nunavut		Petroleum - fuel oil (jet A, diesel, turbo A, heat)	205.00	Other	GN - Government of Nunavut

Displaying 1 - 5 of 5

Appendix H

Arviat
ARV-2a

			2018				Statistics		
Parameter	**Unit**	**DL**	**21-Jun-18**	**17-Jul-18**	**13-Aug-18**	**10-Sep-18**	**Min**	**Max**	**Average**
Alkalinity									
Bicarbonate (HCO3)	mg/L	1.2	460	478	479	548	243	934	586.08
Carbonate (CO3)	mg/L	0.60	<0.60	<0.60	<0.60	<0.60	0.6	12	2.35
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	<0.34	<0.34	0.34	6.8	1.33
Total (as CaCO3)	mg/L	1.0	377	391	393	449	199	766	480.46
Ammonia by Colour									
Total (as N)	mg/L	0.010	9.20	5.27	5.45	6.07	0.119	15.2	7.27
Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	mg/L	20	17.5	25.5	32	27.6	2.2	79	33.01
Carbonaceous BOD									
BOD Carbonaceous	mg/L	20	13.4	20.5	42.2	26.1	9.9	46	24.07
Chloride in Water by IC									
Chloride (Cl)	mg/L	10	372	691	732	650	291	869	460.00
Conductivity									
Conductivity	umhos/cm	1.0	2360	3580	3820	3670	272	3500	2594.13
Fecal Coliforms									
Fecal Coliforms	MPN/100mL	3	390	30	200	140	3	24000	1639.47
Hardness Calculated									
Hardness (as CaCO3)	mg/L	0.30	709	879	1180	1140	520	1160	922.46
Mercury Total									
Mercury (Hg)	mg/L	0.000200	0.0000554	<0.0000050	<0.0000050	<0.0000050	0.000005	0.0002	0.00008
Nitrate in Water by IC									
Nitrate (as N)	mg/L	0.020	<0.10	<0.40	<0.40	<0.40	0.1	0.4	0.31
Nitrate + Nitrite									
Nitrate and Nitrite as N	mg/L	0.070	<0.11	<0.45	<0.45	<0.45	0.11	0.479	0.35
Nitrite in Water by IC									
Nitrite (as N)	mg/L	0.010	<0.050	<0.20	<0.20	<0.20	0.01	0.27	0.16
Oil & Grease - Gravimetric									
Oil and Grease	mg/L	2.00	<5.0	<5.0	<5.0	<5.0	2	11	4.59
Phenol									
Phenols	mg/L	0.0010	0.0057	0.0049	0.0034	0.0015	0.001	0.0295	0.01
Phosphorus, Total									
Phosphorus (P)	mg/L	0.10	0.968	0.363	0.552	0.429	0.1	2.21	0.93
Sulfate in Water by IC									
Sulfate (SO4)	mg/L	0.30	384	456	664	625	50.1	565	434.07
Total Metals by ICP-MS									
Aluminium (Al)	mg/L	0.0050	0.0379	0.0271	0.0168	0.0088	0.0105	0.305	0.05
Arsenic (As)	mg/L	0.00020	0.00468	0.00557	0.00618	0.00574	0.00038	0.00853	0.01
Cadmium (Cd)	mg/L	0.000010	0.000606	0.0000338	0.0000134	0.0000113	0.00001	0.000336	0.0001
Calcium (Ca)	mg/L	0.10	207	201	311	310	36.1	356	257.94
Chromium (Cr)	mg/L	0.0010	0.00157	0.00215	0.00083	0.00076	0.00093	0.01	0.0022
Cobalt (Co)	mg/L	0.00020	0.00308	0.00124	0.00098	0.00086	0.00047	0.00396	0.0014
Copper (Cu)	mg/L	0.00020	0.0666	0.00960	0.00428	0.00343	0.00282	0.0434	0.02
Iron (Fe)	mg/L	0.010	4.55	1.10	0.66	0.65	0.34	5.13	1.46
Lead (Pb)	mg/L	0.000090	0.009010	0.000967	0.000224	0.000250	0.000174	0.0111	0.0027
Magnesium (Mg)	mg/L	0.010	46.4	91.8	98.6	88.9	3.66	100	57.81
Manganese (Mn)	mg/L	0.00030	0.972	0.213	0.64	0.761	0.197	1.69	0.73
Nickel (Ni)	mg/L	0.0020	0.00877	0.00904	0.00765	0.00695	0.002	0.02	0.01
Potassium (K)	mg/L	0.020	42.9	82.7	68.6	61.4	4	78.5	56.87
Sodium (Na)	mg/L	0.030	234	473	460	419	7.84	572	296.52
Zinc (Zn)	mg/L	0.0020	0.311	0.0151	0.0156	0.0067	0.0087	0.64	0.086
Total Organic Carbon by Combustion									
Total Organic Carbon	mg/L	0.50	43.8	53.4	55.5	47.7	30.3	67	46.02
Total Suspended Solids									
Total Suspended Solids	mg/L	5.0	22	8.1	71.7	24	5	143	52.67
pH									
pH	pH Units	0.10	7.57	8.10	7.76	8.00	7.4	8.11	7.84
Benzene	mg/L	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	/	0.001	0.001	0.001
Ethyl Benzene	mg/L	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	/	0.0005	0.00082	0.0005
F1 (C6-C10)	mg/L	0.10	<0.10	<0.10	<0.10	/	0.1	0.1	0.10
F2 (C10-C16)	mg/L	0.25	0.15	0.17	0.13	/	0.1	0.5	0.22
F3 (C16-C34)	mg/L	0.25	0.31	0.30	0.36	/	0.25	0.69	0.47
F4 (C34-C50)	mg/L	0.25	<0.25	<0.25	<0.25	/	0.25	0.5	0.28
Total Hydrocarbons (C6-C50)	mg/L	0.44	0.46	0.48	0.5	/	0.38	1.07	0.66

