

ANNUAL REPORT FOR GN-CGS RANKIN INLET

YEAR BEING REPORTED: 2019

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence No. **3AM-GRA1624** issued to **Government of Nunavut, Department of Community and Government Services (GN-CGS)**.

- 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 Station GRA-1 and GRA-3, as well as detailed chemical, physical and biological analysis required at GRA-2, GRA-6 and GRA-7.

Month Reported	Quantity of Water Obtained from all Sources (m³)	Quantity of Sewage Waste Discharged (Estimated, m³)
January	63,002.00	Same
February	55,587.00	Same
March	67,687.00	Same
April	62,143.00	Same
May	61,859.00	Same
June	54,221.00	Same
July	47,060.00	Same
August	33,412.00*	Same
September	20,237.00*	Same
October	55,846.00	Same
November	53,006.00	Same
December	56,034.00	Same
ANNUAL TOTAL	630,094.00	630,094.00

*Broken flow meters and missed readings have caused monthly totals to become incomplete and inaccurate; most notably from August 18th to September 18th, 2019.

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Pumping from Lower Landing Lake began on June 27, 2019. Below is the estimated Lower Landing Lake pumping volumes from June 29th, 2019 to August 23rd, 2019.

Month Reported	Estimated Water Transferred From Lower Landing Lake to Nipissar (m³)
June	12,536.84
July	188,052.60
August	112,831.56
TOTAL	313,421.00

An estimated total of 313,421.00 m³ was pumped to Nipissar Lake in 2019.

Below are the results for Monitoring Program Station GRA-1. Please note, water elevation is a measurement taken from a datum on the shoreline; therefore a decrease in elevation measurement represents an increase in Lake water level.

Date	Nipissar Lake Elevation (m)	Change in Nipissar Lake Elevation (m)
June	No Reading on Record	No Reading on Record
July	No Reading on Record	No Reading on Record
August	No Reading on Record	No Reading on Record

*No Nipissar Lake elevation readings are on record for 2019.

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Solid screenings separated from the sewage effluent at the Sewage Treatment Facility are contained in bags and transported to a designated area of the Rankin Inlet Solid Waste Site. Approximately 1 m³ of screenings are removed weekly. As per Part H, Item 5 of the Licence, below is a summary of solids remove from Sewage Treatment Facility at Monitoring Station Number GRA-4.

Month Reported	Solids Removed from the Sewage Treatment Facility (m ³)
January	4
February	4
March	4
April	4
May	4
June	4
July	4
August	4
September	4
October	4
November	4
December	4
ANNUAL TOTAL	48

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- 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;

- none

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

Spills:

Spill #	Occurrence Date	Location Description	Product Spilled	Quantity
2019452	03-Nov-19	Between Health Centre and Power Plant		40,000 L
2019480	31-Oct-19	Melvin Bay		Unknown Quantity
2019425	14-Oct-19	414 / 17-13 Ave.	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	200 L
2019410	01-Oct-19	902 Maniruaq 61st	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity
2019270	05-Jul-19	188-24 Inukshuk Avenue, unit 541b	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	278 L
2019255	26-Jun-19	Condominiums, 44 - 15th Street		Unknown Quantity
2019216	22-May-19	Box 251	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity
2019194	02-May-19	CBC Building 101-21 Tariuq Avenue	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity
2019155	09-Apr-19	Courtyard Condominiums, 44-15 Ayaruaq street	Wastewater (sewage, mine tailings)	800 L
2019221	01-Mar-19	CBC Building 101-21 Tariuq Avenue	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	2000 L

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

- none

- 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;

- A Wastewater Effluent Characterization Study has been undertaken by Dillon Consulting, as per Environment and Climate Change Canada Fisheries Act Direction.

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

- Pumping from Landing Lake started on June 27th, 2019.

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

- none

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- none

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- The 3AM-GRA1624 CIRNAC Inspection took place on July 17th, 2019. A copy of the inspection report has not been received to date.

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Appendix A

The Lower Landing Lake monthly pumping volumes are approximate calculations based on an hourly flow rate of $272.54 \text{ m}^3/\text{h}$. The calculation accounts for an hour of maintenance, pump checks, and fuel addition into the pump for an estimated total of 23 pumping hours per day. This is equal to $6,268.42 \text{ m}^3/\text{day}$. Due to broken flow meters, inconsistent recording, and missing log sheets, this is the best approach to record keeping for the 2019 pumping season.

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Appendix B

Spill	Occurance Date -	Spill Region	Location	Location Description	Product Spilled	Quantity	Measurement	Spill Cause	Lead Agency
spill-2019452	November 3, 2019	Keewatin	Rankin Inlet, Community, Nunavut	Between Health Centre and Power Plant		40000.00	Litres	Breakage	GN - Government of Nunavut
spill-2019480	October 31, 2019	Keewatin	Rankin Inlet, Community, Nunavut	Melvin Bay		Unknown Quantity			INAC - Indigenous and Northern Affairs Canada
spill-2019425	October 14, 2019	Keewatin	Rankin Inlet, Community, Nunavut	414 / 17-13 Ave.	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	200.00	Litres	Tank Leak	GN - Government of Nunavut
spill-2019410	October 1, 2019	Keewatin	Rankin Inlet, Community, Nunavut	902 Maniruaq 61st	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity		Breakage	GN - Government of Nunavut
spill-2019270	July 5, 2019	Keewatin	Rankin Inlet, Community, Nunavut	188-24 Inukshuk Avenue, unit 541b	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	278.00	Litres	Breakage	GN - Government of Nunavut
spill-2019255	June 26, 2019	Keewatin	Rankin Inlet, Community, Nunavut	Condominiums, 44 - 15th Street		Unknown Quantity			GN - Government of Nunavut
spill-2019216	May 22, 2019	Keewatin	Rankin Inlet, Community, Nunavut	Box 251	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity		Pipe Leaks	GN - Government of Nunavut
spill-2019194	May 2, 2019	Keewatin	Rankin Inlet, Community, Nunavut	CBC Building 101-21 Tariuq Avenue	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	Unknown Quantity			GN - Government of Nunavut
spill-2019155	April 9, 2019	Keewatin	Rankin Inlet, Community, Nunavut	Courtyard Condominiums, 44-15 Ayaruaq street	Wastewater (sewage, mine tailings)	800.00	Litres	Breakage	GN - Government of Nunavut
spill-2019221	March 1, 2019	Keewatin	Rankin Inlet, Community, Nunavut	CBC Building 101-21 Tariuq Avenue	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	2000.00	Litres	Fitting Leak	GN - Government of Nunavut

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Appendix C

Rankin Inlet-CGS
GRA-1

			2019	Statistics		
Parameter	Unit	DL	25-Jun-19	Min	Max	Average
Alkalinity						
Bicarbonate (HCO3)	mg/L	1.2	37.2	36.1	57.1	43.93
Carbonate (CO3)	mg/L	0.60	<0.60	0.60	0.60	0.60
Hydroxide (OH)	mg/L	0.34	<0.34	0.34	0.34	0.34
Alkalinity, Total (as CaCO3)	mg/L	1.0	30.5	29.6	46.8	36.00
Ammonia by Colour						
Ammonia Total (as N)	mg/L	0.20	0.040	0.010	0.087	0.050
Biochemical Oxygen Demand (BOD)						
Biochemical Oxygen Demand	mg/L	6.0	<2.0	2.0	2.9	2.33
Carbonaceous BOD						
BOD Carbonaceous	mg/L	6.0	<2.0	2.0	2.5	2.17
Chloride in Water by IC						
Chloride (Cl)	mg/L	10	21.9	20.7	36.9	28.60
Conductivity (I)						
Conductivity	umhos/cm	1.0	157	149	246	194.67
Fecal Coliforms (I)						
Fecal Coliforms	MPN/100mL	3	<10	3	10	5.33
Hardness Calculated						
Hardness (as CaCO3)	mg/L	0.30	45.2	40.8	72.5	55.87
Mercury Total						
Mercury (Hg)	mg/L	0.00020	<0.0000050	0.000005	0.00002	0.00002
Nitrate in Water by IC						
Nitrate (as N)	mg/L	0.40	<0.020	0.020	0.020	0.020
Nitrate + Nitrite						
Nitrate and Nitrite as N	mg/L	0.45	<0.070	0.070	0.070	0.070
Nitrite in Water by IC						
Nitrite (as N)	mg/L	0.20	<0.010	0.010	0.010	0.010
Oil & Grease - Gravimetric						
Oil and Grease	mg/L	5.0	<5.0	2.0	5.0	4.00
Phenol						
Phenols	mg/L	0.0010	<0.0010	0.001	0.0027	0.0016
Phosphorus, Total						
Phosphorus (P)	mg/L	0.010	0.0163	0.012	0.014	0.013
Sulfate in Water by IC						
Sulfate (SO4)	mg/L	6.0	14.7	10.9	20.8	15.30
Total Metals by ICP-MS						
Aluminium (Al)	mg/L	0.0050	0.0352	0.0126	0.0491	0.025
Arsenic (As)	mg/L	0.00020	0.00061	0.00046	0.00052	0.00049
Cadmium (Cd)	mg/L	0.000010	<0.0000050	0.00001	0.00001	0.00001
Calcium (Ca)	mg/L	0.10	12.7	11.80	21.0	16.233
Chromium (Cr)	mg/L	0.0010	0.00044	0.0010	0.0010	0.0010
Cobalt (Co)	mg/L	0.00020	0.00012	0.0002	0.0002	0.00020
Copper (Cu)	mg/L	0.00020	0.00098	0.00073	0.00087	0.00082
Iron (Fe)	mg/L	0.010	0.071	0.0290	0.10	0.053
Lead (Pb)	mg/L	0.000090	<0.000050	0.00009	0.00009	0.00009
Magnesium (Mg)	mg/L	0.010	3.28	2.72	4.9	3.72
Manganese (Mn)	mg/L	0.00030	0.0446	0.0112	0.031	0.024
Nickel (Ni)	mg/L	0.0020	0.00098	0.0020	0.0020	0.0020
Potassium (K)	mg/L	0.020	1.58	1.57	2.61	2.05
Sodium (Na)	mg/L	0.030	12.8	13.1	22.5	17.70
Zinc (Zn)	mg/L	0.0020	<0.0030	0.0020	0.0020	0.0020
Total Organic Carbon by Combustion						
Total Organic Carbon	mg/L	0.50	3.72	3.9	4.18	4.06
Total Suspended Solids (I)						
Total Suspended Solids	mg/L	13	<2.0	5.0	5.0	5.00
pH						
pH	pH Units	0.10	7.40	7.34	7.63	7.48
Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
Toluene	mg/L	0.0010	<0.0010	0.0010	0.0010	0.0010
Ethyl Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
o-Xylene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
F1 (C6-C10)	mg/L	0.10	<0.10	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	<0.10	0.10	0.25	0.15
F3 (C16-C34)	mg/L	0.25	<0.25	0.25	0.25	0.25
F4 (C34-C50)	mg/L	0.25	<0.25	0.25	0.25	0.25
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	0.38	0.44	0.40

Rankin Inlet-CGS GRA-6			2019	Statistics		
Parameter	Unit	DL	25-Jun-19	Min	Max	Average
Alkalinity						
Bicarbonate (HCO3)	mg/L	1.2	24.9	19.0	30.3	25.8
Carbonate (CO3)	mg/L	0.60	<0.60	0.60	0.60	0.60
Hydroxide (OH)	mg/L	0.34	<0.34	0.34	0.34	0.34
Alkalinity, Total (as CaCO3)	mg/L	1.0	20.4	15.6	24.8	21.2
Ammonia by Colour						
Ammonia Total (as N)	mg/L	0.20	<0.010	0.010	0.010	0.010
Biochemical Oxygen Demand (BOD)						
Biochemical Oxygen Demand	mg/L	6.0	<2.0	2.0	2.0	2.0
Carbonaceous BOD						
BOD Carbonaceous	mg/L	6.0	<2.0	2.0	2.0	2.0
Chloride in Water by IC						
Chloride (Cl)	mg/L	10	16.0	13.2	23.7	16.9
Conductivity ()						
Conductivity	umhos/cm	1.0	101	88.7	143.0	109.4
Fecal Coliforms ()						
Fecal Coliforms	MPN/100mL	3	<10	3.0	10.0	5.3
Hardness Calculated						
Hardness (as CaCO3)	mg/L	0.30	26.8	23.00	42.00	30.90
Mercury Total						
Mercury (Hg)	mg/L	0.00020	<0.0000050	0.000005	0.000020	0.000015
Nitrate in Water by IC						
Nitrate (as N)	mg/L	0.40	<0.020	0.020	0.020	0.020
Nitrate + Nitrite						
Nitrate and Nitrite as N	mg/L	0.45	<0.070	0.070	0.070	0.070
Nitrite in Water by IC						
Nitrite (as N)	mg/L	0.20	<0.010	0.010	0.010	0.010
Oil & Grease - Gravimetric						
Oil and Grease	mg/L	5.0	<5.0	2.0	5.0	4.0
Phenol						
Phenols	mg/L	0.0010	<0.0010	0.0010	0.0028	0.0016
Phosphorus, Total						
Phosphorus (P)	mg/L	0.010	0.0076	0.010	0.011	0.010
Sulfate in Water by IC						
Sulfate (SO4)	mg/L	6.0	4.36	4.32	6.29	5.01
Total Metals by ICP-MS						
Aluminium (Al)	mg/L	0.0050	0.0118	0.0085	0.0289	0.0176
Arsenic (As)	mg/L	0.00020	0.00035	0.00023	0.00033	0.00028
Cadmium (Cd)	mg/L	0.000010	<0.0000050	0.000010	0.000010	0.000010
Calcium (Ca)	mg/L	0.10	7.85	6.71	12.70	9.23
Chromium (Cr)	mg/L	0.0010	0.00025	0.0010	0.0010	0.0010
Cobalt (Co)	mg/L	0.00020	<0.00010	0.00020	0.00020	0.00020
Copper (Cu)	mg/L	0.00020	0.00092	0.00075	0.00083	0.00080
Iron (Fe)	mg/L	0.010	0.066	0.10	0.18	0.14
Lead (Pb)	mg/L	0.000090	<0.000050	0.00009	0.00009	0.00009
Magnesium (Mg)	mg/L	0.010	1.75	1.52	2.48	1.91
Manganese (Mn)	mg/L	0.00030	0.0034	0.0030	0.0436	0.0191
Nickel (Ni)	mg/L	0.0020	0.00063	0.0020	0.0020	0.0020
Potassium (K)	mg/L	0.020	1.26	1.17	1.71	1.43
Sodium (Na)	mg/L	0.030	8.75	7.35	12.50	9.24
Zinc (Zn)	mg/L	0.0020	<0.0030	0.0020	0.0020	0.0020
Total Organic Carbon by Combustion						
Total Organic Carbon	mg/L	0.50	4.53	4.0	5.0	4.6
Total Suspended Solids ()						
Total Suspended Solids	mg/L	13	<2.0	5.0	5.0	5.0
pH						
pH	pH Units	0.10	7.28	7.4	7.4	7.4
Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
Toluene	mg/L	0.0010	<0.0010	0.0010	0.0010	0.0010
Ethyl Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
o-Xylene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
F1 (C6-C10)	mg/L	0.10	<0.10	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	<0.10	0.10	0.25	0.15
F3 (C16-C34)	mg/L	0.25	<0.25	0.25	0.25	0.25
F4 (C34-C50)	mg/L	0.25	<0.25	0.25	0.25	0.25
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	0.38	0.44	0.40

Rankin Inlet-CGS GRA-7			2019	Statistics		
Parameter	Unit	DL	25-Jun-19	Min	Max	Average
Alkalinity						
Bicarbonate (HCO3)	mg/L	1.2	15.6	16.5	30	23.8
Carbonate (CO3)	mg/L	0.60	<0.60	0.60	0.60	0.60
Hydroxide (OH)	mg/L	0.34	<0.34	0.34	0.34	0.34
Alkalinity, Total (as CaCO3)	mg/L	1.0	12.8	13.5	24.6	19.5
Ammonia by Colour						
Ammonia Total (as N)	mg/L	0.20	<0.0010	0.010	0.12	0.047
Biochemical Oxygen Demand (BOD)						
Biochemical Oxygen Demand	mg/L	6.0	<2.0	2.0	2.0	2.0
Carbonaceous BOD						
BOD Carbonaceous	mg/L	6.0	<2.0	2.0	2.0	2.0
Chloride in Water by IC						
Chloride (Cl)	mg/L	10	14.9	11.4	23.5	15.83
Conductivity ()						
Conductivity	umhos/cm	1.0	96.0	77.1	143	102.77
Fecal Coliforms ()						
Fecal Coliforms	MPN/100mL	3	<10	3	10	5.33
Hardness Calculated						
Hardness (as CaCO3)	mg/L	0.30	24.5	19.6	41.4	28.87
Mercury Total						
Mercury (Hg)	mg/L	0.00020	<0.0000050	0.000005	0.00002	0.000015
Nitrate in Water by IC						
Nitrate (as N)	mg/L	0.40	<0.020	0.020	0.020	0.020
Nitrate + Nitrite						
Nitrate and Nitrite as N	mg/L	0.45	<0.070	0.070	0.070	0.070
Nitrite in Water by IC						
Nitrite (as N)	mg/L	0.20	<0.010	0.010	0.010	0.010
Oil & Grease - Gravimetric						
Oil and Grease	mg/L	5.0	<5.0	2.0	5.0	4.0
Phenol						
Phenols	mg/L	0.0010	0.0011	0.001	0.0021	0.0015
Phosphorus, Total						
Phosphorus (P)	mg/L	0.010	0.0081	0.010	0.011	0.010
Sulfate in Water by IC						
Sulfate (SO4)	mg/L	6.0	4.03	3.94	6.31	4.75
Total Metals by ICP-MS						
Aluminium (Al)	mg/L	0.0050	0.0143	0.0139	0.0469	0.026
Arsenic (As)	mg/L	0.00020	0.00034	0.00021	0.00031	0.00027
Cadmium (Cd)	mg/L	0.000010	<0.0000050	0.000010	0.000010	0.000010
Calcium (Ca)	mg/L	0.10	7.17	5.68	12.5	8.61
Chromium (Cr)	mg/L	0.0010	0.00040	0.0010	0.0010	0.0010
Cobalt (Co)	mg/L	0.00020	<0.00010	0.00020	0.00020	0.00020
Copper (Cu)	mg/L	0.00020	0.00106	0.00068	0.00082	0.00075
Iron (Fe)	mg/L	0.010	0.069	0.10	0.19	0.14
Lead (Pb)	mg/L	0.000090	<0.000050	0.000090	0.000090	0.000090
Magnesium (Mg)	mg/L	0.010	1.59	1.32	2.46	1.79
Manganese (Mn)	mg/L	0.00030	0.00362	0.00312	0.029	0.016
Nickel (Ni)	mg/L	0.0020	0.00064	0.0020	0.0020	0.0020
Potassium (K)	mg/L	0.020	1.20	1.02	1.68	1.34
Sodium (Na)	mg/L	0.030	7.81	6.65	12	8.45
Zinc (Zn)	mg/L	0.0020	<0.0030	0.0020	0.0020	0.0020
Total Organic Carbon by Combustion						
Total Organic Carbon	mg/L	0.50	4.37	3.93	4.76	4.26
Total Suspended Solids ()						
Total Suspended Solids	mg/L	13	<2.0	5.0	5.0	5.0
pH						
pH	pH Units	0.10	6.78	7.31	7.38	7.35
Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
Toluene	mg/L	0.0010	<0.0010	0.0010	0.0010	0.0010
Ethyl Benzene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
o-Xylene	mg/L	0.00050	<0.00050	0.00050	0.00050	0.00050
F1 (C6-C10)	mg/L	0.10	<0.10	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.25	<0.10	0.10	0.25	0.15
F3 (C16-C34)	mg/L	0.25	<0.25	0.25	0.25	0.25
F4 (C34-C50)	mg/L	0.25	<0.25	0.25	0.25	0.25
Total Hydrocarbons (C6-C50)	mg/L	0.44	<0.38	0.38	0.44	0.40

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Appendix D

Summary of Hydrocarbon Contamination Analysis

Parameters	Units	Detection Limit	25-Jun-19			Guidelines for Canadian Drinking Water Quality
			GRA-1: Nipissar Lake	GRA-6: Char River	GRA-7: Lower Landing Lake	
BTX plus F1 by GCMS						
Benzene	mg/L	0.00050	<0.00050	<0.00050	<0.00050	MAC: 0.005 mg/L
Toluene	mg/L	0.0010	<0.0010	<0.0010	<0.0010	AO: ≤ 0.024 mg/L ¹
Ethylbenzene	mg/L	0.00050	<0.00050	<0.00050	<0.00050	AO: ≤ 0.0024 mg/L ²
o-Xylene	mg/L	0.00050	<0.00050	<0.00050	<0.00050	
m+p-Xylenes	mg/L	0.00040	<0.00040	<0.00040	<0.00040	
F1 (C6-C10)	mg/L	0.10	<0.10	<0.10	<0.10	
CCME Total Hydrocarbons						
F1-BTEX	mg/L	0.10	<0.10	<0.10	<0.10	
F2-Naphth	mg/L	0.1	<0.10	<0.10	<0.10	
F3-PAH	mg/L	0.25	<0.25	<0.25	<0.25	
Total Hydrocarbons (C6-C50)	mg/L	0.38	<0.38	<0.38	<0.38	
F2-F4 PHC Method						
F2 (C10-C16)	mg/L	0.1	<0.10	<0.10	<0.10	
F3 (C16-C34)	mg/L	0.25	<0.25	<0.25	<0.25	
F4 (C34-C50)	mg/L	0.25	<0.25	<0.25	<0.25	
Sum of Xylene Isomer Concentrations						
Xylenes (Total)	mg/L	0.00064	<0.00064	<0.00064	<0.00064	AO: ≤ 0.3 mg/L ³
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Napthalene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
2-Methyl Naphthalene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Acenaphthene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Acenaphthylene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Anthracene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Acridine	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Benzo(a)anthracene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Benzo(a)pyrene	mg/L	0.0000050	<0.0000050	<0.0000050	<0.0000050	MAC: 0.00001 mg/L
Benzo(b&j)fluoranthene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Benzo(g,h,i)perylene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Benzo(k)fluoranthene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Chrysene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Dibenzo(a,h)anthracene	mg/L	0.0000050	<0.0000050	<0.0000050	<0.0000050	
Fluoranthene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Fluorene	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
Indeno(1,2,3-cd)pyrene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Naphthalene	mg/L	0.000050	<0.000050	<0.000050	<0.000050	
Phenanthrene	mg/L	0.000050	<0.000050	<0.000050	<0.000050	
Pyrene	mg/L	0.000010	<0.000010	<0.000010	<0.000010	
Quinoline	mg/L	0.000020	<0.000020	<0.000020	<0.000020	
B(a)P Total Potency Equivalent	mg/L	0.000030	<0.000030	<0.000030	<0.000030	

MAC - Maximum acceptable concentrations (health based)
AO - Aesthetic objectives (based on aesthetic considerations)
OG - Operational guidance values (based on operational considerations)

¹ AO based on odour
³ AO based on odour; levels above the AO would render drinking water unpalatable
³ AO based on taste and odour; levels above the AO would render water unpalatable

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix E

Rankin Inlet-CGS GRA-3		2019														
Parameter	Unit	13-May-19	04-Jun-19	02-Jul-19	08-Jul-19	16-Jul-19	22-Jul-19	29-Jul-19	06-Aug-19	12-Aug-19	19-Aug-19	26-Aug-19	02-Oct-19	31-Oct-19	25-Nov-19	04-Dec-19
Alkalinity																
Bicarbonate (HCO3)	mg/L	149	63.8	59.4	108	135	151	78.9	63.9	53.4	43.6	114	75.6	137	152	71.1
Carbonate (CO3)	mg/L	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Hydroxide (OH)	mg/L	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Total (as CaCO3)	mg/L	122	52.3	48.7	88.6	110	124	64.7	52.4	43.8	35.7	93.7	62	112	124	58.3
Ammonia by Colour																
Total Ammonia (as N)	mg/L	7.03	2.47	1.92	4.37	9.2	1.9	3.70	2.95	1.99	1.26	5.69	2.38	9.05	13.1	1.97
Biochemical Oxygen Demand (BOD)																
Biochemical Oxygen Demand	mg/L	106	27	28	115	113	108	65	49	16.7	11.8	124	68	195	150	63
Carbonaceous BOD																
BOD Carbonaceous	mg/L	90	18.6	22.7	110	75	114	46	40	13.8	9.9	99	86	158	160	53
Chloride in Water by IC																
Chloride (Cl)	mg/L	77.2	44.6	38	51.2	43.7	49.9	44.2	38	35.8	33.1	55.7	46.6	54.5	56.3	47.5
Conductivity (l)																
Conductivity	umhos/cm	557	290	256	380	430	491	336	271	241	216	416	325	463	492	300
Fecal Coliforms (l)																
Fecal Coliforms	MPN/100mL	24200	\	24200									24200	24200	24200	24200
Hardness Calculated																
Hardness (as CaCO3)	mg/L	127	79.7	68.9	103	77.9	91.4	78.2	271	63.8	117	100	90.1	473	89.5	82.1
Mercury Total																
Mercury (Hg)	mg/L	0.0000140	0.0000050	0.0000050	0.0000050	0.000610	0.0000170	0.0000050	0.00000050	0.0000050	0.000025	0.0000070	0.0000050	0.0000090	0.0000150	0.0000070
Nitrate in Water by IC																
Nitrate (as N)	mg/L	0.020	0.072	0.039	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.029	0.020	0.020	0.020
Nitrate + Nitrite																
Nitrate and Nitrite as N	mg/L	0.070	0.111	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
Nitrite in Water by IC																
Nitrite (as N)	mg/L	0.010	0.039	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Total Nitrogen	mg/L															
Oil & Grease - Gravimetric																
Oil and Grease	mg/L	19.3	8.3	10	52.2	18.3	17.5	15.3	11.2	7.4	5	24.7	41.1	35.7	44.7	24
Phenol																
Phenols	mg/L	0.0099	0.0026	0.0027	0.0059	0.0116	0.0117	0.0057	0.0034	0.0021	0.0026	0.0097	0.0065	0.0153	0.0191	0.0032
Phosphorus, Total																
Phosphorus (P)	mg/L	2.40	0.51	0.722	1.67	2.97	3.94	1.28	1.01	0.48	0.40	1.81	1.05	3.28	3.71	0.98
Sulfate in Water by IC																
Sulfate (SO4)	mg/L	33.6	20.4	20.1	29.2	23.3	28.7	22.8	20.7	19.3	17.8	28.7	24.9	27	27.1	24.6
Total Metals by ICP-MS																
Aluminium (Al)	mg/L	0.0171	0.148	0.148	0.289	0.115	0.112	0.106	0.096	0.0841	0.150	0.275	0.128	0.003	0.283	0.118
Arsenic (As)	mg/L	0.00109	0.00103	0.00139	0.00138	0.00098	0.00105	0.00085	0.00093	0.00076	0.00172	0.00115	0.00114	0.00077	0.00085	0.00083
Cadmium (Cd)	mg/L	0.0000595	0.0000312	0.0000242	0.0000723	0.0000744	0.000136	0.0000465	0.0000299	0.0000242	0.000104	0.0000700	0.0000567	0.000005	0.000135	0.0000371
Calcium (Ca)	mg/L	35.8	22.5	19.8	32.6	23	27.4	22.7	17.9	18.4	34.9	29.8	27.1	70.9	25.4	23.5
Chromium (Cr)	mg/L	0.00064	0.00077	0.00069	0.00128	0.00070	0.00057	0.00047	0.00052	0.00037	0.00113	0.00079	0.00086	0.00014	0.00085	0.00064
Cobalt (Co)	mg/L	0.00020	0.00026	0.00053	0.00058	0.00033	0.00053	0.00030	0.00021	0.00019	0.0054	0.00044	0.00035	0.00022	0.00024	0.00015
Copper (Cu)	mg/L	0.257	0.133	0.137	0.136	0.137	0.157	0.0911	0.0714	0.0549	0.178	0.140	0.0843	0.0271	0.191	0.136
Iron (Fe)	mg/L	0.632	0.407	0.7260000	0.411	0.226	0.284	0.162	0.196	0.126	0.359	0.285	0.420	0.191	0.276	0.240
Lead (Pb)	mg/L	0.00302	0.00354	0.00217	0.00127	0.00107	0.00124	0.00123	0.00114	0.00109	0.00207	0.00251	0.00318	0.000198	0.00279	0.00279
Magnesium (Mg)	mg/L	9.22	5.68	4.71	5.36	4.95	5.59	5.21	4.34	4.33	7.12	6.32	5.47	71.8	6.33	5.71
Manganese (Mn)	mg/L	0.0620	0.0353	0.334	0.0433	0.0348	0.0517	0.0476	0.0435	0.0438	0.0893	0.0811	0.0478	0.0084	0.0378	0.0252
Nickel (Ni)	mg/L	0.00308	0.00314	0.00384	0.00952	0.00667	0.0138	0.00403	0.00247	0.00099	0.00607	0.00454	0.00301	0.00085	0.00298	0.00293
Potassium (K)	mg/L	8.59	5.14	3.59	7.86	6.48	11.7	5.71	4.03	3.46	10.2	8.02	5.39	5.68	12.1	4.83
Sodium (Na)	mg/L	44.5	24.7	22.4	30	25.6	28	25.6	20.1	21.3	31.9	31.7	24.8	22	34.6	28.1
Zinc (Zn)	mg/L	0.087	0.044	0.0408	0.132	0.0830	0.104	0.049	0.051	0.027	0.123	0.063	0.048	0.005	0.108	0.000
Antimony (Sb)	mg/L	0.00016		0.00013										0.0001	0.0002	0.00087
Barium (Ba)	mg/L	0.0448		0.0252										0.038	0.029	0.027
Beryllium (Be)	mg/L	0.0001		0.00010										0.0001	0.0001	0.0001
Cesium (Cs)	mg/L	0.000074		0.000038										0.00001	0.000109	0.000043
Lithium (Li)	mg/L	0.0040		0.0023										0.0265	0.0032	0.0034
Molybdenum (Mo)	mg/L	0.000743		0.000418										0.000434	0.00133	0.00104
Rubidium (Rb)	mg/L	0.00876		0.00351										0.00343	0.0132	0.00466
Selenium (Se)	mg/L	0.000272		0.000108										0.00005	0.000329	0.000129
Silver (Ag)	mg/L	0.000029		0.000010										0.00001	0.000068	0.000027
Strontium (Sr)	mg/L	0.164		0.0920										0.252	0.116	0.115
Thallium (Tl)	mg/L	0.00001		0.000019										0.00001	0.00001	0.00001
Titanium (Ti)	mg/L	0.00327		0.00324										0.0003	0.00291	0.0107
Uranium (U)	mg/L	0.000101		0.000223										0.000283	0.000175	0.000162
Vanadium (V)	mg/L	0.0005		0.00080										0.0005	0.00052	0.00059
Total Organic Carbon by Combustion																
Total Organic Carbon	mg/L	73.9	13.4	22.9	70.2	59.2	68.8	46.8	37.9	18.2	8.84	71.8	44.5	86.7	129	28.6
Total Suspended Solids (l)																
Total Suspended Solids	mg/L	85.3	36.5	46.8	106	111	78	63.5	45.9	43.5	7.9	87.4	83.2	209	166	97.2
pH																
pH	pH Units	6.86	6.80	7.13	7.01	7.29	7.23	6.95	7.02	7.27	7.68	7.22	6.88	7.00	7.30	7.14
Benzene	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Toluene	mg/L	0.0010	0.0010	0.0010	0.0013	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0041	0.001	0.0012	0.0023
Ethyl Benzene	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
o-Xylene	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100
F1 (C6-C10)	mg/L	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
F2 (C10-C16)	mg/L	0.48	0.14	0.14	0.72	0.49	100.00	0.25	100.00	0.12	0.54	0.34	2.04	0.51	1.51	0.32
F3 (C16-C34)	mg/L	7.88	2.34	3.15	10.3	9.0	780.0	4.5	250.0	1.9	13.8	6.6	11.4	12.9	21.6	8.3
F4 (C34-C50)	mg/L	3.34	1.05	0.72	4.74	2.66	500.00	2.58	250.00	0.78	4.91	4.18	9.46	4.23	6.41	2.09
Total Hydrocarbons (C6-C50)	mg/L	11.7	3.54	4.01	15.70	12.10	1.28	7.28	0.38	2.76	19.3	11.2	22.9	17.7	29.5	10.7
Fluoride (F)	mg/L	0.132		0.057										0.07	0.155	0.108
Total and E. Coli																
Total Coliforms	MPN/100mL	24200	2420	2420	2420	83600000	248000000	56500000	24200000	15500000	4110000	88800000		24200	24200	24200
Escherichia Coli	MPN/100mL	24200	2420	2420	2420	10900000	26900000	5200000	3260000	1020000	146000	12100000		24200	24200	24200

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix F



Nunavut Community & Government Services - Rankin Inlet
P.O. Box 490
Rankin Inlet NU X0C 0G0
ATTN: SIMON DOIRON

Date: 01-FEB-19
PO No.:
WO No.: L2222351
Project Ref: RANKIN INLET WWTP - MONTHLY EFFLUENT
Sample ID: RANKIN WWTP - EFFLUENT
Sampled By: SD
Date Collected: 10-JAN-19
Lab Sample ID: L2222351-1
Matrix: WASTE

PAGE 1 of 5

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTEX plus F1-F4						
Xylenes (Total)	0.00171		mg/L	0.09	0.02	23-JAN-19
CCME Total Hydrocarbons						
F1-BTEX	<0.10		mg/L			31-JAN-19
F2-Naphth	0.46		mg/L			31-JAN-19
F3-PAH	8.97		mg/L			31-JAN-19
Total Hydrocarbons (C6-C50)	12.5		mg/L			31-JAN-19
CCME PHC F2-F4 in Water						
F2 (C10-C16)	0.46		mg/L			19-JAN-19
F3 (C16-C34)	8.97		mg/L			19-JAN-19
F4 (C34-C50)	3.04		mg/L			19-JAN-19
Surr: 2-Bromobenzotrifluoride	102.0		%			19-JAN-19
BTX plus F1 by GCMS						
Benzene	<0.00050		mg/L	0.005		22-JAN-19
Toluene	0.0035		mg/L	0.06	0.024	22-JAN-19
Ethyl benzene	0.00058		mg/L	0.14	0.0016	22-JAN-19
o-Xylene	0.00067		mg/L			22-JAN-19
m+p-Xylenes	0.00104		mg/L			22-JAN-19
F1 (C6-C10)	<0.10		mg/L			22-JAN-19
Surr: 4-Bromofluorobenzene (SS)	98.2		%			22-JAN-19
Nunavut WW Group 1						
Phosphorus, Total						
Phosphorus (P)-Total	2.94		mg/L			22-JAN-19
Mercury Total						
Mercury (Hg)-Total	0.000025		mg/L	0.001		23-JAN-19
Bicarbonate (HCO3)	158		mg/L			23-JAN-19
Carbonate (CO3)	<0.60		mg/L			23-JAN-19
Hydroxide (OH)	<0.34		mg/L			23-JAN-19
*Nitrate and Nitrite as N	<0.070		mg/L	10		22-JAN-19
pH						
pH	6.90		pH units			22-JAN-19
Total Suspended Solids						
Total Suspended Solids	53.6		mg/L			23-JAN-19
Total Organic Carbon by Combustion						
Total Organic Carbon	66.8		mg/L			21-JAN-19
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.215		mg/L		0.1	22-JAN-19
Antimony (Sb)-Total	0.00018		mg/L	0.006		22-JAN-19
Arsenic (As)-Total	0.00086		mg/L	0.01		22-JAN-19

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company



Nunavut Community & Government Services - Rankin Inlet
P.O. Box 490
Rankin Inlet NU X0C 0G0
ATTN: SIMON DOIRON

Date: 01-FEB-19

PO No.:

WO No.: L2222351

Project Ref: RANKIN INLET WWTP - MONTHLY EFFLUENT

Sample ID: RANKIN WWTP - EFFLUENT

Sampled By: SD

Date Collected: 10-JAN-19

Lab Sample ID: L2222351-1

Matrix: WASTE

PAGE 2 of 5

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Nunavut WW Group 1						
Total Metals in Water by CRC ICPMS						
Barium (Ba)-Total	0.0319		mg/L	1		22-JAN-19
Beryllium (Be)-Total	<0.00010		mg/L			22-JAN-19
Bismuth (Bi)-Total	0.00463		mg/L			22-JAN-19
Boron (B)-Total	0.079		mg/L	5		22-JAN-19
Cadmium (Cd)-Total	0.0000454		mg/L	0.005		22-JAN-19
Calcium (Ca)-Total	23.8		mg/L			22-JAN-19
Cesium (Cs)-Total	0.000078		mg/L			22-JAN-19
Chromium (Cr)-Total	0.00055		mg/L	0.05		22-JAN-19
Cobalt (Co)-Total	0.00017		mg/L			22-JAN-19
Copper (Cu)-Total	0.253		mg/L	2.0	1.0	22-JAN-19
Iron (Fe)-Total	0.246		mg/L		0.3	22-JAN-19
Lead (Pb)-Total	0.00312		mg/L	0.01		22-JAN-19
Lithium (Li)-Total	0.0030		mg/L			22-JAN-19
Magnesium (Mg)-Total	5.93		mg/L			22-JAN-19
Manganese (Mn)-Total	0.0323		mg/L		0.05	22-JAN-19
Molybdenum (Mo)-Total	0.00114		mg/L			22-JAN-19
Nickel (Ni)-Total	0.00256		mg/L			22-JAN-19
Potassium (K)-Total	8.22		mg/L			22-JAN-19
Phosphorus (P)-Total	3.33		mg/L			22-JAN-19
Rubidium (Rb)-Total	0.00954		mg/L			22-JAN-19
Selenium (Se)-Total	0.000258		mg/L	0.05		22-JAN-19
Silicon (Si)-Total	0.38		mg/L			22-JAN-19
Silver (Ag)-Total	0.000095		mg/L			22-JAN-19
Sodium (Na)-Total	32.5		mg/L		200	22-JAN-19
Strontium (Sr)-Total	0.116		mg/L			22-JAN-19
Sulfur (S)-Total	10.7		mg/L			22-JAN-19
Tellurium (Te)-Total	<0.00020		mg/L			22-JAN-19
Thallium (Tl)-Total	<0.000010		mg/L			22-JAN-19
Thorium (Th)-Total	<0.00010		mg/L			22-JAN-19
Tin (Sn)-Total	0.00104		mg/L			22-JAN-19
Titanium (Ti)-Total	0.00687		mg/L			22-JAN-19
Tungsten (W)-Total	<0.00010		mg/L			22-JAN-19
Uranium (U)-Total	0.000117		mg/L	0.02		22-JAN-19
Vanadium (V)-Total	<0.00050		mg/L			22-JAN-19
Zinc (Zn)-Total	0.106		mg/L		5.0	22-JAN-19
Zirconium (Zr)-Total	0.000956		mg/L			22-JAN-19
Sulfate in Water by IC						
Sulfate (SO4)	22.9		mg/L		500	19-JAN-19
Phenol (4AAP)						
Phenols (4AAP)	0.0611		mg/L			21-JAN-19
Oil & Grease - Gravimetric						
Oil and Grease	18.0		mg/L			28-JAN-19

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Nunavut Community & Government Services - Rankin Inlet
P.O. Box 490
Rankin Inlet NU X0C 0G0
ATTN: SIMON DOIRON

Date: 01-FEB-19
PO No.:
WO No.: L2222351
Project Ref: RANKIN INLET WWTP - MONTHLY EFFLUENT
Sample ID: RANKIN WWTP - EFFLUENT
Sampled By: SD
Date Collected: 10-JAN-19
Lab Sample ID: L2222351-1
Matrix: WASTE

PAGE 3 of 5

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Nunavut WW Group 1						
Nitrite in Water by IC						
*Nitrite (as N)	<0.010		mg/L	1		19-JAN-19
Nitrate in Water by IC						
*Nitrate (as N)	<0.020		mg/L	10		19-JAN-19
Hardness Calculated						
Hardness (as CaCO ₃)	83.9	HTC	mg/L		500	23-JAN-19
Fecal coliforms, 1:10 dilution by QT97						
Fecal Coliforms	>24200	PEHR	MPN/100mL			18-JAN-19
Conductivity						
Conductivity	502		umhos/cm			22-JAN-19
Chloride in Water by IC						
Chloride (Cl)	55.9		mg/L		250	19-JAN-19
Carbonaceous BOD						
BOD Carbonaceous	65		mg/L			19-JAN-19
Biochemical Oxygen Demand (BOD)						
Biochemical Oxygen Demand	82		mg/L			19-JAN-19
Ammonia by colour						
Ammonia, Total (as N)	10.9		mg/L			23-JAN-19
Alkalinity, Total (as CaCO₃)						
Alkalinity, Total (as CaCO ₃)	130		mg/L			22-JAN-19
Fluoride (F)	0.105		mg/L	1.5		19-JAN-19
Total and E. coli, 1:10 dilution by QT97						
Total Coliforms	>24200	PEHR	MPN/100mL	0		18-JAN-19
Escherichia Coli	>24200	PEHR	MPN/100mL	0		18-JAN-19
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.000020		mg/L			30-JAN-19
2-Methyl Naphthalene	<0.000020		mg/L			30-JAN-19
Acenaphthene	<0.000020		mg/L			30-JAN-19
Acenaphthylene	<0.000020		mg/L			30-JAN-19
Anthracene	<0.000010		mg/L			30-JAN-19
Acridine	<0.000020		mg/L			30-JAN-19
Benzo(a)anthracene	<0.000010		mg/L			30-JAN-19
Benzo(a)pyrene	<0.0000050		mg/L	0.00004		30-JAN-19
Benzo(b&j)fluoranthene	<0.000010		mg/L			30-JAN-19
Benzo(g,h,i)perylene	<0.000020		mg/L			30-JAN-19
Benzo(k)fluoranthene	<0.000010		mg/L			30-JAN-19
Chrysene	<0.000020		mg/L			30-JAN-19

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Nunavut Community & Government Services - Rankin Inlet
P.O. Box 490
Rankin Inlet NU X0C 0G0
ATTN: SIMON DOIRON

Date: 01-FEB-19
PO No.:
WO No.: L2222351
Project Ref: RANKIN INLET WWTP - MONTHLY EFFLUENT
Sample ID: RANKIN WWTP - EFFLUENT
Sampled By: SD
Date Collected: 10-JAN-19
Lab Sample ID: L2222351-1
Matrix: WASTE

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Polyaromatic Hydrocarbons (PAHs)						
Dibenzo(a,h)anthracene	<0.0000050	DLCI	mg/L			30-JAN-19
Fluoranthene	<0.000020		mg/L			30-JAN-19
Fluorene	<0.00005		mg/L			30-JAN-19
Indeno(1,2,3-cd)pyrene	<0.000010		mg/L			30-JAN-19
Naphthalene	<0.000050		mg/L			30-JAN-19
Phenanthrene	<0.000050		mg/L			30-JAN-19
Pyrene	<0.000010		mg/L			30-JAN-19
Quinoline	<0.000020		mg/L			30-JAN-19
B(a)P Total Potency Equivalent	<0.000030		mg/L			30-JAN-19
Surr: Acenaphthene d10	70.9		%			30-JAN-19
Surr: Acridine d9	98.3		%			30-JAN-19
Surr: Chrysene d12	98.1		%			30-JAN-19
Surr: Naphthalene d8	90.6		%			30-JAN-19
Surr: Phenanthrene d10	86.5		%			30-JAN-19
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by <u>Hua Wo</u> Hua Wo Account Manager						

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

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

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2222351

Report Date: 01-FEB-19

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Client: Nunavut Community & Government Services - Rankin Inlet

P.O. Box 490

Rankin Inlet NU X0C 0G0

Contact: SIMON DOIRON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP Water								
Batch	R4462708							
WG2975278-15 DUP		L2222351-1						
Alkalinity, Total (as CaCO ₃)		130	131		mg/L	0.7	20	22-JAN-19
WG2975278-14 LCS								
Alkalinity, Total (as CaCO ₃)			103.4		%		85-115	22-JAN-19
WG2975278-11 MB								
Alkalinity, Total (as CaCO ₃)			1.0		mg/L		1	22-JAN-19
BOD-CBOD-WP Water								
Batch	R4467581							
WG2973145-4 DUP		L2222351-1						
BOD Carbonaceous		65	68		mg/L	4.8	20	19-JAN-19
WG2973145-2 LCS								
BOD Carbonaceous			90.9		%		85-115	19-JAN-19
WG2973145-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	19-JAN-19
BOD-WP Water								
Batch	R4467581							
WG2973145-2 LCS								
Biochemical Oxygen Demand			97.0		%		85-115	19-JAN-19
WG2973145-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	19-JAN-19
BTEXS+F1-HSMS-WP Water								
Batch	R4463528							
WG2974301-2 LCS								
Benzene			105.0		%		70-130	21-JAN-19
Toluene			113.6		%		70-130	21-JAN-19
Ethyl benzene			110.5		%		70-130	21-JAN-19
o-Xylene			113.5		%		70-130	21-JAN-19
m+p-Xylenes			106.4		%		70-130	21-JAN-19
WG2974301-3 LCS								
F1 (C6-C10)			86.3		%		70-130	21-JAN-19
WG2974301-1 MB								
Benzene			<0.00050		mg/L		0.0005	21-JAN-19
Toluene			<0.0010		mg/L		0.001	21-JAN-19
Ethyl benzene			<0.00050		mg/L		0.0005	21-JAN-19
o-Xylene			<0.00030		mg/L		0.0003	21-JAN-19
m+p-Xylenes			<0.00040		mg/L		0.0004	21-JAN-19
F1 (C6-C10)			<0.10		mg/L		0.1	21-JAN-19

Quality Control Report

Workorder: L2222351

Report Date: 01-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP								
Water								
Batch	R4463528							
WG2974301-1	MB							
Surrogate: 4-Bromofluorobenzene (SS)			92.7		%		70-130	21-JAN-19
C-TOC-HTC-WP								
Water								
Batch	R4460928							
WG2974562-2	LCS							
Total Organic Carbon			100.7		%		80-120	21-JAN-19
WG2974562-1	MB							
Total Organic Carbon			<0.50		mg/L		0.5	21-JAN-19
CL-IC-N-WP								
Water								
Batch	R4460787							
WG2973611-2	LCS							
Chloride (Cl)			99.2		%		90-110	19-JAN-19
WG2973611-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-JAN-19
EC-WP								
Water								
Batch	R4462708							
WG2975278-15	DUP	L2222351-1						
Conductivity		502	500		umhos/cm	0.4	10	22-JAN-19
WG2975278-13	LCS							
Conductivity			99.2		%		90-110	22-JAN-19
WG2975278-11	MB							
Conductivity			<1.0		umhos/cm		1	22-JAN-19
F-IC-N-WP								
Water								
Batch	R4460787							
WG2973611-2	LCS							
Fluoride (F)			100.4		%		90-110	19-JAN-19
WG2973611-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-JAN-19
F2-F4-FID-WP								
Water								
Batch	R4459890							
WG2973190-2	LCS							
F2 (C10-C16)			83.5		%		70-130	19-JAN-19
F3 (C16-C34)			92.5		%		70-130	19-JAN-19
F4 (C34-C50)			95.6		%		70-130	19-JAN-19
WG2973190-1	MB							
F2 (C10-C16)			<0.10		mg/L		0.1	19-JAN-19

Quality Control Report

Workorder: L2222351

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-FID-WP	Water							
Batch	R4459890							
WG2973190-1 MB								
F3 (C16-C34)			<0.25		mg/L		0.25	19-JAN-19
F4 (C34-C50)			<0.25		mg/L		0.25	19-JAN-19
Surrogate: 2-Bromobenzotrifluoride			108.5		%		60-140	19-JAN-19
FC10-QT97-WP	Water							
Batch	R4456143							
WG2972898-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	18-JAN-19
HG-T-CVAA-WP	Water							
Batch	R4465029							
WG2976047-2 LCS								
Mercury (Hg)-Total			104.0		%		80-120	23-JAN-19
WG2976047-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	23-JAN-19
MET-T-CCMS-WP	Water							
Batch	R4462078							
WG2974391-2 LCS								
Aluminum (Al)-Total			104.4		%		80-120	22-JAN-19
Antimony (Sb)-Total			101.0		%		80-120	22-JAN-19
Arsenic (As)-Total			99.0		%		80-120	22-JAN-19
Barium (Ba)-Total			102.7		%		80-120	22-JAN-19
Beryllium (Be)-Total			105.6		%		80-120	22-JAN-19
Bismuth (Bi)-Total			103.0		%		80-120	22-JAN-19
Boron (B)-Total			103.4		%		80-120	22-JAN-19
Cadmium (Cd)-Total			104.2		%		80-120	22-JAN-19
Calcium (Ca)-Total			104.1		%		80-120	22-JAN-19
Cesium (Cs)-Total			112.4		%		80-120	22-JAN-19
Chromium (Cr)-Total			103.3		%		80-120	22-JAN-19
Cobalt (Co)-Total			103.3		%		80-120	22-JAN-19
Copper (Cu)-Total			104.9		%		80-120	22-JAN-19
Iron (Fe)-Total			98.5		%		80-120	22-JAN-19
Lead (Pb)-Total			107.5		%		80-120	22-JAN-19
Lithium (Li)-Total			106.8		%		80-120	22-JAN-19
Magnesium (Mg)-Total			113.9		%		80-120	22-JAN-19
Manganese (Mn)-Total			104.2		%		80-120	22-JAN-19

Quality Control Report

Workorder: L2222351

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4462078							
WG2974391-2	LCS							
Molybdenum (Mo)-Total			102.7		%		80-120	22-JAN-19
Nickel (Ni)-Total			103.9		%		80-120	22-JAN-19
Potassium (K)-Total			99.0		%		80-120	22-JAN-19
Phosphorus (P)-Total			103.1		%		80-120	22-JAN-19
Rubidium (Rb)-Total			103.3		%		80-120	22-JAN-19
Selenium (Se)-Total			97.7		%		80-120	22-JAN-19
Silicon (Si)-Total			102.5		%		80-120	22-JAN-19
Silver (Ag)-Total			109.7		%		80-120	22-JAN-19
Sodium (Na)-Total			105.4		%		80-120	22-JAN-19
Strontium (Sr)-Total			110.2		%		80-120	22-JAN-19
Sulfur (S)-Total			106.6		%		80-120	22-JAN-19
Tellurium (Te)-Total			100.5		%		80-120	22-JAN-19
Thallium (Tl)-Total			97.8		%		80-120	22-JAN-19
Thorium (Th)-Total			110.2		%		80-120	22-JAN-19
Tin (Sn)-Total			100.2		%		80-120	22-JAN-19
Titanium (Ti)-Total			99.6		%		80-120	22-JAN-19
Tungsten (W)-Total			103.5		%		80-120	22-JAN-19
Uranium (U)-Total			113.2		%		80-120	22-JAN-19
Vanadium (V)-Total			104.5		%		80-120	22-JAN-19
Zinc (Zn)-Total			105.9		%		80-120	22-JAN-19
Zirconium (Zr)-Total			105.1		%		80-120	22-JAN-19
WG2974391-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	22-JAN-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-JAN-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-JAN-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-JAN-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-JAN-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-JAN-19
Boron (B)-Total			<0.010		mg/L		0.01	22-JAN-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	22-JAN-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-JAN-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	22-JAN-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	22-JAN-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-JAN-19

Quality Control Report

Workorder: L2222351

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-N-WP								
Batch R4460787								
WG2973611-2	LCS							
Nitrite (as N)			100.4		%		90-110	19-JAN-19
WG2973611-1	MB							
Nitrite (as N)			<0.010		mg/L		0.01	19-JAN-19
NO3-IC-N-WP								
Batch R4460787								
WG2973611-2	LCS							
Nitrate (as N)			98.5		%		90-110	19-JAN-19
WG2973611-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	19-JAN-19
OG-GRAV-WP								
Batch R4472727								
WG2977154-2	LCS							
Oil and Grease			89.9		%		70-130	28-JAN-19
WG2977154-1	MB							
Oil and Grease			<5.0		mg/L		5	28-JAN-19
P-T-COL-WP								
Batch R4462090								
WG2974270-14	LCS							
Phosphorus (P)-Total			93.4		%		80-120	22-JAN-19
WG2974270-13	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	22-JAN-19
PAH,PANH-WP								
Batch R4479968								
WG2976483-2	LCS							
1-Methyl Naphthalene			92.0		%		60-130	30-JAN-19
2-Methyl Naphthalene			78.6		%		60-130	30-JAN-19
Acenaphthene			82.4		%		60-130	30-JAN-19
Acenaphthylene			80.3		%		60-130	30-JAN-19
Anthracene			83.1		%		60-130	30-JAN-19
Acridine			75.3		%		60-130	30-JAN-19
Benzo(a)anthracene			75.9		%		60-130	30-JAN-19
Benzo(a)pyrene			77.2		%		60-130	30-JAN-19
Benzo(b&j)fluoranthene			79.9		%		60-130	30-JAN-19
Benzo(g,h,i)perylene			85.5		%		60-130	30-JAN-19
Benzo(k)fluoranthene			85.8		%		60-130	30-JAN-19

Quality Control Report

Workorder: L2222351

Report Date: 01-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4479968							
WG2976483-2	LCS							
Chrysene			73.4		%		60-130	30-JAN-19
Dibenzo(a,h)anthracene			81.3		%		60-130	30-JAN-19
Fluoranthene			87.5		%		60-130	30-JAN-19
Fluorene			78.4		%		60-130	30-JAN-19
Indeno(1,2,3-cd)pyrene			76.2		%		60-130	30-JAN-19
Naphthalene			79.3		%		50-130	30-JAN-19
Phenanthrene			84.6		%		60-130	30-JAN-19
Pyrene			85.6		%		60-130	30-JAN-19
Quinoline			91.2		%		60-130	30-JAN-19
WG2976483-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	31-JAN-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	31-JAN-19
Acenaphthene			<0.000020		mg/L		0.00002	31-JAN-19
Acenaphthylene			<0.000020		mg/L		0.00002	31-JAN-19
Anthracene			<0.000010		mg/L		0.00001	31-JAN-19
Acridine			<0.000020		mg/L		0.00002	31-JAN-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	31-JAN-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	31-JAN-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	31-JAN-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	31-JAN-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	31-JAN-19
Chrysene			<0.000020		mg/L		0.00002	31-JAN-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	31-JAN-19
Fluoranthene			<0.000020		mg/L		0.00002	31-JAN-19
Fluorene			<0.000020		mg/L		0.00002	31-JAN-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	31-JAN-19
Naphthalene			<0.000050		mg/L		0.00005	31-JAN-19
Phenanthrene			<0.000050		mg/L		0.00005	31-JAN-19
Pyrene			<0.000010		mg/L		0.00001	31-JAN-19
Quinoline			<0.000020		mg/L		0.00002	31-JAN-19
Surrogate: Acenaphthene d10			113.7		%		60-130	31-JAN-19
Surrogate: Acridine d9			108.9		%		60-130	31-JAN-19
Surrogate: Chrysene d12			104.7		%		60-130	31-JAN-19
Surrogate: Naphthalene d8			116.3		%		50-130	31-JAN-19

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Workorder: L2222351

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP								
Water								
Batch	R4479968							
WG2976483-1	MB							
Surrogate: Phenanthrene d10			115.2		%		60-130	31-JAN-19
PH-WP								
Water								
Batch	R4462708							
WG2975278-15	DUP	L2222351-1						
pH		6.90	6.91	J	pH units	0.01	0.2	22-JAN-19
WG2975278-12	LCS							
pH			7.40		pH units		7.3-7.5	22-JAN-19
PHENOLS-4AAP-WT								
Water								
Batch	R4459947							
WG2973953-2	LCS							
Phenols (4AAP)			100.7		%		85-115	21-JAN-19
WG2973953-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	21-JAN-19
SO4-IC-N-WP								
Water								
Batch	R4460787							
WG2973611-2	LCS							
Sulfate (SO4)			99.6		%		90-110	19-JAN-19
WG2973611-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	19-JAN-19
SOLIDS-TOTSUS-WP								
Water								
Batch	R4467929							
WG2975184-6	LCS							
Total Suspended Solids			93.0		%		85-115	23-JAN-19
WG2975184-5	MB							
Total Suspended Solids			<2.0		mg/L		2	23-JAN-19
TC,EC10-QT97-WP								
Water								
Batch	R4456145							
WG2972900-1	MB							
Total Coliforms			<1		MPN/100mL		1	18-JAN-19
Escherichia Coli			<1		MPN/100mL		1	18-JAN-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

Workorder: L2222351

Report Date: 01-FEB-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Suspended Solids	1	10-JAN-19 09:30	23-JAN-19 08:00	7	13	days	EHTR
pH	1	10-JAN-19 09:30	22-JAN-19 12:00	0.25	290	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC	1	10-JAN-19 09:30	19-JAN-19 12:00	3	9	days	EHTR
Nitrite in Water by IC	1	10-JAN-19 09:30	19-JAN-19 12:00	3	9	days	EHTR
Bacteriological Tests							
Fecal coliforms, 1:10 dilution by QT97	1	10-JAN-19 09:30	18-JAN-19 17:00	30	199	hours	EHTR
Total and E. coli, 1:10 dilution by QT97	1	10-JAN-19 09:30	18-JAN-19 17:00	30	199	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	10-JAN-19 09:30	19-JAN-19 07:00	48	214	hours	EHTR
Carbonaceous BOD	1	10-JAN-19 09:30	19-JAN-19 07:00	48	214	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.
 EHTR: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2222351 were received on 18-JAN-19 12:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

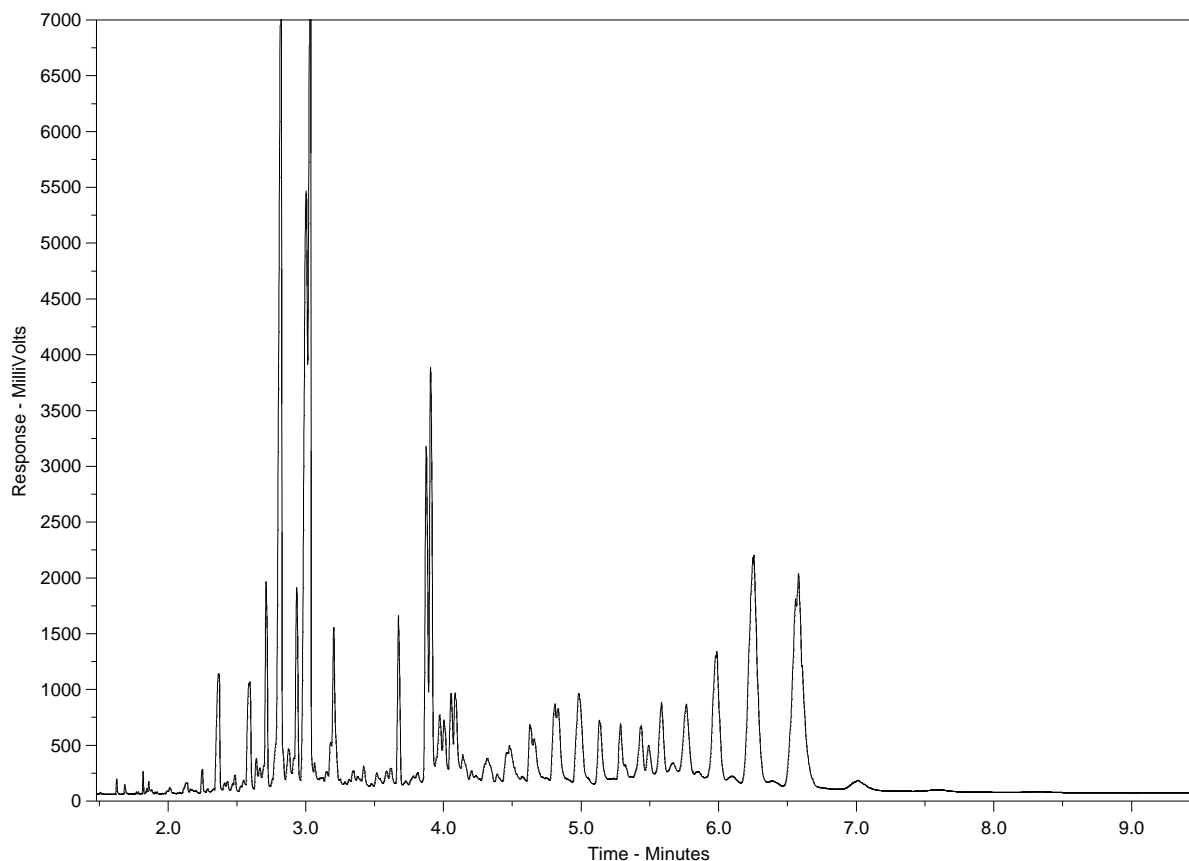
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2222351-1
Client Sample ID: RANKIN WWTP - EFFLUENT



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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix G



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 13-FEB-19
Report Date: 26-FEB-19 13:13 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2232348

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2232348-1 RANKIN INLET WWTP - EFFLUENT Sampled By: Bill Ross on 11-FEB-19 @ 14:20 Matrix: WASTE BTEX plus F1-F4 BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		21-FEB-19	R4520834
Toluene	0.0056		0.0010	mg/L		21-FEB-19	R4520834
Ethyl benzene	<0.00050		0.00050	mg/L		21-FEB-19	R4520834
o-Xylene	<0.00050		0.00050	mg/L		21-FEB-19	R4520834
m+p-Xylenes	<0.00040		0.00040	mg/L		21-FEB-19	R4520834
F1 (C6-C10)	<0.10		0.10	mg/L		21-FEB-19	R4520834
Surrogate: 4-Bromofluorobenzene (SS)	83.1		70-130	%		21-FEB-19	R4520834
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.53		0.10	mg/L	16-FEB-19	16-FEB-19	R4518372
F3 (C16-C34)	12.9		0.25	mg/L	16-FEB-19	16-FEB-19	R4518372
F4 (C34-C50)	3.28		0.25	mg/L	16-FEB-19	16-FEB-19	R4518372
Surrogate: 2-Bromobenzotrifluoride	106.1		60-140	%	16-FEB-19	16-FEB-19	R4518372
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		25-FEB-19	
F2-Naphth	0.53		0.10	mg/L		25-FEB-19	
F3-PAH	12.9		0.25	mg/L		25-FEB-19	
Total Hydrocarbons (C6-C50)	16.7		0.38	mg/L		25-FEB-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		22-FEB-19	
Miscellaneous Parameters							
Fluoride (F)	0.122		0.020	mg/L		14-FEB-19	R4512851
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420		1	MPN/100mL		13-FEB-19	R4506649
Escherichia Coli	>2420		1	MPN/100mL		13-FEB-19	R4506649
CCME PAHs in mg/L							
1-Methyl Naphthalene	0.000093		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
2-Methyl Naphthalene	0.000147		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Acenaphthene	<0.000020		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Acenaphthylene	<0.000020		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Anthracene	<0.000010		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Acridine	<0.000020		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Benzo(a)anthracene	<0.000010		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Benzo(a)pyrene	0.0000050		0.0000050	mg/L	22-FEB-19	25-FEB-19	R4524713
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Benzo(g,h,i)perylene	0.000058		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Chrysene	<0.000020		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Dibenzo(a,h)anthracene	0.0000379		0.0000050	mg/L	22-FEB-19	25-FEB-19	R4524713
Fluoranthene	0.000021		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
Fluorene	<0.000060	DLQ	0.000060	mg/L	22-FEB-19	25-FEB-19	R4524713
Indeno(1,2,3-cd)pyrene	0.000493		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Naphthalene	0.000080		0.000050	mg/L	22-FEB-19	25-FEB-19	R4524713
Phenanthrene	<0.000050		0.000050	mg/L	22-FEB-19	25-FEB-19	R4524713
Pyrene	0.000020		0.000010	mg/L	22-FEB-19	25-FEB-19	R4524713
Quinoline	0.000071		0.000020	mg/L	22-FEB-19	25-FEB-19	R4524713
B(a)P Total Potency Equivalent	0.000094		0.000030	mg/L	22-FEB-19	25-FEB-19	R4524713
Surrogate: d8-Naphthalene	124.0		50-150	%	22-FEB-19	25-FEB-19	R4524713
Surrogate: d10-Phenanthrene	109.3		50-150	%	22-FEB-19	25-FEB-19	R4524713
Surrogate: d12-Chrysene	104.8		50-150	%	22-FEB-19	25-FEB-19	R4524713
Surrogate: d10-Acenaphthene	109.5		50-150	%	22-FEB-19	25-FEB-19	R4524713
Surrogate: d9-Acridine (SS)	107.4		50-150	%	22-FEB-19	25-FEB-19	R4524713

* 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
L2232348-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Bill Ross on 11-FEB-19 @ 14:20							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	113		1.2	mg/L		20-FEB-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		20-FEB-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		20-FEB-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	92.6		1.0	mg/L		15-FEB-19	R4511402
Ammonia by colour							
Ammonia, Total (as N)	6.6		1.0	mg/L		14-FEB-19	R4508897
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	101		20	mg/L		14-FEB-19	R4513827
Carbonaceous BOD							
BOD Carbonaceous	95		20	mg/L		14-FEB-19	R4513827
Chloride in Water by IC							
Chloride (Cl)	60.5		0.50	mg/L		14-FEB-19	R4512851
Conductivity							
Conductivity	448		1.0	umhos/cm		15-FEB-19	R4511402
Hardness Calculated							
Hardness (as CaCO3)	108	HTC	0.20	mg/L		20-FEB-19	
Mercury Total							
Mercury (Hg)-Total	0.0000130		0.0000050	mg/L	15-FEB-19	20-FEB-19	R4517787
Nitrate in Water by IC							
Nitrate (as N)	0.022		0.020	mg/L		14-FEB-19	R4512851
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-FEB-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		14-FEB-19	R4512851
Oil & Grease - Gravimetric							
Oil and Grease	48.8		5.0	mg/L		25-FEB-19	R4525613
Phenol (4AAP)							
Phenols (4AAP)	0.0106		0.0010	mg/L		19-FEB-19	R4513850
Phosphorus, Total							
Phosphorus (P)-Total	2.25		0.030	mg/L		20-FEB-19	R4516026
Sulfate in Water by IC							
Sulfate (SO4)	26.5		0.30	mg/L		14-FEB-19	R4512851
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.398		0.0030	mg/L	19-FEB-19	19-FEB-19	R4515089
Antimony (Sb)-Total	0.00015		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Arsenic (As)-Total	0.00148		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Barium (Ba)-Total	0.0392		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Bismuth (Bi)-Total	0.00149		0.000050	mg/L	19-FEB-19	19-FEB-19	R4515089
Boron (B)-Total	0.070		0.010	mg/L	19-FEB-19	19-FEB-19	R4515089
Cadmium (Cd)-Total	0.000135		0.0000050	mg/L	19-FEB-19	19-FEB-19	R4515089
Calcium (Ca)-Total	29.8		0.050	mg/L	19-FEB-19	19-FEB-19	R4515089
Cesium (Cs)-Total	0.000098		0.000010	mg/L	19-FEB-19	19-FEB-19	R4515089
Chromium (Cr)-Total	0.00233		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Cobalt (Co)-Total	0.00058		0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Copper (Cu)-Total	0.160		0.00050	mg/L	19-FEB-19	19-FEB-19	R4515089
Iron (Fe)-Total	0.828		0.010	mg/L	19-FEB-19	19-FEB-19	R4515089
Lead (Pb)-Total	0.00352		0.000050	mg/L	19-FEB-19	19-FEB-19	R4515089

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2232348-1	RANKIN INLET WWTP - EFFLUENT							
Sampled By:	Bill Ross on 11-FEB-19 @ 14:20							
Matrix:	WASTE							
Total Metals in Water by CRC ICPMS								
Lithium (Li)-Total	0.0040			0.0010	mg/L	19-FEB-19	19-FEB-19	R4515089
Magnesium (Mg)-Total	8.05			0.0050	mg/L	19-FEB-19	19-FEB-19	R4515089
Manganese (Mn)-Total	0.0529			0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Molybdenum (Mo)-Total	0.00104			0.000050	mg/L	19-FEB-19	19-FEB-19	R4515089
Nickel (Ni)-Total	0.00414			0.00050	mg/L	19-FEB-19	19-FEB-19	R4515089
Potassium (K)-Total	7.98			0.050	mg/L	19-FEB-19	19-FEB-19	R4515089
Phosphorus (P)-Total	2.58			0.030	mg/L	19-FEB-19	19-FEB-19	R4515089
Rubidium (Rb)-Total	0.00836			0.00020	mg/L	19-FEB-19	19-FEB-19	R4515089
Selenium (Se)-Total	0.000267			0.000050	mg/L	19-FEB-19	19-FEB-19	R4515089
Silicon (Si)-Total	0.72			0.10	mg/L	19-FEB-19	19-FEB-19	R4515089
Silver (Ag)-Total	0.000041			0.000010	mg/L	19-FEB-19	19-FEB-19	R4515089
Sodium (Na)-Total	35.4			0.050	mg/L	19-FEB-19	19-FEB-19	R4515089
Strontium (Sr)-Total	0.136			0.00020	mg/L	19-FEB-19	19-FEB-19	R4515089
Sulfur (S)-Total	10.9			0.50	mg/L	19-FEB-19	19-FEB-19	R4515089
Tellurium (Te)-Total	<0.00020			0.00020	mg/L	19-FEB-19	19-FEB-19	R4515089
Thallium (Tl)-Total	<0.000010			0.000010	mg/L	19-FEB-19	19-FEB-19	R4515089
Thorium (Th)-Total	0.00011			0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Tin (Sn)-Total	0.00086			0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Titanium (Ti)-Total	0.00997			0.00030	mg/L	19-FEB-19	19-FEB-19	R4515089
Tungsten (W)-Total	<0.00010			0.00010	mg/L	19-FEB-19	19-FEB-19	R4515089
Uranium (U)-Total	0.000137			0.000010	mg/L	19-FEB-19	19-FEB-19	R4515089
Vanadium (V)-Total	0.00114			0.00050	mg/L	19-FEB-19	19-FEB-19	R4515089
Zinc (Zn)-Total	0.0825			0.0030	mg/L	19-FEB-19	19-FEB-19	R4515089
Zirconium (Zr)-Total	0.000350			0.000060	mg/L	19-FEB-19	19-FEB-19	R4515089
Total Organic Carbon by Combustion								
Total Organic Carbon	57.3			2.5	mg/L		20-FEB-19	R4519529
Total Suspended Solids								
Total Suspended Solids	134			6.0	mg/L		15-FEB-19	R4515894
pH								
pH	6.92			0.10	pH units		15-FEB-19	R4511402

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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
<p>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.</p>			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
<p>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.</p>			
HG-T-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>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.</p>			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
<p>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>			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
<p>This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>			
PAH-CCME-PPM-WT	Water	CCME PAHs in mg/L	EPA 3511/8270D (mod)
<p>PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.</p>			
PH-WP	Water	pH	APHA 4500H
<p>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.</p>			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
<p>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.</p>			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-WP	Water	Total Coliform and E.coli by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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.

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4519529							
WG2992658-2 LCS								
Total Organic Carbon			95.3		%		80-120	20-FEB-19
WG2992658-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	20-FEB-19
CL-IC-N-WP	Water							
Batch	R4512851							
WG2989002-10 LCS								
Chloride (Cl)			97.9		%		90-110	14-FEB-19
WG2989002-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-FEB-19
EC-WP	Water							
Batch	R4511402							
WG2990374-23 LCS								
Conductivity			101.4		%		90-110	15-FEB-19
WG2990374-21 MB								
Conductivity			<1.0		umhos/cm		1	15-FEB-19
F-IC-N-WP	Water							
Batch	R4512851							
WG2989002-10 LCS								
Fluoride (F)			100.5		%		90-110	14-FEB-19
WG2989002-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-FEB-19
F2-F4-FID-WP	Water							
Batch	R4518372							
WG2990406-2 LCS								
F2 (C10-C16)			83.6		%		70-130	16-FEB-19
F3 (C16-C34)			87.5		%		70-130	16-FEB-19
F4 (C34-C50)			90.4		%		70-130	16-FEB-19
WG2990406-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	16-FEB-19
F3 (C16-C34)			<0.25		mg/L		0.25	16-FEB-19
F4 (C34-C50)			<0.25		mg/L		0.25	16-FEB-19
Surrogate: 2-Bromobenzotrifluoride			104.8		%		60-140	16-FEB-19
HG-T-CVAA-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP		Water						
Batch R4517787								
WG2992453-2 LCS								
Mercury (Hg)-Total			100.0		%		80-120	20-FEB-19
WG2992453-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	20-FEB-19
MET-T-CCMS-WP		Water						
Batch R4515089								
WG2991122-2 LCS								
Aluminum (Al)-Total			107.6		%		80-120	19-FEB-19
Antimony (Sb)-Total			103.2		%		80-120	19-FEB-19
Arsenic (As)-Total			97.9		%		80-120	19-FEB-19
Barium (Ba)-Total			102.0		%		80-120	19-FEB-19
Beryllium (Be)-Total			105.7		%		80-120	19-FEB-19
Bismuth (Bi)-Total			106.5		%		80-120	19-FEB-19
Boron (B)-Total			104.3		%		80-120	19-FEB-19
Cadmium (Cd)-Total			102.6		%		80-120	19-FEB-19
Calcium (Ca)-Total			99.5		%		80-120	19-FEB-19
Cesium (Cs)-Total			105.3		%		80-120	19-FEB-19
Chromium (Cr)-Total			102.2		%		80-120	19-FEB-19
Cobalt (Co)-Total			94.3		%		80-120	19-FEB-19
Copper (Cu)-Total			101.4		%		80-120	19-FEB-19
Iron (Fe)-Total			94.8		%		80-120	19-FEB-19
Lead (Pb)-Total			106.7		%		80-120	19-FEB-19
Lithium (Li)-Total			99.9		%		80-120	19-FEB-19
Magnesium (Mg)-Total			119.3		%		80-120	19-FEB-19
Manganese (Mn)-Total			102.7		%		80-120	19-FEB-19
Molybdenum (Mo)-Total			100.4		%		80-120	19-FEB-19
Nickel (Ni)-Total			100.5		%		80-120	19-FEB-19
Potassium (K)-Total			103.5		%		80-120	19-FEB-19
Phosphorus (P)-Total			106.6		%		80-120	19-FEB-19
Rubidium (Rb)-Total			105.4		%		80-120	19-FEB-19
Selenium (Se)-Total			99.6		%		80-120	19-FEB-19
Silicon (Si)-Total			106.2		%		80-120	19-FEB-19
Silver (Ag)-Total			105.4		%		80-120	19-FEB-19
Sodium (Na)-Total			106.8		%		80-120	19-FEB-19
Strontium (Sr)-Total			107.8		%		80-120	19-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4515089							
WG2991122-2	LCS							
Sulfur (S)-Total			101.7		%		80-120	19-FEB-19
Tellurium (Te)-Total			99.5		%		80-120	19-FEB-19
Thallium (Tl)-Total			105.1		%		80-120	19-FEB-19
Thorium (Th)-Total			106.9		%		80-120	19-FEB-19
Tin (Sn)-Total			98.9		%		80-120	19-FEB-19
Titanium (Ti)-Total			96.4		%		80-120	19-FEB-19
Tungsten (W)-Total			98.6		%		80-120	19-FEB-19
Uranium (U)-Total			110.4		%		80-120	19-FEB-19
Vanadium (V)-Total			102.4		%		80-120	19-FEB-19
Zinc (Zn)-Total			105.6		%		80-120	19-FEB-19
Zirconium (Zr)-Total			99.5		%		80-120	19-FEB-19
WG2991122-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	19-FEB-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	19-FEB-19
Boron (B)-Total			<0.010		mg/L		0.01	19-FEB-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	19-FEB-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	19-FEB-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	19-FEB-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	19-FEB-19
Iron (Fe)-Total			<0.010		mg/L		0.01	19-FEB-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	19-FEB-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	19-FEB-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	19-FEB-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	19-FEB-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	19-FEB-19
Potassium (K)-Total			<0.050		mg/L		0.05	19-FEB-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	19-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch R4515089								
WG2991122-1 MB								
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	19-FEB-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	19-FEB-19
Silicon (Si)-Total			<0.10		mg/L		0.1	19-FEB-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	19-FEB-19
Sodium (Na)-Total			<0.050		mg/L		0.05	19-FEB-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	19-FEB-19
Sulfur (S)-Total			<0.50		mg/L		0.5	19-FEB-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	19-FEB-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	19-FEB-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	19-FEB-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	19-FEB-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	19-FEB-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	19-FEB-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	19-FEB-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	19-FEB-19
NH3-COL-WP		Water						
Batch R4508897								
WG2989570-10 LCS								
Ammonia, Total (as N)			101.1		%		85-115	14-FEB-19
WG2989570-9 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	14-FEB-19
NO2-IC-N-WP		Water						
Batch R4512851								
WG2989002-10 LCS								
Nitrite (as N)			98.1		%		90-110	14-FEB-19
WG2989002-9 MB								
Nitrite (as N)			<0.010		mg/L		0.01	14-FEB-19
NO3-IC-N-WP		Water						
Batch R4512851								
WG2989002-10 LCS								
Nitrate (as N)			98.7		%		90-110	14-FEB-19
WG2989002-9 MB								
Nitrate (as N)			<0.020		mg/L		0.02	14-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OG-GRAV-WP		Water						
Batch	R4525613							
WG2993830-2	LCS							
Oil and Grease			94.1		%		70-130	25-FEB-19
WG2993830-1	MB							
Oil and Grease			<5.0		mg/L		5	25-FEB-19
P-T-COL-WP		Water						
Batch	R4516026							
WG2991833-10	LCS							
Phosphorus (P)-Total			90.5		%		80-120	20-FEB-19
WG2991833-9	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	20-FEB-19
PAH-CCME-PPM-WT		Water						
Batch	R4524713							
WG2993781-2	LCS							
1-Methyl Naphthalene			99.4		%		50-150	25-FEB-19
2-Methyl Naphthalene			98.5		%		50-150	25-FEB-19
Acenaphthene			99.8		%		50-150	25-FEB-19
Acenaphthylene			98.3		%		50-150	25-FEB-19
Anthracene			93.6		%		50-150	25-FEB-19
Acridine			83.8		%		50-150	25-FEB-19
Benzo(a)anthracene			86.5		%		50-150	25-FEB-19
Benzo(a)pyrene			75.8		%		50-150	25-FEB-19
Benzo(b&j)fluoranthene			80.9		%		50-150	25-FEB-19
Benzo(g,h,i)perylene			84.8		%		50-150	25-FEB-19
Benzo(k)fluoranthene			83.0		%		50-150	25-FEB-19
Chrysene			89.8		%		50-150	25-FEB-19
Dibenzo(a,h)anthracene			78.8		%		50-150	25-FEB-19
Fluoranthene			102.1		%		50-150	25-FEB-19
Fluorene			102.0		%		50-150	25-FEB-19
Indeno(1,2,3-cd)pyrene			84.8		%		50-150	25-FEB-19
Naphthalene			102.5		%		50-150	25-FEB-19
Phenanthrene			105.0		%		50-150	25-FEB-19
Pyrene			103.8		%		50-150	25-FEB-19
Quinoline			120.6		%		50-150	25-FEB-19
WG2993781-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	25-FEB-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	25-FEB-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-PPM-WT		Water						
Batch	R4524713							
WG2993781-1 MB								
Acenaphthene			<0.000020		mg/L		0.00002	25-FEB-19
Acenaphthylene			<0.000020		mg/L		0.00002	25-FEB-19
Anthracene			<0.000010		mg/L		0.00001	25-FEB-19
Acridine			<0.000020		mg/L		0.00002	25-FEB-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	25-FEB-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	25-FEB-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	25-FEB-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	25-FEB-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	25-FEB-19
Chrysene			<0.000020		mg/L		0.00002	25-FEB-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	25-FEB-19
Fluoranthene			<0.000020		mg/L		0.00002	25-FEB-19
Fluorene			<0.000020		mg/L		0.00002	25-FEB-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	25-FEB-19
Naphthalene			<0.000050		mg/L		0.00005	25-FEB-19
Phenanthrene			<0.000050		mg/L		0.00005	25-FEB-19
Pyrene			<0.000010		mg/L		0.00001	25-FEB-19
Quinoline			<0.000020		mg/L		0.00002	25-FEB-19
Surrogate: d8-Naphthalene			107.8		%		50-150	25-FEB-19
Surrogate: d10-Phenanthrene			111.6		%		50-150	25-FEB-19
Surrogate: d12-Chrysene			104.4		%		50-150	25-FEB-19
Surrogate: d10-Acenaphthene			109.4		%		50-150	25-FEB-19
Surrogate: d9-Acridine (SS)			82.8		%		50-150	25-FEB-19
PH-WP		Water						
Batch	R4511402							
WG2990374-22 LCS								
pH			7.41		pH units		7.3-7.5	15-FEB-19
PHENOLS-4AAP-WT		Water						
Batch	R4513850							
WG2990979-6 LCS								
Phenols (4AAP)			90.6		%		85-115	19-FEB-19
WG2990979-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	19-FEB-19
SO4-IC-N-WP		Water						

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Workorder: L2232348

Report Date: 26-FEB-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WP								
Batch R4512851								
WG2989002-10	LCS							
Sulfate (SO4)			98.5		%		90-110	14-FEB-19
WG2989002-9	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	14-FEB-19
SOLIDS-TOTSUS-WP								
Batch R4515894								
WG2989638-6	LCS							
Total Suspended Solids			105.2		%		85-115	15-FEB-19
WG2989638-5	MB							
Total Suspended Solids			<2.0		mg/L		2	15-FEB-19
TC,EC-QT97-WP								
Batch R4506649								
WG2988470-2	DUP	L2232348-1						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	13-FEB-19
Escherichia Coli		>2420	>2420		MPN/100mL	0.0	65	13-FEB-19
WG2988470-1	MB							
Total Coliforms			<1		MPN/100mL		1	13-FEB-19
Escherichia Coli			<1		MPN/100mL		1	13-FEB-19

Quality Control Report

Workorder: L2232348

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2232348

Report Date: 26-FEB-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	11-FEB-19 14:20	15-FEB-19 12:00	0.25	94	hours	EHTR-FM
Bacteriological Tests							
Total Coliform and E.coli by MPN QT97	1	11-FEB-19 14:20	13-FEB-19 17:15	30	51	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	11-FEB-19 14:20	14-FEB-19 07:00	48	65	hours	EHTR
Carbonaceous BOD	1	11-FEB-19 14:20	14-FEB-19 07:00	48	65	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2232348 were received on 13-FEB-19 14:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

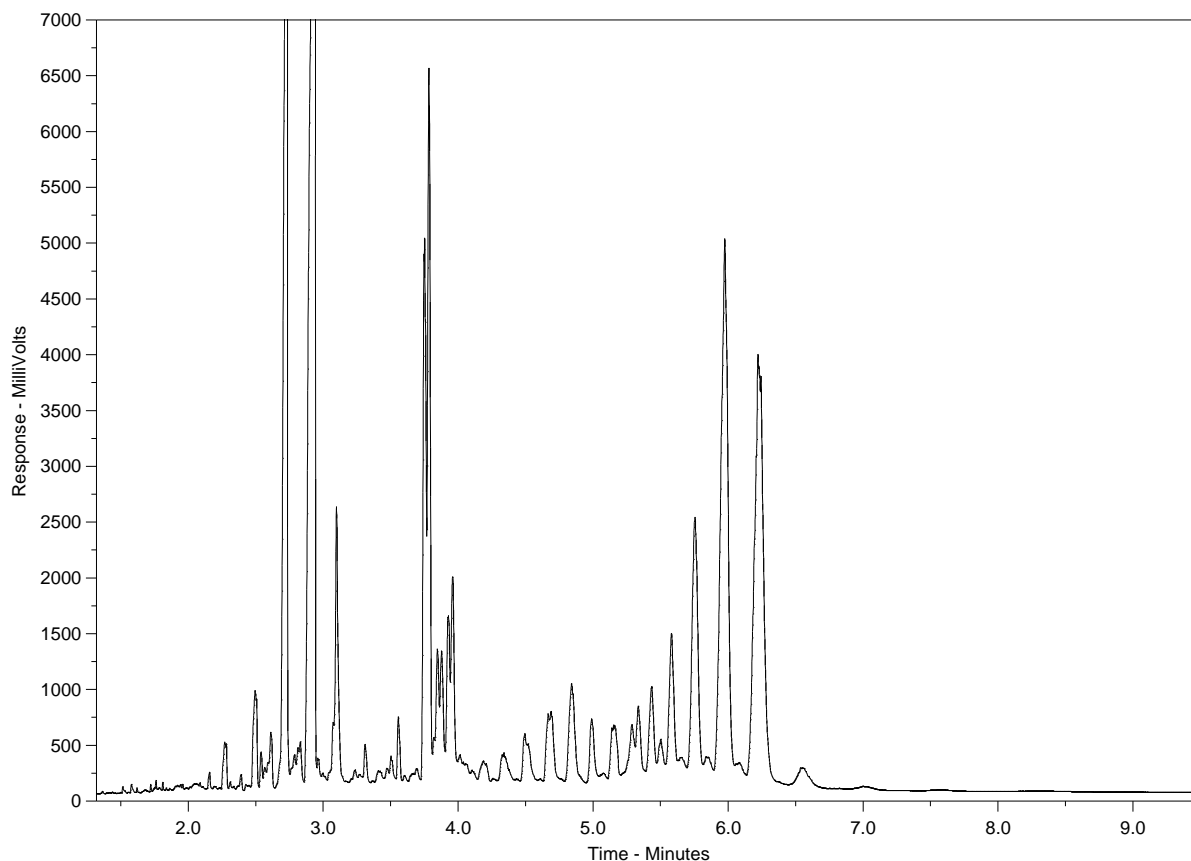
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2232348-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