Arviat
ARV-4

			2018				Statistics		
Parameter	**Unit**	**DL**	**21-Jun-18**	**17-Jul-18**	**13-Aug-18**	**10-Sep-18**	**Min**	**Max**	**Average**
Alkalinity									
Bicarbonate (HCO3)	mg/L	1.2	155	310	247	192	82.00	354.00	220.77
Carbonate (CO3)	mg/L	0.60	<0.6	<0.60	<0.60	<0.60	0.60	13.20	3.32
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	<0.60	<0.34	0.34	6.80	1.33
Total (as CaCO3)	mg/L	1.0	127	254	202	158	67.00	290.00	182.54
Ammonia by Colour									
Total (as N)	mg/L	0.20	8.56	43.7	22.8	18.50	8.68	39.90	19.64
Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	mg/L	20	10	43	36.1	12.3	5.60	215.00	48.31
Carbonaceous BOD									
BOD Carbonaceous	mg/L	20	5	30.6	18.9	7.2	2.00	154.00	31.84
Chloride in Water by IC									
Chloride (Cl)	mg/L	10	155	194	416	465	83.50	517.00	239.58
Conductivity									
Conductivity	umhos/cm	1.0	782	1120	1770	1880	570.00	1830.00	1079.07
Fecal Coliforms									
Fecal Coliforms	MPN/100mL	3	<10	>24200	11200	220	4.00	24000.00	2642.67
Hardness Calculated									
Hardness (as CaCO3)	mg/L	0.30	85.7	123	243	246	81.20	254.00	140.36
Mercury Total									
Mercury (Hg)	mg/L	0.00020	0.0000107	<0.000025	<0.0000050	<0.0000050	0.000005	0.00040	0.00012
Nitrate in Water by IC									
Nitrate (as N)	mg/L	0.020	0.50	<0.10	<0.10	0.25	0.02	1.94	0.41
Nitrate + Nitrite									
Nitrate and Nitrite as N	mg/L	0.070	0.62	<0.11	<0.11	0.25	0.07	2.15	0.56
Nitrite in Water by IC									
Nitrite (as N)	mg/L	0.010	0.12	<0.050	<0.05	<0.10	0.02	0.37	0.102
Oil & Grease - Gravimetric									
Oil and Grease	mg/L	2.0	<5.0	5.6	<5.0	<5.0	0.04	18.50	4.60
Phenol									
Phenols	mg/L	0.0010	0.0011	0.0049	0.0029	0.0025	0.00	0.04	0.007
Phosphorus, Total									
Phosphorus (P)	mg/L	0.10	3.15	7.80	22.40	13.8	0.92	9.55	5.17
Sulfate in Water by IC									
Sulfate (SO4)	mg/L	6.0	13.6	6.9	23.4	42.7	2.18	66.00	15.46
Total Metals by ICP-MS									
Aluminium (Al)	mg/L	0.0050	0.151	0.156	0.0492	0.0327	0.03	1.26	0.29
Arsenic (As)	mg/L	0.00020	0.011	0.00758	0.00476	0.00398	0.00	0.01	0.00664
Cadmium (Cd)	mg/L	0.000010	0.00061	0.0000524	0.0000122	0.0000092	0.00	0.00	0.00008
Calcium (Ca)	mg/L	0.10	15.4	21.7	38.5	37.3	15.80	44.10	24.86
Chromium (Cr)	mg/L	0.0010	0.00114	0.00112	0.00059	0.00420	0.00	0.00	0.0015
Cobalt (Co)	mg/L	0.00020	0.00487	0.00273	0.00179	0.00119	0.00	0.00	0.0026
Copper (Cu)	mg/L	0.00020	0.0188	0.0374	0.00244	0.00221	0.00	0.10	0.032
Iron (Fe)	mg/L	0.010	4.02	4.58	3.57	3.86	1.59	19.60	5.72
Lead (Pb)	mg/L	0.000090	0.001400	0.00172	0.00015	0.000113	0.00	0.01	0.0017
Magnesium (Mg)	mg/L	0.010	11.5	16.7	35.6	37.3	8.85	34.80	17.23
Manganese (Mn)	mg/L	0.00030	0.0107	0.418	0.79	0.794	0.25	0.89	0.54
Nickel (Ni)	mg/L	0.0020	0.00877	0.00772	0.00537	0.0038	0.00	0.01	0.007
Potassium (K)	mg/L	0.020	18.3	24.0	22.1	20.1	18.60	37.40	23.55
Sodium (Na)	mg/L	0.030	107	137	232	261	66.50	315.00	134.84
Zinc (Zn)	mg/L	0.0020	0.0079	0.0225	<0.0030	0.0066	0.00	0.06	0.024
Total Organic Carbon by Combustion									
Total Organic Carbon	mg/L	0.50	33.2	39.7	38	34.5	17.60	175.00	47.19
Total Suspended Solids									
Total Suspended Solids	mg/L	13	53	50	8	349	10.00	1670.00	177.67
pH									
pH	pH Units	0.10	7.29	7.25	7.21	7.00	6.76	8.96	7.52
Benzene	mg/L	0.00050	<0.00050	<0.00050	<0.00050		0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	<0.0010	0.0015	0.0015		0.001	0.019	0.0035
Ethyl Benzene	mg/L	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		0.0005	0.0005	0.0005
F1 (C6-C10)	mg/L	0.10	<0.10	<0.20	<0.20		0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	<0.10	0.13	0.12		0.10	0.50	0.20
F3 (C16-C34)	mg/L	0.25	<0.25	0.59	<0.25		0.25	4.09	1.36
F4 (C34-C50)	mg/L	0.25	<0.25	<0.25	<0.25		0.25	1.44	0.55
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	0.72	<0.38		0.38	5.53	1.89