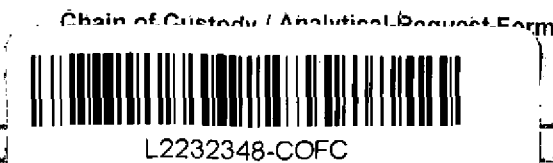
← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

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

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

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



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GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix H



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 08-MAR-19
Report Date: 20-MAR-19 09:27 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2241719

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2241719-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 07-MAR-19							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		16-MAR-19	R4571797
Toluene	<0.0010		0.0010	mg/L		16-MAR-19	R4571797
Ethyl benzene	<0.00050		0.00050	mg/L		16-MAR-19	R4571797
o-Xylene	<0.00050		0.00050	mg/L		16-MAR-19	R4571797
m+p-Xylenes	<0.00040		0.00040	mg/L		16-MAR-19	R4571797
F1 (C6-C10)	<0.10		0.10	mg/L		16-MAR-19	R4571797
Surrogate: 4-Bromofluorobenzene (SS)	94.6		70-130	%		16-MAR-19	R4571797
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.70		0.10	mg/L	11-MAR-19	12-MAR-19	R4561209
F3 (C16-C34)	11.3		0.25	mg/L	11-MAR-19	12-MAR-19	R4561209
F4 (C34-C50)	5.96		0.25	mg/L	11-MAR-19	12-MAR-19	R4561209
Surrogate: 2-Bromobenzotrifluoride	120.9		60-140	%	11-MAR-19	12-MAR-19	R4561209
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		20-MAR-19	
F2-Naphth	0.70		0.10	mg/L		20-MAR-19	
F3-PAH	11.3		0.25	mg/L		20-MAR-19	
Total Hydrocarbons (C6-C50)	17.9		0.38	mg/L		20-MAR-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		20-MAR-19	
Miscellaneous Parameters							
Fluoride (F)	0.155		0.020	mg/L		08-MAR-19	R4554132
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200		10	MPN/100mL		08-MAR-19	R4553884
Escherichia Coli	>24200		10	MPN/100mL		08-MAR-19	R4553884
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000041		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
2-Methyl Naphthalene	0.000051		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Acenaphthene	<0.000020		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Acenaphthylene	<0.000020		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Anthracene	<0.000010		0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Acridine	<0.000020		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Benzo(a)anthracene	0.000010		0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Benzo(a)pyrene	0.0000539		0.0000050	mg/L	08-MAR-19	12-MAR-19	R4559187
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Benzo(k)fluoranthene	0.000029	EMPC	0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Chrysene	0.000021	EMPC	0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	08-MAR-19	12-MAR-19	R4559187
Fluoranthene	0.000022		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Fluorene	<0.000020		0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Naphthalene	<0.000050		0.000050	mg/L	08-MAR-19	12-MAR-19	R4559187
Phenanthrene	<0.000050		0.000050	mg/L	08-MAR-19	12-MAR-19	R4559187
Pyrene	0.000031		0.000010	mg/L	08-MAR-19	12-MAR-19	R4559187
Quinoline	0.000064	EMPC	0.000020	mg/L	08-MAR-19	12-MAR-19	R4559187
B(a)P Total Potency Equivalent	0.000062		0.000030	mg/L	08-MAR-19	12-MAR-19	R4559187
Surrogate: Acenaphthene d10	88.9		60-130	%	08-MAR-19	12-MAR-19	R4559187
Surrogate: Acridine d9	94.4		60-130	%	08-MAR-19	12-MAR-19	R4559187
Surrogate: Chrysene d12	109.8		60-130	%	08-MAR-19	12-MAR-19	R4559187
Surrogate: Naphthalene d8	103.2		50-130	%	08-MAR-19	12-MAR-19	R4559187
Surrogate: Phenanthrene d10	94.2		60-130	%	08-MAR-19	12-MAR-19	R4559187

* 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
L2241719-1 RANKIN INLET WWTP - EFFLUENT Sampled By: SD on 07-MAR-19 Matrix: WASTE Nunavut WW Group 1							
Alkalinity, Bicarbonate Bicarbonate (HCO3)	107		1.2	mg/L		13-MAR-19	
Alkalinity, Carbonate Carbonate (CO3)	<0.60		0.60	mg/L		13-MAR-19	
Alkalinity, Hydroxide Hydroxide (OH)	<0.34		0.34	mg/L		13-MAR-19	
Alkalinity, Total (as CaCO3) Alkalinity, Total (as CaCO3)	87.5		1.0	mg/L		12-MAR-19	R4561039
Ammonia by colour Ammonia, Total (as N)	5.4		1.0	mg/L		12-MAR-19	R4562808
Biochemical Oxygen Demand (BOD) Biochemical Oxygen Demand	82		20	mg/L		09-MAR-19	R4567525
Carbonaceous BOD BOD Carbonaceous	52		20	mg/L		09-MAR-19	R4567525
Chloride in Water by IC Chloride (Cl)	66.8		0.50	mg/L		08-MAR-19	R4554132
Conductivity Conductivity	448		1.0	umhos/cm		12-MAR-19	R4561039
Fecal coliforms, 1:10 dilution by QT97 Fecal Coliforms	>24200		10	MPN/100mL		08-MAR-19	R4553882
Hardness Calculated Hardness (as CaCO3)	110	HTC	0.20	mg/L		14-MAR-19	
Mercury Total Mercury (Hg)-Total	0.0000070		0.0000050	mg/L	12-MAR-19	15-MAR-19	R4570467
Nitrate in Water by IC Nitrate (as N)	0.168		0.020	mg/L		08-MAR-19	R4554132
Nitrate+Nitrite Nitrate and Nitrite as N	0.181		0.070	mg/L		11-MAR-19	
Nitrite in Water by IC Nitrite (as N)	0.013		0.010	mg/L		08-MAR-19	R4554132
Oil & Grease - Gravimetric Oil and Grease	14.8		5.0	mg/L		14-MAR-19	R4564773
Phenol (4AAP) Phenols (4AAP)	0.0099		0.0010	mg/L		11-MAR-19	R4558527
Phosphorus, Total Phosphorus (P)-Total	2.14		0.030	mg/L		19-MAR-19	R4570207
Sulfate in Water by IC Sulfate (SO4)	30.8		0.30	mg/L		09-MAR-19	R4558311
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.223		0.0030	mg/L	13-MAR-19	13-MAR-19	R4563001
Antimony (Sb)-Total	0.00038		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Arsenic (As)-Total	0.00106		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Barium (Ba)-Total	0.0388		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Bismuth (Bi)-Total	0.000728		0.000050	mg/L	13-MAR-19	13-MAR-19	R4563001
Boron (B)-Total	0.085		0.010	mg/L	13-MAR-19	13-MAR-19	R4563001
Cadmium (Cd)-Total	0.0000492		0.0000050	mg/L	13-MAR-19	13-MAR-19	R4563001
Calcium (Ca)-Total	30.8		0.050	mg/L	13-MAR-19	13-MAR-19	R4563001
Cesium (Cs)-Total	0.000061		0.000010	mg/L	13-MAR-19	13-MAR-19	R4563001
Chromium (Cr)-Total	0.00086		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Cobalt (Co)-Total	0.00019		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Copper (Cu)-Total	0.212		0.00050	mg/L	13-MAR-19	13-MAR-19	R4563001

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2241719-1	RANKIN INLET WWTP - EFFLUENT							
Sampled By:	SD on 07-MAR-19							
Matrix:	WASTE							
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total		0.229		0.010	mg/L	13-MAR-19	13-MAR-19	R4563001
Lead (Pb)-Total		0.00410		0.000050	mg/L	13-MAR-19	13-MAR-19	R4563001
Lithium (Li)-Total		0.0039		0.0010	mg/L	13-MAR-19	13-MAR-19	R4563001
Magnesium (Mg)-Total		8.01		0.0050	mg/L	13-MAR-19	13-MAR-19	R4563001
Manganese (Mn)-Total		0.0536		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Molybdenum (Mo)-Total		0.00172		0.000050	mg/L	13-MAR-19	13-MAR-19	R4563001
Nickel (Ni)-Total		0.00429		0.00050	mg/L	13-MAR-19	13-MAR-19	R4563001
Potassium (K)-Total		8.12		0.050	mg/L	13-MAR-19	13-MAR-19	R4563001
Phosphorus (P)-Total		1.73		0.030	mg/L	13-MAR-19	13-MAR-19	R4563001
Rubidium (Rb)-Total		0.00794		0.00020	mg/L	13-MAR-19	13-MAR-19	R4563001
Selenium (Se)-Total		0.000192		0.000050	mg/L	13-MAR-19	13-MAR-19	R4563001
Silicon (Si)-Total		0.64		0.10	mg/L	13-MAR-19	13-MAR-19	R4563001
Silver (Ag)-Total		0.000028		0.000010	mg/L	13-MAR-19	13-MAR-19	R4563001
Sodium (Na)-Total		42.7		0.050	mg/L	13-MAR-19	13-MAR-19	R4563001
Strontium (Sr)-Total		0.146		0.00020	mg/L	13-MAR-19	13-MAR-19	R4563001
Sulfur (S)-Total		12.8		0.50	mg/L	13-MAR-19	13-MAR-19	R4563001
Tellurium (Te)-Total		<0.00020		0.00020	mg/L	13-MAR-19	13-MAR-19	R4563001
Thallium (Tl)-Total		<0.000010		0.000010	mg/L	13-MAR-19	13-MAR-19	R4563001
Thorium (Th)-Total		<0.00010		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Tin (Sn)-Total		0.00101		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Titanium (Ti)-Total		0.00250		0.00030	mg/L	13-MAR-19	13-MAR-19	R4563001
Tungsten (W)-Total		<0.00010		0.00010	mg/L	13-MAR-19	13-MAR-19	R4563001
Uranium (U)-Total		0.000111		0.000010	mg/L	13-MAR-19	13-MAR-19	R4563001
Vanadium (V)-Total		<0.00050		0.00050	mg/L	13-MAR-19	13-MAR-19	R4563001
Zinc (Zn)-Total		0.0848		0.0030	mg/L	13-MAR-19	13-MAR-19	R4563001
Zirconium (Zr)-Total		0.000494		0.000060	mg/L	13-MAR-19	13-MAR-19	R4563001
Total Organic Carbon by Combustion								
Total Organic Carbon		77.6		5.0	mg/L		12-MAR-19	R4560427
Total Suspended Solids								
Total Suspended Solids		53.7		2.0	mg/L		13-MAR-19	R4566868
pH								
pH		6.80		0.10	pH units		12-MAR-19	R4561039

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.			
3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.			
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.			
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-WP	Water	pH	APHA 4500H

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 ± 105°C.			
TC,EC10-QT97-WP	Water	Total and E. coli, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Escherichia coli bacteria are simultaneously 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 35.0 ± 0.5°C for 18 or 24 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.			
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 ww - 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.

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4560427							
WG3005275-2 LCS								
Total Organic Carbon			93.5		%		80-120	12-MAR-19
WG3005275-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	12-MAR-19
CL-IC-N-WP	Water							
Batch	R4554132							
WG3002754-10 LCS								
Chloride (Cl)			99.2		%		90-110	08-MAR-19
WG3002754-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	08-MAR-19
EC-WP	Water							
Batch	R4561039							
WG3005284-3 LCS								
Conductivity			99.6		%		90-110	12-MAR-19
WG3005284-1 MB								
Conductivity			<1.0		umhos/cm		1	12-MAR-19
F-IC-N-WP	Water							
Batch	R4554132							
WG3002754-10 LCS								
Fluoride (F)			100.6		%		90-110	08-MAR-19
WG3002754-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	08-MAR-19
F2-F4-FID-WP	Water							
Batch	R4561209							
WG3003708-2 LCS								
F2 (C10-C16)			90.4		%		70-130	12-MAR-19
F3 (C16-C34)			92.9		%		70-130	12-MAR-19
F4 (C34-C50)			101.3		%		70-130	12-MAR-19
WG3003708-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	12-MAR-19
F3 (C16-C34)			<0.25		mg/L		0.25	12-MAR-19
F4 (C34-C50)			<0.25		mg/L		0.25	12-MAR-19
Surrogate: 2-Bromobenzotrifluoride			106.2		%		60-140	12-MAR-19
FC10-QT97-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP								
Batch R4553882								
WG3002911-2 DUP		L2241719-1						
Fecal Coliforms		>24200	>24200		MPN/100mL	0.0	65	08-MAR-19
WG3002911-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	08-MAR-19
HG-T-CVAA-WP								
Batch R4570467								
WG3009008-2 LCS								
Mercury (Hg)-Total			98.0		%		80-120	15-MAR-19
WG3009008-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	15-MAR-19
MET-T-CCMS-WP								
Batch R4563001								
WG3005516-2 LCS								
Aluminum (Al)-Total			99.4		%		80-120	13-MAR-19
Antimony (Sb)-Total			104.5		%		80-120	13-MAR-19
Arsenic (As)-Total			98.6		%		80-120	13-MAR-19
Barium (Ba)-Total			98.8		%		80-120	13-MAR-19
Beryllium (Be)-Total			101.0		%		80-120	13-MAR-19
Bismuth (Bi)-Total			101.7		%		80-120	13-MAR-19
Boron (B)-Total			106.4		%		80-120	13-MAR-19
Cadmium (Cd)-Total			100.7		%		80-120	13-MAR-19
Calcium (Ca)-Total			101.0		%		80-120	13-MAR-19
Cesium (Cs)-Total			105.7		%		80-120	13-MAR-19
Chromium (Cr)-Total			100.2		%		80-120	13-MAR-19
Cobalt (Co)-Total			99.5		%		80-120	13-MAR-19
Copper (Cu)-Total			99.1		%		80-120	13-MAR-19
Iron (Fe)-Total			98.6		%		80-120	13-MAR-19
Lead (Pb)-Total			98.3		%		80-120	13-MAR-19
Lithium (Li)-Total			102.9		%		80-120	13-MAR-19
Magnesium (Mg)-Total			107.8		%		80-120	13-MAR-19
Manganese (Mn)-Total			100.2		%		80-120	13-MAR-19
Molybdenum (Mo)-Total			103.3		%		80-120	13-MAR-19
Nickel (Ni)-Total			97.2		%		80-120	13-MAR-19
Potassium (K)-Total			100.7		%		80-120	13-MAR-19
Phosphorus (P)-Total			103.6		%		80-120	13-MAR-19
Rubidium (Rb)-Total			99.3		%		80-120	13-MAR-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4563001							
WG3005516-2	LCS							
Selenium (Se)-Total			102.7		%		80-120	13-MAR-19
Silicon (Si)-Total			100.8		%		80-120	13-MAR-19
Silver (Ag)-Total			100.1		%		80-120	13-MAR-19
Sodium (Na)-Total			104.5		%		80-120	13-MAR-19
Strontium (Sr)-Total			105.1		%		80-120	13-MAR-19
Sulfur (S)-Total			92.9		%		80-120	13-MAR-19
Tellurium (Te)-Total			98.4		%		80-120	13-MAR-19
Thallium (Tl)-Total			99.98		%		80-120	13-MAR-19
Thorium (Th)-Total			101.4		%		80-120	13-MAR-19
Tin (Sn)-Total			102.2		%		80-120	13-MAR-19
Titanium (Ti)-Total			96.4		%		80-120	13-MAR-19
Tungsten (W)-Total			98.8		%		80-120	13-MAR-19
Uranium (U)-Total			105.1		%		80-120	13-MAR-19
Vanadium (V)-Total			100.7		%		80-120	13-MAR-19
Zinc (Zn)-Total			99.98		%		80-120	13-MAR-19
Zirconium (Zr)-Total			105.0		%		80-120	13-MAR-19
WG3005516-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	13-MAR-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-MAR-19
Boron (B)-Total			<0.010		mg/L		0.01	13-MAR-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	13-MAR-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-MAR-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	13-MAR-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	13-MAR-19
Iron (Fe)-Total			<0.010		mg/L		0.01	13-MAR-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-MAR-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-MAR-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-MAR-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4563001							
WG3005516-1 MB								
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-MAR-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-MAR-19
Potassium (K)-Total			<0.050		mg/L		0.05	13-MAR-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	13-MAR-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	13-MAR-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-MAR-19
Silicon (Si)-Total			<0.10		mg/L		0.1	13-MAR-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	13-MAR-19
Sodium (Na)-Total			<0.050		mg/L		0.05	13-MAR-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	13-MAR-19
Sulfur (S)-Total			<0.50		mg/L		0.5	13-MAR-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	13-MAR-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-MAR-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-MAR-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	13-MAR-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-MAR-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-MAR-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-MAR-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	13-MAR-19
NH3-COL-WP		Water						
Batch	R4562808							
WG3005745-18 LCS								
Ammonia, Total (as N)			101.5		%		85-115	12-MAR-19
WG3005745-17 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	12-MAR-19
NO2-IC-N-WP		Water						
Batch	R4554132							
WG3002754-10 LCS								
Nitrite (as N)			98.4		%		90-110	08-MAR-19
WG3002754-9 MB								
Nitrite (as N)			<0.010		mg/L		0.01	08-MAR-19
NO3-IC-N-WP		Water						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP	Water							
Batch	R4554132							
WG3002754-10 LCS								
Nitrate (as N)			99.7		%		90-110	08-MAR-19
WG3002754-9 MB								
Nitrate (as N)			<0.020		mg/L		0.02	08-MAR-19
OG-GRAV-WP	Water							
Batch	R4564773							
WG3005398-2 LCS								
Oil and Grease			91.6		%		70-130	14-MAR-19
WG3005398-1 MB								
Oil and Grease			<5.0		mg/L		5	14-MAR-19
P-T-COL-WP	Water							
Batch	R4570207							
WG3008731-6 LCS								
Phosphorus (P)-Total			94.4		%		80-120	19-MAR-19
WG3008731-5 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	19-MAR-19
PAH,PANH-WP	Water							
Batch	R4559187							
WG3001877-2 LCS								
1-Methyl Naphthalene			90.6		%		60-130	11-MAR-19
2-Methyl Naphthalene			76.1		%		60-130	11-MAR-19
Acenaphthene			89.2		%		60-130	11-MAR-19
Acenaphthylene			77.5		%		60-130	11-MAR-19
Anthracene			74.4		%		60-130	11-MAR-19
Acridine			70.2		%		60-130	11-MAR-19
Benzo(a)anthracene			74.5		%		60-130	11-MAR-19
Benzo(a)pyrene			82.8		%		60-130	11-MAR-19
Benzo(b&j)fluoranthene			71.8		%		60-130	11-MAR-19
Benzo(g,h,i)perylene			73.7		%		60-130	11-MAR-19
Benzo(k)fluoranthene			100.3		%		60-130	11-MAR-19
Chrysene			91.7		%		60-130	11-MAR-19
Dibenzo(a,h)anthracene			77.7		%		60-130	11-MAR-19
Fluoranthene			80.5		%		60-130	11-MAR-19
Fluorene			75.9		%		60-130	11-MAR-19
Indeno(1,2,3-cd)pyrene			76.4		%		60-130	11-MAR-19
Naphthalene			86.4		%		50-130	11-MAR-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4558527								
WG3003602-2	LCS							
Phenols (4AAP)			95.2		%		85-115	11-MAR-19
WG3003602-1	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	11-MAR-19
SO4-IC-N-WP								
Batch R4558311								
WG3003210-2	LCS							
Sulfate (SO4)			97.8		%		90-110	09-MAR-19
WG3003210-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	09-MAR-19
SOLIDS-TOTSUS-WP								
Batch R4566868								
WG3005540-22	LCS							
Total Suspended Solids			110.8		%		85-115	13-MAR-19
WG3005540-21	MB							
Total Suspended Solids			<2.0		mg/L		2	13-MAR-19
TC,EC10-QT97-WP								
Batch R4553884								
WG3002915-2	DUP	L2241719-1						
Total Coliforms		>24200	>24200		MPN/100mL	0.0	65	08-MAR-19
Escherichia Coli		>24200	>24200		MPN/100mL	0.0	65	08-MAR-19
WG3002915-1	MB							
Total Coliforms			<1		MPN/100mL		1	08-MAR-19
Escherichia Coli			<1		MPN/100mL		1	08-MAR-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	07-MAR-19	12-MAR-19 12:00	0.25	120	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2241719 were received on 08-MAR-19 12:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

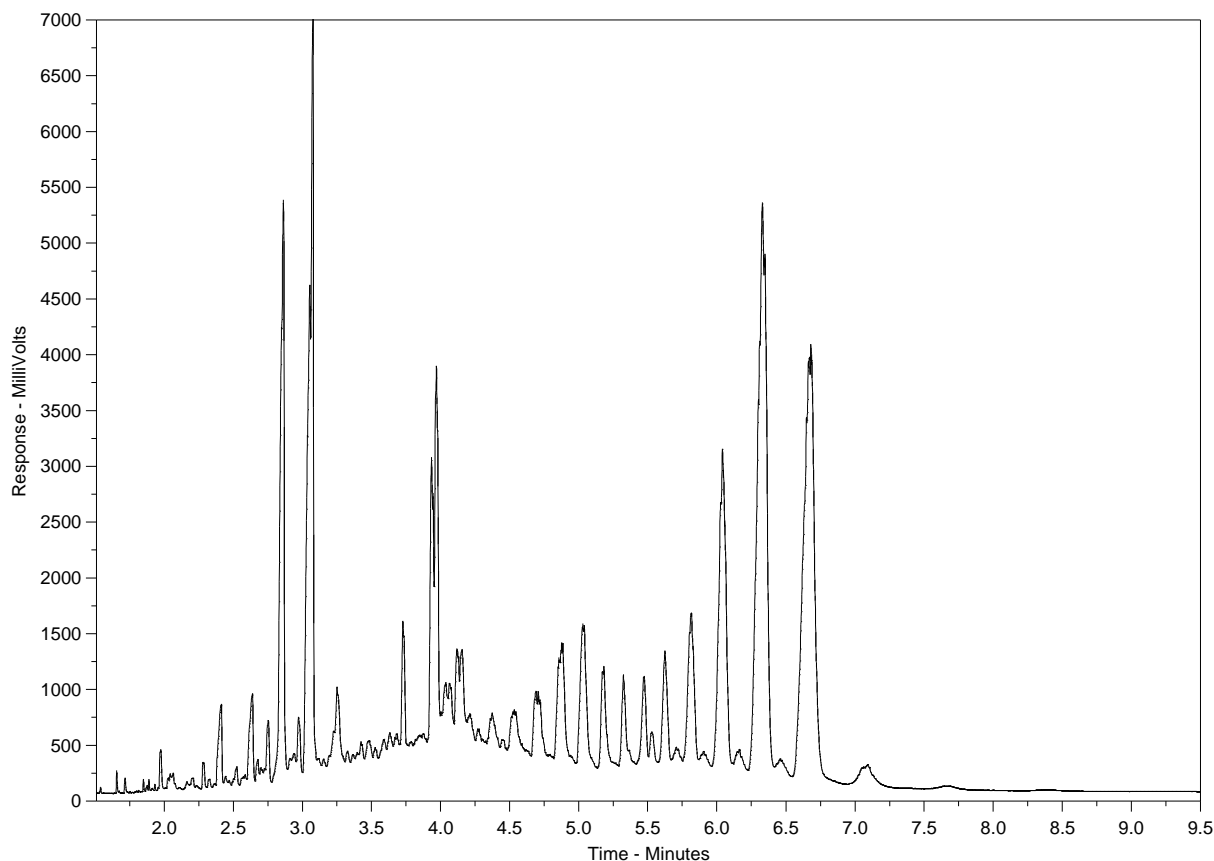
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2241719-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



L2241719-COFC

COC # _____

Page _____ of _____

Report To				Service Requested (Rush for routine analysis subject to availability)															
Company: Nunavut CGS - Rankin Inlet (W8133)				<input checked="" type="checkbox"/> Standard <input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT											
Contact: SIMON DOIRON				Email 1: sdoiron@gov.nu.ca															
Address: Box 490 Rankin Inlet, NU, X0C 0G0				Email 2: mlusty@gov.nu.ca															
Phone: 867-645-8155 Cell#: _____				Email 3: _____															
Invoice To: Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No				Client / Project Information				Analysis Request											
Company: _____				Job #: Rankin Inlet WWTP - Monthly Effluent				Please indicate below Filtered, Preserved or both (F, P, F/P)											
Contact: _____				PO / AFE: _____															
Address: _____				LSD: _____															
Phone: _____ Fax: _____				Quoted #: _____															
Lab Work Order # _____ (lab use only)				ALS Contact: Craig Riddell Sampled By: Simon Doiron															
Sample #		Sample Identification (This description will appear on the report)		Date Sampled	Time Sampled	Sample Type	BTX,F1-F4-WP	PAH-PANH-WP	NUNAVUT-WW-GRP1-WP	F-IC-NWP	TC,EC-QT97-WP								Number of Containers
		Rankin Inlet WWTP - Effluent		Mar 7/19		Waste	x	x	x	x	x							15	
Special Instructions / Regulations with water or land use (CGME-Freshwater Aquatic Life/EC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details Nunavut-WW-GRP1-WP pkg includes 1 L BOD/CBOD, 1 L Routine, 250 ml Metals, 40 ml Mercury Vial, 250 ml Amber Nutrient, 250 ml Amber Phenols, 2 x 250 ml Amber Oil & Grease, 250 ml Bacteria (9 bottles) + 5 Vials for BTX,F1-F4 and 1 L Amber for PAH's = Total of 15 Bottles per sample. 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 provided on a separate Excel tab. Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																			
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)											
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:									
Bill Ross	Mar 7	3:00pm	RL	Mar 8/19	1200	5.9°C				Yes / No ? If Yes add SIF									

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix I



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 04-APR-19
Report Date: 12-APR-19 15:48 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2253873

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2253873-1 RANKIN INLET WWTP - EFFLUENT Sampled By: SD Matrix: WASTE BTEX plus F1-F4 BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		05-APR-19	R4592409
Toluene	<0.0010		0.0010	mg/L		05-APR-19	R4592409
Ethyl benzene	<0.00050		0.00050	mg/L		05-APR-19	R4592409
o-Xylene	<0.00050		0.00050	mg/L		05-APR-19	R4592409
m+p-Xylenes	<0.00040		0.00040	mg/L		05-APR-19	R4592409
F1 (C6-C10)	<0.10		0.10	mg/L		05-APR-19	R4592409
Surrogate: 4-Bromofluorobenzene (SS)	102.3		70-130	%		05-APR-19	R4592409
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		11-APR-19	
F2-Naphth	<0.10		0.10	mg/L		11-APR-19	
F3-PAH	0.50		0.25	mg/L		11-APR-19	
Total Hydrocarbons (C6-C50)	0.86		0.38	mg/L		11-APR-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		09-APR-19	
Miscellaneous Parameters							
Fluoride (F)	<0.10	DLM	0.10	mg/L		10-APR-19	R4598472
Total Suspended Solids	76.3		2.0	mg/L		10-APR-19	R4595533
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420		1	MPN/100mL		04-APR-19	R4591130
Escherichia Coli	>2420		1	MPN/100mL		04-APR-19	R4591130
F2-F4 (O.Reg.153/04)							
F2 (C10-C16)	<100		100	ug/L	08-APR-19	09-APR-19	R4592938
F3 (C16-C34)	500		250	ug/L	08-APR-19	09-APR-19	R4592938
F4 (C34-C50)	350		250	ug/L	08-APR-19	09-APR-19	R4592938
Chrom. to baseline at nC50	YES				08-APR-19	09-APR-19	R4592938
Surrogate: 2-Bromobenzotrifluoride	92.0		60-140	%	08-APR-19	09-APR-19	R4592938
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
2-Methyl Naphthalene	0.000022		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Acenaphthene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Acenaphthylene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Anthracene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Acridine	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Benzo(a)anthracene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	08-APR-19	10-APR-19	R4595667
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Chrysene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	08-APR-19	10-APR-19	R4595667
Fluoranthene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Fluorene	<0.000020		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Naphthalene	0.000069		0.000050	mg/L	08-APR-19	10-APR-19	R4595667
Phenanthrene	<0.000050		0.000050	mg/L	08-APR-19	10-APR-19	R4595667
Pyrene	<0.000010		0.000010	mg/L	08-APR-19	10-APR-19	R4595667
Quinoline	0.000028		0.000020	mg/L	08-APR-19	10-APR-19	R4595667
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	08-APR-19	10-APR-19	R4595667
Surrogate: Acenaphthene d10	93.9		60-130	%	08-APR-19	10-APR-19	R4595667
Surrogate: Acridine d9	73.4		60-130	%	08-APR-19	10-APR-19	R4595667
Surrogate: Chrysene d12	91.3		60-130	%	08-APR-19	10-APR-19	R4595667

* 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
L2253873-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD							
Matrix: WASTE							
Polyaromatic Hydrocarbons (PAHs)							
Surrogate: Naphthalene d8	95.8		50-130	%	08-APR-19	10-APR-19	R4595667
Surrogate: Phenanthrene d10	60.8		60-130	%	08-APR-19	10-APR-19	R4595667
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	108		1.2	mg/L		06-APR-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		06-APR-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		06-APR-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	88.7		1.0	mg/L		05-APR-19	R4591781
Ammonia by colour							
Ammonia, Total (as N)	3.20		0.10	mg/L		08-APR-19	R4592829
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	51		20	mg/L		05-APR-19	R4598267
Carbonaceous BOD							
BOD Carbonaceous	50		20	mg/L		05-APR-19	R4598267
Chloride in Water by IC							
Chloride (Cl)	73.5		0.50	mg/L		05-APR-19	R4591802
Conductivity							
Conductivity	494		1.0	umhos/cm		05-APR-19	R4591781
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		04-APR-19	R4591122
Hardness Calculated							
Hardness (as CaCO3)	113	HTC	0.20	mg/L		12-APR-19	
Mercury Total							
Mercury (Hg)-Total	0.0000060		0.0000050	mg/L	08-APR-19	10-APR-19	R4593514
Nitrate in Water by IC							
Nitrate (as N)	0.129		0.020	mg/L		05-APR-19	R4591802
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.141		0.070	mg/L		09-APR-19	
Nitrite in Water by IC							
Nitrite (as N)	0.012		0.010	mg/L		05-APR-19	R4591802
Oil & Grease - Gravimetric							
Oil and Grease	11.1		5.0	mg/L		12-APR-19	R4599046
Phenol (4AAP)							
Phenols (4AAP)	0.0051		0.0010	mg/L		08-APR-19	R4592955
Phosphorus, Total							
Phosphorus (P)-Total	1.31		0.0060	mg/L		11-APR-19	R4596067
Sulfate in Water by IC							
Sulfate (SO4)	40.5		0.30	mg/L		05-APR-19	R4591802
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0833		0.0030	mg/L	11-APR-19	11-APR-19	R4597668
Arsenic (As)-Total	0.00112		0.00010	mg/L	11-APR-19	11-APR-19	R4597668
Cadmium (Cd)-Total	0.0000576		0.0000050	mg/L	11-APR-19	11-APR-19	R4597668
Calcium (Ca)-Total	31.9		0.050	mg/L	11-APR-19	11-APR-19	R4597668
Chromium (Cr)-Total	0.00067		0.00010	mg/L	11-APR-19	11-APR-19	R4597668
Cobalt (Co)-Total	0.00013		0.00010	mg/L	11-APR-19	11-APR-19	R4597668
Copper (Cu)-Total	0.168		0.00050	mg/L	11-APR-19	11-APR-19	R4597668
Iron (Fe)-Total	0.258		0.010	mg/L	11-APR-19	11-APR-19	R4597668
Lead (Pb)-Total	0.00162		0.000050	mg/L	11-APR-19	11-APR-19	R4597668
Magnesium (Mg)-Total	8.07		0.0050	mg/L	11-APR-19	11-APR-19	R4597668

* 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
L2253873-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: SD								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Manganese (Mn)-Total		0.0601		0.00010	mg/L	11-APR-19	11-APR-19	R4597668
Nickel (Ni)-Total		0.00247		0.00050	mg/L	11-APR-19	11-APR-19	R4597668
Potassium (K)-Total		7.88		0.050	mg/L	11-APR-19	11-APR-19	R4597668
Sodium (Na)-Total		40.1		0.050	mg/L	11-APR-19	11-APR-19	R4597668
Zinc (Zn)-Total		0.0593		0.0030	mg/L	11-APR-19	11-APR-19	R4597668
Total Organic Carbon by Combustion								
Total Organic Carbon		47.2		0.50	mg/L		05-APR-19	R4591644
pH								
pH		7.01		0.10	pH units		05-APR-19	R4591781

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
<p>Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.</p>			
FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97
<p>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.</p>			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
<p>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.</p>			
HG-T-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020B (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>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.</p>			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
<p>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>			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
<p>This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
<p>PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.</p>			
PH-WP	Water	pH	APHA 4500H
<p>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.</p>			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-WP	Water	Total Coliform and E.coli by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2253873

Report Date: 12-APR-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP								
Water								
Batch R4591644								
WG3022438-2	LCS							
Total Organic Carbon			98.7		%		80-120	05-APR-19
WG3022438-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-APR-19
CL-IC-N-WP								
Water								
Batch R4591802								
WG3021924-3	DUP	L2253873-1						
Chloride (Cl)		73.5	73.9		mg/L	0.6	20	05-APR-19
WG3021924-2 LCS								
Chloride (Cl)			101.0		%		90-110	05-APR-19
WG3021924-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	05-APR-19
WG3021924-4 MS								
Chloride (Cl)		L2253873-1	107.6		%		75-125	05-APR-19
EC-WP								
Water								
Batch R4591781								
WG3022578-13	LCS							
Conductivity			97.7		%		90-110	05-APR-19
WG3022578-11 MB								
Conductivity			<1.0		umhos/cm		1	05-APR-19
F-IC-N-WP								
Water								
Batch R4598472								
WG3024887-2	LCS							
Fluoride (F)			102.4		%		90-110	10-APR-19
WG3024887-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	10-APR-19
F2-F4-WT								
Water								
Batch R4592938								
WG3023264-2	LCS							
F2 (C10-C16)			98.8		%		65-135	09-APR-19
F3 (C16-C34)			99.0		%		65-135	09-APR-19
F4 (C34-C50)			105.2		%		65-135	09-APR-19
WG3023264-1 MB								
F2 (C10-C16)			<100		ug/L		100	09-APR-19
F3 (C16-C34)			<250		ug/L		250	09-APR-19
F4 (C34-C50)			<250		ug/L		250	09-APR-19
Surrogate: 2-Bromobenzotrifluoride			88.8		%		60-140	09-APR-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP								
Water								
Batch	R4591122							
WG3021366-2	DUP	L2253873-1						
Fecal Coliforms		>24200	>24200		MPN/100mL	0.0	65	04-APR-19
WG3021366-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	04-APR-19
HG-T-CVAA-WP								
Water								
Batch	R4593514							
WG3024665-2	LCS							
Mercury (Hg)-Total			109.0		%		80-120	10-APR-19
WG3024665-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	10-APR-19
MET-T-CCMS-WP								
Water								
Batch	R4597668							
WG3025505-2	LCS							
Aluminum (Al)-Total			98.3		%		80-120	11-APR-19
Arsenic (As)-Total			96.2		%		80-120	11-APR-19
Cadmium (Cd)-Total			96.7		%		80-120	11-APR-19
Calcium (Ca)-Total			96.2		%		80-120	11-APR-19
Chromium (Cr)-Total			96.3		%		80-120	11-APR-19
Cobalt (Co)-Total			95.8		%		80-120	11-APR-19
Copper (Cu)-Total			96.3		%		80-120	11-APR-19
Iron (Fe)-Total			90.6		%		80-120	11-APR-19
Lead (Pb)-Total			96.9		%		80-120	11-APR-19
Magnesium (Mg)-Total			105.2		%		80-120	11-APR-19
Manganese (Mn)-Total			97.5		%		80-120	11-APR-19
Nickel (Ni)-Total			95.3		%		80-120	11-APR-19
Potassium (K)-Total			93.7		%		80-120	11-APR-19
Sodium (Na)-Total			97.1		%		80-120	11-APR-19
Zinc (Zn)-Total			94.3		%		80-120	11-APR-19
WG3025505-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	11-APR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-APR-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	11-APR-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	11-APR-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	11-APR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-APR-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	11-APR-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OG-GRAV-WP		Water						
Batch	R4599046							
WG3025093-2	LCS							
Oil and Grease			100.1		%		70-130	12-APR-19
WG3025093-1	MB							
Oil and Grease			<5.0		mg/L		5	12-APR-19
P-T-COL-WP		Water						
Batch	R4596067							
WG3025385-2	LCS							
Phosphorus (P)-Total			97.6		%		80-120	11-APR-19
WG3025385-1	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	11-APR-19
PAH,PANH-WP		Water						
Batch	R4595667							
WG3023337-2	LCS							
1-Methyl Naphthalene			87.1		%		60-130	10-APR-19
2-Methyl Naphthalene			79.9		%		60-130	10-APR-19
Acenaphthene			87.5		%		60-130	10-APR-19
Acenaphthylene			77.5		%		60-130	10-APR-19
Anthracene			70.3		%		60-130	10-APR-19
Acridine			74.9		%		60-130	10-APR-19
Benzo(a)anthracene			84.0		%		60-130	10-APR-19
Benzo(a)pyrene			74.8		%		60-130	10-APR-19
Benzo(b&j)fluoranthene			73.5		%		60-130	10-APR-19
Benzo(g,h,i)perylene			79.8		%		60-130	10-APR-19
Benzo(k)fluoranthene			95.7		%		60-130	10-APR-19
Chrysene			90.9		%		60-130	10-APR-19
Dibenzo(a,h)anthracene			74.2		%		60-130	10-APR-19
Fluoranthene			86.6		%		60-130	10-APR-19
Fluorene			74.0		%		60-130	10-APR-19
Indeno(1,2,3-cd)pyrene			73.9		%		60-130	10-APR-19
Naphthalene			84.1		%		50-130	10-APR-19
Phenanthrene			72.2		%		60-130	10-APR-19
Pyrene			86.0		%		60-130	10-APR-19
Quinoline			112.0		%		60-130	10-APR-19
WG3023337-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	10-APR-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	10-APR-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WP								
Batch R4591802								
WG3021924-3	DUP	L2253873-1						
Sulfate (SO4)		40.5	40.9		mg/L	1.0	20	05-APR-19
WG3021924-2	LCS							
Sulfate (SO4)			101.3		%		90-110	05-APR-19
WG3021924-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	05-APR-19
WG3021924-4	MS	L2253873-1						
Sulfate (SO4)			106.6		%		75-125	05-APR-19
SOLIDS-TOTSUS-WP								
Batch R4595533								
WG3024734-6	LCS							
Total Suspended Solids			98.0		%		85-115	10-APR-19
WG3024734-5	MB							
Total Suspended Solids			<2.0		mg/L		2	10-APR-19
TC,EC-QT97-WP								
Batch R4591130								
WG3021367-2	DUP	L2253873-1						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	04-APR-19
Escherichia Coli		>2420	>2420		MPN/100mL	0.0	65	04-APR-19
WG3021367-1	MB							
Total Coliforms			<1		MPN/100mL		1	04-APR-19
Escherichia Coli			<1		MPN/100mL		1	04-APR-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2253873

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	Not provided	05-APR-19 12:00	0.25	20	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2253873 were received on 04-APR-19 16:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

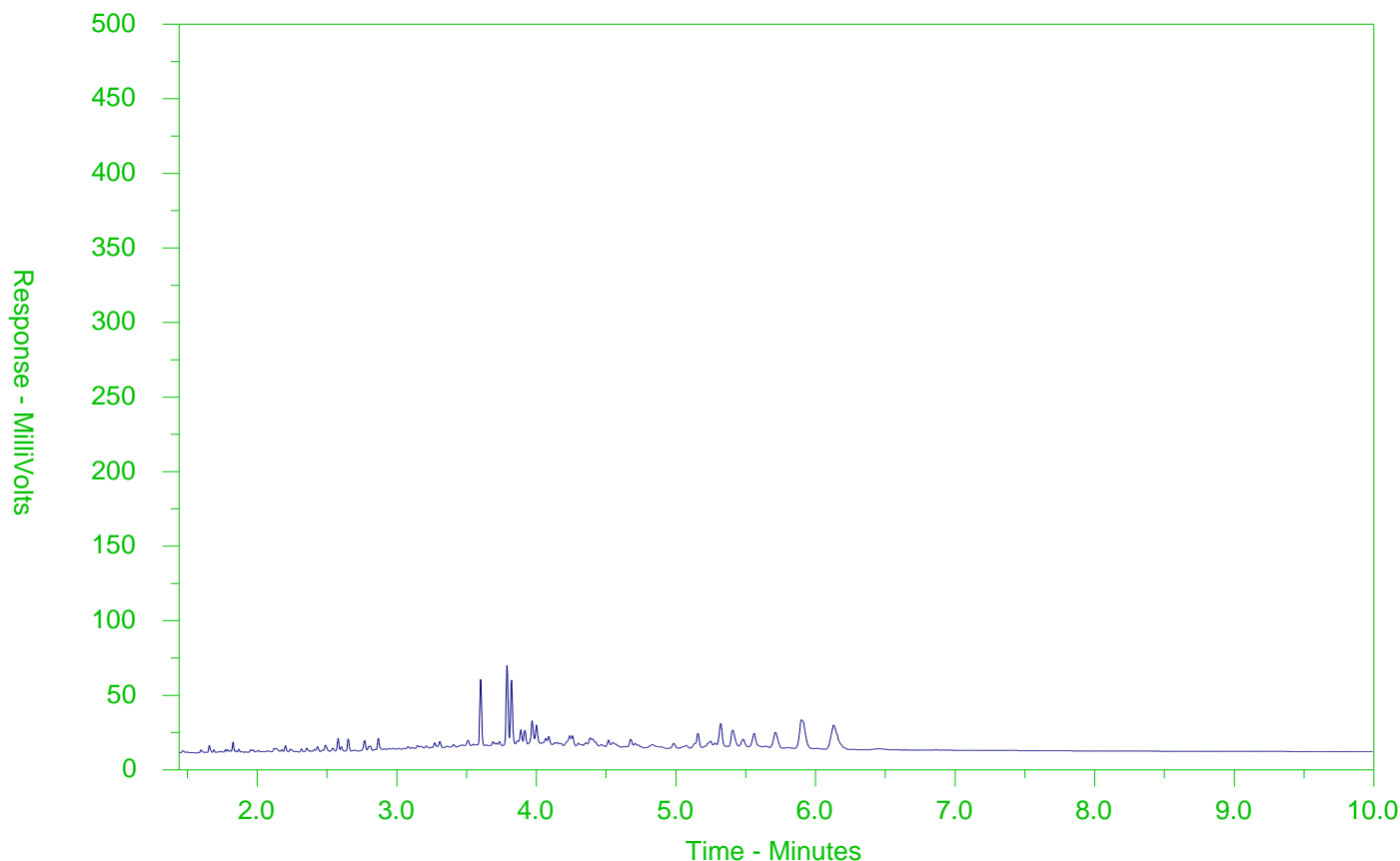
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2253873-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix J