Arviat
ARV-5

			2018				Statistics		
Parameter	**Unit**	**DL**	**21-Jun-18**	**17-Jul-18**	**13-Aug-18**	**10-Sep-18**	**Min**	**Max**	**Average**
Alkalinity									
Bicarbonate (HCO3)	mg/L	1.2	55.5	92.0	94.4	88.2	38.40	135.00	88.07
Carbonate (CO3)	mg/L	0.60	<0.60	<0.60	<0.60	<0.60	0.60	12.00	2.35
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	<0.34	<0.34	0.34	6.80	1.33
Total (as CaCO3)	mg/L	1.0	45.5	75.4	77.4	72.3	31.50	110.00	72.07
Ammonia by Colour									
Total (as N)	mg/L	0.20	0.01	0.025	0.019	0.02	0.01	0.09	0.03
Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	mg/L	6.0	<2.0	<2.0	<2.0	2.3	2.00	6.00	2.98
Carbonaceous BOD									
BOD Carbonaceous	mg/L	6.0	<2.0	<2.0	<2.0	<2.0	2.00	6.00	2.69
Chloride in Water by IC									
Chloride (Cl)	mg/L	10	131	259	372	441	94.50	1300.00	554.58
Conductivity									
Conductivity	umhos/cm	1.0	537	953	1340	1570	305.00	3890.00	1789.07
Fecal Coliforms									
Fecal Coliforms	MPN/100mL	3	<10	30	20	30	3.00	7500.00	514.73
Hardness Calculated									
Hardness (as CaCO3)	mg/L	0.30	81.6	138	212	226	64.30	744.00	308.18
Mercury Total									
Mercury (Hg)	mg/L	0.00020	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	<0.020	<0.040	<0.10	<0.10	0.02	0.40	0.15
Nitrate + Nitrite									
Nitrate and Nitrite as N	mg/L	0.070	<0.070	<0.070	<0.11	<0.11	0.07	0.45	0.21
Nitrite in Water by IC									
Nitrite (as N)	mg/L	0.010	<0.010	<0.020	<0.050	<0.050	0.01	0.25	0.09
Oil & Grease - Gravimetric									
Oil and Grease	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	2.00	5.00	3.71
Phenol									
Phenols	mg/L	0.0010	<0.0010	0.0011	0.0015	<0.0010	0.0010	0.014	0.0025
Phosphorus, Total									
Phosphorus (P)	mg/L	0.010	0.0058	0.0314	0.0275	0.0236	0.0038	0.17	0.065
Sulfate in Water by IC									
Sulfate (SO4)	mg/L	6.0	13.2	5.40	2.80	11.2	4.90	119.00	29.34
Total Metals by ICP-MS									
Aluminium (Al)	mg/L	0.0050	0.0158	0.0157	0.042	0.0094	0.01	0.46	0.13
Arsenic (As)	mg/L	0.00020	0.0004	0.00076	0.00077	0.00055	0.0002	0.0009	0.0006
Cadmium (Cd)	mg/L	0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000005	0.000074	0.000014
Calcium (Ca)	mg/L	0.10	14.8	21.7	34.5	36	8.98	79.90	41.74
Chromium (Cr)	mg/L	0.0010	0.00014	0.00018	0.00025	0.00016	0.0001	0.0016	0.0009
Cobalt (Co)	mg/L	0.00020	0.0001	0.00029	0.0005	0.00015	0.0001	0.0006	0.0003
Copper (Cu)	mg/L	0.00020	0.00059	0.00066	<0.00050	0.00061	0.0003	0.0015	0.0007
Iron (Fe)	mg/L	0.010	0.514	1.79	3.54	0.721	0.21	7.56	2.53
Lead (Pb)	mg/L	0.000090	0.000052	0.000072	0.000070	0.000066	0.0001	0.0006	0.0002
Magnesium (Mg)	mg/L	0.010	10.8	20.2	30.7	33.1	6.27	132.00	46.55
Manganese (Mn)	mg/L	0.00030	0.00856	0.150	0.536	0.0619	0.01	0.26	0.12
Nickel (Ni)	mg/L	0.0020	0.00055	0.00077	0.00052	0.00052	0.0005	0.0020	0.0017
Potassium (K)	mg/L	0.020	4.92	6.81	7.08	7.64	2.90	23.60	11.01
Sodium (Na)	mg/L	0.030	72.2	144	191	222	41.60	765.00	288.01
Zinc (Zn)	mg/L	0.0020	0.0031	0.0052	0.0058	0.0611	0.0020	0.42	0.033
Total Organic Carbon by Combustion									
Total Organic Carbon	mg/L	0.50	7.76	11.4	11.0	10.6	7.23	13.20	9.39
Total Suspended Solids									
Total Suspended Solids	mg/L	13	<2.0	3.1	22.5	146	5.00	124.00	26.99
pH									
pH	pH Units	0.10	7.67	7.51	7.18	7.24	6.96	8.05	7.51
Benzene	mg/L	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		0.001	0.001	0.001
Ethyl Benzene	mg/L	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		0.0005	0.0005	0.0005
F1 (C6-C10)	mg/L	0.10	<0.10	<0.10	<0.10		0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	<0.10	<0.10	<0.10		0.10	0.50	0.18
F3 (C16-C34)	mg/L	0.25	<0.25	<0.25	<0.25		0.25	0.50	0.27
F4 (C34-C50)	mg/L	0.25	<0.25	<0.25	<0.25		0.25	0.50	0.27
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	<0.38	<0.38		0.38	0.87	0.44

Arviat
ARV-6

			2018				Statistics		
Parameter	**Unit**	**DL**	**21-Jun-18**	**17-Jul-18**	**13-Aug-18**	**10-Sep-18**	**Min**	**Max**	**Average**
Alkalinity									
Bicarbonate (HCO3)	mg/L	1.2	98.7	136	79.3	96	31.00	138.00	102.75
Carbonate (CO3)	mg/L	0.60	<0.60	<0.60	<0.60	<0.60	0.60	12.00	2.67
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	<0.34	<0.34	0.34	6.80	1.51
Total (as CaCO3)	mg/L	1.0	80.9	111	65	78.7	25.40	113.00	84.21
Ammonia by Colour									
Total (as N)	mg/L	0.20	0.12	0.639	0.038	0.052	0.01	0.83	0.26
Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	mg/L	6.0	11.4	<6	<2.0	2.1	2.10	70.10	12.51
Carbonaceous BOD									
BOD Carbonaceous	mg/L	6.0	7.3	<6	<2.0	<2.0	2.00	6.60	3.89
Chloride in Water by IC									
Chloride (Cl)	mg/L	10	247	177	238	224	45.10	267.00	149.16
Conductivity									
Conductivity	umhos/cm	1.0	944	767	894	892	198.00	1070.00	650.23
Fecal Coliforms									
Fecal Coliforms	MPN/100mL	3	<10	<10	20	<10	3.00	430.00	38.54
Hardness Calculated									
Hardness (as CaCO3)	mg/L	0.30	319	272	223	207	99.60	253.00	179.24
Mercury Total									
Mercury (Hg)	mg/L	0.00020	<0.0000050	<0.000010	<0.0000050	<0.0000050	0.000005	0.00040	0.00012
Nitrate in Water by IC									
Nitrate (as N)	mg/L	0.40	<0.020	<0.020	<0.040	<0.040	0.02	0.16	0.04
Nitrate + Nitrite									
Nitrate and Nitrite as N	mg/L	0.45	<0.070	<0.070	<0.070	<0.070	0.07	0.16	0.08
Nitrite in Water by IC									
Nitrite (as N)	mg/L	0.20	<0.010	<0.010	<0.020	<0.020	0.01	0.05	0.02
Oil & Grease - Gravimetric									
Oil and Grease	mg/L	5.0	<5.0	6.5	<5.0	<5.0	2.00	33.00	6.03
Phenol									
Phenols	mg/L	0.0010	0.0145	0.0043	0.0014	<0.0010	0.0010	0.019	0.006
Phosphorus, Total									
Phosphorus (P)	mg/L	0.010	0.0433	0.399	0.028	0.0638	0.04	0.43	0.16
Sulfate in Water by IC									
Sulfate (SO4)	mg/L	6.0	0.99	0.59	<0.60	1.65	0.30	8.83	1.64
Total Metals by ICP-MS									