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 15-MAY-19
Report Date: 28-MAY-19 07:37 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2273673

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2273673-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 13-MAY-19							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		27-MAY-19	R4644890
Toluene	<0.0010		0.0010	mg/L		27-MAY-19	R4644890
Ethyl benzene	<0.00050		0.00050	mg/L		27-MAY-19	R4644890
o-Xylene	<0.00050		0.00050	mg/L		27-MAY-19	R4644890
m+p-Xylenes	0.00044		0.00040	mg/L		27-MAY-19	R4644890
F1 (C6-C10)	<0.10		0.10	mg/L		27-MAY-19	R4644890
Surrogate: 4-Bromofluorobenzene (SS)	106.0		70-130	%		27-MAY-19	R4644890
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.48		0.10	mg/L	17-MAY-19	17-MAY-19	R4637345
F3 (C16-C34)	7.88		0.25	mg/L	17-MAY-19	17-MAY-19	R4637345
F4 (C34-C50)	3.34		0.25	mg/L	17-MAY-19	17-MAY-19	R4637345
Surrogate: 2-Bromobenzotrifluoride	88.5		60-140	%	17-MAY-19	17-MAY-19	R4637345
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		27-MAY-19	
F2-Naphth	0.48		0.10	mg/L		27-MAY-19	
F3-PAH	7.88		0.25	mg/L		27-MAY-19	
Total Hydrocarbons (C6-C50)	11.7		0.38	mg/L		27-MAY-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		27-MAY-19	
Miscellaneous Parameters							
Fluoride (F)	0.132		0.020	mg/L		16-MAY-19	R4637947
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200		10	MPN/100mL		15-MAY-19	R4636262
Escherichia Coli	>24200	PEHR	10	MPN/100mL		15-MAY-19	R4636262
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000023		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
2-Methyl Naphthalene	0.000041		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Acenaphthene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Acenaphthylene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Anthracene	<0.000010		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Acridine	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Benzo(a)anthracene	<0.000010		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	17-MAY-19	19-MAY-19	R4641977
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Chrysene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Dibenzo(a,h)anthracene	0.0000051		0.0000050	mg/L	17-MAY-19	19-MAY-19	R4641977
Fluoranthene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Fluorene	<0.000020		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Naphthalene	0.000057		0.000050	mg/L	17-MAY-19	19-MAY-19	R4641977
Phenanthrene	<0.000050		0.000050	mg/L	17-MAY-19	19-MAY-19	R4641977
Pyrene	0.000023		0.000010	mg/L	17-MAY-19	19-MAY-19	R4641977
Quinoline	0.000021		0.000020	mg/L	17-MAY-19	19-MAY-19	R4641977
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	17-MAY-19	19-MAY-19	R4641977
Surrogate: Acenaphthene d10	105.3		60-130	%	17-MAY-19	19-MAY-19	R4641977
Surrogate: Acridine d9	113.9		60-130	%	17-MAY-19	19-MAY-19	R4641977
Surrogate: Chrysene d12	113.9		60-130	%	17-MAY-19	19-MAY-19	R4641977
Surrogate: Naphthalene d8	108.4		50-130	%	17-MAY-19	19-MAY-19	R4641977
Surrogate: Phenanthrene d10	116.0		60-130	%	17-MAY-19	19-MAY-19	R4641977

* 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
L2273673-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 13-MAY-19							
Matrix: WATER							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	149		1.2	mg/L		18-MAY-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		18-MAY-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		18-MAY-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	122		1.0	mg/L		17-MAY-19	R4637826
Ammonia by colour							
Ammonia, Total (as N)	7.03		0.20	mg/L		21-MAY-19	R4640491
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	106		20	mg/L		16-MAY-19	R4640272
Carbonaceous BOD							
BOD Carbonaceous	90		20	mg/L		16-MAY-19	R4640272
Chloride in Water by IC							
Chloride (Cl)	77.2		0.50	mg/L		16-MAY-19	R4637947
Conductivity							
Conductivity	557		1.0	umhos/cm		17-MAY-19	R4637826
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200	PEHR	10	MPN/100mL		15-MAY-19	R4636265
Hardness Calculated							
Hardness (as CaCO3)	127	HTC	0.20	mg/L		21-MAY-19	
Mercury Total							
Mercury (Hg)-Total	0.000014	DLM	0.000010	mg/L	21-MAY-19	23-MAY-19	R4642548
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		16-MAY-19	R4637947
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		22-MAY-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		16-MAY-19	R4637947
Oil & Grease - Gravimetric							
Oil and Grease	19.3		5.0	mg/L		23-MAY-19	R4641370
Phenol (4AAP)							
Phenols (4AAP)	0.0099		0.0010	mg/L		21-MAY-19	R4639681
Phosphorus, Total							
Phosphorus (P)-Total	2.40		0.030	mg/L		17-MAY-19	R4637142
Sulfate in Water by IC							
Sulfate (SO4)	33.6		0.30	mg/L		16-MAY-19	R4637947
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.171		0.0030	mg/L	17-MAY-19	17-MAY-19	R4638587
Antimony (Sb)-Total	0.00016		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Arsenic (As)-Total	0.00109		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Barium (Ba)-Total	0.0448		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Bismuth (Bi)-Total	0.00146		0.000050	mg/L	17-MAY-19	17-MAY-19	R4638587
Boron (B)-Total	0.101		0.010	mg/L	17-MAY-19	17-MAY-19	R4638587
Cadmium (Cd)-Total	0.0000595		0.0000050	mg/L	17-MAY-19	17-MAY-19	R4638587
Calcium (Ca)-Total	35.8		0.050	mg/L	17-MAY-19	17-MAY-19	R4638587
Cesium (Cs)-Total	0.000074		0.000010	mg/L	17-MAY-19	17-MAY-19	R4638587
Chromium (Cr)-Total	0.00064		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Cobalt (Co)-Total	0.00020		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Copper (Cu)-Total	0.257		0.00050	mg/L	17-MAY-19	17-MAY-19	R4638587

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2273673-1	RANKIN INLET WWTP - EFFLUENT							
Sampled By:	SD on 13-MAY-19							
Matrix:	WATER							
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total		0.632		0.010	mg/L	17-MAY-19	17-MAY-19	R4638587
Lead (Pb)-Total		0.00302		0.000050	mg/L	17-MAY-19	17-MAY-19	R4638587
Lithium (Li)-Total		0.0040		0.0010	mg/L	17-MAY-19	17-MAY-19	R4638587
Magnesium (Mg)-Total		9.22		0.0050	mg/L	17-MAY-19	17-MAY-19	R4638587
Manganese (Mn)-Total		0.0620		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Molybdenum (Mo)-Total		0.000743		0.000050	mg/L	17-MAY-19	17-MAY-19	R4638587
Nickel (Ni)-Total		0.00308		0.00050	mg/L	17-MAY-19	17-MAY-19	R4638587
Potassium (K)-Total		8.59		0.050	mg/L	17-MAY-19	17-MAY-19	R4638587
Phosphorus (P)-Total		2.86		0.030	mg/L	17-MAY-19	17-MAY-19	R4638587
Rubidium (Rb)-Total		0.00876		0.00020	mg/L	17-MAY-19	17-MAY-19	R4638587
Selenium (Se)-Total		0.000272		0.000050	mg/L	17-MAY-19	17-MAY-19	R4638587
Silicon (Si)-Total		0.50		0.10	mg/L	17-MAY-19	17-MAY-19	R4638587
Silver (Ag)-Total		0.000029		0.000010	mg/L	17-MAY-19	17-MAY-19	R4638587
Sodium (Na)-Total		44.5		0.050	mg/L	17-MAY-19	17-MAY-19	R4638587
Strontium (Sr)-Total		0.164		0.00020	mg/L	17-MAY-19	17-MAY-19	R4638587
Sulfur (S)-Total		13.8		0.50	mg/L	17-MAY-19	17-MAY-19	R4638587
Tellurium (Te)-Total		<0.00020		0.00020	mg/L	17-MAY-19	17-MAY-19	R4638587
Thallium (Tl)-Total		<0.000010		0.000010	mg/L	17-MAY-19	17-MAY-19	R4638587
Thorium (Th)-Total		<0.00010		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Tin (Sn)-Total		0.00074		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Titanium (Ti)-Total		0.00327		0.00030	mg/L	17-MAY-19	17-MAY-19	R4638587
Tungsten (W)-Total		<0.00010		0.00010	mg/L	17-MAY-19	17-MAY-19	R4638587
Uranium (U)-Total		0.000101		0.000010	mg/L	17-MAY-19	17-MAY-19	R4638587
Vanadium (V)-Total		<0.00050		0.00050	mg/L	17-MAY-19	17-MAY-19	R4638587
Zinc (Zn)-Total		0.0865		0.0030	mg/L	17-MAY-19	17-MAY-19	R4638587
Zirconium (Zr)-Total		0.000591		0.000060	mg/L	17-MAY-19	17-MAY-19	R4638587
Total Organic Carbon by Combustion								
Total Organic Carbon		73.9		2.5	mg/L		22-MAY-19	R4641367
Total Suspended Solids								
Total Suspended Solids		85.3		2.0	mg/L		17-MAY-19	R4639613
pH								
pH		6.86		0.10	pH units		17-MAY-19	R4637826

* 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).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
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 transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>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.</p> <p>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.</p> <p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC,EC10-QT97-WP	Water	Total and E. coli, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously 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 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2273673

Report Date: 28-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4641367							
WG3056392-2 LCS								
Total Organic Carbon			103.5		%		80-120	22-MAY-19
WG3056392-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-MAY-19
CL-IC-N-WP	Water							
Batch	R4637947							
WG3051356-2 LCS								
Chloride (Cl)			100.2		%		90-110	16-MAY-19
WG3051356-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-MAY-19
EC-WP	Water							
Batch	R4637826							
WG3053365-3 LCS								
Conductivity			98.2		%		90-110	17-MAY-19
WG3053365-1 MB								
Conductivity			<1.0		umhos/cm		1	17-MAY-19
F-IC-N-WP	Water							
Batch	R4637947							
WG3051356-2 LCS								
Fluoride (F)			103.6		%		90-110	16-MAY-19
WG3051356-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-MAY-19
F2-F4-FID-WP	Water							
Batch	R4637345							
WG3052255-2 LCS								
F2 (C10-C16)			107.3		%		70-130	17-MAY-19
F3 (C16-C34)			103.6		%		70-130	17-MAY-19
F4 (C34-C50)			104.0		%		70-130	17-MAY-19
WG3052255-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	17-MAY-19
F3 (C16-C34)			<0.25		mg/L		0.25	17-MAY-19
F4 (C34-C50)			<0.25		mg/L		0.25	17-MAY-19
Surrogate: 2-Bromobenzotrifluoride			79.6		%		60-140	17-MAY-19
FC10-QT97-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP	Water							
Batch R4636265								
WG3050791-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	15-MAY-19
HG-T-CVAA-WP	Water							
Batch R4642548								
WG3057799-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	23-MAY-19
WG3057799-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	23-MAY-19
MET-T-CCMS-WP	Water							
Batch R4638587								
WG3052561-2 LCS								
Aluminum (Al)-Total			111.5		%		80-120	17-MAY-19
Antimony (Sb)-Total			108.6		%		80-120	17-MAY-19
Arsenic (As)-Total			106.0		%		80-120	17-MAY-19
Barium (Ba)-Total			104.5		%		80-120	17-MAY-19
Beryllium (Be)-Total			104.6		%		80-120	17-MAY-19
Bismuth (Bi)-Total			103.1		%		80-120	17-MAY-19
Boron (B)-Total			112.3		%		80-120	17-MAY-19
Cadmium (Cd)-Total			105.8		%		80-120	17-MAY-19
Calcium (Ca)-Total			104.9		%		80-120	17-MAY-19
Cesium (Cs)-Total			104.9		%		80-120	17-MAY-19
Chromium (Cr)-Total			112.9		%		80-120	17-MAY-19
Cobalt (Co)-Total			109.0		%		80-120	17-MAY-19
Copper (Cu)-Total			91.8		%		80-120	17-MAY-19
Iron (Fe)-Total			100.4		%		80-120	17-MAY-19
Lead (Pb)-Total			106.5		%		80-120	17-MAY-19
Lithium (Li)-Total			109.6		%		80-120	17-MAY-19
Magnesium (Mg)-Total			112.5		%		80-120	17-MAY-19
Manganese (Mn)-Total			108.4		%		80-120	17-MAY-19
Molybdenum (Mo)-Total			106.8		%		80-120	17-MAY-19
Nickel (Ni)-Total			106.8		%		80-120	17-MAY-19
Potassium (K)-Total			104.7		%		80-120	17-MAY-19
Phosphorus (P)-Total			119.2		%		80-120	17-MAY-19
Rubidium (Rb)-Total			108.6		%		80-120	17-MAY-19
Selenium (Se)-Total			107.0		%		80-120	17-MAY-19

Quality Control Report

Workorder: L2273673

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4638587							
WG3052561-2		LCS						
Silicon (Si)-Total			106.1		%		80-120	17-MAY-19
Silver (Ag)-Total			105.0		%		80-120	17-MAY-19
Sodium (Na)-Total			109.9		%		80-120	17-MAY-19
Strontium (Sr)-Total			107.3		%		80-120	17-MAY-19
Sulfur (S)-Total			109.8		%		80-120	17-MAY-19
Tellurium (Te)-Total			104.4		%		80-120	17-MAY-19
Thallium (Tl)-Total			104.6		%		80-120	17-MAY-19
Thorium (Th)-Total			103.5		%		80-120	17-MAY-19
Tin (Sn)-Total			105.3		%		80-120	17-MAY-19
Titanium (Ti)-Total			106.6		%		80-120	17-MAY-19
Tungsten (W)-Total			105.7		%		80-120	17-MAY-19
Uranium (U)-Total			108.7		%		80-120	17-MAY-19
Vanadium (V)-Total			109.5		%		80-120	17-MAY-19
Zinc (Zn)-Total			113.3		%		80-120	17-MAY-19
Zirconium (Zr)-Total			104.3		%		80-120	17-MAY-19
WG3052561-1		MB						
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	17-MAY-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	17-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-MAY-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	17-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-MAY-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-MAY-19



Quality Control Report

Workorder: L2273673

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4638587							
WG3052561-1 MB								
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	17-MAY-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	17-MAY-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	17-MAY-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-MAY-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	17-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-MAY-19
Sulfur (S)-Total			<0.50		mg/L		0.5	17-MAY-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	17-MAY-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-MAY-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-MAY-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-MAY-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	17-MAY-19
NH3-COL-WP		Water						
Batch	R4640491							
WG3055635-6 LCS								
Ammonia, Total (as N)			102.2		%		85-115	21-MAY-19
WG3055635-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	21-MAY-19
NO2-IC-N-WP		Water						
Batch	R4637947							
WG3051356-2 LCS								
Nitrite (as N)			105.3		%		90-110	16-MAY-19
WG3051356-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	16-MAY-19
NO3-IC-N-WP		Water						

Quality Control Report

Workorder: L2273673

Report Date: 28-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP								
Water								
Batch	R4637947							
WG3051356-2	LCS							
Nitrate (as N)			100.4		%		90-110	16-MAY-19
WG3051356-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	16-MAY-19
OG-GRAV-WP								
Water								
Batch	R4641370							
WG3055181-2	LCS							
Oil and Grease			83.1		%		70-130	23-MAY-19
WG3055181-1	MB							
Oil and Grease			<5.0		mg/L		5	23-MAY-19
P-T-COL-WP								
Water								
Batch	R4637142							
WG3051783-2	LCS							
Phosphorus (P)-Total			98.2		%		80-120	17-MAY-19
WG3051783-1	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	17-MAY-19
PAH,PANH-WP								
Water								
Batch	R4641977							
WG3052974-2	LCS							
1-Methyl Naphthalene			119.2		%		60-130	19-MAY-19
2-Methyl Naphthalene			110.1		%		60-130	19-MAY-19
Acenaphthene			125.0		%		60-130	19-MAY-19
Acenaphthylene			105.8		%		60-130	19-MAY-19
Anthracene			97.7		%		60-130	19-MAY-19
Acridine			100.4		%		60-130	19-MAY-19
Benzo(a)anthracene			91.9		%		60-130	19-MAY-19
Benzo(a)pyrene			88.7		%		60-130	19-MAY-19
Benzo(b&j)fluoranthene			91.4		%		60-130	19-MAY-19
Benzo(g,h,i)perylene			91.8		%		60-130	19-MAY-19
Benzo(k)fluoranthene			111.8		%		60-130	19-MAY-19
Chrysene			113.2		%		60-130	19-MAY-19
Dibenzo(a,h)anthracene			87.5		%		60-130	19-MAY-19
Fluoranthene			113.9		%		60-130	19-MAY-19
Fluorene			106.2		%		60-130	19-MAY-19
Indeno(1,2,3-cd)pyrene			78.2		%		60-130	19-MAY-19
Naphthalene			122.3		%		50-130	19-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4639681								
WG3054396-6	LCS							
Phenols (4AAP)			97.8		%		85-115	21-MAY-19
WG3054396-5	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	21-MAY-19
SO4-IC-N-WP								
Batch R4637947								
WG3051356-2	LCS							
Sulfate (SO4)			100.4		%		90-110	16-MAY-19
WG3051356-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-MAY-19
SOLIDS-TOTSUS-WP								
Batch R4639613								
WG3051561-44	LCS							
Total Suspended Solids			95.0		%		85-115	17-MAY-19
WG3051561-43	MB							
Total Suspended Solids			<2.0		mg/L		2	17-MAY-19
TC,EC10-QT97-WP								
Batch R4636262								
WG3050808-2	DUP	L2273673-1						
Total Coliforms		>24200	>24200		MPN/100mL	0.0	65	15-MAY-19
Escherichia Coli		>24200	>24200		MPN/100mL	0.0	65	15-MAY-19
WG3050808-1	MB							
Total Coliforms			<1		MPN/100mL		1	15-MAY-19
Escherichia Coli			<1		MPN/100mL		1	15-MAY-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	13-MAY-19	17-MAY-19 12:00	0.25	96	hours	EHTR-FM
Bacteriological Tests							
Fecal coliforms, 1:10 dilution by QT97	1	13-MAY-19	15-MAY-19 17:50	30	54	hours	EHTR
Total and E. coli, 1:10 dilution by QT97	1	13-MAY-19	15-MAY-19 17:50	30	54	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	13-MAY-19	16-MAY-19 07:00	48	67	hours	EHTR
Carbonaceous BOD	1	13-MAY-19	16-MAY-19 07:00	48	67	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2273673 were received on 15-MAY-19 12:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

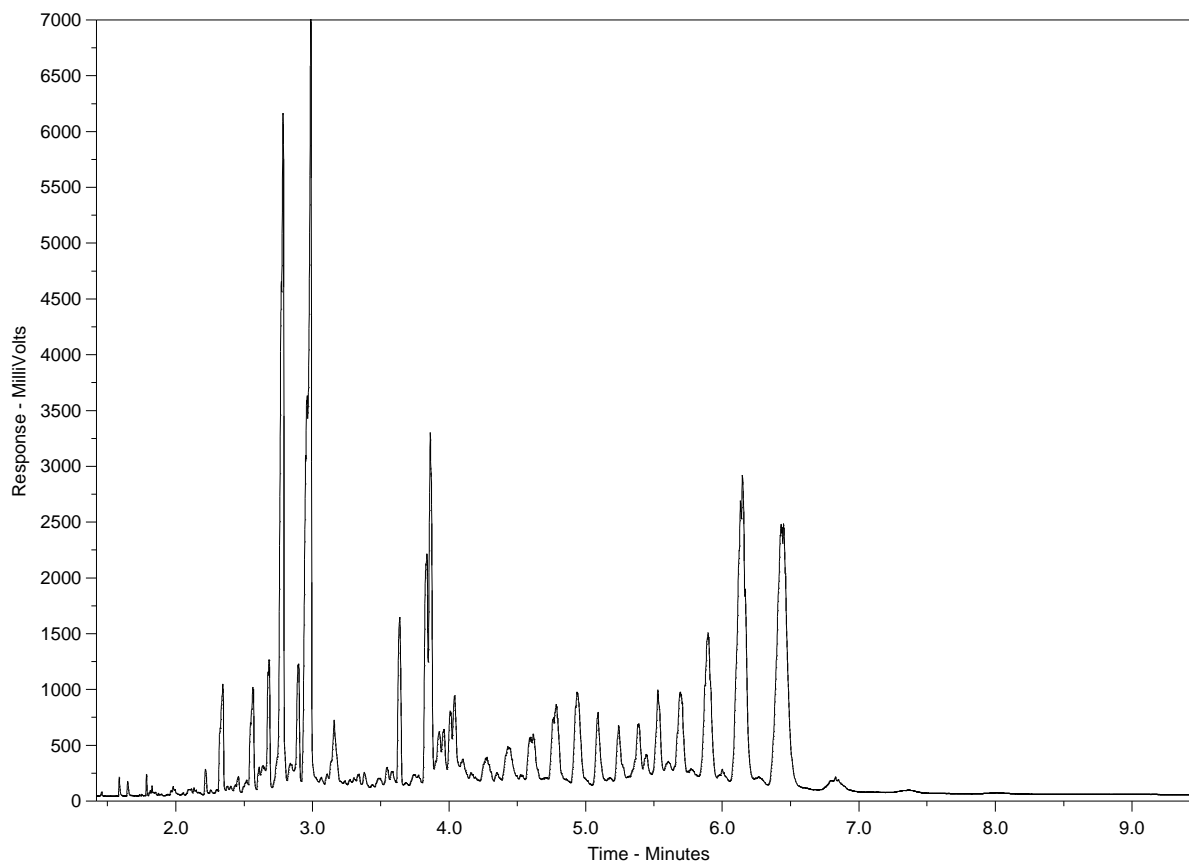
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2273673-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix K



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 06-JUN-19
Report Date: 19-JUN-19 12:24 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2287018

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2287018-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 04-JUN-19							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		12-JUN-19	R4660945
Toluene	<0.0010		0.0010	mg/L		12-JUN-19	R4660945
Ethyl benzene	<0.00050		0.00050	mg/L		12-JUN-19	R4660945
o-Xylene	<0.00050		0.00050	mg/L		12-JUN-19	R4660945
m+p-Xylenes	<0.00040		0.00040	mg/L		12-JUN-19	R4660945
F1 (C6-C10)	<0.10		0.10	mg/L		12-JUN-19	R4660945
Surrogate: 4-Bromofluorobenzene (SS)	88.0		70-130	%		12-JUN-19	R4660945
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.14		0.10	mg/L	07-JUN-19	09-JUN-19	R4663393
F3 (C16-C34)	2.34		0.25	mg/L	07-JUN-19	09-JUN-19	R4663393
F4 (C34-C50)	1.05		0.25	mg/L	07-JUN-19	09-JUN-19	R4663393
Surrogate: 2-Bromobenzotrifluoride	86.5		60-140	%	07-JUN-19	09-JUN-19	R4663393
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		14-JUN-19	
F2-Naphth	0.14		0.10	mg/L		14-JUN-19	
F3-PAH	2.34		0.25	mg/L		14-JUN-19	
Total Hydrocarbons (C6-C50)	3.54		0.38	mg/L		14-JUN-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		14-JUN-19	
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420	PEHR	1	MPN/100mL		06-JUN-19	R4661108
Escherichia Coli	>2420	PEHR	1	MPN/100mL		06-JUN-19	R4661108
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Acenaphthene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Acenaphthylene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Anthracene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Acridine	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-JUN-19	13-JUN-19	R4669879
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Chrysene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-JUN-19	13-JUN-19	R4669879
Fluoranthene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Fluorene	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Naphthalene	<0.000050		0.000050	mg/L	12-JUN-19	13-JUN-19	R4669879
Phenanthrene	<0.000050		0.000050	mg/L	12-JUN-19	13-JUN-19	R4669879
Pyrene	<0.000010		0.000010	mg/L	12-JUN-19	13-JUN-19	R4669879
Quinoline	<0.000020		0.000020	mg/L	12-JUN-19	13-JUN-19	R4669879
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-JUN-19	13-JUN-19	R4669879
Surrogate: Acenaphthene d10	86.3		60-130	%	12-JUN-19	13-JUN-19	R4669879
Surrogate: Acridine d9	94.7		60-130	%	12-JUN-19	13-JUN-19	R4669879
Surrogate: Chrysene d12	94.8		60-130	%	12-JUN-19	13-JUN-19	R4669879
Surrogate: Naphthalene d8	84.3		50-130	%	12-JUN-19	13-JUN-19	R4669879
Surrogate: Phenanthrene d10	94.1		60-130	%	12-JUN-19	13-JUN-19	R4669879
Nunavut WW Group 1							

* 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
L2287018-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 04-JUN-19							
Matrix: WASTE							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	63.8		1.2	mg/L		10-JUN-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		10-JUN-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		10-JUN-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	52.3		1.0	mg/L		07-JUN-19	R4662373
Ammonia by colour							
Ammonia, Total (as N)	2.47		0.20	mg/L		07-JUN-19	R4662823
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	27		20	mg/L		07-JUN-19	R4670223
Carbonaceous BOD							
BOD Carbonaceous	18.6		6.0	mg/L		07-JUN-19	R4670223
Chloride in Water by IC							
Chloride (Cl)	44.6		0.50	mg/L		07-JUN-19	R4663515
Conductivity							
Conductivity	290		1.0	umhos/cm		07-JUN-19	R4662373
Hardness Calculated							
Hardness (as CaCO3)	79.7	HTC	0.20	mg/L		17-JUN-19	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	15-JUN-19	17-JUN-19	R4672470
Nitrate in Water by IC							
Nitrate (as N)	0.072		0.020	mg/L		07-JUN-19	R4663515
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.111		0.070	mg/L		11-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	0.039		0.010	mg/L		07-JUN-19	R4663515
Oil & Grease - Gravimetric							
Oil and Grease	8.3		5.0	mg/L		13-JUN-19	R4668051
Phenol (4AAP)							
Phenols (4AAP)	0.0026		0.0010	mg/L		12-JUN-19	R4668667
Phosphorus, Total							
Phosphorus (P)-Total	0.510		0.0030	mg/L		10-JUN-19	R4665090
Sulfate in Water by IC							
Sulfate (SO4)	20.4		0.30	mg/L		07-JUN-19	R4663515
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.148		0.0030	mg/L	14-JUN-19	14-JUN-19	R4671275
Arsenic (As)-Total	0.00103		0.00010	mg/L	14-JUN-19	14-JUN-19	R4671275
Cadmium (Cd)-Total	0.0000312		0.0000050	mg/L	14-JUN-19	14-JUN-19	R4671275
Calcium (Ca)-Total	22.5		0.050	mg/L	14-JUN-19	14-JUN-19	R4671275
Chromium (Cr)-Total	0.00077		0.00010	mg/L	14-JUN-19	14-JUN-19	R4671275
Cobalt (Co)-Total	0.00026		0.00010	mg/L	14-JUN-19	14-JUN-19	R4671275
Copper (Cu)-Total	0.133		0.00050	mg/L	14-JUN-19	14-JUN-19	R4671275
Iron (Fe)-Total	0.407		0.010	mg/L	14-JUN-19	14-JUN-19	R4671275
Lead (Pb)-Total	0.00354		0.000050	mg/L	14-JUN-19	14-JUN-19	R4671275
Magnesium (Mg)-Total	5.68		0.0050	mg/L	14-JUN-19	14-JUN-19	R4671275
Manganese (Mn)-Total	0.0353		0.00010	mg/L	14-JUN-19	14-JUN-19	R4671275
Nickel (Ni)-Total	0.00314		0.00050	mg/L	14-JUN-19	14-JUN-19	R4671275
Potassium (K)-Total	5.14		0.050	mg/L	14-JUN-19	14-JUN-19	R4671275
Sodium (Na)-Total	24.7		0.050	mg/L	14-JUN-19	14-JUN-19	R4671275
Zinc (Zn)-Total	0.0440		0.0030	mg/L	14-JUN-19	14-JUN-19	R4671275
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
L2287018-1	RANKIN INLET WWTP - EFFLUENT							
Sampled By:	CLIENT on 04-JUN-19							
Matrix:	WASTE							
Total Organic Carbon by Combustion								
Total Organic Carbon		13.4		0.50	mg/L		18-JUN-19	R4674167
Total Suspended Solids								
Total Suspended Solids		36.5		2.0	mg/L		11-JUN-19	R4665046
pH								
pH		6.80		0.10	pH units		07-JUN-19	R4662373

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
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 transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			

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

1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene. 3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges: 1. All extraction and analysis holding times were met. 2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average. 3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors. 4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511
Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.			
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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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 aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC,EC-QT97-WP	Water	Total Coliform and E.coli by MPN QT97	APHA 9223B QT97

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.</p>			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
<p>Total xylenes represents the sum of o-xylene and m&p-xylene.</p>			

** 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 ww - 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.

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP								
Water								
Batch R4674167								
WG3081439-2	LCS							
Total Organic Carbon			104.2		%		80-120	18-JUN-19
WG3081439-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	18-JUN-19
CL-IC-N-WP								
Water								
Batch R4663515								
WG3070793-3	DUP	L2287018-1						
Chloride (Cl)		44.6	45.1		mg/L	0.9	20	07-JUN-19
WG3070793-2 LCS								
Chloride (Cl)			98.1		%		90-110	07-JUN-19
WG3070793-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	07-JUN-19
WG3070793-4 MS								
Chloride (Cl)		L2287018-1	104.3		%		75-125	07-JUN-19
EC-WP								
Water								
Batch R4662373								
WG3072352-3	LCS							
Conductivity			99.4		%		90-110	07-JUN-19
WG3072352-1 MB								
Conductivity			<1.0		umhos/cm		1	07-JUN-19
F2-F4-FID-WP								
Water								
Batch R4663393								
WG3070647-2	LCS							
F2 (C10-C16)			103.1		%		70-130	09-JUN-19
F3 (C16-C34)			94.2		%		70-130	09-JUN-19
F4 (C34-C50)			103.4		%		70-130	09-JUN-19
WG3070647-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	09-JUN-19
F3 (C16-C34)			<0.25		mg/L		0.25	09-JUN-19
F4 (C34-C50)			<0.25		mg/L		0.25	09-JUN-19
Surrogate: 2-Bromobenzotrifluoride			92.2		%		60-140	09-JUN-19
HG-T-CVAA-WP								
Water								
Batch R4672470								
WG3080356-2	LCS							
Mercury (Hg)-Total			98.0		%		80-120	17-JUN-19
WG3080356-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	17-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4671275							
WG3077371-2 LCS								
Aluminum (Al)-Total			98.4		%		80-120	14-JUN-19
Arsenic (As)-Total			98.4		%		80-120	14-JUN-19
Cadmium (Cd)-Total			96.6		%		80-120	14-JUN-19
Calcium (Ca)-Total			94.0		%		80-120	14-JUN-19
Chromium (Cr)-Total			95.9		%		80-120	14-JUN-19
Cobalt (Co)-Total			93.9		%		80-120	14-JUN-19
Copper (Cu)-Total			96.2		%		80-120	14-JUN-19
Iron (Fe)-Total			90.5		%		80-120	14-JUN-19
Lead (Pb)-Total			98.5		%		80-120	14-JUN-19
Magnesium (Mg)-Total			106.6		%		80-120	14-JUN-19
Manganese (Mn)-Total			95.4		%		80-120	14-JUN-19
Nickel (Ni)-Total			94.8		%		80-120	14-JUN-19
Potassium (K)-Total			94.4		%		80-120	14-JUN-19
Sodium (Na)-Total			95.3		%		80-120	14-JUN-19
Zinc (Zn)-Total			99.9		%		80-120	14-JUN-19
WG3077371-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	14-JUN-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	14-JUN-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	14-JUN-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	14-JUN-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	14-JUN-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	14-JUN-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	14-JUN-19
Iron (Fe)-Total			<0.010		mg/L		0.01	14-JUN-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	14-JUN-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	14-JUN-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	14-JUN-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	14-JUN-19
Potassium (K)-Total			<0.050		mg/L		0.05	14-JUN-19
Sodium (Na)-Total			<0.050		mg/L		0.05	14-JUN-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	14-JUN-19
NH3-COL-WP		Water						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-COL-WP	Water							
Batch	R4662823							
WG3072778-14 LCS								
Ammonia, Total (as N)			97.6		%		85-115	07-JUN-19
WG3072778-13 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	07-JUN-19
NO2-IC-N-WP	Water							
Batch	R4663515							
WG3070793-3 DUP		L2287018-1						
Nitrite (as N)		0.039	0.039		mg/L	1.4	20	07-JUN-19
WG3070793-2 LCS								
Nitrite (as N)			101.0		%		90-110	07-JUN-19
WG3070793-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	07-JUN-19
WG3070793-4 MS		L2287018-1						
Nitrite (as N)			109.6		%		75-125	07-JUN-19
NO3-IC-N-WP	Water							
Batch	R4663515							
WG3070793-3 DUP		L2287018-1						
Nitrate (as N)		0.072	0.071		mg/L	1.9	20	07-JUN-19
WG3070793-2 LCS								
Nitrate (as N)			98.7		%		90-110	07-JUN-19
WG3070793-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	07-JUN-19
WG3070793-4 MS		L2287018-1						
Nitrate (as N)			106.2		%		75-125	07-JUN-19
OG-GRAV-WP	Water							
Batch	R4668051							
WG3074648-2 LCS								
Oil and Grease			91.2		%		70-130	13-JUN-19
WG3074648-1 MB								
Oil and Grease			<5.0		mg/L		5	13-JUN-19
P-T-COL-WP	Water							
Batch	R4665090							
WG3072251-18 LCS								
Phosphorus (P)-Total			99.6		%		80-120	10-JUN-19
WG3072251-17 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	10-JUN-19
PAH,PANH-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4669879							
WG3076147-2	LCS							
1-Methyl Naphthalene			108.0		%		60-130	13-JUN-19
2-Methyl Naphthalene			99.7		%		60-130	13-JUN-19
Acenaphthene			111.3		%		60-130	13-JUN-19
Acenaphthylene			99.7		%		60-130	13-JUN-19
Anthracene			84.0		%		60-130	13-JUN-19
Acridine			65.7		%		60-130	13-JUN-19
Benzo(a)anthracene			83.6		%		60-130	13-JUN-19
Benzo(a)pyrene			81.5		%		60-130	13-JUN-19
Benzo(b&j)fluoranthene			82.3		%		60-130	13-JUN-19
Benzo(g,h,i)perylene			91.6		%		60-130	13-JUN-19
Benzo(k)fluoranthene			99.5		%		60-130	13-JUN-19
Chrysene			101.1		%		60-130	13-JUN-19
Dibenzo(a,h)anthracene			81.6		%		60-130	13-JUN-19
Fluoranthene			102.7		%		60-130	13-JUN-19
Fluorene			100.1		%		60-130	13-JUN-19
Indeno(1,2,3-cd)pyrene			83.9		%		60-130	13-JUN-19
Naphthalene			111.4		%		50-130	13-JUN-19
Phenanthrene			112.0		%		60-130	13-JUN-19
Pyrene			101.0		%		60-130	13-JUN-19
Quinoline			103.9		%		60-130	13-JUN-19
WG3076147-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	13-JUN-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	13-JUN-19
Acenaphthene			<0.000020		mg/L		0.00002	13-JUN-19
Acenaphthylene			<0.000020		mg/L		0.00002	13-JUN-19
Anthracene			<0.000010		mg/L		0.00001	13-JUN-19
Acridine			<0.000020		mg/L		0.00002	13-JUN-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	13-JUN-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	13-JUN-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	13-JUN-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	13-JUN-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	13-JUN-19
Chrysene			<0.000020		mg/L		0.00002	13-JUN-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	13-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP								
Batch R4665046								
WG3072270-10 LCS								
Total Suspended Solids			113.2		%		85-115	11-JUN-19
WG3072270-9 MB								
Total Suspended Solids			<2.0		mg/L		2	11-JUN-19
TC,EC-QT97-WP								
Batch R4661108								
WG3070100-2 DUP		L2287018-1						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	06-JUN-19
Escherichia Coli		>2420	>2420		MPN/100mL	0.0	65	06-JUN-19
WG3070100-1 MB								
Total Coliforms			<1		MPN/100mL		1	06-JUN-19
Escherichia Coli			<1		MPN/100mL		1	06-JUN-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	04-JUN-19	07-JUN-19 12:00	0.25	72	hours	EHTR-FM
Bacteriological Tests							
Total Coliform and E.coli by MPN QT97	1	04-JUN-19	06-JUN-19 18:20	30	54	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	04-JUN-19	07-JUN-19 07:00	48	67	hours	EHTR
Carbonaceous BOD	1	04-JUN-19	07-JUN-19 07:00	48	67	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2287018 were received on 06-JUN-19 16:35.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

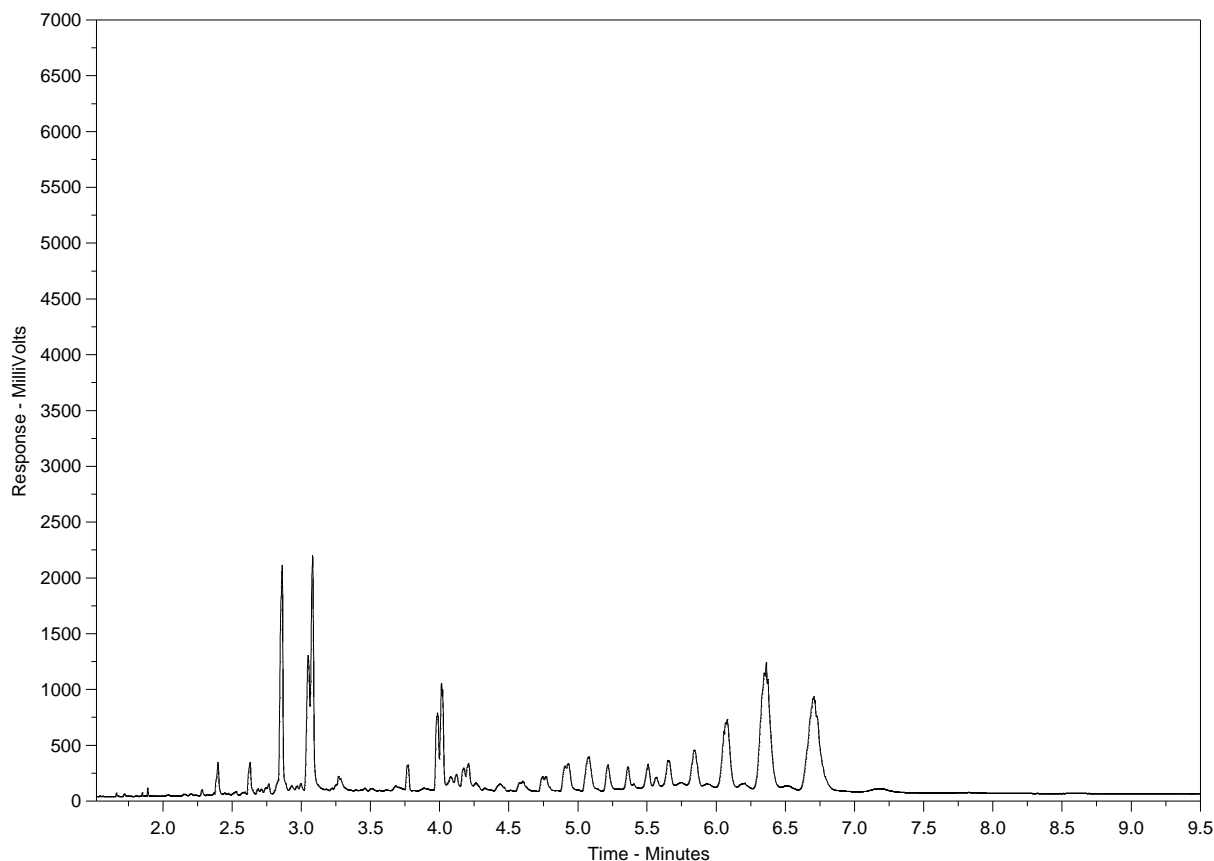
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2287018-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix L



Nunavut Community & Government
Services - Rankin Inlet
ATTN: CONNOR FAULKNER
Box 96
Whale Cove NU X0C 0J0

Date Received: 26-JUN-19
Report Date: 17-JUL-19 08:50 (MT)
Version: FINAL

Client Phone: 867-645-8176

Certificate of Analysis

Lab Work Order #: L2299273
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2299273-1 GRA-7							
Sampled By: CF on 25-JUN-19 @ 09:15							
Matrix: WW							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
Toluene	<0.0010		0.0010	mg/L		05-JUL-19	R4696443
Ethyl benzene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
o-Xylene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
m+p-Xylenes	<0.00040		0.00040	mg/L		05-JUL-19	R4696443
F1 (C6-C10)	<0.10		0.10	mg/L		05-JUL-19	R4696443
Surrogate: 4-Bromofluorobenzene (SS)	84.0		70-130	%		05-JUL-19	R4696443
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	28-JUN-19	07-JUL-19	R4699009
F3 (C16-C34)	<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride	89.9		60-140	%	28-JUN-19	07-JUL-19	R4699009
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		11-JUL-19	
F2-Naphth	<0.10		0.10	mg/L		11-JUL-19	
F3-PAH	<0.25		0.25	mg/L		11-JUL-19	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		11-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		09-JUL-19	
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L		02-JUL-19	R4692638
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthylene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Anthracene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Acridine	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)anthracene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Chrysene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluoranthene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluorene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Naphthalene	<0.000050		0.000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Phenanthrene	<0.000050		0.000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Pyrene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Quinoline	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acenaphthene d10	92.7		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acridine d9	88.3		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Chrysene d12	105.4		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Naphthalene d8	90.1		50-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Phenanthrene d10	100.3		60-130	%	02-JUL-19	03-JUL-19	R4693589
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	15.6		1.2	mg/L		28-JUN-19	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2299273-1 GRA-7							
Sampled By: CF on 25-JUN-19 @ 09:15							
Matrix: WW							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		28-JUN-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		28-JUN-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	12.8		1.0	mg/L		27-JUN-19	R4689958
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		02-JUL-19	R4692838
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-JUN-19	R4693417
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		27-JUN-19	R4693417
Chloride in Water by IC							
Chloride (Cl)	14.9		0.50	mg/L		27-JUN-19	R4691095
Conductivity							
Conductivity	96.0		1.0	umhos/cm		27-JUN-19	R4689958
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		26-JUN-19	R4689275
Hardness Calculated							
Hardness (as CaCO3)	24.5	HTC	0.20	mg/L		08-JUL-19	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-JUL-19	15-JUL-19	R4712816
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		27-JUN-19	R4691095
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		27-JUN-19	R4691095
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		28-JUN-19	R4690642
Phenol (4AAP)							
Phenols (4AAP)	0.0011		0.0010	mg/L		28-JUN-19	R4690317
Phosphorus, Total							
Phosphorus (P)-Total	0.0081		0.0030	mg/L		03-JUL-19	R4692701
Sulfate in Water by IC							
Sulfate (SO4)	4.03		0.30	mg/L		27-JUN-19	R4691095
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0143		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Arsenic (As)-Total	0.00034		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Barium (Ba)-Total	0.0113		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Boron (B)-Total	0.024		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Calcium (Ca)-Total	7.17		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Chromium (Cr)-Total	0.00040		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Copper (Cu)-Total	0.00106		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Iron (Fe)-Total	0.069		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Lead (Pb)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Lithium (Li)-Total	<0.0010		0.0010	mg/L	05-JUL-19	05-JUL-19	R4695920

* 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
L2299273-1 GRA-7 Sampled By: CF on 25-JUN-19 @ 09:15 Matrix: WW Total Metals in Water by CRC ICPMS							
Magnesium (Mg)-Total	1.59		0.0050	mg/L	05-JUL-19	05-JUL-19	R4695920
Manganese (Mn)-Total	0.00362		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Molybdenum (Mo)-Total	0.000195		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Nickel (Ni)-Total	0.00064		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Potassium (K)-Total	1.20		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Phosphorus (P)-Total	<0.030		0.030	mg/L	05-JUL-19	05-JUL-19	R4695920
Rubidium (Rb)-Total	0.00150		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Selenium (Se)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Silicon (Si)-Total	0.24		0.10	mg/L	05-JUL-19	05-JUL-19	R4695920
Silver (Ag)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Sodium (Na)-Total	7.81		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Strontium (Sr)-Total	0.0413		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Sulfur (S)-Total	1.53		0.50	mg/L	05-JUL-19	05-JUL-19	R4695920
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Thorium (Th)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Tin (Sn)-Total	0.00120		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Titanium (Ti)-Total	0.00054		0.00030	mg/L	05-JUL-19	05-JUL-19	R4695920
Tungsten (W)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Uranium (U)-Total	0.000029		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Vanadium (V)-Total	<0.00050		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Zirconium (Zr)-Total	<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Total Organic Carbon by Combustion							
Total Organic Carbon	4.37		0.50	mg/L		05-JUL-19	R4696200
pH							
pH	6.78		0.10	pH units		27-JUN-19	R4689958
L2299273-2 GRA-6 Sampled By: CF on 25-JUN-19 @ 09:40 Matrix: WW BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
Toluene	<0.0010		0.0010	mg/L		05-JUL-19	R4696443
Ethyl benzene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
o-Xylene	<0.00050		0.00050	mg/L		05-JUL-19	R4696443
m+p-Xylenes	<0.00040		0.00040	mg/L		05-JUL-19	R4696443
F1 (C6-C10)	<0.10		0.10	mg/L		05-JUL-19	R4696443
Surrogate: 4-Bromofluorobenzene (SS)	102.0		70-130	%		05-JUL-19	R4696443
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	28-JUN-19	07-JUL-19	R4699009
F3 (C16-C34)	<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
F4 (C34-C50)	<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride	82.7		60-140	%	28-JUN-19	07-JUL-19	R4699009
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		11-JUL-19	
F2-Naphth	<0.10		0.10	mg/L		11-JUL-19	
F3-PAH	<0.25		0.25	mg/L		11-JUL-19	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		11-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		09-JUL-19	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2299273-2 GRA-6							
Sampled By: CF on 25-JUN-19 @ 09:40							
Matrix: WW							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L		02-JUL-19	R4692638
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthylene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Anthracene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Acridine	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)anthracene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Chrysene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluoranthene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluorene	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Naphthalene	<0.000050		0.000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Phenanthrene	<0.000050		0.000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Pyrene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Quinoline	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acenaphthene d10	77.7		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acridine d9	79.2		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Chrysene d12	102.0		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Naphthalene d8	78.2		50-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Phenanthrene d10	85.4		60-130	%	02-JUL-19	03-JUL-19	R4693589
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO ₃)	24.9		1.2	mg/L		28-JUN-19	
Alkalinity, Carbonate							
Carbonate (CO ₃)	<0.60		0.60	mg/L		28-JUN-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		28-JUN-19	
Alkalinity, Total (as CaCO₃)							
Alkalinity, Total (as CaCO ₃)	20.4		1.0	mg/L		27-JUN-19	R4689958
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		02-JUL-19	R4692838
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-JUN-19	R4693417
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		27-JUN-19	R4693417
Chloride in Water by IC							
Chloride (Cl)	16.0		0.50	mg/L		27-JUN-19	R4691095
Conductivity							
Conductivity	101		1.0	umhos/cm		27-JUN-19	R4689958
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		26-JUN-19	R4689275
Hardness Calculated							
Hardness (as CaCO ₃)	26.8	HTC	0.20	mg/L		08-JUL-19	
Mercury 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
L2299273-2 GRA-6							
Sampled By: CF on 25-JUN-19 @ 09:40							
Matrix: WW							
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-JUL-19	15-JUL-19	R4712816
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		27-JUN-19	R4691095
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		27-JUN-19	R4691095
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		28-JUN-19	R4690642
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		28-JUN-19	R4690317
Phosphorus, Total							
Phosphorus (P)-Total	0.0076		0.0030	mg/L		03-JUL-19	R4692701
Sulfate in Water by IC							
Sulfate (SO4)	4.36		0.30	mg/L		27-JUN-19	R4691095
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0118		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Arsenic (As)-Total	0.00035		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Barium (Ba)-Total	0.0124		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Boron (B)-Total	0.021		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Calcium (Ca)-Total	7.85		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Chromium (Cr)-Total	0.00025		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Copper (Cu)-Total	0.00092		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Iron (Fe)-Total	0.066		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Lead (Pb)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Lithium (Li)-Total	<0.0010		0.0010	mg/L	05-JUL-19	05-JUL-19	R4695920
Magnesium (Mg)-Total	1.75		0.0050	mg/L	05-JUL-19	05-JUL-19	R4695920
Manganese (Mn)-Total	0.00340		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Molybdenum (Mo)-Total	0.000204		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Nickel (Ni)-Total	0.00063		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Potassium (K)-Total	1.26		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Phosphorus (P)-Total	<0.030		0.030	mg/L	05-JUL-19	05-JUL-19	R4695920
Rubidium (Rb)-Total	0.00159		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Selenium (Se)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Silicon (Si)-Total	0.27		0.10	mg/L	05-JUL-19	05-JUL-19	R4695920
Silver (Ag)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Sodium (Na)-Total	8.75		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Strontium (Sr)-Total	0.0451		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Sulfur (S)-Total	1.59		0.50	mg/L	05-JUL-19	05-JUL-19	R4695920
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Thorium (Th)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Tin (Sn)-Total	0.00102		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Titanium (Ti)-Total	0.00051		0.00030	mg/L	05-JUL-19	05-JUL-19	R4695920
Tungsten (W)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Uranium (U)-Total	0.000034		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2299273-2	GRA-6							
Sampled By: CF on 25-JUN-19 @ 09:40								
Matrix: WW								
Total Metals in Water by CRC ICPMS								
Vanadium (V)-Total		<0.00050		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Zinc (Zn)-Total		<0.0030		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Zirconium (Zr)-Total		<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Total Organic Carbon by Combustion								
Total Organic Carbon		4.53		0.50	mg/L		05-JUL-19	R4696200
pH								
pH		7.28		0.10	pH units		27-JUN-19	R4689958
L2299273-3	GRA-1							
Sampled By: CF on 25-JUN-19 @ 10:00								
Matrix: WW								
BTEX plus F1-F4								
BTX plus F1 by GCMS								
Benzene		<0.00050		0.00050	mg/L		05-JUL-19	R4696443
Toluene		<0.0010		0.0010	mg/L		05-JUL-19	R4696443
Ethyl benzene		<0.00050		0.00050	mg/L		05-JUL-19	R4696443
o-Xylene		<0.00050		0.00050	mg/L		05-JUL-19	R4696443
m+p-Xylenes		<0.00040		0.00040	mg/L		05-JUL-19	R4696443
F1 (C6-C10)		<0.10		0.10	mg/L		05-JUL-19	R4696443
Surrogate: 4-Bromofluorobenzene (SS)		105.0		70-130	%		05-JUL-19	R4696443
CCME PHC F2-F4 in Water								
F2 (C10-C16)		<0.10		0.10	mg/L	28-JUN-19	07-JUL-19	R4699009
F3 (C16-C34)		<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
F4 (C34-C50)		<0.25		0.25	mg/L	28-JUN-19	07-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride		84.3		60-140	%	28-JUN-19	07-JUL-19	R4699009
CCME Total Hydrocarbons								
F1-BTEX		<0.10		0.10	mg/L		11-JUL-19	
F2-Naphth		<0.10		0.10	mg/L		11-JUL-19	
F3-PAH		<0.25		0.25	mg/L		11-JUL-19	
Total Hydrocarbons (C6-C50)		<0.38		0.38	mg/L		11-JUL-19	
Sum of Xylene Isomer Concentrations								
Xylenes (Total)		<0.00064		0.00064	mg/L		09-JUL-19	
Miscellaneous Parameters								
Total Suspended Solids		<2.0		2.0	mg/L		02-JUL-19	R4692638
Polyaromatic Hydrocarbons (PAHs)								
1-Methyl Naphthalene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
2-Methyl Naphthalene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Acenaphthylene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Anthracene		<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Acridine		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)anthracene		<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(a)pyrene		<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(b&j)fluoranthene		<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(g,h,i)perylene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Benzo(k)fluoranthene		<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Chrysene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Dibenzo(a,h)anthracene		<0.0000050		0.0000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluoranthene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Fluorene		<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
Indeno(1,2,3-cd)pyrene		<0.000010		0.00001				

* 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
L2299273-3 GRA-1							
Sampled By: CF on 25-JUN-19 @ 10:00							
Matrix: WW							
Polyaromatic Hydrocarbons (PAHs)							
Phenanthrene	<0.000050		0.000050	mg/L	02-JUL-19	03-JUL-19	R4693589
Pyrene	<0.000010		0.000010	mg/L	02-JUL-19	03-JUL-19	R4693589
Quinoline	<0.000020		0.000020	mg/L	02-JUL-19	03-JUL-19	R4693589
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acenaphthene d10	79.4		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Acridine d9	79.8		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Chrysene d12	104.9		60-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Naphthalene d8	81.0		50-130	%	02-JUL-19	03-JUL-19	R4693589
Surrogate: Phenanthrene d10	89.2		60-130	%	02-JUL-19	03-JUL-19	R4693589
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO ₃)	37.2		1.2	mg/L		28-JUN-19	
Alkalinity, Carbonate							
Carbonate (CO ₃)	<0.60		0.60	mg/L		28-JUN-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		28-JUN-19	
Alkalinity, Total (as CaCO₃)							
Alkalinity, Total (as CaCO ₃)	30.5		1.0	mg/L		27-JUN-19	R4689958
Ammonia by colour							
Ammonia, Total (as N)	0.040		0.010	mg/L		02-JUL-19	R4692838
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		27-JUN-19	R4693417
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		27-JUN-19	R4693417
Chloride in Water by IC							
Chloride (Cl)	21.9		0.50	mg/L		27-JUN-19	R4691095
Conductivity							
Conductivity	157		1.0	umhos/cm		27-JUN-19	R4689958
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		26-JUN-19	R4689275
Hardness Calculated							
Hardness (as CaCO ₃)	45.2	HTC	0.20	mg/L		08-JUL-19	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-JUL-19	15-JUL-19	R4712816
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		27-JUN-19	R4691095
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-JUN-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		27-JUN-19	R4691095
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		28-JUN-19	R4690642
Phenol (4AAP)							
Phenols (4AAP)	<0.0010		0.0010	mg/L		28-JUN-19	R4690317
Phosphorus, Total							
Phosphorus (P)-Total	0.0163		0.0030	mg/L		03-JUL-19	R4692701
Sulfate in Water by IC							
Sulfate (SO ₄)	14.7		0.30	mg/L		27-JUN-19	R4691095
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0352		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Arsenic (As)-Total	0.00061		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920

* 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
L2299273-3 GRA-1							
Sampled By: CF on 25-JUN-19 @ 10:00							
Matrix: WW							
Total Metals in Water by CRC ICPMS							
Barium (Ba)-Total	0.0157		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Boron (B)-Total	0.032		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Calcium (Ca)-Total	12.7		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Cesium (Cs)-Total	0.000013		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Chromium (Cr)-Total	0.00044		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Cobalt (Co)-Total	0.00012		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Copper (Cu)-Total	0.00098		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Iron (Fe)-Total	0.071		0.010	mg/L	05-JUL-19	05-JUL-19	R4695920
Lead (Pb)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Lithium (Li)-Total	0.0015		0.0010	mg/L	05-JUL-19	05-JUL-19	R4695920
Magnesium (Mg)-Total	3.28		0.0050	mg/L	05-JUL-19	05-JUL-19	R4695920
Manganese (Mn)-Total	0.0446		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Molybdenum (Mo)-Total	0.000379		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Nickel (Ni)-Total	0.00098		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Potassium (K)-Total	1.58		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Phosphorus (P)-Total	<0.030		0.030	mg/L	05-JUL-19	05-JUL-19	R4695920
Rubidium (Rb)-Total	0.00142		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Selenium (Se)-Total	<0.000050		0.000050	mg/L	05-JUL-19	05-JUL-19	R4695920
Silicon (Si)-Total	0.15		0.10	mg/L	05-JUL-19	05-JUL-19	R4695920
Silver (Ag)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Sodium (Na)-Total	12.8		0.050	mg/L	05-JUL-19	05-JUL-19	R4695920
Strontium (Sr)-Total	0.0614		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Sulfur (S)-Total	4.79		0.50	mg/L	05-JUL-19	05-JUL-19	R4695920
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Thorium (Th)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Tin (Sn)-Total	0.00085		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Titanium (Ti)-Total	0.00188		0.00030	mg/L	05-JUL-19	05-JUL-19	R4695920
Tungsten (W)-Total	<0.00010		0.00010	mg/L	05-JUL-19	05-JUL-19	R4695920
Uranium (U)-Total	0.000086		0.000010	mg/L	05-JUL-19	05-JUL-19	R4695920
Vanadium (V)-Total	<0.00050		0.00050	mg/L	05-JUL-19	05-JUL-19	R4695920
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	05-JUL-19	05-JUL-19	R4695920
Zirconium (Zr)-Total	<0.00020		0.00020	mg/L	05-JUL-19	05-JUL-19	R4695920
Total Organic Carbon by Combustion							
Total Organic Carbon	3.72		0.50	mg/L		05-JUL-19	R4696200
pH							
pH	7.40		0.10	pH units		27-JUN-19	R4689958

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
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 transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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
<p>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.</p>			
FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97
<p>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.</p>			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
<p>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.</p>			
HG-T-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020B (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>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.</p>			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
<p>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>			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
<p>This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
<p>PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.</p>			
PH-WP	Water	pH	APHA 4500H
<p>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.</p>			
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 aqueous 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 ww - 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.

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Client: Nunavut Community & Government Services - Rankin Inlet

Box 96

Whale Cove NU X0C 0J0

Contact: CONNOR FAULKNER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP								
Water								
Batch	R4689958							
WG3091118-20 DUP		L2299273-2						
Alkalinity, Total (as CaCO3)		20.4	20.8		mg/L	1.9	20	27-JUN-19
WG3091118-19 LCS								
Alkalinity, Total (as CaCO3)			105.0		%		85-115	27-JUN-19
WG3091118-16 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	27-JUN-19
BOD-CBOD-WP								
Water								
Batch	R4693417							
WG3089639-7 LCS								
BOD Carbonaceous			90.0		%		85-115	27-JUN-19
WG3089639-6 MB								
BOD Carbonaceous			<2.0		mg/L		2	27-JUN-19
BOD-WP								
Water								
Batch	R4693417							
WG3089639-7 LCS								
Biochemical Oxygen Demand			103.9		%		85-115	27-JUN-19
WG3089639-6 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	27-JUN-19
BTEXS+F1-HSMS-WP								
Water								
Batch	R4696443							
WG3098147-4 DUP		L2299273-1						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	05-JUL-19
Toluene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	05-JUL-19
Ethyl benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	05-JUL-19
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	05-JUL-19
m+p-Xylenes		<0.00040	<0.00040	RPD-NA	mg/L	N/A	30	05-JUL-19
F1 (C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	05-JUL-19
WG3098147-2 LCS								
Benzene			92.4		%		70-130	07-JUL-19
Toluene			92.4		%		70-130	07-JUL-19
Ethyl benzene			99.9		%		70-130	07-JUL-19
o-Xylene			105.2		%		70-130	07-JUL-19
m+p-Xylenes			85.4		%		70-130	07-JUL-19
WG3098147-3 LCS								
F1 (C6-C10)			97.2		%		70-130	07-JUL-19
WG3098147-1 MB								
Benzene			<0.00050		mg/L		0.0005	05-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP								
Batch R4696443								
WG3098147-1 MB								
Toluene			<0.0010		mg/L		0.001	05-JUL-19
Ethyl benzene			<0.00050		mg/L		0.0005	05-JUL-19
o-Xylene			<0.00030		mg/L		0.0003	05-JUL-19
m+p-Xylenes			<0.00040		mg/L		0.0004	05-JUL-19
F1 (C6-C10)			<0.10		mg/L		0.1	05-JUL-19
Surrogate: 4-Bromofluorobenzene (SS)			101.0		%		70-130	05-JUL-19
WG3098147-5 MS		L2299273-3						
F1 (C6-C10)			107.2		%		50-150	07-JUL-19
WG3098147-6 MS		L2299273-2						
Benzene			90.8		%		50-150	07-JUL-19
Toluene			88.7		%		50-150	07-JUL-19
Ethyl benzene			97.4		%		50-150	07-JUL-19
o-Xylene			104.7		%		50-150	07-JUL-19
m+p-Xylenes			83.2		%		50-150	07-JUL-19
C-TOC-HTC-WP								
Batch R4696200								
WG3098093-6 LCS								
Total Organic Carbon			99.2		%		80-120	05-JUL-19
WG3098093-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-JUL-19
CL-IC-N-WP								
Batch R4691095								
WG3089396-2 LCS								
Chloride (Cl)			100.0		%		90-110	27-JUN-19
WG3089396-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	27-JUN-19
EC-WP								
Batch R4689958								
WG3091118-20 DUP		L2299273-2						
Conductivity		101	101		umhos/cm	0.0	10	27-JUN-19
WG3091118-18 LCS								
Conductivity			97.4		%		90-110	27-JUN-19
WG3091118-16 MB								
Conductivity			<1.0		umhos/cm		1	27-JUN-19
F2-F4-FID-WP								
Water								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-FID-WP								
Water								
Batch	R4699009							
WG3092259-4	LCS							
F2 (C10-C16)			99.6		%		70-130	07-JUL-19
F3 (C16-C34)			100.4		%		70-130	07-JUL-19
F4 (C34-C50)			111.8		%		70-130	07-JUL-19
WG3092259-3	MB							
F2 (C10-C16)			<0.10		mg/L		0.1	07-JUL-19
F3 (C16-C34)			<0.25		mg/L		0.25	07-JUL-19
F4 (C34-C50)			<0.25		mg/L		0.25	07-JUL-19
Surrogate: 2-Bromobenzotrifluoride			89.3		%		60-140	07-JUL-19
FC10-QT97-WP								
Water								
Batch	R4689275							
WG3089240-2	DUP	L2299273-1						
Fecal Coliforms		<10	<10	RPD-NA	MPN/100mL	N/A	65	26-JUN-19
WG3089240-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	26-JUN-19
HG-T-CVAA-WP								
Water								
Batch	R4712816							
WG3106592-3	DUP	L2299273-1						
Mercury (Hg)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	15-JUL-19
WG3106592-2	LCS							
Mercury (Hg)-Total			91.0		%		80-120	15-JUL-19
WG3106592-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	15-JUL-19
WG3106592-4	MS	L2299273-2						
Mercury (Hg)-Total			100.0		%		70-130	15-JUL-19
MET-T-CCMS-WP								
Water								
Batch	R4695920							
WG3096575-2	LCS							
Aluminum (Al)-Total			99.8		%		80-120	05-JUL-19
Antimony (Sb)-Total			100.0		%		80-120	05-JUL-19
Arsenic (As)-Total			100.3		%		80-120	05-JUL-19
Barium (Ba)-Total			97.1		%		80-120	05-JUL-19
Beryllium (Be)-Total			99.3		%		80-120	05-JUL-19
Bismuth (Bi)-Total			98.6		%		80-120	05-JUL-19
Boron (B)-Total			98.2		%		80-120	05-JUL-19
Cadmium (Cd)-Total			98.6		%		80-120	05-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4695920							
WG3096575-2	LCS							
Calcium (Ca)-Total			98.8		%		80-120	05-JUL-19
Cesium (Cs)-Total			95.6		%		80-120	05-JUL-19
Chromium (Cr)-Total			99.2		%		80-120	05-JUL-19
Cobalt (Co)-Total			97.8		%		80-120	05-JUL-19
Copper (Cu)-Total			98.3		%		80-120	05-JUL-19
Iron (Fe)-Total			84.3		%		80-120	05-JUL-19
Lead (Pb)-Total			98.6		%		80-120	05-JUL-19
Lithium (Li)-Total			89.3		%		80-120	05-JUL-19
Magnesium (Mg)-Total			110.9		%		80-120	05-JUL-19
Manganese (Mn)-Total			98.0		%		80-120	05-JUL-19
Molybdenum (Mo)-Total			102.7		%		80-120	05-JUL-19
Nickel (Ni)-Total			98.0		%		80-120	05-JUL-19
Potassium (K)-Total			95.6		%		80-120	05-JUL-19
Phosphorus (P)-Total			102.9		%		80-120	05-JUL-19
Rubidium (Rb)-Total			99.99		%		80-120	05-JUL-19
Selenium (Se)-Total			96.9		%		80-120	05-JUL-19
Silicon (Si)-Total			95.3		%		80-120	05-JUL-19
Silver (Ag)-Total			96.8		%		80-120	05-JUL-19
Sodium (Na)-Total			96.5		%		80-120	05-JUL-19
Strontium (Sr)-Total			97.8		%		80-120	05-JUL-19
Sulfur (S)-Total			99.6		%		80-120	05-JUL-19
Tellurium (Te)-Total			100.4		%		80-120	05-JUL-19
Thallium (Tl)-Total			102.4		%		80-120	05-JUL-19
Thorium (Th)-Total			96.1		%		80-120	05-JUL-19
Tin (Sn)-Total			98.8		%		80-120	05-JUL-19
Titanium (Ti)-Total			98.1		%		80-120	05-JUL-19
Tungsten (W)-Total			98.2		%		80-120	05-JUL-19
Uranium (U)-Total			98.5		%		80-120	05-JUL-19
Vanadium (V)-Total			99.2		%		80-120	05-JUL-19
Zinc (Zn)-Total			98.9		%		80-120	05-JUL-19
Zirconium (Zr)-Total			95.8		%		80-120	05-JUL-19
WG3096575-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	05-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	05-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4695920							
WG3096575-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	05-JUL-19
Boron (B)-Total			<0.010		mg/L		0.01	05-JUL-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	05-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	05-JUL-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	05-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	05-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	05-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	05-JUL-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	05-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	05-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	05-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	05-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	05-JUL-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	05-JUL-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	05-JUL-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	05-JUL-19
Silicon (Si)-Total			<0.10		mg/L		0.1	05-JUL-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	05-JUL-19
Sodium (Na)-Total			<0.050		mg/L		0.05	05-JUL-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	05-JUL-19
Sulfur (S)-Total			<0.50		mg/L		0.5	05-JUL-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	05-JUL-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	05-JUL-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	05-JUL-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	05-JUL-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	05-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4695920							
WG3096575-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	05-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	05-JUL-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	05-JUL-19
NH3-COL-WP	Water							
Batch	R4692838							
WG3094584-6 LCS								
Ammonia, Total (as N)			96.6		%		85-115	02-JUL-19
WG3094584-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	02-JUL-19
NO2-IC-N-WP	Water							
Batch	R4691095							
WG3089396-2 LCS								
Nitrite (as N)			101.7		%		90-110	27-JUN-19
WG3089396-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	27-JUN-19
NO3-IC-N-WP	Water							
Batch	R4691095							
WG3089396-2 LCS								
Nitrate (as N)			99.8		%		90-110	27-JUN-19
WG3089396-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	27-JUN-19
OG-GRAV-WP	Water							
Batch	R4690642							
WG3091032-2 LCS								
Oil and Grease			91.2		%		70-130	28-JUN-19
WG3091032-1 MB								
Oil and Grease			<5.0		mg/L		5	28-JUN-19
P-T-COL-WP	Water							
Batch	R4692701							
WG3092371-2 LCS								
Phosphorus (P)-Total			100.2		%		80-120	03-JUL-19
WG3092371-1 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	03-JUL-19
PAH,PANH-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4693589							
WG3094695-2	LCS							
1-Methyl Naphthalene			97.1		%		60-130	03-JUL-19
2-Methyl Naphthalene			89.4		%		60-130	03-JUL-19
Acenaphthene			96.4		%		60-130	03-JUL-19
Acenaphthylene			83.3		%		60-130	03-JUL-19
Anthracene			86.3		%		60-130	03-JUL-19
Acridine			99.0		%		60-130	03-JUL-19
Benzo(a)anthracene			91.5		%		60-130	03-JUL-19
Benzo(a)pyrene			88.8		%		60-130	03-JUL-19
Benzo(b&j)fluoranthene			89.4		%		60-130	03-JUL-19
Benzo(g,h,i)perylene			89.8		%		60-130	03-JUL-19
Benzo(k)fluoranthene			93.0		%		60-130	03-JUL-19
Chrysene			92.5		%		60-130	03-JUL-19
Dibenzo(a,h)anthracene			109.9		%		60-130	03-JUL-19
Fluoranthene			99.4		%		60-130	03-JUL-19
Fluorene			96.9		%		60-130	03-JUL-19
Indeno(1,2,3-cd)pyrene			85.7		%		60-130	03-JUL-19
Naphthalene			101.9		%		50-130	03-JUL-19
Phenanthrene			112.6		%		60-130	03-JUL-19
Pyrene			99.1		%		60-130	03-JUL-19
Quinoline			105.4		%		60-130	03-JUL-19
WG3094695-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	03-JUL-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	03-JUL-19
Acenaphthene			<0.000020		mg/L		0.00002	03-JUL-19
Acenaphthylene			<0.000020		mg/L		0.00002	03-JUL-19
Anthracene			<0.000010		mg/L		0.00001	03-JUL-19
Acridine			<0.000020		mg/L		0.00002	03-JUL-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	03-JUL-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	03-JUL-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	03-JUL-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	03-JUL-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	03-JUL-19
Chrysene			<0.000020		mg/L		0.00002	03-JUL-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	03-JUL-19

Quality Control Report

Workorder: L2299273

Report Date: 17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP								
Batch R4693589								
WG3094695-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	03-JUL-19
Fluorene			<0.000020		mg/L		0.00002	03-JUL-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	03-JUL-19
Naphthalene			<0.000050		mg/L		0.00005	03-JUL-19
Phenanthrene			<0.000050		mg/L		0.00005	03-JUL-19
Pyrene			<0.000010		mg/L		0.00001	03-JUL-19
Quinoline			<0.000020		mg/L		0.00002	03-JUL-19
Surrogate: Acenaphthene d10			84.0		%		60-130	03-JUL-19
Surrogate: Acridine d9			82.4		%		60-130	03-JUL-19
Surrogate: Chrysene d12			107.2		%		60-130	03-JUL-19
Surrogate: Naphthalene d8			86.4		%		50-130	03-JUL-19
Surrogate: Phenanthrene d10			87.1		%		60-130	03-JUL-19
PH-WP								
Batch R4689958								
WG3091118-20 DUP		L2299273-2						
pH		7.28	7.29	J	pH units	0.01	0.2	27-JUN-19
WG3091118-17 LCS								
pH			7.39		pH units		7.3-7.5	27-JUN-19
PHENOLS-4AAP-WT								
Batch R4690317								
WG3091117-6 LCS								
Phenols (4AAP)			98.4		%		85-115	28-JUN-19
WG3091117-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	28-JUN-19
SO4-IC-N-WP								
Batch R4691095								
WG3089396-2 LCS								
Sulfate (SO4)			101.1		%		90-110	27-JUN-19
WG3089396-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	27-JUN-19
SOLIDS-TOTSUS-WP								
Batch R4692638								
WG3091740-10 LCS								
Total Suspended Solids			110.6		%		85-115	02-JUL-19
WG3091740-9 MB								



Quality Control Report

Workorder: L2299273

Report Date: 17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP	Water							
Batch	R4692638							
WG3091740-9 MB								
Total Suspended Solids			<2.0		mg/L		2	02-JUL-19

Quality Control Report

Workorder: L2299273

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2299273

Report Date: 17-JUL-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	25-JUN-19 09:15	27-JUN-19 12:00	0.25	51	hours	EHTR-FM
	2	25-JUN-19 09:40	27-JUN-19 12:00	0.25	50	hours	EHTR-FM
	3	25-JUN-19 10:00	27-JUN-19 12:00	0.25	50	hours	EHTR-FM
Bacteriological Tests							
Fecal coliforms, 1:10 dilution by QT97							
	1	25-JUN-19 09:15	26-JUN-19 17:00	30	32	hours	EHTL
	2	25-JUN-19 09:40	26-JUN-19 17:00	30	31	hours	EHTL
	3	25-JUN-19 10:00	26-JUN-19 17:00	30	31	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2299273 were received on 26-JUN-19 12:20.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

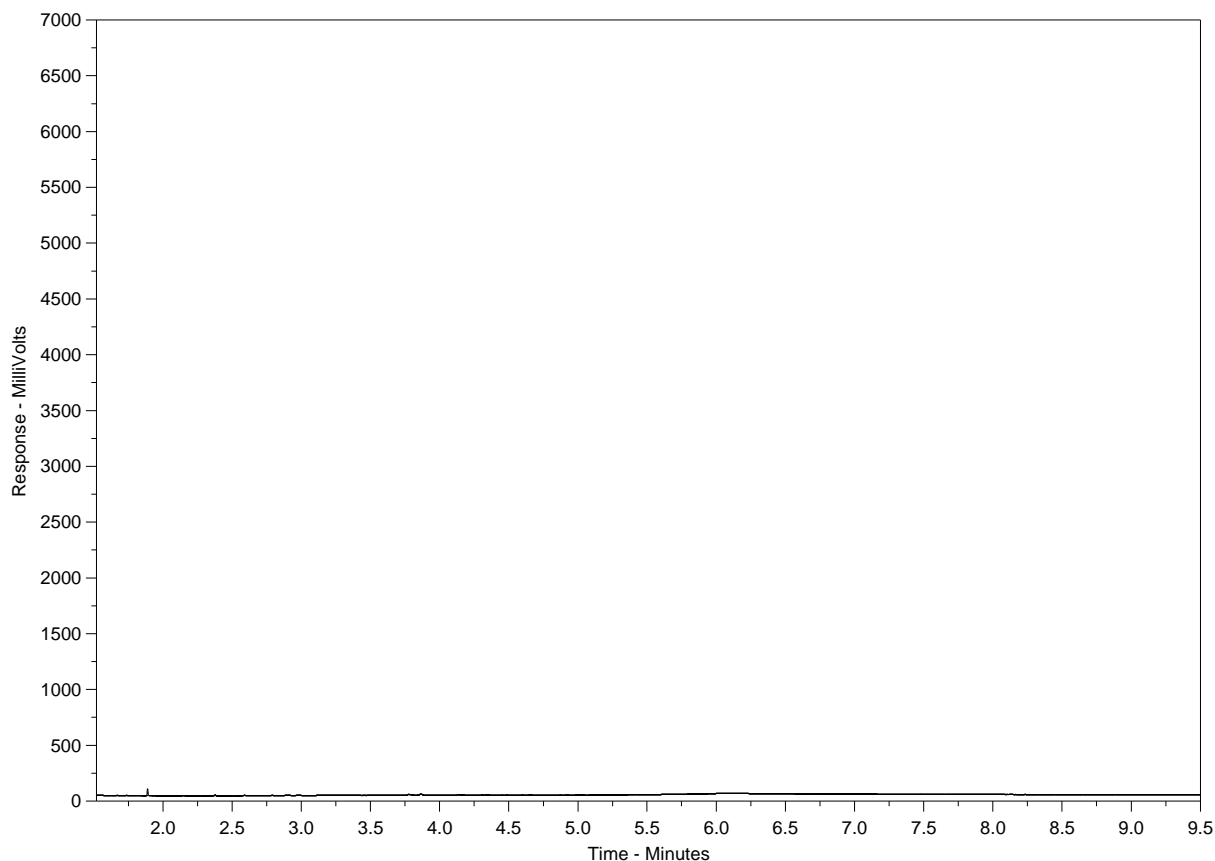
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2299273-1
Client Sample ID: GRA-7



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

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

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

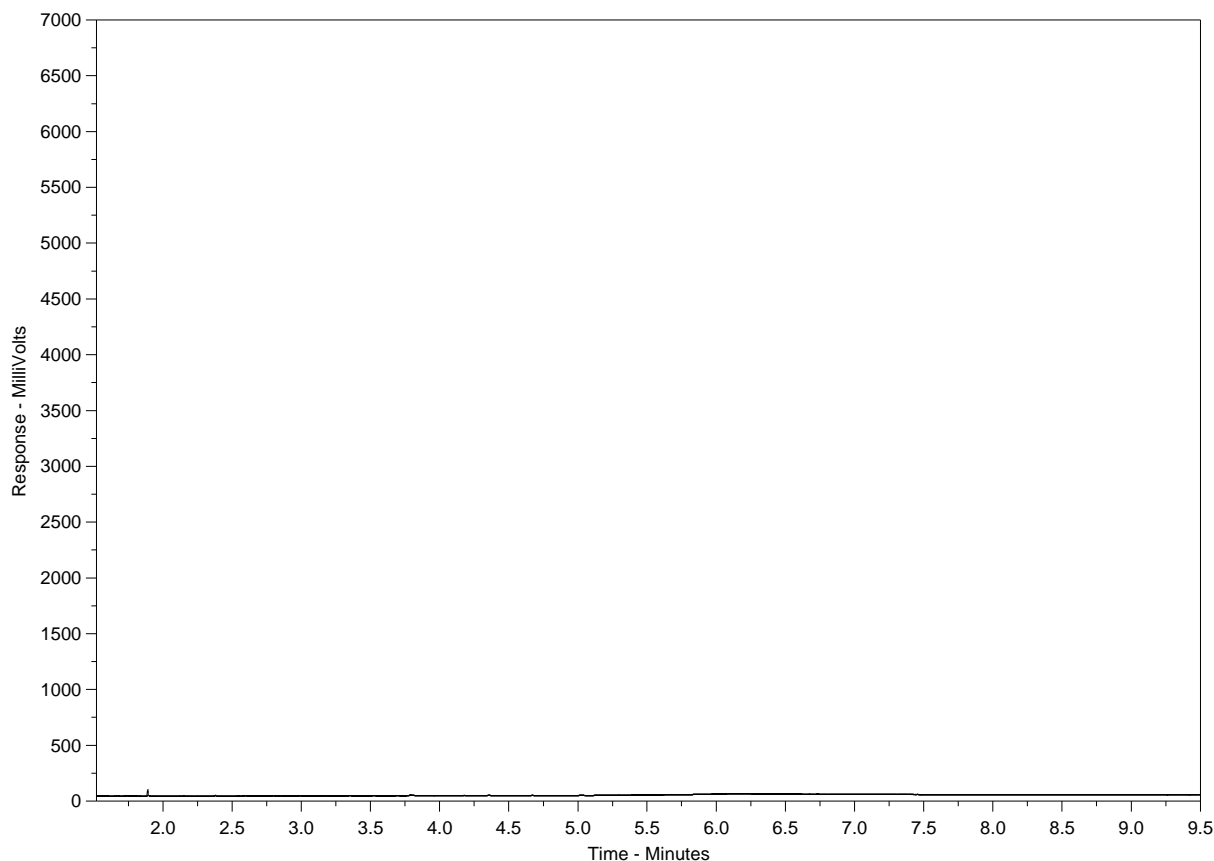
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2299273-2
Client Sample ID: GRA-6



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

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

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

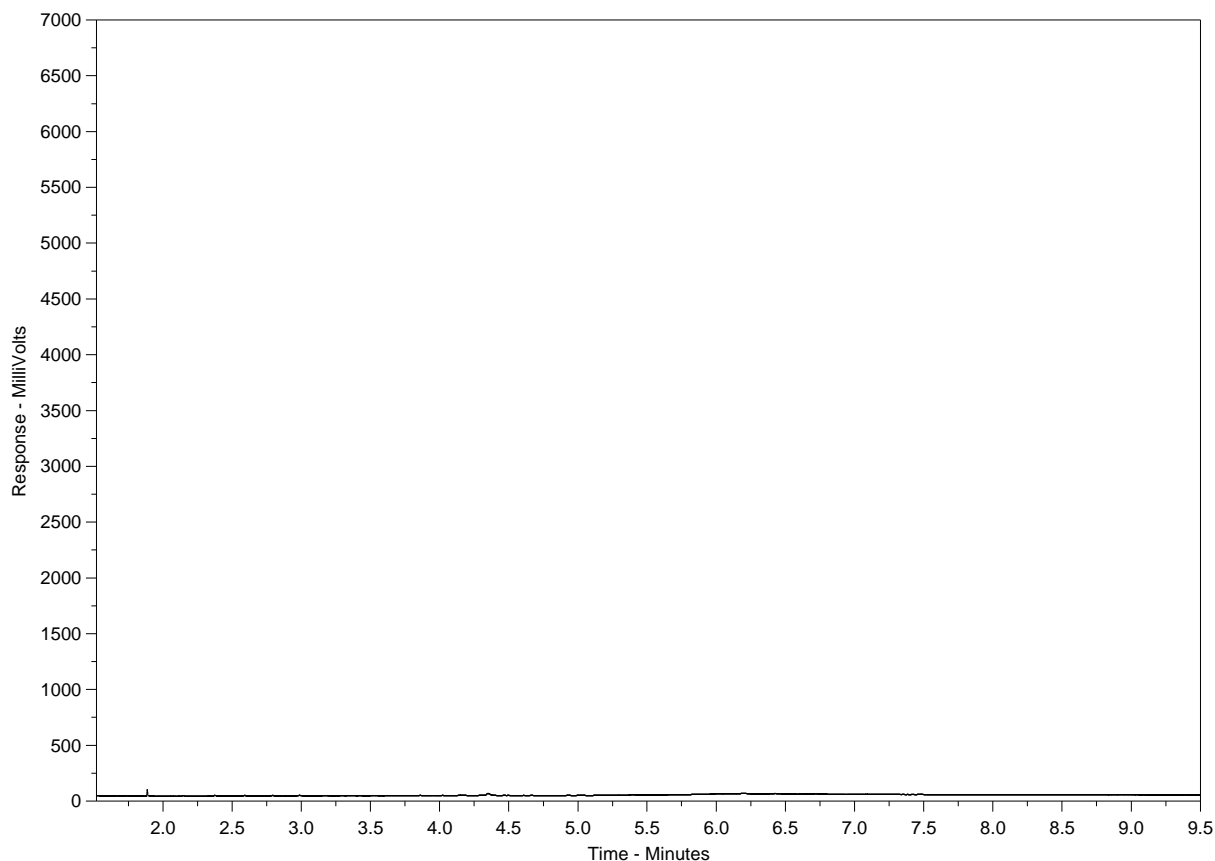
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L2299273-3
Client Sample ID: GRA-1



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

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

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

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



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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix M