Aluminium (Al)	mg/L	0.0050	0.0202	0.132	0.0305	0.152	0.025	1.690	0.511
Arsenic (As)	mg/L	0.00020	0.0068	0.00321	0.00045	0.00054	0.00036	0.00584	0.00146
Cadmium (Cd)	mg/L	0.000010	0.000015	0.0000172	<0.0000050	0.0000332	0.000005	0.000091	0.000030
Calcium (Ca)	mg/L	0.10	101	84.7	60.1	54.3	17.40	74.20	47.02
Chromium (Cr)	mg/L	0.0010	0.00024	0.00097	0.00047	0.00073	0.0010	0.32	0.027
Cobalt (Co)	mg/L	0.00020	0.00347	0.00198	0.001	0.00126	0.0009	0.0048	0.0024
Copper (Cu)	mg/L	0.00020	0.00123	0.00116	<0.00050	0.0014	0.0003	0.0060	0.0023
Iron (Fe)	mg/L	0.010	8.93	34.0	11.5	7.69	2.81	147.00	41.46
Lead (Pb)	mg/L	0.000090	0.000102	0.000272	0.000196	0.000370	0.00009	0.00198	0.00076
Magnesium (Mg)	mg/L	0.010	16.3	14.7	17.7	17.4	4.13	17.80	12.76
Manganese (Mn)	mg/L	0.00030	3.91	1.60	1.66	2.13	1.07	3.89	2.31
Nickel (Ni)	mg/L	0.0020	0.00419	0.00189	0.00062	0.00134	0.00126	0.00430	0.00250
Potassium (K)	mg/L	0.020	9.58	9.17	5.09	5.72	3.23	8.30	5.74
Sodium (Na)	mg/L	0.030	43.5	35.0	84.5	85.7	10.00	82.70	56.92
Zinc (Zn)	mg/L	0.0020	0.0131	0.0173	0.0135	0.0234	0.0020	0.30	0.048
Total Organic Carbon by Combustion									
Total Organic Carbon	mg/L	0.50	16.3	17.9	7.99	7.2	1.00	28.20	13.92
Total Suspended Solids									
Total Suspended Solids	mg/L	13	35	132	30	24	18.00	1500.00	201.38
pH									
pH	pH Units	0.10	6.92	6.77	6.66	6.66	6.45	7.67	6.92
Benzene	mg/L	0.00050	<0.00050	<0.00050	<0.00050		0.0005	0.0005	0.0005
Toluene	mg/L	0.0010	0.0012	0.0013	0.0013		0.0010	0.0042	0.0021
Ethyl Benzene	mg/L	0.00050	<0.00050	<0.00050	<0.00050		0.0005	0.0024	0.0007
o-Xylene	mg/L	0.00050	<0.00050	<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
F2 (C10-C16)	mg/L	0.25	<0.10	0.16	0.14		0.10	2.47	0.47
F3 (C16-C34)	mg/L	0.25	<0.25	<0.25	<0.25		0.25	13.90	2.19
F4 (C34-C50)	mg/L	0.25	<0.25	<0.25	<0.25		0.25	0.72	0.37
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	<0.38	<0.38		0.38	17.20	2.72