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 04-JUL-19
Report Date: 22-JUL-19 07:20 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2304104
Project P.O. #: NOT SUBMITTED
Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2304104-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 02-JUL-19 @ 10:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		11-JUL-19	R4707927
Toluene	<0.0010		0.0010	mg/L		11-JUL-19	R4707927
Ethyl benzene	<0.00050		0.00050	mg/L		11-JUL-19	R4707927
o-Xylene	<0.00050		0.00050	mg/L		11-JUL-19	R4707927
m+p-Xylenes	<0.00040		0.00040	mg/L		11-JUL-19	R4707927
F1 (C6-C10)	<0.10		0.10	mg/L		11-JUL-19	R4707927
Surrogate: 4-Bromofluorobenzene (SS)	90.7		70-130	%		11-JUL-19	R4707927
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.14		0.10	mg/L	11-JUL-19	20-JUL-19	R4699009
F3 (C16-C34)	3.15		0.25	mg/L	11-JUL-19	20-JUL-19	R4699009
F4 (C34-C50)	0.72		0.25	mg/L	11-JUL-19	20-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride	88.7		60-140	%	11-JUL-19	20-JUL-19	R4699009
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		21-JUL-19	
F2-Naphth	0.14		0.10	mg/L		21-JUL-19	
F3-PAH	3.15		0.25	mg/L		21-JUL-19	
Total Hydrocarbons (C6-C50)	4.01		0.38	mg/L		21-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		14-JUL-19	
Miscellaneous Parameters							
Fluoride (F)	0.057		0.020	mg/L		05-JUL-19	R4698591
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420	PEHR	1	MPN/100mL		04-JUL-19	R4694644
Escherichia Coli	>2420	PEHR	1	MPN/100mL		04-JUL-19	R4694644
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000028		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
2-Methyl Naphthalene	0.000031		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Acenaphthene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Acenaphthylene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Anthracene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Acridine	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Benzo(a)anthracene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	05-JUL-19	11-JUL-19	R4708979
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Chrysene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	05-JUL-19	11-JUL-19	R4708979
Fluoranthene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Fluorene	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Naphthalene	<0.000050		0.000050	mg/L	05-JUL-19	11-JUL-19	R4708979
Phenanthrene	<0.000050		0.000050	mg/L	05-JUL-19	11-JUL-19	R4708979
Pyrene	<0.000010		0.000010	mg/L	05-JUL-19	11-JUL-19	R4708979
Quinoline	<0.000020		0.000020	mg/L	05-JUL-19	11-JUL-19	R4708979
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	05-JUL-19	11-JUL-19	R4708979
Surrogate: Acenaphthene d10	91.2		60-130	%	05-JUL-19	11-JUL-19	R4708979
Surrogate: Acridine d9	91.9		60-130	%	05-JUL-19	11-JUL-19	R4708979
Surrogate: Chrysene d12	105.9		60-130	%	05-JUL-19	11-JUL-19	R4708979
Surrogate: Naphthalene d8	85.7		50-130	%	05-JUL-19	11-JUL-19	R4708979
Surrogate: Phenanthrene d10	103.4		60-130	%	05-JUL-19	11-JUL-19	R4708979

* 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
L2304104-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 02-JUL-19 @ 10:30							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	59.4		1.2	mg/L		08-JUL-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		08-JUL-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		08-JUL-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	48.7		1.0	mg/L		05-JUL-19	R4696018
Ammonia by colour							
Ammonia, Total (as N)	1.92		0.10	mg/L		09-JUL-19	R4704510
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	28		20	mg/L		05-JUL-19	R4707552
Carbonaceous BOD							
BOD Carbonaceous	22.7		6.0	mg/L		05-JUL-19	R4707552
Chloride in Water by IC							
Chloride (Cl)	38.0		0.50	mg/L		05-JUL-19	R4698591
Conductivity							
Conductivity	256		1.0	umhos/cm		05-JUL-19	R4696018
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200	PEHR	10	MPN/100mL		04-JUL-19	R4694636
Hardness Calculated							
Hardness (as CaCO3)	68.9	HTC	0.20	mg/L		15-JUL-19	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	12-JUL-19	15-JUL-19	R4712816
Nitrate in Water by IC							
Nitrate (as N)	0.039		0.020	mg/L		05-JUL-19	R4698591
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		09-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		05-JUL-19	R4698591
Oil & Grease - Gravimetric							
Oil and Grease	10.0		5.0	mg/L		10-JUL-19	R4705011
Phenol (4AAP)							
Phenols (4AAP)	0.0027		0.0010	mg/L		10-JUL-19	R4698590
Phosphorus, Total							
Phosphorus (P)-Total	0.722		0.0030	mg/L		11-JUL-19	R4707716
Sulfate in Water by IC							
Sulfate (SO4)	20.1		0.30	mg/L		05-JUL-19	R4698591
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.148		0.0030	mg/L	12-JUL-19	12-JUL-19	R4710569
Antimony (Sb)-Total	0.00013		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Arsenic (As)-Total	0.00139		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Barium (Ba)-Total	0.0252		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Bismuth (Bi)-Total	0.00132		0.000050	mg/L	12-JUL-19	12-JUL-19	R4710569
Boron (B)-Total	0.049		0.010	mg/L	12-JUL-19	12-JUL-19	R4710569
Cadmium (Cd)-Total	0.0000424		0.0000050	mg/L	12-JUL-19	12-JUL-19	R4710569
Calcium (Ca)-Total	19.8		0.050	mg/L	12-JUL-19	12-JUL-19	R4710569
Cesium (Cs)-Total	0.000038		0.000010	mg/L	12-JUL-19	12-JUL-19	R4710569
Chromium (Cr)-Total	0.00069		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Cobalt (Co)-Total	0.00053		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Copper (Cu)-Total	0.137		0.00050	mg/L	12-JUL-19	12-JUL-19	R4710569

* 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
L2304104-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: CLIENT on 02-JUL-19 @ 10:30								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total		0.726		0.010	mg/L	12-JUL-19	12-JUL-19	R4710569
Lead (Pb)-Total		0.00217		0.000050	mg/L	12-JUL-19	12-JUL-19	R4710569
Lithium (Li)-Total		0.0023		0.0010	mg/L	12-JUL-19	12-JUL-19	R4710569
Magnesium (Mg)-Total		4.71		0.0050	mg/L	12-JUL-19	12-JUL-19	R4710569
Manganese (Mn)-Total		0.334		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Molybdenum (Mo)-Total		0.000418		0.000050	mg/L	12-JUL-19	12-JUL-19	R4710569
Nickel (Ni)-Total		0.00384		0.00050	mg/L	12-JUL-19	12-JUL-19	R4710569
Potassium (K)-Total		3.59		0.050	mg/L	12-JUL-19	12-JUL-19	R4710569
Phosphorus (P)-Total		0.631		0.030	mg/L	12-JUL-19	12-JUL-19	R4710569
Rubidium (Rb)-Total		0.00351		0.00020	mg/L	12-JUL-19	12-JUL-19	R4710569
Selenium (Se)-Total		0.000108		0.000050	mg/L	12-JUL-19	12-JUL-19	R4710569
Silicon (Si)-Total		0.36		0.10	mg/L	12-JUL-19	12-JUL-19	R4710569
Silver (Ag)-Total		<0.000010		0.000010	mg/L	12-JUL-19	12-JUL-19	R4710569
Sodium (Na)-Total		22.4		0.050	mg/L	12-JUL-19	12-JUL-19	R4710569
Strontium (Sr)-Total		0.0920		0.00020	mg/L	12-JUL-19	12-JUL-19	R4710569
Sulfur (S)-Total		7.81		0.50	mg/L	12-JUL-19	12-JUL-19	R4710569
Tellurium (Te)-Total		<0.00020		0.00020	mg/L	12-JUL-19	12-JUL-19	R4710569
Thallium (Tl)-Total		0.000019		0.000010	mg/L	12-JUL-19	12-JUL-19	R4710569
Thorium (Th)-Total		<0.00010		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Tin (Sn)-Total		0.00019		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Titanium (Ti)-Total		0.00324		0.00030	mg/L	12-JUL-19	12-JUL-19	R4710569
Tungsten (W)-Total		<0.00010		0.00010	mg/L	12-JUL-19	12-JUL-19	R4710569
Uranium (U)-Total		0.000223		0.000010	mg/L	12-JUL-19	12-JUL-19	R4710569
Vanadium (V)-Total		0.00080		0.00050	mg/L	12-JUL-19	12-JUL-19	R4710569
Zinc (Zn)-Total		0.0408		0.0030	mg/L	12-JUL-19	12-JUL-19	R4710569
Zirconium (Zr)-Total		<0.00020		0.00020	mg/L	12-JUL-19	12-JUL-19	R4710569
Total Organic Carbon by Combustion								
Total Organic Carbon		22.9		0.50	mg/L		09-JUL-19	R4702703
Total Suspended Solids								
Total Suspended Solids		46.8		6.0	mg/L		09-JUL-19	R4702695
pH								
pH		7.13		0.10	pH units		05-JUL-19	R4696018

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

Reference Information

Qualifiers for Individual Samples Listed:

Lab Sample ID	Client Sample ID	Qualifier	Description
L2304104-1	RANKIN INLET WWTP - EFFI	PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Sample Parameter Qualifier Key:

Qualifier	Description
DUPM	MPN duplicate results were outside default ALS Data Quality Objective, but within 95% confidence interval for MPN reference method. Sample results are reliable.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
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 transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-WP	Water	Total Coliform and E.coli by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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.

Quality Control Report

Workorder: L2304104

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4702703							
WG3100819-2 LCS								
Total Organic Carbon			94.1		%		80-120	09-JUL-19
WG3100819-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	09-JUL-19
CL-IC-N-WP	Water							
Batch	R4698591							
WG3097515-6 LCS								
Chloride (Cl)			103.2		%		90-110	05-JUL-19
WG3097515-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	05-JUL-19
EC-WP	Water							
Batch	R4696018							
WG3098502-13 LCS								
Conductivity			97.9		%		90-110	05-JUL-19
WG3098502-11 MB								
Conductivity			<1.0		umhos/cm		1	05-JUL-19
F-IC-N-WP	Water							
Batch	R4698591							
WG3097515-6 LCS								
Fluoride (F)			103.8		%		90-110	05-JUL-19
WG3097515-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	05-JUL-19
F2-F4-FID-WP	Water							
Batch	R4699009							
WG3103140-2 LCS								
F2 (C10-C16)			97.7		%		70-130	20-JUL-19
F3 (C16-C34)			89.3		%		70-130	20-JUL-19
F4 (C34-C50)			92.2		%		70-130	20-JUL-19
WG3103140-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	20-JUL-19
F3 (C16-C34)			<0.25		mg/L		0.25	20-JUL-19
F4 (C34-C50)			<0.25		mg/L		0.25	20-JUL-19
Surrogate: 2-Bromobenzotrifluoride			91.1		%		60-140	20-JUL-19
FC10-QT97-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP	Water							
Batch R4694636								
WG3096058-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	04-JUL-19
HG-T-CVAA-WP	Water							
Batch R4712816								
WG3106610-2 LCS								
Mercury (Hg)-Total			90.0		%		80-120	15-JUL-19
WG3106610-1 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	15-JUL-19
MET-T-CCMS-WP	Water							
Batch R4710569								
WG3103633-6 LCS								
Aluminum (Al)-Total			97.7		%		80-120	12-JUL-19
Antimony (Sb)-Total			103.3		%		80-120	12-JUL-19
Arsenic (As)-Total			101.4		%		80-120	12-JUL-19
Barium (Ba)-Total			97.4		%		80-120	12-JUL-19
Beryllium (Be)-Total			109.4		%		80-120	12-JUL-19
Bismuth (Bi)-Total			104.6		%		80-120	12-JUL-19
Boron (B)-Total			110.3		%		80-120	12-JUL-19
Cadmium (Cd)-Total			101.9		%		80-120	12-JUL-19
Calcium (Ca)-Total			102.3		%		80-120	12-JUL-19
Cesium (Cs)-Total			99.1		%		80-120	12-JUL-19
Chromium (Cr)-Total			101.2		%		80-120	12-JUL-19
Cobalt (Co)-Total			99.8		%		80-120	12-JUL-19
Copper (Cu)-Total			103.8		%		80-120	12-JUL-19
Iron (Fe)-Total			97.9		%		80-120	12-JUL-19
Lead (Pb)-Total			101.7		%		80-120	12-JUL-19
Lithium (Li)-Total			107.2		%		80-120	12-JUL-19
Magnesium (Mg)-Total			109.3		%		80-120	12-JUL-19
Manganese (Mn)-Total			99.5		%		80-120	12-JUL-19
Molybdenum (Mo)-Total			103.6		%		80-120	12-JUL-19
Nickel (Ni)-Total			102.4		%		80-120	12-JUL-19
Potassium (K)-Total			95.6		%		80-120	12-JUL-19
Phosphorus (P)-Total			103.5		%		80-120	12-JUL-19
Rubidium (Rb)-Total			97.1		%		80-120	12-JUL-19
Selenium (Se)-Total			104.3		%		80-120	12-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4710569							
WG3103633-6		LCS						
Silicon (Si)-Total			98.4		%		80-120	12-JUL-19
Silver (Ag)-Total			98.8		%		80-120	12-JUL-19
Sodium (Na)-Total			103.8		%		80-120	12-JUL-19
Strontium (Sr)-Total			100.5		%		80-120	12-JUL-19
Sulfur (S)-Total			97.5		%		80-120	12-JUL-19
Tellurium (Te)-Total			102.1		%		80-120	12-JUL-19
Thallium (Tl)-Total			103.3		%		80-120	12-JUL-19
Thorium (Th)-Total			101.9		%		80-120	12-JUL-19
Tin (Sn)-Total			100.3		%		80-120	12-JUL-19
Titanium (Ti)-Total			97.1		%		80-120	12-JUL-19
Tungsten (W)-Total			102.5		%		80-120	12-JUL-19
Uranium (U)-Total			105.8		%		80-120	12-JUL-19
Vanadium (V)-Total			100.8		%		80-120	12-JUL-19
Zinc (Zn)-Total			102.6		%		80-120	12-JUL-19
Zirconium (Zr)-Total			103.3		%		80-120	12-JUL-19
WG3103633-5		MB						
Aluminum (Al)-Total			<0.0030		mg/L		0.003	12-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	12-JUL-19
Boron (B)-Total			<0.010		mg/L		0.01	12-JUL-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	12-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	12-JUL-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	12-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	12-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	12-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	12-JUL-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	12-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	12-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	12-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP	Water							
Batch	R4698591							
WG3097515-6	LCS							
Nitrate (as N)			103.9		%		90-110	05-JUL-19
WG3097515-5	MB							
Nitrate (as N)			<0.020		mg/L		0.02	05-JUL-19
OG-GRAV-WP	Water							
Batch	R4705011							
WG3099060-2	LCS							
Oil and Grease			91.5		%		70-130	10-JUL-19
WG3099060-1	MB							
Oil and Grease			<5.0		mg/L		5	10-JUL-19
P-T-COL-WP	Water							
Batch	R4707716							
WG3101905-2	LCS							
Phosphorus (P)-Total			97.1		%		80-120	11-JUL-19
WG3101905-1	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	11-JUL-19
PAH,PANH-WP	Water							
Batch	R4708979							
WG3102534-2	LCS							
1-Methyl Naphthalene			95.4		%		60-130	12-JUL-19
2-Methyl Naphthalene			86.3		%		60-130	12-JUL-19
Acenaphthene			94.4		%		60-130	12-JUL-19
Acenaphthylene			82.8		%		60-130	12-JUL-19
Anthracene			86.5		%		60-130	12-JUL-19
Acridine			88.4		%		60-130	12-JUL-19
Benzo(a)anthracene			87.4		%		60-130	12-JUL-19
Benzo(a)pyrene			82.2		%		60-130	12-JUL-19
Benzo(b&j)fluoranthene			89.3		%		60-130	12-JUL-19
Benzo(g,h,i)perylene			77.7		%		60-130	12-JUL-19
Benzo(k)fluoranthene			85.0		%		60-130	12-JUL-19
Chrysene			90.5		%		60-130	12-JUL-19
Dibenzo(a,h)anthracene			89.6		%		60-130	12-JUL-19
Fluoranthene			91.3		%		60-130	12-JUL-19
Fluorene			96.9		%		60-130	12-JUL-19
Indeno(1,2,3-cd)pyrene			77.6		%		60-130	12-JUL-19
Naphthalene			114.2		%		50-130	12-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4698590								
WG3099616-2 LCS								
Phenols (4AAP)			100.5		%		85-115	09-JUL-19
WG3099616-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	09-JUL-19
SO4-IC-N-WP								
Batch R4698591								
WG3097515-6 LCS								
Sulfate (SO4)			104.0		%		90-110	05-JUL-19
WG3097515-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	05-JUL-19
SOLIDS-TOTSUS-WP								
Batch R4702695								
WG3098899-13 LCS								
Total Suspended Solids			103.6		%		85-115	09-JUL-19
WG3098899-12 MB								
Total Suspended Solids			<2.0		mg/L		2	09-JUL-19
TC,EC-QT97-WP								
Batch R4694644								
WG3096065-2 DUP		L2304104-1						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	04-JUL-19
Escherichia Coli		>2420	>2420		MPN/100mL	0.0	65	04-JUL-19
WG3096065-1 MB								
Total Coliforms			<1		MPN/100mL		1	04-JUL-19
Escherichia Coli			<1		MPN/100mL		1	04-JUL-19

Quality Control Report

Workorder: L2304104

Report Date: 22-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2304104

Report Date: 22-JUL-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	02-JUL-19 10:30	05-JUL-19 12:00	0.25	73	hours	EHTR-FM
Bacteriological Tests							
Fecal coliforms, 1:10 dilution by QT97	1	02-JUL-19 10:30	04-JUL-19 17:30	30	55	hours	EHTR
Total Coliform and E.coli by MPN QT97	1	02-JUL-19 10:30	04-JUL-19 17:30	30	55	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	02-JUL-19 10:30	05-JUL-19 07:00	48	68	hours	EHTR
Carbonaceous BOD	1	02-JUL-19 10:30	05-JUL-19 07:00	48	68	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2304104 were received on 04-JUL-19 14:20.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

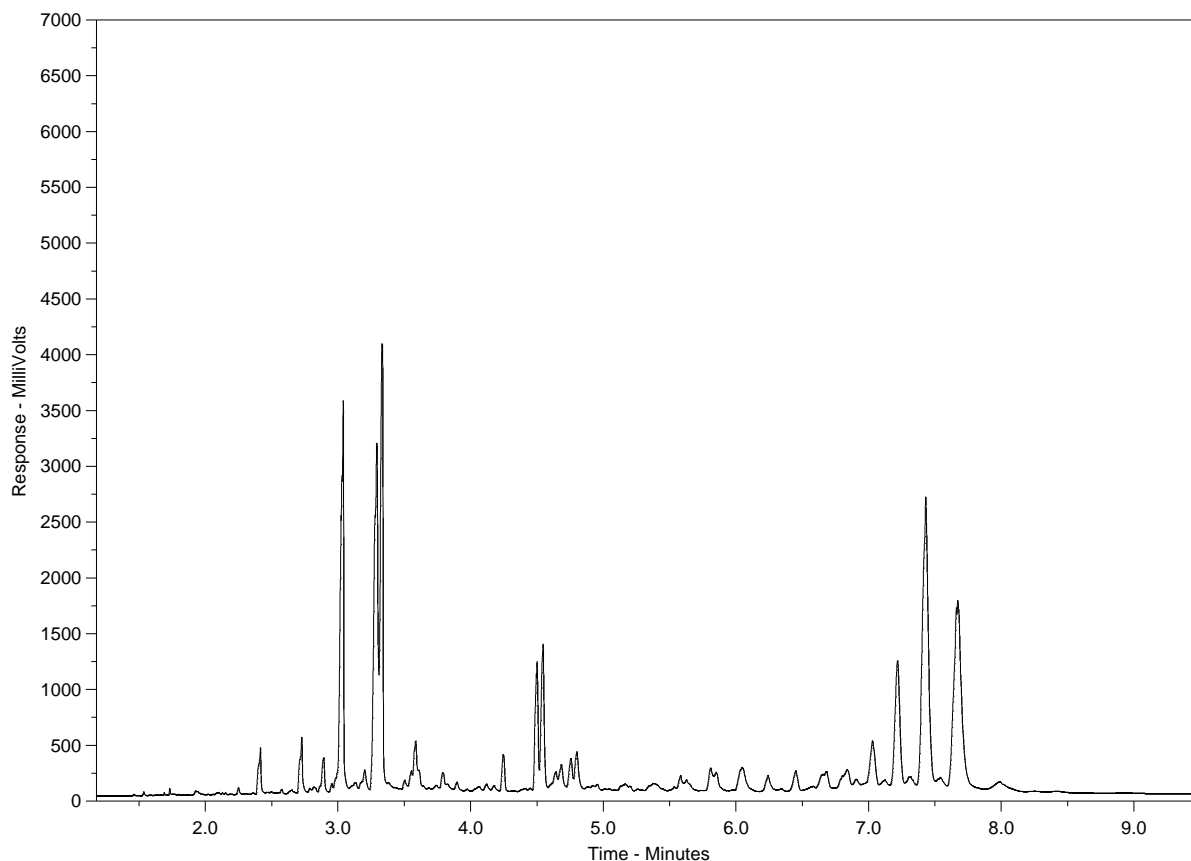
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2304104-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



L2304104-COFC

COC #

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GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix N



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 11-JUL-19
Report Date: 25-JUL-19 13:17 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2308289

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2308289-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		18-JUL-19	R4714779
Toluene	0.0013		0.0010	mg/L		18-JUL-19	R4714779
Ethyl benzene	<0.00050		0.00050	mg/L		18-JUL-19	R4714779
o-Xylene	<0.00050		0.00050	mg/L		18-JUL-19	R4714779
m+p-Xylenes	0.00059		0.00040	mg/L		18-JUL-19	R4714779
F1 (C6-C10)	<0.10		0.10	mg/L		18-JUL-19	R4714779
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%		18-JUL-19	R4714779
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.72		0.10	mg/L	12-JUL-19	18-JUL-19	R4699009
F3 (C16-C34)	10.3		0.25	mg/L	12-JUL-19	18-JUL-19	R4699009
F4 (C34-C50)	4.74		0.25	mg/L	12-JUL-19	18-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride	104.7		60-140	%	12-JUL-19	18-JUL-19	R4699009
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		22-JUL-19	
F2-Naphth	0.72		0.10	mg/L		22-JUL-19	
F3-PAH	10.3		0.25	mg/L		22-JUL-19	
Total Hydrocarbons (C6-C50)	15.7		0.38	mg/L		22-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		22-JUL-19	
Miscellaneous Parameters							
Fecal Coliforms	>2420		1	MPN/100mL		11-JUL-19	R4708698
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420		1	MPN/100mL		11-JUL-19	R4708700
Escherichia Coli	>2420		1	MPN/100mL		11-JUL-19	R4708700
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000192		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
2-Methyl Naphthalene	0.000247		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Acenaphthene	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Acenaphthylene	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Anthracene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Acridine	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Benzo(a)pyrene	0.0000105	EMPC	0.0000050	mg/L	12-JUL-19	18-JUL-19	R4715869
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Chrysene	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Dibenzo(a,h)anthracene	0.0000092	EMPC	0.0000050	mg/L	12-JUL-19	18-JUL-19	R4715869
Fluoranthene	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Fluorene	0.000041	EMPC	0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Naphthalene	0.000162		0.000050	mg/L	12-JUL-19	18-JUL-19	R4715869
Phenanthrene	<0.000050		0.000050	mg/L	12-JUL-19	18-JUL-19	R4715869
Pyrene	<0.000010		0.000010	mg/L	12-JUL-19	18-JUL-19	R4715869
Quinoline	<0.000020		0.000020	mg/L	12-JUL-19	18-JUL-19	R4715869
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-JUL-19	18-JUL-19	R4715869
Surrogate: Acenaphthene d10	93.2		60-130	%	12-JUL-19	18-JUL-19	R4715869
Surrogate: Acridine d9	95.5		60-130	%	12-JUL-19	18-JUL-19	R4715869
Surrogate: Chrysene d12	102.5		60-130	%	12-JUL-19	18-JUL-19	R4715869
Surrogate: Naphthalene d8	109.6		50-130	%	12-JUL-19	18-JUL-19	R4715869
Surrogate: Phenanthrene d10	106.7		60-130	%	12-JUL-19	18-JUL-19	R4715869

* 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
L2308289-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	108		1.2	mg/L		15-JUL-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		15-JUL-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		15-JUL-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	88.6		1.0	mg/L		12-JUL-19	R4710828
Ammonia by colour							
Ammonia, Total (as N)	4.37		0.10	mg/L		18-JUL-19	R4714710
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	115		20	mg/L		12-JUL-19	R4716108
Carbonaceous BOD							
BOD Carbonaceous	110		20	mg/L		12-JUL-19	R4716108
Chloride in Water by IC							
Chloride (Cl)	51.2		0.50	mg/L		12-JUL-19	R4712449
Conductivity							
Conductivity	380		1.0	umhos/cm		12-JUL-19	R4710828
Hardness Calculated							
Hardness (as CaCO3)	103	HTC	0.20	mg/L		25-JUL-19	
Mercury Total							
Mercury (Hg)-Total	0.0000050		0.0000050	mg/L	15-JUL-19	16-JUL-19	R4713506
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		12-JUL-19	R4712449
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		16-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		12-JUL-19	R4712449
Oil & Grease - Gravimetric							
Oil and Grease	52.2		5.0	mg/L		18-JUL-19	R4714203
Phenol (4AAP)							
Phenols (4AAP)	0.0059		0.0010	mg/L		18-JUL-19	R4714834
Phosphorus, Total							
Phosphorus (P)-Total	1.67		0.12	mg/L		15-JUL-19	R4711474
Sulfate in Water by IC							
Sulfate (SO4)	29.2		0.30	mg/L		12-JUL-19	R4712449
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.289		0.0030	mg/L	18-JUL-19	18-JUL-19	R4717602
Arsenic (As)-Total	0.00138		0.00010	mg/L	18-JUL-19	18-JUL-19	R4717602
Cadmium (Cd)-Total	0.0000723		0.0000050	mg/L	18-JUL-19	18-JUL-19	R4717602
Calcium (Ca)-Total	32.6		0.050	mg/L	18-JUL-19	18-JUL-19	R4717602
Chromium (Cr)-Total	0.00128		0.00010	mg/L	18-JUL-19	18-JUL-19	R4717602
Cobalt (Co)-Total	0.00058		0.00010	mg/L	18-JUL-19	18-JUL-19	R4717602
Copper (Cu)-Total	0.136		0.00050	mg/L	18-JUL-19	18-JUL-19	R4717602
Iron (Fe)-Total	0.411		0.010	mg/L	18-JUL-19	18-JUL-19	R4717602
Lead (Pb)-Total	0.00127		0.000050	mg/L	18-JUL-19	18-JUL-19	R4717602
Magnesium (Mg)-Total	5.36		0.0050	mg/L	18-JUL-19	18-JUL-19	R4717602
Manganese (Mn)-Total	0.0433		0.00010	mg/L	18-JUL-19	18-JUL-19	R4717602
Nickel (Ni)-Total	0.00952		0.00050	mg/L	18-JUL-19	18-JUL-19	R4717602
Potassium (K)-Total	7.86		0.050	mg/L	18-JUL-19	18-JUL-19	R4717602
Sodium (Na)-Total	30.0		0.050	mg/L	18-JUL-19	18-JUL-19	R4717602
Zinc (Zn)-Total	0.132		0.0030	mg/L	18-JUL-19	18-JUL-19	R4717602

* 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
L2308289-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: AA								
Matrix: WASTE								
Total Organic Carbon by Combustion								
Total Organic Carbon		70.2		2.5	mg/L		17-JUL-19	R4714206
Total Suspended Solids								
Total Suspended Solids		106		4.3	mg/L		18-JUL-19	R4715410
pH								
pH		7.01		0.10	pH units		12-JUL-19	R4710828

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

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

ALK-CO3CO3-CALC-WP Water Alkalinity, Carbonate CALCULATION

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

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

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

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

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

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

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

BOD-CBOD-WP Water Carbonaceous BOD APHA 5210 B

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

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

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

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

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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**
<p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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.			
FC-QT97-WP	Water	Fecal Coliform by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-WP	Water	Total Coliform and E.coli by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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.

Quality Control Report

Workorder: L2308289

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4714206							
WG3107856-6 LCS								
Total Organic Carbon			97.8		%		80-120	17-JUL-19
WG3107856-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	17-JUL-19
CL-IC-N-WP	Water							
Batch	R4712449							
WG3103429-6 LCS								
Chloride (Cl)			103.5		%		90-110	12-JUL-19
WG3103429-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	12-JUL-19
EC-WP	Water							
Batch	R4710828							
WG3105128-18 LCS								
Conductivity			97.6		%		90-110	12-JUL-19
WG3105128-16 MB								
Conductivity			<1.0		umhos/cm		1	12-JUL-19
F2-F4-FID-WP	Water							
Batch	R4699009							
WG3103566-2 LCS								
F2 (C10-C16)			102.0		%		70-130	20-JUL-19
F3 (C16-C34)			97.2		%		70-130	20-JUL-19
F4 (C34-C50)			103.9		%		70-130	20-JUL-19
WG3103566-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	20-JUL-19
F3 (C16-C34)			<0.25		mg/L		0.25	20-JUL-19
F4 (C34-C50)			<0.25		mg/L		0.25	20-JUL-19
Surrogate: 2-Bromobenzotrifluoride			89.7		%		60-140	20-JUL-19
WG3103566-3 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	18-JUL-19
F3 (C16-C34)			<0.25		mg/L		0.25	18-JUL-19
F4 (C34-C50)			<0.25		mg/L		0.25	18-JUL-19
Surrogate: 2-Bromobenzotrifluoride			96.7		%		60-140	18-JUL-19
FC-QT97-WP	Water							
Batch	R4708698							
WG3102641-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	11-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP								
Water								
Batch	R4713506							
WG3107536-2	LCS							
Mercury (Hg)-Total			93.0		%		80-120	16-JUL-19
WG3107536-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	16-JUL-19
MET-T-CCMS-WP								
Water								
Batch	R4717602							
WG3108640-2	LCS							
Aluminum (Al)-Total			104.3		%		80-120	18-JUL-19
Arsenic (As)-Total			105.0		%		80-120	18-JUL-19
Cadmium (Cd)-Total			104.8		%		80-120	18-JUL-19
Calcium (Ca)-Total			103.1		%		80-120	18-JUL-19
Chromium (Cr)-Total			100.7		%		80-120	18-JUL-19
Cobalt (Co)-Total			102.3		%		80-120	18-JUL-19
Copper (Cu)-Total			106.4		%		80-120	18-JUL-19
Iron (Fe)-Total			101.4		%		80-120	18-JUL-19
Lead (Pb)-Total			101.7		%		80-120	18-JUL-19
Magnesium (Mg)-Total			105.8		%		80-120	18-JUL-19
Manganese (Mn)-Total			104.1		%		80-120	18-JUL-19
Nickel (Ni)-Total			110.3		%		80-120	18-JUL-19
Potassium (K)-Total			102.2		%		80-120	18-JUL-19
Sodium (Na)-Total			106.1		%		80-120	18-JUL-19
Zinc (Zn)-Total			103.2		%		80-120	18-JUL-19
WG3108640-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-JUL-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	18-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-JUL-19
Chromium (Cr)-Total			0.00011	B	mg/L		0.0001	18-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	18-JUL-19
Lead (Pb)-Total			0.000474	B	mg/L		0.00005	18-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	18-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4717602							
WG3108640-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	18-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-JUL-19
NH3-COL-WP	Water							
Batch	R4714710							
WG3108983-2 LCS								
Ammonia, Total (as N)			98.6		%		85-115	18-JUL-19
WG3108983-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	18-JUL-19
NO2-IC-N-WP	Water							
Batch	R4712449							
WG3103429-6 LCS								
Nitrite (as N)			101.6		%		90-110	12-JUL-19
WG3103429-5 MB								
Nitrite (as N)			<0.010		mg/L		0.01	12-JUL-19
NO3-IC-N-WP	Water							
Batch	R4712449							
WG3103429-6 LCS								
Nitrate (as N)			104.1		%		90-110	12-JUL-19
WG3103429-5 MB								
Nitrate (as N)			<0.020		mg/L		0.02	12-JUL-19
OG-GRAV-WP	Water							
Batch	R4714203							
WG3105352-2 LCS								
Oil and Grease			109.0		%		70-130	18-JUL-19
WG3105352-1 MB								
Oil and Grease			<5.0		mg/L		5	18-JUL-19
P-T-COL-WP	Water							
Batch	R4711474							
WG3103799-18 LCS								
Phosphorus (P)-Total			97.4		%		80-120	15-JUL-19
WG3103799-17 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	15-JUL-19
PAH,PANH-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4715869							
WG3103709-2	LCS							
1-Methyl Naphthalene			116.9		%		60-130	17-JUL-19
2-Methyl Naphthalene			105.9		%		60-130	17-JUL-19
Acenaphthene			113.7		%		60-130	17-JUL-19
Acenaphthylene			94.7		%		60-130	17-JUL-19
Anthracene			85.9		%		60-130	17-JUL-19
Acridine			90.2		%		60-130	17-JUL-19
Benzo(a)anthracene			72.2		%		60-130	17-JUL-19
Benzo(a)pyrene			71.5		%		60-130	17-JUL-19
Benzo(b&j)fluoranthene			96.0		%		60-130	17-JUL-19
Benzo(g,h,i)perylene			101.7		%		60-130	17-JUL-19
Benzo(k)fluoranthene			106.7		%		60-130	17-JUL-19
Chrysene			74.7		%		60-130	17-JUL-19
Dibenzo(a,h)anthracene			81.0		%		60-130	17-JUL-19
Fluoranthene			103.0		%		60-130	17-JUL-19
Fluorene			108.9		%		60-130	17-JUL-19
Indeno(1,2,3-cd)pyrene			80.1		%		60-130	17-JUL-19
Naphthalene			113.6		%		50-130	17-JUL-19
Phenanthrene			105.6		%		60-130	17-JUL-19
Pyrene			99.6		%		60-130	17-JUL-19
Quinoline			103.0		%		60-130	17-JUL-19
WG3103709-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	17-JUL-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	17-JUL-19
Acenaphthene			<0.000020		mg/L		0.00002	17-JUL-19
Acenaphthylene			<0.000020		mg/L		0.00002	17-JUL-19
Anthracene			<0.000010		mg/L		0.00001	17-JUL-19
Acridine			<0.000020		mg/L		0.00002	17-JUL-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	17-JUL-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	17-JUL-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	17-JUL-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	17-JUL-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	17-JUL-19
Chrysene			<0.000020		mg/L		0.00002	17-JUL-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch R4715869								
WG3103709-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	17-JUL-19
Fluorene			<0.000020		mg/L		0.00002	17-JUL-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	17-JUL-19
Naphthalene			<0.000050		mg/L		0.00005	17-JUL-19
Phenanthrene			<0.000050		mg/L		0.00005	17-JUL-19
Pyrene			<0.000010		mg/L		0.00001	17-JUL-19
Quinoline			<0.000020		mg/L		0.00002	17-JUL-19
Surrogate: Acenaphthene d10			110.2		%		60-130	17-JUL-19
Surrogate: Acridine d9			89.1		%		60-130	17-JUL-19
Surrogate: Chrysene d12			104.1		%		60-130	17-JUL-19
Surrogate: Naphthalene d8			103.8		%		50-130	17-JUL-19
Surrogate: Phenanthrene d10			116.7		%		60-130	17-JUL-19
PH-WP		Water						
Batch R4710828								
WG3105128-17 LCS								
pH			7.40		pH units		7.3-7.5	12-JUL-19
PHENOLS-4AAP-WT		Water						
Batch R4714834								
WG3108592-6 LCS								
Phenols (4AAP)			105.0		%		85-115	18-JUL-19
WG3108592-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-JUL-19
SO4-IC-N-WP		Water						
Batch R4712449								
WG3103429-6 LCS								
Sulfate (SO4)			104.1		%		90-110	12-JUL-19
WG3103429-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-JUL-19
SOLIDS-TOTSUS-WP		Water						
Batch R4715410								
WG3107798-2 LCS								
Total Suspended Solids			97.6		%		85-115	18-JUL-19
WG3107798-1 MB								
Total Suspended Solids			<2.0		mg/L		2	18-JUL-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC,EC-QT97-WP	Water							
Batch	R4708700							
WG3102628-1	MB							
Total Coliforms			<1		MPN/100mL		1	11-JUL-19
Escherichia Coli			<1		MPN/100mL		1	11-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	Not provided	12-JUL-19 12:00	0.25	24	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2308289 were received on 11-JUL-19 12:20.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

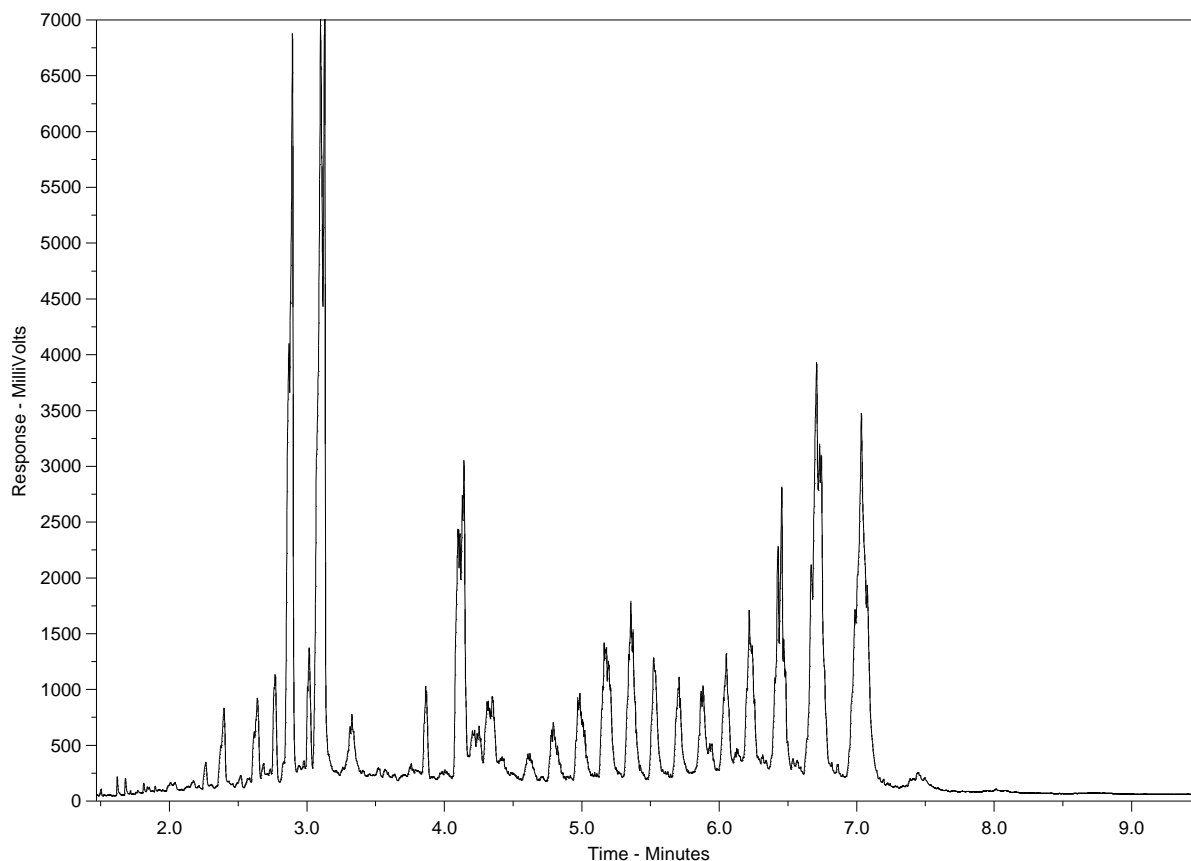
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2308289-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix O



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 18-JUL-19
Report Date: 31-JUL-19 16:47 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2312572

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2312572-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 16-JUL-19 @ 09:00							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		19-JUL-19	R4729929
Toluene	<0.0010		0.0010	mg/L		19-JUL-19	R4729929
Ethyl benzene	<0.00050		0.00050	mg/L		19-JUL-19	R4729929
o-Xylene	<0.00050		0.00050	mg/L		19-JUL-19	R4729929
m+p-Xylenes	<0.00040		0.00040	mg/L		19-JUL-19	R4729929
F1 (C6-C10)	<0.10		0.10	mg/L		19-JUL-19	R4729929
Surrogate: 4-Bromofluorobenzene (SS)	85.0		70-130	%		19-JUL-19	R4729929
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.49		0.10	mg/L	19-JUL-19	20-JUL-19	R4699009
F3 (C16-C34)	8.96		0.25	mg/L	19-JUL-19	20-JUL-19	R4699009
F4 (C34-C50)	2.66		0.25	mg/L	19-JUL-19	20-JUL-19	R4699009
Surrogate: 2-Bromobenzotrifluoride	121.5		60-140	%	19-JUL-19	20-JUL-19	R4699009
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		31-JUL-19	
F2-Naphth	0.49		0.10	mg/L		31-JUL-19	
F3-PAH	8.96		0.25	mg/L		31-JUL-19	
Total Hydrocarbons (C6-C50)	12.1		0.38	mg/L		31-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		31-JUL-19	
Miscellaneous Parameters							
Fecal Coliforms	3870000	PEHR	1	MPN/100mL		18-JUL-19	R4715829
Total and E. coli to endpoint by QT97							
Total Coliforms	83600000	PEHR	1	MPN/100mL		18-JUL-19	R4715814
Escherichia Coli	10900000	PEHR	1	MPN/100mL		18-JUL-19	R4715814
Note: MBEF: Microbiological test results for E. coli > Fecal coliforms due to sample heterogeneity. Both test results are within normal variability for MPN tests.							
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
2-Methyl Naphthalene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Acenaphthene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Acenaphthylene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Anthracene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Acridine	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Benzo(a)anthracene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Benzo(a)pyrene	<0.000015	DLIS	0.000015	mg/L	19-JUL-19	23-JUL-19	R4727407
Benzo(b&j)fluoranthene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Benzo(g,h,i)perylene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Benzo(k)fluoranthene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Chrysene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Dibenzo(a,h)anthracene	<0.000015	DLIS	0.000015	mg/L	19-JUL-19	23-JUL-19	R4727407
Fluoranthene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Fluorene	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
Indeno(1,2,3-cd)pyrene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Naphthalene	<0.00015	DLIS	0.00015	mg/L	19-JUL-19	23-JUL-19	R4727407
Phenanthrene	<0.00015	DLIS	0.00015	mg/L	19-JUL-19	23-JUL-19	R4727407
Pyrene	<0.000030	DLIS	0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Quinoline	<0.000060	DLIS	0.000060	mg/L	19-JUL-19	23-JUL-19	R4727407
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	19-JUL-19	23-JUL-19	R4727407
Surrogate: Acenaphthene d10	92.8		60-130	%	19-JUL-19	23-JUL-19	R4727407