Appendix I

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Arviat	Steve England
Licence No. / Expiry	**Representative's Title**
3AM-ARV1016/ February 27th 2016	Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
--	--
Date of Inspection	**Inspector**
June 27th 2018	Atuat Shouldice

Activities Inspected

☐ Camp ☐ Drilling ☐ Mining ☐ Construction ☐ Reclamation ☐ Fuel Storage
☐ Roads/Hauling ☒ Other: Waste Disposal Facility ☒ Other: Water Treatment Facility

Conditions: A- Acceptable U-Unacceptable C-Concern NI-Not Inspected NA- Not applicable

PART:	Item No.*	Condition	Observation No.*
A: SCOPE, DEFINITIONS AND ENFORCEMENT	--	--	--
B: GENERAL CONDITIONS	3,6	U,A	1,2
C: CONDITIONS APPLYING TO WATER USE AND MANAGMENT	1,2,3	A,C,A	3,4,5
D: CONDITIONS APPLYING TO WASTE DISPOSAL AND MANAGEMENT	1,3,15,18	A,A,A,A	6,7,8,9
E: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION	2	U	10
F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE	--	--	--
G: CONDITIONS APPLYING TO ABANDONMENT, RESTORATION AND CLOSURE	--	--	--
H: CONDITIONS APPLYING TO MONITORING PROGRAM	--	--	--

**The item number corresponds with specific conditions within the licence and the observation number corresponds with specific comments provided below.*

Samples taken by Inspector:	Location(s): ARV-2
☐ Yes ☒ No	

SECTION 1 ☒ **Comments** (s._1_) ☐ **Non-Compliance with Act or Licence** (s.__) ☐ **Action Required** (s.__)

Background

The Hamlet of Arviat is a community located on the Western shore of Hudson Bay at N61° 05.517" W94° 06.249", within the Kivalliq Region of Nunavut. The community is located approximately 221 km South of Rankin Inlet.

In 2015, the Hamlet was granted a short term renewal of water licence no. 3AM-ARV1015 to allow for more time to prepare a water licence renewal application. The short term renewal expired on February 27th, 2016. The Hamlet has not been issued a new license due to insufficient information contained in the original renewal application package.

Inspector's Statement

On June 27th, 2018, a water licence inspection was conducted of expired water licence no. 3AM-ARV1016 with the assistances from Steve England, Senior Administer Officer, Hamlet of Arviat and Connor Faulkner, Community and Government Services.

Observation

1. The 2016 and 2018 annual reports are not available for review on the Nunavut Water Board's FTP website.
2. Fresh water is metered at the source (Wolf River).
3. Freshwater is withdrawn from Wolf River at monitoring station no. ARV-1 to resupply the three potable water reservoirs. The Hamlet constructed a third water reservoir to increase the capacity and prevent an anticipated water shortage.
4. The Hamlet is allotted 86 000m^3 of fresh water annually. The 2017 annual report indicates that a total of 98,750,554.50m^3 was used, which the inspector expects to be unrealistic and incorrect.
5. The fresh water intake is equip with a screen.
6. All sewage is directed to the Sewage Disposal Facility ('SDF').
7. The SDF berm has one (1) meter freeboard as required PART D item 3.
8. The Hamlet has been depolluting vehicles located in the Solid Waste Disposal Facility ('SWDF'). The hazardous waste that has been removed from the vehicles is collected in appropriate containers and is store in seacans.
9. The depolluted vehicles are then shredded and used as a fire barrier in the SWDF to prevent uncontrolled burning.

10. The Hamlet has constructed an additional potable water pond without approval from the Nunavut Water Board.

SECTION 2 ☐ **Comments** ☒ **Non-Compliance with Act or Licence** ☐ **Action Required**

Concerns related to Water Licence no. 3BM-ARV1016;

PART B item 3: Failure to file 2016 and 2018 Annual Reports

- *The Licensee shall submit the outstanding annual reports, as required, before the term of the next inspection.*

PART C item 2: Concerns regarding Annual water use records

- *The Licensee shall review the 2017 annual report and provide a response to the inspectors concerns during the next inspection.*

PART E item 2: Failure to receive approval prior to construction of facilities

- *The Licensee shall complete an application for renewal prior to the next inspection.*

Failures related to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

Section 11(2): No person shall use or permit the use of water in Nunavut except in accordance with the conditions of a licence.

- The Licensee shall submit the necessary information, as required by the Nunavut Water Board, for the renewal application as discussed in section 1 of this report, prior to the term of the next inspection or further enforcement action will be taken.

SECTION 3 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

The Hamlet of Arviat is currently using water and depositing waste without a valid water licence for the third year. The Nunavut Water Board has issued a letter to Community and Government Services in December 2018 requesting information on the stalled Type 'A' application. To date no response has been received by the Board.

The inspector is particularly pleased with the efforts made by the Hamlet over the last three years at SWDF but is concerned with the lack of progress obtain a current authorization.

Licensee or Representative	**Inspector's Name**
Steve England	Atuat Shouldice
Signature	**Signature**
	Sent Electronically
Date	**Date**
	January 23rd , 2018

CC: Licensing Department, NWB
Justin Hack, Manager, Field Operations, CIRNAC