* 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
L2312572-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 16-JUL-19 @ 09:00							
Matrix: WASTE							
Polyaromatic Hydrocarbons (PAHs)							
Surrogate: Acridine d9	104.7		60-130	%	19-JUL-19	23-JUL-19	R4727407
Surrogate: Chrysene d12	105.7		60-130	%	19-JUL-19	23-JUL-19	R4727407
Surrogate: Naphthalene d8	95.1		50-130	%	19-JUL-19	23-JUL-19	R4727407
Surrogate: Phenanthrene d10	98.3		60-130	%	19-JUL-19	23-JUL-19	R4727407
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	135		1.2	mg/L		22-JUL-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		22-JUL-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		22-JUL-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	110		1.0	mg/L		19-JUL-19	R4719748
Ammonia by colour							
Ammonia, Total (as N)	9.2		1.0	mg/L		22-JUL-19	R4721003
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	113		20	mg/L		19-JUL-19	R4727945
Carbonaceous BOD							
BOD Carbonaceous	75		20	mg/L		19-JUL-19	R4727945
Chloride in Water by IC							
Chloride (Cl)	43.7		0.50	mg/L		19-JUL-19	R4722635
Conductivity							
Conductivity	430		1.0	umhos/cm		19-JUL-19	R4719748
Hardness Calculated							
Hardness (as CaCO3)	77.9	HTC	0.20	mg/L		29-JUL-19	
Mercury Total							
Mercury (Hg)-Total	0.000610		0.0000050	mg/L	23-JUL-19	23-JUL-19	R4723870
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		19-JUL-19	R4722635
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		24-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		19-JUL-19	R4722635
Oil & Grease - Gravimetric							
Oil and Grease	18.3		5.0	mg/L		23-JUL-19	R4720809
Phenol (4AAP)							
Phenols (4AAP)	0.0116		0.0010	mg/L		19-JUL-19	R4719699
Phosphorus, Total							
Phosphorus (P)-Total	2.97		0.030	mg/L		22-JUL-19	R4720390
Sulfate in Water by IC							
Sulfate (SO4)	23.3		0.30	mg/L		19-JUL-19	R4722635
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.115		0.0030	mg/L	26-JUL-19	26-JUL-19	R4728936
Arsenic (As)-Total	0.00098		0.00010	mg/L	26-JUL-19	26-JUL-19	R4728936
Cadmium (Cd)-Total	0.0000744		0.0000050	mg/L	26-JUL-19	26-JUL-19	R4728936
Calcium (Ca)-Total	23.0		0.050	mg/L	26-JUL-19	26-JUL-19	R4728936
Chromium (Cr)-Total	0.00070		0.00010	mg/L	26-JUL-19	26-JUL-19	R4728936
Cobalt (Co)-Total	0.00033		0.00010	mg/L	26-JUL-19	26-JUL-19	R4728936
Copper (Cu)-Total	0.137		0.00050	mg/L	26-JUL-19	26-JUL-19	R4728936
Iron (Fe)-Total	0.226		0.010	mg/L	26-JUL-19	26-JUL-19	R4728936
Lead (Pb)-Total	0.00107		0.000050	mg/L	26-JUL-19	26-JUL-19	R4728936
Magnesium (Mg)-Total	4.95		0.0050	mg/L	26-JUL-19	26-JUL-19	R4728936

* 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
L2312572-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: AA on 16-JUL-19 @ 09:00								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Manganese (Mn)-Total		0.0348		0.00010	mg/L	26-JUL-19	26-JUL-19	R4728936
Nickel (Ni)-Total		0.00667		0.00050	mg/L	26-JUL-19	26-JUL-19	R4728936
Potassium (K)-Total		6.48		0.050	mg/L	26-JUL-19	26-JUL-19	R4728936
Sodium (Na)-Total		25.6		0.050	mg/L	26-JUL-19	26-JUL-19	R4728936
Zinc (Zn)-Total		0.0830		0.0030	mg/L	26-JUL-19	26-JUL-19	R4728936
Total Organic Carbon by Combustion								
Total Organic Carbon		59.2		5.0	mg/L		23-JUL-19	R4722928
Total Suspended Solids								
Total Suspended Solids		111		2.0	mg/L		23-JUL-19	R4722808
pH								
pH		7.29		0.10	pH units		19-JUL-19	R4719748

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

Reference Information

Qualifiers for Individual Samples Listed:

Lab Sample ID	Client Sample ID	Qualifier	Description
L2312572-1	RANKIN INLET WWTP - EFFI	PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Sample Parameter Qualifier Key:

Qualifier	Description
DLIS	Detection Limit Adjusted: Insufficient Sample
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 transferred 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			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.			
3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.			
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.			
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
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.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2312572

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4722928							
WG3113747-2 LCS								
Total Organic Carbon			101.9		%		80-120	23-JUL-19
WG3113747-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	23-JUL-19
CL-IC-N-WP	Water							
Batch	R4722635							
WG3109097-6 LCS								
Chloride (Cl)			101.0		%		90-110	19-JUL-19
WG3109097-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	19-JUL-19
EC-WP	Water							
Batch	R4719748							
WG3111568-23 LCS								
Conductivity			97.9		%		90-110	19-JUL-19
WG3111568-21 MB								
Conductivity			<1.0		umhos/cm		1	19-JUL-19
F2-F4-FID-WP	Water							
Batch	R4699009							
WG3109857-2 LCS								
F2 (C10-C16)			105.6		%		70-130	20-JUL-19
F3 (C16-C34)			97.9		%		70-130	20-JUL-19
F4 (C34-C50)			101.7		%		70-130	20-JUL-19
WG3109857-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	20-JUL-19
F3 (C16-C34)			<0.25		mg/L		0.25	20-JUL-19
F4 (C34-C50)			<0.25		mg/L		0.25	20-JUL-19
Surrogate: 2-Bromobenzotrifluoride			90.0		%		60-140	20-JUL-19
FC-QT97-ENDPT-WP	Water							
Batch	R4715829							
WG3109206-2 DUP		L2312572-1						
Fecal Coliforms		3870000	2910000		MPN/100mL	28	65	18-JUL-19
WG3109206-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	18-JUL-19
HG-T-CVAA-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP		Water						
Batch R4723870								
WG3113275-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	23-JUL-19
WG3113275-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	23-JUL-19
MET-T-CCMS-WP		Water						
Batch R4728936								
WG3116414-2 LCS								
Aluminum (Al)-Total			100.7		%		80-120	26-JUL-19
Arsenic (As)-Total			101.9		%		80-120	26-JUL-19
Cadmium (Cd)-Total			103.8		%		80-120	26-JUL-19
Calcium (Ca)-Total			99.4		%		80-120	26-JUL-19
Chromium (Cr)-Total			100.6		%		80-120	26-JUL-19
Cobalt (Co)-Total			101.9		%		80-120	26-JUL-19
Copper (Cu)-Total			101.8		%		80-120	26-JUL-19
Iron (Fe)-Total			96.9		%		80-120	26-JUL-19
Lead (Pb)-Total			103.8		%		80-120	26-JUL-19
Magnesium (Mg)-Total			114.0		%		80-120	26-JUL-19
Manganese (Mn)-Total			102.3		%		80-120	26-JUL-19
Nickel (Ni)-Total			101.9		%		80-120	26-JUL-19
Potassium (K)-Total			99.2		%		80-120	26-JUL-19
Sodium (Na)-Total			104.8		%		80-120	26-JUL-19
Zinc (Zn)-Total			104.2		%		80-120	26-JUL-19
WG3116414-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	26-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	26-JUL-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	26-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	26-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	26-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	26-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	26-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	26-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	26-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	26-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	26-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	26-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	26-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4728936							
WG3116414-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	26-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	26-JUL-19
NH3-COL-WP	Water							
Batch	R4721003							
WG3113131-10 LCS								
Ammonia, Total (as N)			100.8		%		85-115	22-JUL-19
WG3113131-9 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	22-JUL-19
NO2-IC-N-WP	Water							
Batch	R4722635							
WG3109097-6 LCS								
Nitrite (as N)			100.3		%		90-110	19-JUL-19
WG3109097-5 MB								
Nitrite (as N)			<0.010		mg/L		0.01	19-JUL-19
NO3-IC-N-WP	Water							
Batch	R4722635							
WG3109097-6 LCS								
Nitrate (as N)			100.1		%		90-110	19-JUL-19
WG3109097-5 MB								
Nitrate (as N)			<0.020		mg/L		0.02	19-JUL-19
OG-GRAV-WP	Water							
Batch	R4720809							
WG3110326-2 LCS								
Oil and Grease			90.7		%		70-130	23-JUL-19
WG3110326-1 MB								
Oil and Grease			<5.0		mg/L		5	23-JUL-19
P-T-COL-WP	Water							
Batch	R4720390							
WG3110374-2 LCS								
Phosphorus (P)-Total			100.8		%		80-120	22-JUL-19
WG3110374-1 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	22-JUL-19
PAH,PANH-WP	Water							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4727407							
WG3110428-2	LCS							
1-Methyl Naphthalene			101.9		%		60-130	22-JUL-19
2-Methyl Naphthalene			94.5		%		60-130	22-JUL-19
Acenaphthene			102.6		%		60-130	22-JUL-19
Acenaphthylene			89.1		%		60-130	22-JUL-19
Anthracene			94.4		%		60-130	22-JUL-19
Acridine			99.1		%		60-130	22-JUL-19
Benzo(a)anthracene			90.9		%		60-130	22-JUL-19
Benzo(a)pyrene			99.7		%		60-130	22-JUL-19
Benzo(b&j)fluoranthene			80.1		%		60-130	22-JUL-19
Benzo(g,h,i)perylene			105.0		%		60-130	22-JUL-19
Benzo(k)fluoranthene			93.4		%		60-130	22-JUL-19
Chrysene			93.6		%		60-130	22-JUL-19
Dibenzo(a,h)anthracene			97.8		%		60-130	22-JUL-19
Fluoranthene			100.8		%		60-130	22-JUL-19
Fluorene			109.1		%		60-130	22-JUL-19
Indeno(1,2,3-cd)pyrene			92.9		%		60-130	22-JUL-19
Naphthalene			113.7		%		50-130	22-JUL-19
Phenanthrene			112.6		%		60-130	22-JUL-19
Pyrene			99.0		%		60-130	22-JUL-19
Quinoline			102.4		%		60-130	22-JUL-19
WG3110428-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	23-JUL-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	23-JUL-19
Acenaphthene			<0.000020		mg/L		0.00002	23-JUL-19
Acenaphthylene			<0.000020		mg/L		0.00002	23-JUL-19
Anthracene			<0.000010		mg/L		0.00001	23-JUL-19
Acridine			<0.000020		mg/L		0.00002	23-JUL-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	23-JUL-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	23-JUL-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	23-JUL-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	23-JUL-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	23-JUL-19
Chrysene			<0.000020		mg/L		0.00002	23-JUL-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	23-JUL-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch R4727407								
WG3110428-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	23-JUL-19
Fluorene			<0.000020		mg/L		0.00002	23-JUL-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	23-JUL-19
Naphthalene			<0.000050		mg/L		0.00005	23-JUL-19
Phenanthrene			<0.000050		mg/L		0.00005	23-JUL-19
Pyrene			<0.000010		mg/L		0.00001	23-JUL-19
Quinoline			<0.000020		mg/L		0.00002	23-JUL-19
Surrogate: Acenaphthene d10			101.5		%		60-130	23-JUL-19
Surrogate: Acridine d9			89.2		%		60-130	23-JUL-19
Surrogate: Chrysene d12			104.9		%		60-130	23-JUL-19
Surrogate: Naphthalene d8			99.98		%		50-130	23-JUL-19
Surrogate: Phenanthrene d10			98.1		%		60-130	23-JUL-19
PH-WP		Water						
Batch R4719748								
WG3111568-22 LCS								
pH			7.36		pH units		7.3-7.5	19-JUL-19
PHENOLS-4AAP-WT		Water						
Batch R4719699								
WG3109768-38 LCS								
Phenols (4AAP)			104.3		%		85-115	19-JUL-19
WG3109768-37 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	19-JUL-19
SO4-IC-N-WP		Water						
Batch R4722635								
WG3109097-6 LCS								
Sulfate (SO4)			102.0		%		90-110	19-JUL-19
WG3109097-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	19-JUL-19
SOLIDS-TOTSUS-WP		Water						
Batch R4722808								
WG3111829-26 LCS								
Total Suspended Solids			95.6		%		85-115	23-JUL-19
WG3111829-25 MB								
Total Suspended Solids			<2.0		mg/L		2	23-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC,EC-QT97-ENDPT-WP	Water							
Batch	R4715814							
WG3109207-2	DUP	L2312572-1						
Total Coliforms		83600000	58100000		MPN/100mL	36	65	18-JUL-19
Escherichia Coli		10900000	8500000		MPN/100mL	25	65	18-JUL-19
WG3109207-1	MB							
Total Coliforms			<1		MPN/100mL		1	18-JUL-19
Escherichia Coli			<1		MPN/100mL		1	18-JUL-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

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Report Date: 31-JUL-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	16-JUL-19 09:00	19-JUL-19 12:00	0.25	75	hours	EHTR-FM
Bacteriological Tests							
Fecal Coliform to endpoint by MPN QT97	1	16-JUL-19 09:00	18-JUL-19 16:20	30	55	hours	EHTR
Total and E. coli to endpoint by QT97	1	16-JUL-19 09:00	18-JUL-19 16:25	30	55	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	16-JUL-19 09:00	19-JUL-19 07:00	48	70	hours	EHTR
Carbonaceous BOD	1	16-JUL-19 09:00	19-JUL-19 07:00	48	70	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2312572 were received on 18-JUL-19 13:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

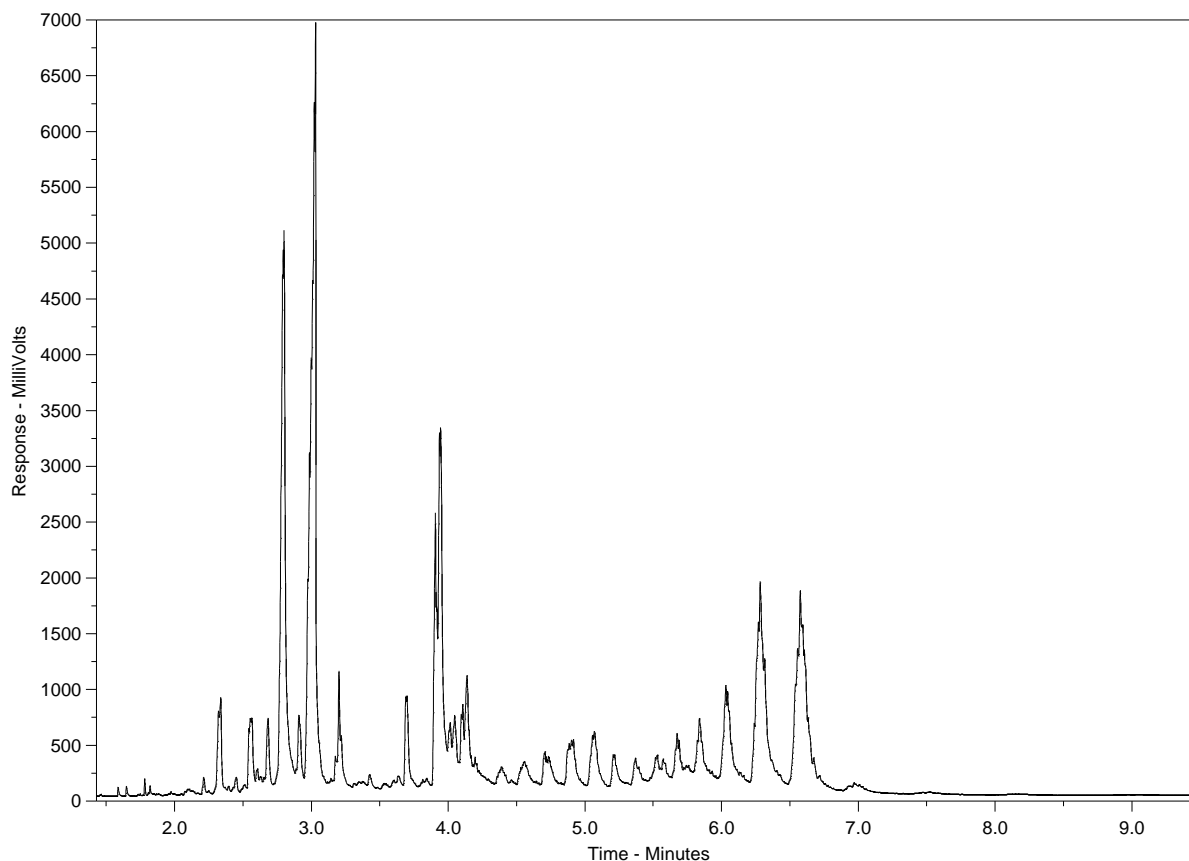
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2312572-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



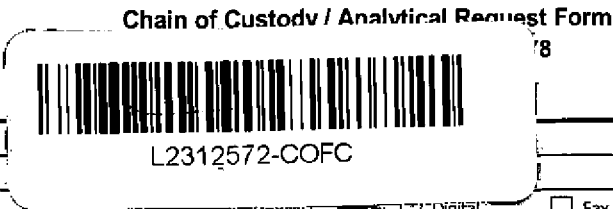
F2		F3		F4	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
Gasoline		Motor Oils/ Lube Oils/ Grease			
Diesel/ Jet Fuels					

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

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

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



GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix P



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 23-JUL-19
Report Date: 01-AUG-19 08:04 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2314912
Project P.O. #: NOT SUBMITTED
Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2314912-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 22-JUL-19 @ 09:15							
Matrix: WASTE							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		25-JUL-19	R4727342
Toluene	<0.0010		0.0010	mg/L		25-JUL-19	R4727342
Ethyl benzene	<0.00050		0.00050	mg/L		25-JUL-19	R4727342
o-Xylene	<0.00050		0.00050	mg/L		25-JUL-19	R4727342
m+p-Xylenes	<0.00040		0.00040	mg/L		25-JUL-19	R4727342
F1 (C6-C10)	<0.10		0.10	mg/L		25-JUL-19	R4727342
Surrogate: 4-Bromofluorobenzene (SS)	82.7		70-130	%		25-JUL-19	R4727342
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		29-JUL-19	
F2-Naphth	<0.10		0.10	mg/L		29-JUL-19	
F3-PAH	0.78		0.25	mg/L		29-JUL-19	
Total Hydrocarbons (C6-C50)	1.28		0.38	mg/L		29-JUL-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		26-JUL-19	
Miscellaneous Parameters							
Fecal Coliforms	13000000	MBEF	1	MPN/100mL		23-JUL-19	R4722496
Total and E. coli to endpoint by QT97							
Total Coliforms	248000000		1	MPN/100mL		23-JUL-19	R4722508
Escherichia Coli	26900000		1	MPN/100mL		23-JUL-19	R4722508
F2-F4 (O.Reg.153/04)							
F2 (C10-C16)	<100	OWP	100	ug/L	24-JUL-19	25-JUL-19	R4726354
F3 (C16-C34)	780	OWP	250	ug/L	24-JUL-19	25-JUL-19	R4726354
F4 (C34-C50)	500	OWP	250	ug/L	24-JUL-19	25-JUL-19	R4726354
Chrom. to baseline at nC50	YES				24-JUL-19	25-JUL-19	R4726354
Surrogate: 2-Bromobenzotrifluoride	88.3		60-140	%	24-JUL-19	25-JUL-19	R4726354
CCME PAHs in mg/L							
1-Methyl Naphthalene	0.000083		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
2-Methyl Naphthalene	0.000084		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Acenaphthene	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Acenaphthylene	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Anthracene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Acridine	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Benzo(a)anthracene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	24-JUL-19	29-JUL-19	R4729324
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Chrysene	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Dibenzo(a,h)anthracene	0.0000093		0.0000050	mg/L	24-JUL-19	29-JUL-19	R4729324
Fluoranthene	<0.000020		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Fluorene	0.000037	R	0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Naphthalene	0.000099		0.000050	mg/L	24-JUL-19	29-JUL-19	R4729324
Phenanthrene	<0.000050		0.000050	mg/L	24-JUL-19	29-JUL-19	R4729324
Pyrene	<0.000010		0.000010	mg/L	24-JUL-19	29-JUL-19	R4729324
Quinoline	0.000021		0.000020	mg/L	24-JUL-19	29-JUL-19	R4729324
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	24-JUL-19	29-JUL-19	R4729324
Surrogate: d8-Naphthalene	131.8		50-150	%	24-JUL-19	29-JUL-19	R4729324
Surrogate: d10-Phenanthrene	99.9		50-150	%	24-JUL-19	29-JUL-19	R4729324
Surrogate: d12-Chrysene	103.1		50-150	%	24-JUL-19	29-JUL-19	R4729324
Surrogate: d10-Acenaphthene	92.3		50-150	%	24-JUL-19	29-JUL-19	R4729324

* 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
L2314912-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 22-JUL-19 @ 09:15							
Matrix: WASTE							
CCME PAHs in mg/L							
Surrogate: d9-Acridine (SS)	96.4		50-150	%	24-JUL-19	29-JUL-19	R4729324
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	151		1.2	mg/L		24-JUL-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		24-JUL-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		24-JUL-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	124		1.0	mg/L		23-JUL-19	R4723131
Ammonia by colour							
Ammonia, Total (as N)	1.90		0.20	mg/L		23-JUL-19	R4723915
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	108		50	mg/L		24-JUL-19	R4730556
Carbonaceous BOD							
BOD Carbonaceous	114		20	mg/L		24-JUL-19	R4730556
Chloride in Water by IC							
Chloride (Cl)	49.9		0.50	mg/L		23-JUL-19	R4724448
Conductivity							
Conductivity	491		1.0	umhos/cm		23-JUL-19	R4723131
Hardness Calculated							
Hardness (as CaCO3)	91.4	HTC	0.20	mg/L		01-AUG-19	
Mercury Total							
Mercury (Hg)-Total	0.0000170		0.0000050	mg/L	30-JUL-19	30-JUL-19	R4731130
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		23-JUL-19	R4724448
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		25-JUL-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		23-JUL-19	R4724448
Oil & Grease - Gravimetric							
Oil and Grease	17.5		5.0	mg/L		25-JUL-19	R4725510
Phenol (4AAP)							
Phenols (4AAP)	0.0117		0.0010	mg/L		26-JUL-19	R4727957
Phosphorus, Total							
Phosphorus (P)-Total	3.94		0.030	mg/L		25-JUL-19	R4727317
Sulfate in Water by IC							
Sulfate (SO4)	28.7		0.30	mg/L		23-JUL-19	R4724448
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.112		0.0030	mg/L	31-JUL-19	31-JUL-19	R4734210
Arsenic (As)-Total	0.00105		0.00010	mg/L	31-JUL-19	31-JUL-19	R4734210
Cadmium (Cd)-Total	0.000136		0.0000050	mg/L	31-JUL-19	31-JUL-19	R4734210
Calcium (Ca)-Total	27.4		0.050	mg/L	31-JUL-19	31-JUL-19	R4734210
Chromium (Cr)-Total	0.00057		0.00010	mg/L	31-JUL-19	31-JUL-19	R4734210
Cobalt (Co)-Total	0.00053		0.00010	mg/L	31-JUL-19	31-JUL-19	R4734210
Copper (Cu)-Total	0.157		0.00050	mg/L	31-JUL-19	31-JUL-19	R4734210
Iron (Fe)-Total	0.284		0.010	mg/L	31-JUL-19	31-JUL-19	R4734210
Lead (Pb)-Total	0.00124		0.000050	mg/L	31-JUL-19	31-JUL-19	R4734210
Magnesium (Mg)-Total	5.59		0.0050	mg/L	31-JUL-19	31-JUL-19	R4734210
Manganese (Mn)-Total	0.0517		0.00010	mg/L	31-JUL-19	31-JUL-19	R4734210
Nickel (Ni)-Total	0.0138		0.00050	mg/L	31-JUL-19	31-JUL-19	R4734210
Potassium (K)-Total	11.7		0.050	mg/L	31-JUL-19	31-JUL-19	R4734210

* 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
L2314912-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: AA on 22-JUL-19 @ 09:15								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Sodium (Na)-Total		28.0		0.050	mg/L	31-JUL-19	31-JUL-19	R4734210
Zinc (Zn)-Total		0.104		0.0030	mg/L	31-JUL-19	31-JUL-19	R4734210
Total Organic Carbon by Combustion								
Total Organic Carbon		68.8		5.0	mg/L		25-JUL-19	R4727520
Total Suspended Solids								
Total Suspended Solids		78.0		2.7	mg/L		29-JUL-19	R4730574
pH								
pH		7.23		0.10	pH units		23-JUL-19	R4723131

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MBEF	Microbiological test results for E. coli > Fecal Coliforms due to sample heterogeneity. Both test results are within normal variability for MPN tests.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
<p>Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.</p>			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
<p>This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is obtained by comparing the number of positive responses to a probability table.</p>			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
<p>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.</p>			
HG-T-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020B (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>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.</p>			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
<p>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>			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
<p>This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>			
PAH-CCME-PPM-WT	Water	CCME PAHs in mg/L	EPA 3511/8270D (mod)
<p>PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.</p>			
PH-WP	Water	pH	APHA 4500H
<p>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.</p>			
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 aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4727520							
WG3116296-2 LCS								
Total Organic Carbon			102.1		%		80-120	25-JUL-19
WG3116296-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	25-JUL-19
CL-IC-N-WP	Water							
Batch	R4724448							
WG3112856-6 LCS								
Chloride (Cl)			99.1		%		90-110	23-JUL-19
WG3112856-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	23-JUL-19
EC-WP	Water							
Batch	R4723131							
WG3113895-15 DUP		L2314912-1						
Conductivity		491	490		umhos/cm	0.2	10	23-JUL-19
WG3113895-13 LCS								
Conductivity			96.9		%		90-110	23-JUL-19
WG3113895-11 MB								
Conductivity			<1.0		umhos/cm		1	23-JUL-19
F2-F4-WT	Water							
Batch	R4726354							
WG3114663-2 LCS								
F2 (C10-C16)			99.6		%		65-135	25-JUL-19
F3 (C16-C34)			97.5		%		65-135	25-JUL-19
F4 (C34-C50)			105.3		%		65-135	25-JUL-19
WG3114663-1 MB								
F2 (C10-C16)			<100		ug/L		100	25-JUL-19
F3 (C16-C34)			<250		ug/L		250	25-JUL-19
F4 (C34-C50)			<250		ug/L		250	25-JUL-19
Surrogate: 2-Bromobenzotrifluoride			84.7		%		60-140	25-JUL-19
FC-QT97-ENDPT-WP	Water							
Batch	R4722496							
WG3113017-2 DUP		L2314912-1						
Fecal Coliforms		13000000	11200000		MPN/100mL	15	65	23-JUL-19
WG3113017-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	23-JUL-19
HG-T-CVAA-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP		Water						
Batch R4731130								
WG3119636-2 LCS								
Mercury (Hg)-Total			95.0		%		80-120	30-JUL-19
WG3119636-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	30-JUL-19
MET-T-CCMS-WP		Water						
Batch R4734210								
WG3120363-2 LCS								
Aluminum (Al)-Total			106.7		%		80-120	31-JUL-19
Arsenic (As)-Total			101.8		%		80-120	31-JUL-19
Cadmium (Cd)-Total			101.4		%		80-120	31-JUL-19
Calcium (Ca)-Total			100.2		%		80-120	31-JUL-19
Chromium (Cr)-Total			106.5		%		80-120	31-JUL-19
Cobalt (Co)-Total			102.4		%		80-120	31-JUL-19
Copper (Cu)-Total			103.2		%		80-120	31-JUL-19
Iron (Fe)-Total			94.2		%		80-120	31-JUL-19
Lead (Pb)-Total			104.0		%		80-120	31-JUL-19
Magnesium (Mg)-Total			112.9		%		80-120	31-JUL-19
Manganese (Mn)-Total			104.0		%		80-120	31-JUL-19
Nickel (Ni)-Total			103.0		%		80-120	31-JUL-19
Potassium (K)-Total			108.1		%		80-120	31-JUL-19
Sodium (Na)-Total			104.5		%		80-120	31-JUL-19
Zinc (Zn)-Total			102.4		%		80-120	31-JUL-19
WG3120363-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	31-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	31-JUL-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	31-JUL-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	31-JUL-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	31-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	31-JUL-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	31-JUL-19
Iron (Fe)-Total			<0.010		mg/L		0.01	31-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	31-JUL-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	31-JUL-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	31-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	31-JUL-19
Potassium (K)-Total			<0.050		mg/L		0.05	31-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4734210							
WG3120363-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	31-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	31-JUL-19
NH3-COL-WP	Water							
Batch	R4723915							
WG3114259-14 LCS								
Ammonia, Total (as N)			102.3		%		85-115	23-JUL-19
WG3114259-13 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	23-JUL-19
NO2-IC-N-WP	Water							
Batch	R4724448							
WG3112856-6 LCS								
Nitrite (as N)			100.8		%		90-110	23-JUL-19
WG3112856-5 MB								
Nitrite (as N)			<0.010		mg/L		0.01	23-JUL-19
NO3-IC-N-WP	Water							
Batch	R4724448							
WG3112856-6 LCS								
Nitrate (as N)			99.1		%		90-110	23-JUL-19
WG3112856-5 MB								
Nitrate (as N)			<0.020		mg/L		0.02	23-JUL-19
OG-GRAV-WP	Water							
Batch	R4725510							
WG3113910-2 LCS								
Oil and Grease			97.1		%		70-130	25-JUL-19
WG3113910-1 MB								
Oil and Grease			<5.0		mg/L		5	25-JUL-19
P-T-COL-WP	Water							
Batch	R4727317							
WG3114346-6 LCS								
Phosphorus (P)-Total			97.7		%		80-120	25-JUL-19
WG3114346-5 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	25-JUL-19
PAH-CCME-PPM-WT	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-PPM-WT		Water						
Batch	R4729324							
WG3114663-2	LCS							
1-Methyl Naphthalene			101.9		%		50-150	23-JUL-19
2-Methyl Naphthalene			92.9		%		50-150	23-JUL-19
Acenaphthene			99.2		%		50-150	23-JUL-19
Acenaphthylene			112.3		%		50-150	23-JUL-19
Anthracene			106.3		%		50-150	23-JUL-19
Acridine			98.3		%		50-150	23-JUL-19
Benzo(a)anthracene			129.4		%		50-150	23-JUL-19
Benzo(a)pyrene			106.8		%		50-150	23-JUL-19
Benzo(b&j)fluoranthene			109.7		%		50-150	23-JUL-19
Benzo(g,h,i)perylene			112.6		%		50-150	23-JUL-19
Benzo(k)fluoranthene			114.3		%		50-150	23-JUL-19
Chrysene			130.4		%		50-150	23-JUL-19
Dibenzo(a,h)anthracene			112.7		%		50-150	23-JUL-19
Fluoranthene			112.2		%		50-150	23-JUL-19
Fluorene			109.1		%		50-150	23-JUL-19
Indeno(1,2,3-cd)pyrene			127.3		%		50-150	23-JUL-19
Naphthalene			95.3		%		50-150	23-JUL-19
Phenanthrene			113.5		%		50-150	23-JUL-19
Pyrene			118.4		%		50-150	23-JUL-19
Quinoline			123.3		%		50-150	23-JUL-19
WG3114663-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	23-JUL-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	23-JUL-19
Acenaphthene			<0.000020		mg/L		0.00002	23-JUL-19
Acenaphthylene			<0.000020		mg/L		0.00002	23-JUL-19
Anthracene			<0.000010		mg/L		0.00001	23-JUL-19
Acridine			<0.000020		mg/L		0.00002	23-JUL-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	23-JUL-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	23-JUL-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	23-JUL-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	23-JUL-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	23-JUL-19
Chrysene			<0.000020		mg/L		0.00002	23-JUL-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	23-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP	Water							
Batch	R4730574							
WG3116376-1 MB								
Total Suspended Solids			<2.0		mg/L		2	29-JUL-19
TC,EC-QT97-ENDPT-WP	Water							
Batch	R4722508							
WG3113018-2 DUP		L2314912-1						
Total Coliforms		248000000	236000000		MPN/100mL	5.0	65	23-JUL-19
Escherichia Coli		26900000	20300000		MPN/100mL	28	65	23-JUL-19
WG3113018-1 MB								
Total Coliforms			<1		MPN/100mL		1	23-JUL-19
Escherichia Coli			<1		MPN/100mL		1	23-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	22-JUL-19 09:15	23-JUL-19 12:00	0.25	27	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2314912 were received on 23-JUL-19 11:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

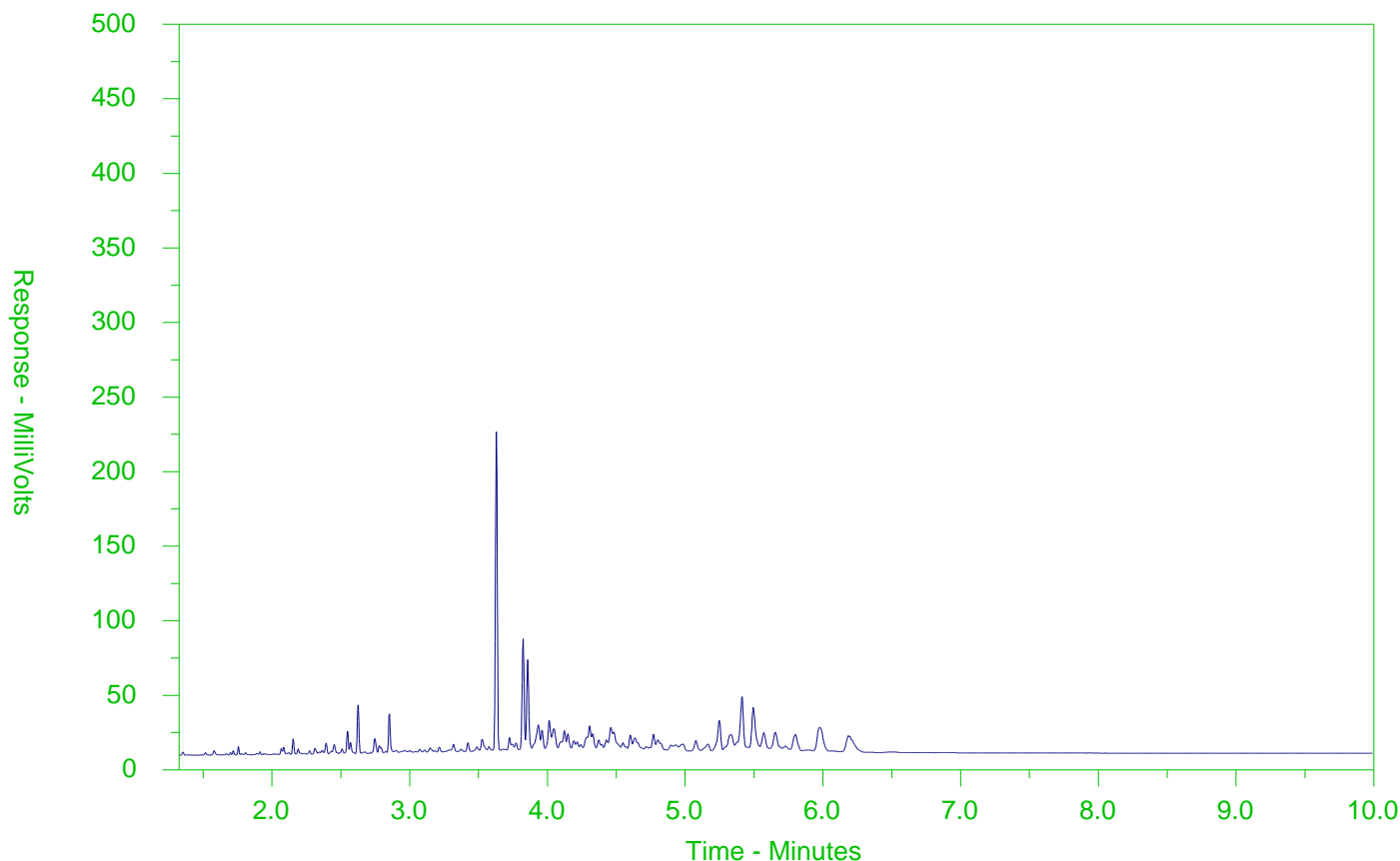
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2314912-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix Q



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 30-JUL-19
Report Date: 12-AUG-19 07:30 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2319681

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2319681-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 29-JUL-19 @ 13:15							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		03-AUG-19	R4739804
Toluene	<0.0010		0.0010	mg/L		03-AUG-19	R4739804
Ethyl benzene	<0.00050		0.00050	mg/L		03-AUG-19	R4739804
o-Xylene	<0.00050		0.00050	mg/L		03-AUG-19	R4739804
m+p-Xylenes	<0.00040		0.00040	mg/L		03-AUG-19	R4739804
F1 (C6-C10)	<0.10		0.10	mg/L		03-AUG-19	R4739804
Surrogate: 4-Bromofluorobenzene (SS)	96.3		70-130	%		03-AUG-19	R4739804
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.25		0.10	mg/L	01-AUG-19	02-AUG-19	R4739024
F3 (C16-C34)	4.45		0.25	mg/L	01-AUG-19	02-AUG-19	R4739024
F4 (C34-C50)	2.58		0.25	mg/L	01-AUG-19	02-AUG-19	R4739024
Surrogate: 2-Bromobenzotrifluoride	97.9		60-140	%	01-AUG-19	02-AUG-19	R4739024
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		06-AUG-19	
Total Hydrocarbons (C6-C50)	7.28		0.38	mg/L		06-AUG-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		06-AUG-19	
Miscellaneous Parameters							
Fecal Coliforms	2140000	MBEF	1	MPN/100mL		30-JUL-19	R4732091
Total and E. coli to endpoint by QT97							
Total Coliforms	56500000		1	MPN/100mL		30-JUL-19	R4732068
Escherichia Coli	5200000		1	MPN/100mL		30-JUL-19	R4732068
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	78.9		1.2	mg/L		01-AUG-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		01-AUG-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		01-AUG-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	64.7		1.0	mg/L		31-JUL-19	R4734401
Ammonia by colour							
Ammonia, Total (as N)	3.70		0.20	mg/L		31-JUL-19	R4735088
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	65		20	mg/L		31-JUL-19	R4739685
Carbonaceous BOD							
BOD Carbonaceous	46		20	mg/L		31-JUL-19	R4739685
Chloride in Water by IC							
Chloride (Cl)	44.2		0.50	mg/L		31-JUL-19	R4738653
Conductivity							
Conductivity	336		1.0	umhos/cm		31-JUL-19	R4734401
Hardness Calculated							
Hardness (as CaCO3)	78.2	HTC	0.20	mg/L		12-AUG-19	
Mercury Total							
Mercury (Hg)-Total	0.0000050		0.0000050	mg/L	07-AUG-19	08-AUG-19	R4744895
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		31-JUL-19	R4738653
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		03-AUG-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		31-JUL-19	R4738653

* 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
L2319681-1 RANKIN INLET WWTP - EFFLUENT Sampled By: AA on 29-JUL-19 @ 13:15 Matrix: WASTE							
Oil & Grease - Gravimetric							
Oil and Grease	15.3		5.0	mg/L		02-AUG-19	R4738743
Phenol (4AAP)							
Phenols (4AAP)	0.0057		0.0010	mg/L		01-AUG-19	R4737245
Phosphorus, Total							
Phosphorus (P)-Total	1.28		0.0060	mg/L		02-AUG-19	R4737930
Sulfate in Water by IC							
Sulfate (SO4)	22.8		0.30	mg/L		31-JUL-19	R4738653
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.106		0.0030	mg/L	08-AUG-19	08-AUG-19	R4746362
Arsenic (As)-Total	0.00085		0.00010	mg/L	08-AUG-19	08-AUG-19	R4746362
Cadmium (Cd)-Total	0.0000465		0.0000050	mg/L	08-AUG-19	08-AUG-19	R4746362
Calcium (Ca)-Total	22.7		0.050	mg/L	08-AUG-19	08-AUG-19	R4746362
Chromium (Cr)-Total	0.00047		0.00010	mg/L	08-AUG-19	08-AUG-19	R4746362
Cobalt (Co)-Total	0.00030		0.00010	mg/L	08-AUG-19	08-AUG-19	R4746362
Copper (Cu)-Total	0.0911		0.00050	mg/L	08-AUG-19	08-AUG-19	R4746362
Iron (Fe)-Total	0.162		0.010	mg/L	08-AUG-19	08-AUG-19	R4746362
Lead (Pb)-Total	0.00123		0.000050	mg/L	08-AUG-19	08-AUG-19	R4746362
Magnesium (Mg)-Total	5.21		0.0050	mg/L	08-AUG-19	08-AUG-19	R4746362
Manganese (Mn)-Total	0.0476		0.00010	mg/L	08-AUG-19	08-AUG-19	R4746362
Nickel (Ni)-Total	0.00403		0.00050	mg/L	08-AUG-19	08-AUG-19	R4746362
Potassium (K)-Total	5.71		0.050	mg/L	08-AUG-19	08-AUG-19	R4746362
Sodium (Na)-Total	25.6		0.050	mg/L	08-AUG-19	08-AUG-19	R4746362
Zinc (Zn)-Total	0.0487		0.0030	mg/L	08-AUG-19	08-AUG-19	R4746362
Total Organic Carbon by Combustion							
Total Organic Carbon	46.8		0.50	mg/L		06-AUG-19	R4742609
Total Suspended Solids							
Total Suspended Solids	63.5		2.0	mg/L		05-AUG-19	R4740066
pH							
pH	6.95		0.10	pH units		31-JUL-19	R4734401

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MBEF	Microbiological test results for E. coli > Fecal Coliforms due to sample heterogeneity. Both test results are within normal variability for MPN tests.
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 transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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: <ol style="list-style-type: none"> 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.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically 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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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.

Quality Control Report

Workorder: L2319681

Report Date: 12-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4742609							
WG3125745-2 LCS								
Total Organic Carbon			103.5		%		80-120	06-AUG-19
WG3125745-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	06-AUG-19
CL-IC-N-WP	Water							
Batch	R4738653							
WG3120477-6 LCS								
Chloride (Cl)			99.9		%		90-110	31-JUL-19
WG3120477-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	31-JUL-19
EC-WP	Water							
Batch	R4734401							
WG3121523-3 LCS								
Conductivity			100.8		%		90-110	31-JUL-19
WG3121523-1 MB								
Conductivity			<1.0		umhos/cm		1	31-JUL-19
F2-F4-FID-WP	Water							
Batch	R4739024							
WG3121638-2 LCS								
F2 (C10-C16)			99.0		%		70-130	02-AUG-19
F3 (C16-C34)			91.7		%		70-130	02-AUG-19
F4 (C34-C50)			99.3		%		70-130	02-AUG-19
WG3121638-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	02-AUG-19
F3 (C16-C34)			<0.25		mg/L		0.25	02-AUG-19
F4 (C34-C50)			<0.25		mg/L		0.25	02-AUG-19
Surrogate: 2-Bromobenzotrifluoride			94.3		%		60-140	02-AUG-19
FC-QT97-ENDPT-WP	Water							
Batch	R4732091							
WG3119749-2 DUP		L2319681-1						
Fecal Coliforms		2140000	1430000		MPN/100mL	40	65	30-JUL-19
WG3119749-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	30-JUL-19
HG-T-CVAA-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP								
Water								
Batch	R4744895							
WG3127888-2	LCS							
Mercury (Hg)-Total			99.0		%		80-120	08-AUG-19
WG3127888-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	08-AUG-19
MET-T-CCMS-WP								
Water								
Batch	R4746362							
WG3127038-2	LCS							
Aluminum (Al)-Total			98.9		%		80-120	08-AUG-19
Arsenic (As)-Total			96.9		%		80-120	08-AUG-19
Cadmium (Cd)-Total			98.1		%		80-120	08-AUG-19
Calcium (Ca)-Total			96.8		%		80-120	08-AUG-19
Chromium (Cr)-Total			96.5		%		80-120	08-AUG-19
Cobalt (Co)-Total			95.2		%		80-120	08-AUG-19
Copper (Cu)-Total			96.6		%		80-120	08-AUG-19
Iron (Fe)-Total			102.6		%		80-120	08-AUG-19
Lead (Pb)-Total			94.7		%		80-120	08-AUG-19
Magnesium (Mg)-Total			111.8		%		80-120	08-AUG-19
Manganese (Mn)-Total			99.5		%		80-120	08-AUG-19
Nickel (Ni)-Total			93.8		%		80-120	08-AUG-19
Potassium (K)-Total			93.1		%		80-120	08-AUG-19
Sodium (Na)-Total			101.5		%		80-120	08-AUG-19
Zinc (Zn)-Total			101.4		%		80-120	08-AUG-19
WG3127038-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	08-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-AUG-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	08-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	08-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	08-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	08-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	08-AUG-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	08-AUG-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	08-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	08-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	08-AUG-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4746362							
WG3127038-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	08-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	08-AUG-19
NH3-COL-WP	Water							
Batch	R4735088							
WG3121920-6 LCS								
Ammonia, Total (as N)			98.4		%		85-115	31-JUL-19
WG3121920-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	31-JUL-19
NO2-IC-N-WP	Water							
Batch	R4738653							
WG3120477-6 LCS								
Nitrite (as N)			100.5		%		90-110	31-JUL-19
WG3120477-5 MB								
Nitrite (as N)			<0.010		mg/L		0.01	31-JUL-19
NO3-IC-N-WP	Water							
Batch	R4738653							
WG3120477-6 LCS								
Nitrate (as N)			99.2		%		90-110	31-JUL-19
WG3120477-5 MB								
Nitrate (as N)			<0.020		mg/L		0.02	31-JUL-19
OG-GRAV-WP	Water							
Batch	R4738743							
WG3122012-2 LCS								
Oil and Grease			97.5		%		70-130	02-AUG-19
WG3122012-1 MB								
Oil and Grease			<5.0		mg/L		5	02-AUG-19
P-T-COL-WP	Water							
Batch	R4737930							
WG3122069-6 LCS								
Phosphorus (P)-Total			98.6		%		80-120	02-AUG-19
WG3122069-5 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	02-AUG-19
PH-WP	Water							

Quality Control Report

Workorder: L2319681

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WP								
Water								
Batch	R4734401							
WG3121523-2	LCS							
pH			7.37		pH units		7.3-7.5	31-JUL-19
PHENOLS-4AAP-WT								
Water								
Batch	R4737245							
WG3121581-6	LCS							
Phenols (4AAP)			101.2		%		85-115	01-AUG-19
WG3121581-5	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	01-AUG-19
SO4-IC-N-WP								
Water								
Batch	R4738653							
WG3120477-6	LCS							
Sulfate (SO4)			100.8		%		90-110	31-JUL-19
WG3120477-5	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	31-JUL-19
SOLIDS-TOTSUS-WP								
Water								
Batch	R4740066							
WG3123253-6	LCS							
Total Suspended Solids			89.3		%		85-115	05-AUG-19
WG3123253-5	MB							
Total Suspended Solids			<2.0		mg/L		2	05-AUG-19
TC,EC-QT97-ENDPT-WP								
Water								
Batch	R4732068							
WG3119754-2	DUP	L2319681-1						
Total Coliforms		56500000	55400000		MPN/100mL	2.0	65	30-JUL-19
Escherichia Coli		5200000	5100000		MPN/100mL	1.9	65	30-JUL-19
WG3119754-1	MB							
Total Coliforms			<1		MPN/100mL		1	30-JUL-19
Escherichia Coli			<1		MPN/100mL		1	30-JUL-19

Quality Control Report

Workorder: L2319681

Report Date: 12-AUG-19

Page 6 of 7

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2319681

Report Date: 12-AUG-19

Page 7 of 7

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	29-JUL-19 13:15	31-JUL-19 12:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2319681 were received on 30-JUL-19 16:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

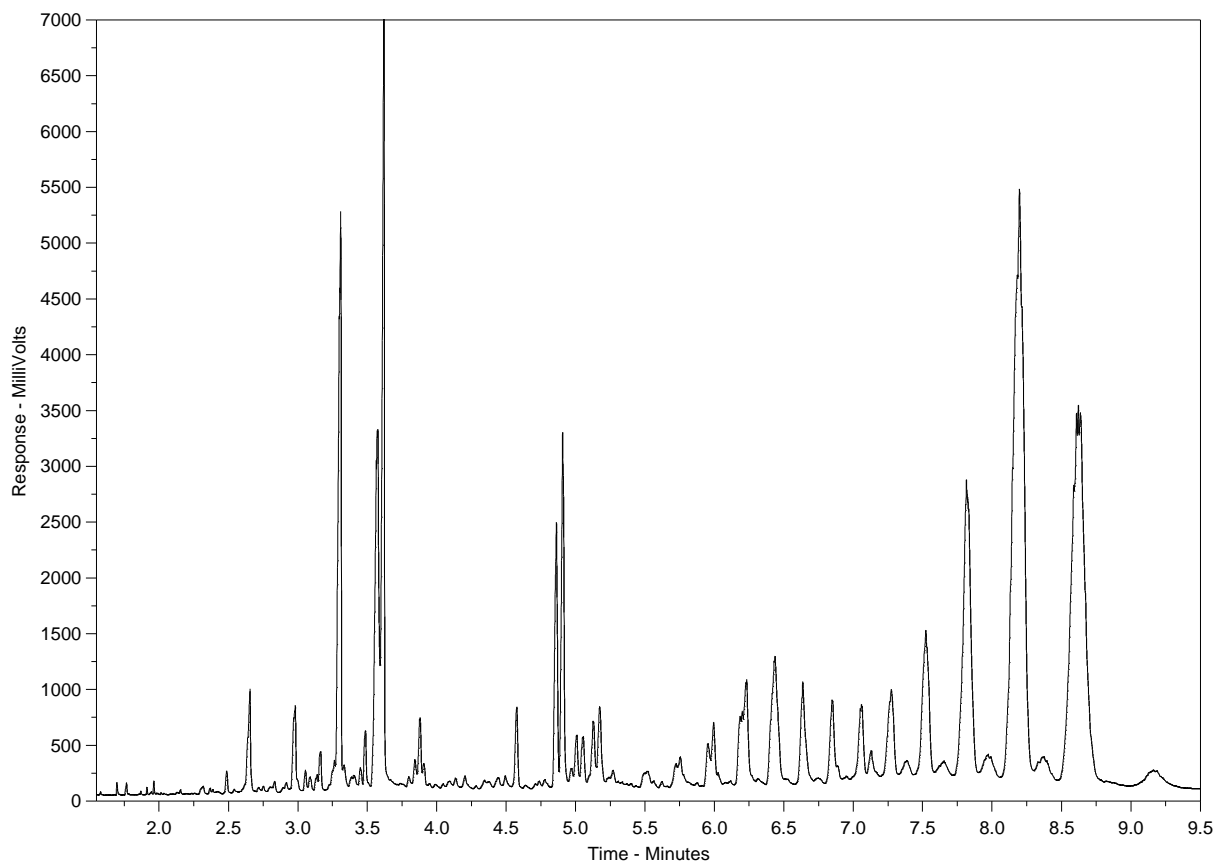
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2319681-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix R



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 07-AUG-19
Report Date: 16-AUG-19 15:11 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2323983

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323983-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 06-AUG-19 @ 10:30							
Matrix: WASTE							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		09-AUG-19	R4756835
Toluene	<0.0010		0.0010	mg/L		09-AUG-19	R4756835
Ethyl benzene	<0.00050		0.00050	mg/L		09-AUG-19	R4756835
o-Xylene	<0.00050		0.00050	mg/L		09-AUG-19	R4756835
m+p-Xylenes	<0.00040		0.00040	mg/L		09-AUG-19	R4756835
F1 (C6-C10)	<0.10		0.10	mg/L		09-AUG-19	R4756835
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%		09-AUG-19	R4756835
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		15-AUG-19	
F2-Naphth	<0.10		0.10	mg/L		15-AUG-19	
F3-PAH	<0.25		0.25	mg/L		15-AUG-19	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		15-AUG-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		15-AUG-19	
Miscellaneous Parameters							
Fecal Coliforms	1720000	MBHT	1	MPN/100mL		07-AUG-19	R4744013
Total and E. coli to endpoint by QT97							
Total Coliforms	>24200000	MBHT	1	MPN/100mL		07-AUG-19	R4744249
Escherichia Coli	3260000	MBHT	1	MPN/100mL		07-AUG-19	R4744249
F2-F4 (O.Reg.153/04)							
F2 (C10-C16)	<100		100	ug/L	09-AUG-19	12-AUG-19	R4746599
F3 (C16-C34)	<250		250	ug/L	09-AUG-19	12-AUG-19	R4746599
F4 (C34-C50)	<250		250	ug/L	09-AUG-19	12-AUG-19	R4746599
Chrom. to baseline at nC50	YES				09-AUG-19	12-AUG-19	R4746599
Surrogate: 2-Bromobenzotrifluoride	90.1		60-140	%	09-AUG-19	12-AUG-19	R4746599
CCME PAHs in mg/L							
1-Methyl Naphthalene	0.000060		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
2-Methyl Naphthalene	0.000062		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Acenaphthene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Acenaphthylene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Anthracene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Acridine	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Benzo(a)anthracene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Benzo(a)pyrene	0.0000051		0.0000050	mg/L	09-AUG-19	13-AUG-19	R4746580
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Chrysene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Dibenzo(a,h)anthracene	0.0000147		0.0000050	mg/L	09-AUG-19	13-AUG-19	R4746580
Fluoranthene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Fluorene	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Naphthalene	0.000088		0.000050	mg/L	09-AUG-19	13-AUG-19	R4746580
Phenanthrene	<0.000050		0.000050	mg/L	09-AUG-19	13-AUG-19	R4746580
Pyrene	<0.000010		0.000010	mg/L	09-AUG-19	13-AUG-19	R4746580
Quinoline	<0.000020		0.000020	mg/L	09-AUG-19	13-AUG-19	R4746580
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	09-AUG-19	13-AUG-19	R4746580
Surrogate: d8-Naphthalene	135.4		50-150	%	09-AUG-19	13-AUG-19	R4746580
Surrogate: d10-Phenanthrene	106.0		50-150	%	09-AUG-19	13-AUG-19	R4746580
Surrogate: d12-Chrysene	92.3		50-150	%	09-AUG-19	13-AUG-19	R4746580
Surrogate: d10-Acenaphthene	123.1		50-150	%	09-AUG-19	13-AUG-19	R4746580

* 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
L2323983-1 RANKIN INLET WWTP - EFFLUENT Sampled By: CLIENT on 06-AUG-19 @ 10:30 Matrix: WASTE							
CCME PAHs in mg/L Surrogate: d9-Acridine (SS)	100.2		50-150	%	09-AUG-19	13-AUG-19	R4746580
Nunavut WW Group 1							
Alkalinity, Bicarbonate Bicarbonate (HCO3)	63.9		1.2	mg/L		09-AUG-19	
Alkalinity, Carbonate Carbonate (CO3)	<0.60		0.60	mg/L		09-AUG-19	
Alkalinity, Hydroxide Hydroxide (OH)	<0.34		0.34	mg/L		09-AUG-19	
Alkalinity, Total (as CaCO3) Alkalinity, Total (as CaCO3)	52.4		1.0	mg/L		08-AUG-19	R4744874
Ammonia by colour Ammonia, Total (as N)	2.95		0.10	mg/L		07-AUG-19	R4744419
Biochemical Oxygen Demand (BOD) Biochemical Oxygen Demand	49		20	mg/L		08-AUG-19	R4753016
Carbonaceous BOD BOD Carbonaceous	40		20	mg/L		08-AUG-19	R4753016
Chloride in Water by IC Chloride (Cl)	38.0		0.50	mg/L		08-AUG-19	R4746733
Conductivity Conductivity	271		1.0	umhos/cm		08-AUG-19	R4744874
Hardness Calculated Hardness (as CaCO3)	62.5	HTC	0.20	mg/L		16-AUG-19	
Mercury Total Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	08-AUG-19	09-AUG-19	R4746685
Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		08-AUG-19	R4746733
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		13-AUG-19	
Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		08-AUG-19	R4746733
Oil & Grease - Gravimetric Oil and Grease	11.2		5.0	mg/L		12-AUG-19	R4747276
Phenol (4AAP) Phenols (4AAP)	0.0034		0.0010	mg/L		09-AUG-19	R4746535
Phosphorus, Total Phosphorus (P)-Total	1.01		0.0060	mg/L		09-AUG-19	R4745230
Sulfate in Water by IC Sulfate (SO4)	20.7		0.30	mg/L		08-AUG-19	R4746733
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0962		0.0030	mg/L	15-AUG-19	15-AUG-19	R4757095
Arsenic (As)-Total	0.00093		0.00010	mg/L	15-AUG-19	15-AUG-19	R4757095
Cadmium (Cd)-Total	0.0000299		0.0000050	mg/L	15-AUG-19	15-AUG-19	R4757095
Calcium (Ca)-Total	17.9		0.050	mg/L	15-AUG-19	15-AUG-19	R4757095
Chromium (Cr)-Total	0.00052		0.00010	mg/L	15-AUG-19	15-AUG-19	R4757095
Cobalt (Co)-Total	0.00021		0.00010	mg/L	15-AUG-19	15-AUG-19	R4757095
Copper (Cu)-Total	0.0714		0.00050	mg/L	15-AUG-19	15-AUG-19	R4757095
Iron (Fe)-Total	0.196		0.010	mg/L	15-AUG-19	15-AUG-19	R4757095
Lead (Pb)-Total	0.00114		0.000050	mg/L	15-AUG-19	15-AUG-19	R4757095
Magnesium (Mg)-Total	4.34		0.0050	mg/L	15-AUG-19	15-AUG-19	R4757095
Manganese (Mn)-Total	0.0435		0.00010	mg/L	15-AUG-19	15-AUG-19	R4757095
Nickel (Ni)-Total	0.00247		0.00050	mg/L	15-AUG-19	15-AUG-19	R4757095
Potassium (K)-Total	4.03		0.050	mg/L	15-AUG-19	15-AUG-19	R4757095

* 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
L2323983-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: CLIENT on 06-AUG-19 @ 10:30								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Sodium (Na)-Total		20.1		0.050	mg/L	15-AUG-19	15-AUG-19	R4757095
Zinc (Zn)-Total		0.0506		0.0030	mg/L	15-AUG-19	15-AUG-19	R4757095
Total Organic Carbon by Combustion								
Total Organic Carbon		37.9		0.50	mg/L		15-AUG-19	R4757724
Total Suspended Solids								
Total Suspended Solids		45.9		2.0	mg/L		13-AUG-19	R4752484
pH								
pH		7.02		0.10	pH units		08-AUG-19	R4744874

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
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 transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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: <ol style="list-style-type: none"> 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-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH-CCME-PPM-WT	Water	CCME PAHs in mg/L	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Escherichia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4757724							
WG3134703-6 LCS								
Total Organic Carbon			105.5		%		80-120	15-AUG-19
WG3134703-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	15-AUG-19
CL-IC-N-WP	Water							
Batch	R4746733							
WG3127304-10 LCS								
Chloride (Cl)			98.2		%		90-110	08-AUG-19
WG3127304-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	08-AUG-19
EC-WP	Water							
Batch	R4744874							
WG3127828-5 DUP		L2323983-1						
Conductivity		271	273		umhos/cm	0.7	10	08-AUG-19
WG3127828-3 LCS								
Conductivity			98.0		%		90-110	08-AUG-19
WG3127828-1 MB								
Conductivity			<1.0		umhos/cm		1	08-AUG-19
F2-F4-WT	Water							
Batch	R4746599							
WG3128165-2 LCS								
F2 (C10-C16)			95.2		%		65-135	12-AUG-19
F3 (C16-C34)			95.7		%		65-135	12-AUG-19
F4 (C34-C50)			101.7		%		65-135	12-AUG-19
WG3128165-1 MB								
F2 (C10-C16)			<100		ug/L		100	12-AUG-19
F3 (C16-C34)			<250		ug/L		250	12-AUG-19
F4 (C34-C50)			<250		ug/L		250	12-AUG-19
Surrogate: 2-Bromobenzotrifluoride			86.8		%		60-140	12-AUG-19
FC-QT97-ENDPT-WP	Water							
Batch	R4744013							
WG3126323-2 DUP		L2323983-1						
Fecal Coliforms		1720000	1500000		MPN/100mL	14	65	07-AUG-19
WG3126323-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	07-AUG-19
HG-T-CVAA-WP	Water							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP								
Water								
Batch	R4746685							
WG3130097-2	LCS							
Mercury (Hg)-Total			105.0		%		80-120	09-AUG-19
WG3130097-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	09-AUG-19
MET-T-CCMS-WP								
Water								
Batch	R4757095							
WG3133852-2	LCS							
Aluminum (Al)-Total			100.9		%		80-120	15-AUG-19
Arsenic (As)-Total			98.3		%		80-120	15-AUG-19
Cadmium (Cd)-Total			96.2		%		80-120	15-AUG-19
Calcium (Ca)-Total			93.7		%		80-120	15-AUG-19
Chromium (Cr)-Total			98.6		%		80-120	15-AUG-19
Cobalt (Co)-Total			94.4		%		80-120	15-AUG-19
Copper (Cu)-Total			95.9		%		80-120	15-AUG-19
Iron (Fe)-Total			88.0		%		80-120	15-AUG-19
Lead (Pb)-Total			97.1		%		80-120	15-AUG-19
Magnesium (Mg)-Total			106.3		%		80-120	15-AUG-19
Manganese (Mn)-Total			99.6		%		80-120	15-AUG-19
Nickel (Ni)-Total			94.2		%		80-120	15-AUG-19
Potassium (K)-Total			92.0		%		80-120	15-AUG-19
Sodium (Na)-Total			96.8		%		80-120	15-AUG-19
Zinc (Zn)-Total			98.0		%		80-120	15-AUG-19
WG3133852-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	15-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	15-AUG-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	15-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	15-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	15-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	15-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	15-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	15-AUG-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	15-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	15-AUG-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	15-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	15-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	15-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4757095							
WG3133852-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	15-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-AUG-19
NH3-COL-WP	Water							
Batch	R4744419							
WG3127188-14 LCS								
Ammonia, Total (as N)			104.2		%		85-115	07-AUG-19
WG3127188-13 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	07-AUG-19
NO2-IC-N-WP	Water							
Batch	R4746733							
WG3127304-10 LCS								
Nitrite (as N)			99.0		%		90-110	08-AUG-19
WG3127304-9 MB								
Nitrite (as N)			<0.010		mg/L		0.01	08-AUG-19
NO3-IC-N-WP	Water							
Batch	R4746733							
WG3127304-10 LCS								
Nitrate (as N)			98.6		%		90-110	08-AUG-19
WG3127304-9 MB								
Nitrate (as N)			<0.020		mg/L		0.02	08-AUG-19
OG-GRAV-WP	Water							
Batch	R4747276							
WG3128574-2 LCS								
Oil and Grease			93.6		%		70-130	12-AUG-19
WG3128574-1 MB								
Oil and Grease			<5.0		mg/L		5	12-AUG-19
P-T-COL-WP	Water							
Batch	R4745230							
WG3127329-18 LCS								
Phosphorus (P)-Total			103.2		%		80-120	09-AUG-19
WG3127329-17 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	09-AUG-19
PAH-CCME-PPM-WT	Water							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-PPM-WT		Water						
Batch	R4746580							
WG3128165-2	LCS							
1-Methyl Naphthalene			114.6		%		50-150	12-AUG-19
2-Methyl Naphthalene			103.8		%		50-150	12-AUG-19
Acenaphthene			115.5		%		50-150	12-AUG-19
Acenaphthylene			111.0		%		50-150	12-AUG-19
Anthracene			103.9		%		50-150	12-AUG-19
Acridine			100.5		%		50-150	12-AUG-19
Benzo(a)anthracene			113.1		%		50-150	12-AUG-19
Benzo(a)pyrene			113.0		%		50-150	12-AUG-19
Benzo(b&j)fluoranthene			120.4		%		50-150	12-AUG-19
Benzo(g,h,i)perylene			104.1		%		50-150	12-AUG-19
Benzo(k)fluoranthene			126.0		%		50-150	12-AUG-19
Chrysene			119.3		%		50-150	12-AUG-19
Dibenzo(a,h)anthracene			110.9		%		50-150	12-AUG-19
Fluoranthene			116.8		%		50-150	12-AUG-19
Fluorene			112.0		%		50-150	12-AUG-19
Indeno(1,2,3-cd)pyrene			107.8		%		50-150	12-AUG-19
Naphthalene			106.3		%		50-150	12-AUG-19
Phenanthrene			116.3		%		50-150	12-AUG-19
Pyrene			110.5		%		50-150	12-AUG-19
Quinoline			114.2		%		50-150	12-AUG-19
WG3128165-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	12-AUG-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	12-AUG-19
Acenaphthene			<0.000020		mg/L		0.00002	12-AUG-19
Acenaphthylene			<0.000020		mg/L		0.00002	12-AUG-19
Anthracene			<0.000010		mg/L		0.00001	12-AUG-19
Acridine			<0.000020		mg/L		0.00002	12-AUG-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	12-AUG-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	12-AUG-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	12-AUG-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	12-AUG-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	12-AUG-19
Chrysene			<0.000020		mg/L		0.00002	12-AUG-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	12-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-PPM-WT								
Batch R4746580								
WG3128165-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	12-AUG-19
Fluorene			<0.000020		mg/L		0.00002	12-AUG-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	12-AUG-19
Naphthalene			<0.000050		mg/L		0.00005	12-AUG-19
Phenanthrene			<0.000050		mg/L		0.00005	12-AUG-19
Pyrene			<0.000010		mg/L		0.00001	12-AUG-19
Quinoline			<0.000020		mg/L		0.00002	12-AUG-19
Surrogate: d8-Naphthalene			99.1		%		50-150	12-AUG-19
Surrogate: d10-Phenanthrene			103.2		%		50-150	12-AUG-19
Surrogate: d12-Chrysene			101.1		%		50-150	12-AUG-19
Surrogate: d10-Acenaphthene			104.4		%		50-150	12-AUG-19
Surrogate: d9-Acridine (SS)			80.8		%		50-150	12-AUG-19
PH-WP								
Batch R4744874								
WG3127828-5 DUP		L2323983-1						
pH		7.02	7.02	J	pH units	0.00	0.2	08-AUG-19
WG3127828-2 LCS								
pH			7.40		pH units		7.3-7.5	08-AUG-19
PHENOLS-4AAP-WT								
Batch R4746535								
WG3128502-2 LCS								
Phenols (4AAP)			105.5		%		85-115	09-AUG-19
WG3128502-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	09-AUG-19
SO4-IC-N-WP								
Batch R4746733								
WG3127304-10 LCS								
Sulfate (SO4)			99.8		%		90-110	08-AUG-19
WG3127304-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	08-AUG-19
SOLIDS-TOTSUS-WP								
Batch R4752484								
WG3130115-30 LCS								
Total Suspended Solids			91.1		%		85-115	13-AUG-19
WG3130115-29 MB								

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP								
Water								
Batch R4752484								
WG3130115-29 MB								
Total Suspended Solids			<2.0		mg/L		2	13-AUG-19
TC,EC-QT97-ENDPT-WP								
Water								
Batch R4744249								
WG3126324-2 DUP								
Total Coliforms		L2323983-1 >24200000	24200000		MPN/100mL	0.1	65	07-AUG-19
Escherichia Coli		3260000	2250000		MPN/100mL	37	65	07-AUG-19
WG3126324-1 MB								
Total Coliforms			<1		MPN/100mL		1	07-AUG-19
Escherichia Coli			<1		MPN/100mL		1	07-AUG-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	06-AUG-19 10:30	08-AUG-19 12:00	0.25	49	hours	EHTR-FM
Bacteriological Tests							
Fecal Coliform to endpoint by MPN QT97	1	06-AUG-19 10:30	07-AUG-19 18:50	30	32	hours	EHTL
Total and E. coli to endpoint by QT97	1	06-AUG-19 10:30	07-AUG-19 18:50	30	32	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2323983 were received on 07-AUG-19 14:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

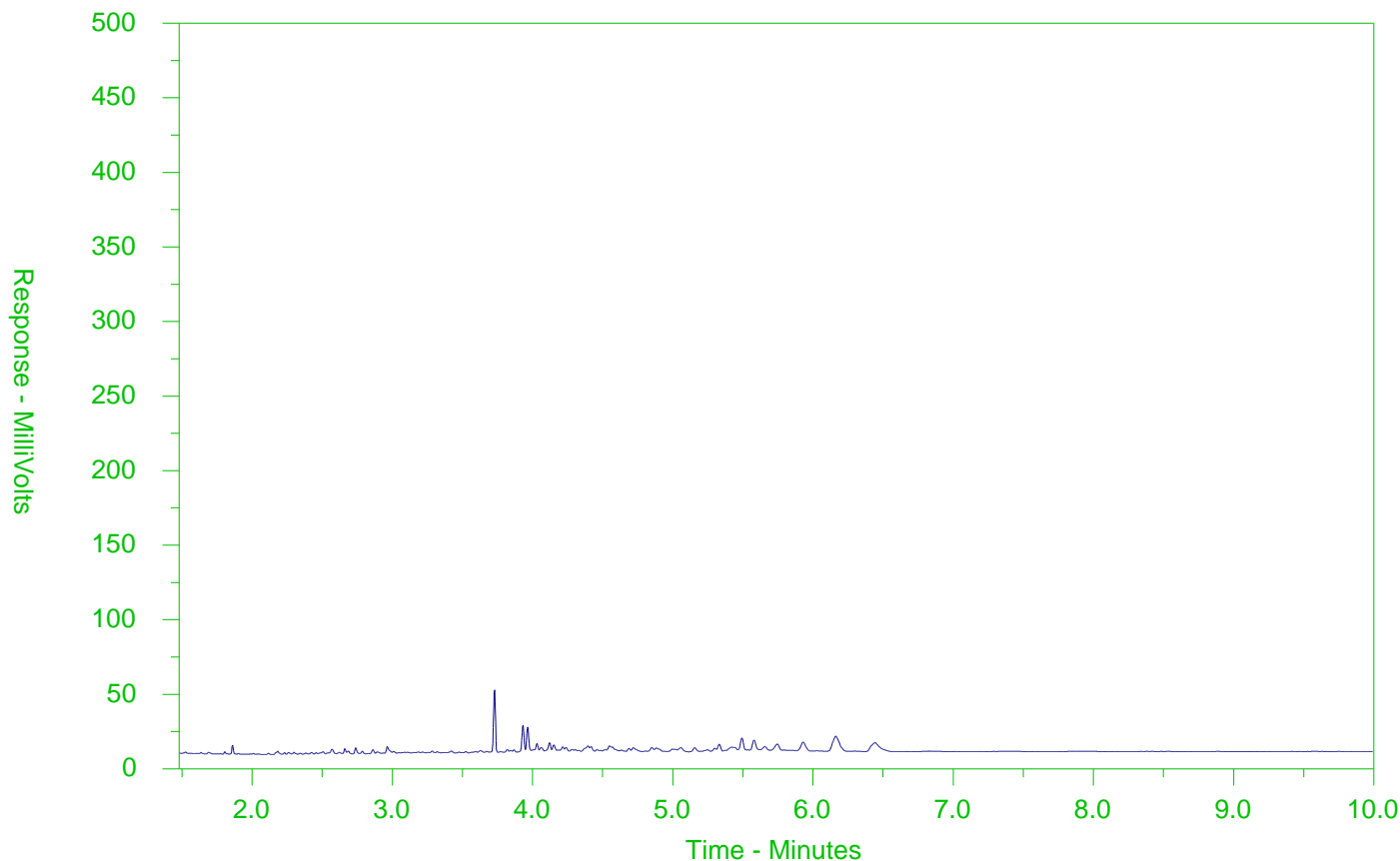
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2323983-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

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

Report To

L2323983-COFC



Service Requested (Rush for routine analysis subject to availability)

- ☒ Regular (Standard Turnaround Times - Business Days)
- ☐ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
- ☐ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
- ☐ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Any: Nunavut CGS - Rankin Inlet (W8133)
 At: SIMON DOIRON
 SS: Box 490
 Rankin Inlet, NU, X0C 0G0
 Phone: 867-645-8155
 C-31#:
 Same as Report? ☒ Yes ☐ No
 Copy of Invoice with Report? ☐ Yes ☐ No
 Fax:
 Address:
 Contact:
 PO / AFE:
 LSD:

Email 1: sdoiron@gov.nu.ca
 Email 2: mlustv@gov.nu.ca
 Email 3: aanderson@gov.nu.ca
 Client / Project Information
 Job #: Rankin Inlet WWTP- Monthly Effluent
 Quote #:
 ALS Contact: Craig Riddell
 Sampled By: Amanda Anderson

Lab Work Order #
 (lab use only)

Sample Identification

(This description will appear on the report)

Sample # Rankin Inlet WWTP - Effluent

Date Sampled Aug 6
 Time Sampled 10:30
 Sample Type Waste

BTX,F1-F4-WP
 PAH,PAH-WP
 NUNAVUT-WW-GRP1-WP
 TC,EC-QT97-ENDPT-WP
 FC-QT97-ENDPT-WP

Number of Containers 15

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Nunavut-WW-GRP1-WP pkg includes 1 L BOD/CBOD, 1 L Routine, 250 ml Metals, 40 ml Mercury Vial, 250 ml Amber Nutrient, 250 ml Amber Phenols, 2 x 250 ml Amber Oil & Grease, 250 ml Bacteria (9 bottles) + 5 Vials for BTX,F1-F4 and 1 L Amber for PAHs = Total of 15 Bottles per sample.

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 provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)

SHIPMENT RECEPTION (lab use only)

SHIPMENT VERIFICATION (lab use only)

Released by: Amanda Anderson	Date (dd-mm-yy): 06/Aug/19	Time (hh-mm): 10:30	Received by: DK	Date: 06/08/2019	Time: 15:00	Temperature: 15.8 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
------------------------------	----------------------------	---------------------	-----------------	------------------	-------------	----------------------	--------------	-------	-------	--

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix S



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 13-AUG-19
Report Date: 23-AUG-19 11:42 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2327566

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2327566-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 12-AUG-19 @ 13:15							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		16-AUG-19	R4762569
Toluene	<0.0010		0.0010	mg/L		16-AUG-19	R4762569
Ethyl benzene	<0.00050		0.00050	mg/L		16-AUG-19	R4762569
o-Xylene	<0.00050		0.00050	mg/L		16-AUG-19	R4762569
m+p-Xylenes	<0.00040		0.00040	mg/L		16-AUG-19	R4762569
F1 (C6-C10)	<0.10		0.10	mg/L		16-AUG-19	R4762569
Surrogate: 4-Bromofluorobenzene (SS)	89.0		70-130	%		16-AUG-19	R4762569
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.12		0.10	mg/L	15-AUG-19	15-AUG-19	R4757751
F3 (C16-C34)	1.86		0.25	mg/L	15-AUG-19	15-AUG-19	R4757751
F4 (C34-C50)	0.78		0.25	mg/L	15-AUG-19	15-AUG-19	R4757751
Surrogate: 2-Bromobenzotrifluoride	96.6		60-140	%	15-AUG-19	15-AUG-19	R4757751
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		21-AUG-19	
F2-Naphth	0.11		0.10	mg/L		21-AUG-19	
F3-PAH	1.86		0.25	mg/L		21-AUG-19	
Total Hydrocarbons (C6-C50)	2.76		0.38	mg/L		21-AUG-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		21-AUG-19	
Miscellaneous Parameters							
Fecal Coliforms	677000		1	MPN/100mL		13-AUG-19	R4752760
Total and E. coli to endpoint by QT97							
Total Coliforms	15500000		1	MPN/100mL		13-AUG-19	R4752766
Escherichia Coli	1020000		1	MPN/100mL		13-AUG-19	R4752766
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.00327	EMPC	0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
2-Methyl Naphthalene	0.00692		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Acenaphthene	0.000114		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Acenaphthylene	0.000026		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Anthracene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Acridine	<0.000020		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Benzo(a)anthracene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	16-AUG-19	16-AUG-19	R4757673
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Chrysene	<0.000020		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	16-AUG-19	16-AUG-19	R4757673
Fluoranthene	<0.000020		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Fluorene	0.000210		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Naphthalene	0.00376		0.000050	mg/L	16-AUG-19	16-AUG-19	R4757673
Phenanthrene	<0.000050		0.000050	mg/L	16-AUG-19	16-AUG-19	R4757673
Pyrene	<0.000010		0.000010	mg/L	16-AUG-19	16-AUG-19	R4757673
Quinoline	<0.000020		0.000020	mg/L	16-AUG-19	16-AUG-19	R4757673
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	16-AUG-19	16-AUG-19	R4757673
Surrogate: Acenaphthene d10	102.1		60-130	%	16-AUG-19	16-AUG-19	R4757673
Surrogate: Acridine d9	91.2		60-130	%	16-AUG-19	16-AUG-19	R4757673
Surrogate: Chrysene d12	94.9		60-130	%	16-AUG-19	16-AUG-19	R4757673
Surrogate: Naphthalene d8	93.4		50-130	%	16-AUG-19	16-AUG-19	R4757673
Surrogate: Phenanthrene d10	100.5		60-130	%	16-AUG-19	16-AUG-19	R4757673

* 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
L2327566-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 12-AUG-19 @ 13:15							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	53.4		1.2	mg/L		16-AUG-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		16-AUG-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		16-AUG-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	43.8		1.0	mg/L		15-AUG-19	R4757241
Ammonia by colour							
Ammonia, Total (as N)	1.99		0.10	mg/L		14-AUG-19	R4756488
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	16.7		6.0	mg/L		14-AUG-19	R4759527
Carbonaceous BOD							
BOD Carbonaceous	13.8		6.0	mg/L		14-AUG-19	R4759527
Chloride in Water by IC							
Chloride (Cl)	35.8		0.50	mg/L		15-AUG-19	R4757306
Conductivity							
Conductivity	241		1.0	umhos/cm		15-AUG-19	R4757241
Hardness Calculated							
Hardness (as CaCO3)	63.8	HTC	0.20	mg/L		22-AUG-19	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	19-AUG-19	22-AUG-19	R4765809
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		15-AUG-19	R4757306
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		15-AUG-19	R4757306
Oil & Grease - Gravimetric							
Oil and Grease	7.4		5.0	mg/L		20-AUG-19	R4759566
Phenol (4AAP)							
Phenols (4AAP)	0.0021		0.0010	mg/L		14-AUG-19	R4753047
Phosphorus, Total							
Phosphorus (P)-Total	0.482		0.0030	mg/L		15-AUG-19	R4755950
Sulfate in Water by IC							
Sulfate (SO4)	19.3		0.30	mg/L		15-AUG-19	R4757306
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0841		0.0030	mg/L	21-AUG-19	21-AUG-19	R4762873
Arsenic (As)-Total	0.00076		0.00010	mg/L	21-AUG-19	21-AUG-19	R4762873
Cadmium (Cd)-Total	0.0000242		0.0000050	mg/L	21-AUG-19	21-AUG-19	R4762873
Calcium (Ca)-Total	18.4		0.050	mg/L	21-AUG-19	21-AUG-19	R4762873
Chromium (Cr)-Total	0.00037		0.00010	mg/L	21-AUG-19	21-AUG-19	R4762873
Cobalt (Co)-Total	0.00019		0.00010	mg/L	21-AUG-19	21-AUG-19	R4762873
Copper (Cu)-Total	0.0549		0.00050	mg/L	21-AUG-19	21-AUG-19	R4762873
Iron (Fe)-Total	0.126		0.010	mg/L	21-AUG-19	21-AUG-19	R4762873
Lead (Pb)-Total	0.00109		0.000050	mg/L	21-AUG-19	21-AUG-19	R4762873
Magnesium (Mg)-Total	4.33		0.0050	mg/L	21-AUG-19	21-AUG-19	R4762873
Manganese (Mn)-Total	0.0438		0.00010	mg/L	21-AUG-19	21-AUG-19	R4762873
Nickel (Ni)-Total	0.00099		0.00050	mg/L	21-AUG-19	21-AUG-19	R4762873
Potassium (K)-Total	3.46		0.050	mg/L	21-AUG-19	21-AUG-19	R4762873
Sodium (Na)-Total	21.3		0.050	mg/L	21-AUG-19	21-AUG-19	R4762873
Zinc (Zn)-Total	0.0265		0.0030	mg/L	21-AUG-19	21-AUG-19	R4762873

* 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
L2327566-1 RANKIN INLET WWTP - EFFLUENT Sampled By: AA on 12-AUG-19 @ 13:15 Matrix: WASTE Total Organic Carbon by Combustion Total Organic Carbon Total Suspended Solids Total Suspended Solids pH pH	 18.2 43.5 7.27		 0.50 2.0 0.10	 mg/L mg/L pH units		 16-AUG-19 19-AUG-19 15-AUG-19	 R4758901 R4759865 R4757241

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			

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

1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene. 3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges: 1. All extraction and analysis holding times were met. 2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average. 3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors. 4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511
Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - 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.



Workorder: L2327566

Report Date: 23-AUG-19

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Client: Nunavut Community & Government Services - Rankin Inlet

P.O. Box 490

Rankin Inlet NU X0C 0G0

Contact: SIMON DOIRON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R4757241							
WG3134736-30	DUP	L2327566-1						
Alkalinity, Total (as CaCO3)			43.8	43.6	mg/L	0.5	20	15-AUG-19
WG3134736-29	LCS							
Alkalinity, Total (as CaCO3)				100.9	%		85-115	15-AUG-19
WG3134736-26	MB							
Alkalinity, Total (as CaCO3)			<1.0	mg/L		1	15-AUG-19	
BOD-CBOD-WP		Water						
Batch	R4759527							
WG3132087-7	LCS							
BOD Carbonaceous			95.2	%		85-115	14-AUG-19	
WG3132087-6	MB							
BOD Carbonaceous			<2.0	mg/L		2	14-AUG-19	
BOD-WP		Water						
Batch	R4759527							
WG3132087-7	LCS							
Biochemical Oxygen Demand			96.0	%		85-115	14-AUG-19	
WG3132087-6	MB							
Biochemical Oxygen Demand			<2.0	mg/L		2	14-AUG-19	
BTEXS+F1-HSMS-WP		Water						
Batch	R4762569							
WG3134039-2	LCS							
Benzene			90.3	%		70-130	15-AUG-19	
Toluene			91.8	%		70-130	15-AUG-19	
Ethyl benzene			99.7	%		70-130	15-AUG-19	
o-Xylene			93.4	%		70-130	15-AUG-19	
m+p-Xylenes			96.8	%		70-130	15-AUG-19	
WG3134039-3	LCS							
F1 (C6-C10)			105.3	%		70-130	16-AUG-19	
WG3134039-1	MB							
Benzene			<0.00050	mg/L		0.0005	16-AUG-19	
Toluene			<0.0010	mg/L		0.001	16-AUG-19	
Ethyl benzene			<0.00050	mg/L		0.0005	16-AUG-19	
o-Xylene			<0.00050	mg/L		0.0005	16-AUG-19	
m+p-Xylenes			<0.00040	mg/L		0.0004	16-AUG-19	
F1 (C6-C10)			<0.10	mg/L		0.1	16-AUG-19	
Surrogate: 4-Bromofluorobenzene (SS)			91.0	%		70-130	16-AUG-19	

Quality Control Report

Workorder: L2327566

Report Date: 23-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch R4758901								
WG3136582-6 LCS								
Total Organic Carbon			101.5		%		80-120	16-AUG-19
WG3136582-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	16-AUG-19
CL-IC-N-WP	Water							
Batch R4757306								
WG3133622-2 LCS								
Chloride (Cl)			99.0		%		90-110	15-AUG-19
WG3133622-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	15-AUG-19
EC-WP	Water							
Batch R4757241								
WG3134736-30 DUP		L2327566-1						
Conductivity		241	240		umhos/cm	0.4	10	15-AUG-19
WG3134736-28 LCS								
Conductivity			98.0		%		90-110	15-AUG-19
WG3134736-26 MB								
Conductivity			<1.0		umhos/cm		1	15-AUG-19
F2-F4-FID-WP	Water							
Batch R4757751								
WG3133697-2 LCS								
F2 (C10-C16)			89.6		%		70-130	15-AUG-19
F3 (C16-C34)			89.9		%		70-130	15-AUG-19
F4 (C34-C50)			94.7		%		70-130	15-AUG-19
WG3133697-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	15-AUG-19
F3 (C16-C34)			<0.25		mg/L		0.25	15-AUG-19
F4 (C34-C50)			<0.25		mg/L		0.25	15-AUG-19
Surrogate: 2-Bromobenzotrifluoride			97.5		%		60-140	15-AUG-19
FC-QT97-ENDPT-WP	Water							
Batch R4752760								
WG3131725-2 DUP		L2327566-1						
Fecal Coliforms		677000	546000		MPN/100mL	21	65	13-AUG-19
WG3131725-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	13-AUG-19
HG-T-CVAA-WP	Water							

Quality Control Report

Workorder: L2327566

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP								
Water								
Batch	R4765809							
WG3141537-2	LCS							
Mercury (Hg)-Total			98.0		%		80-120	22-AUG-19
WG3141537-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	22-AUG-19
MET-T-CCMS-WP								
Water								
Batch	R4762873							
WG3139155-2	LCS							
Aluminum (Al)-Total			106.4		%		80-120	21-AUG-19
Arsenic (As)-Total			105.1		%		80-120	21-AUG-19
Cadmium (Cd)-Total			106.1		%		80-120	21-AUG-19
Calcium (Ca)-Total			107.7		%		80-120	21-AUG-19
Chromium (Cr)-Total			109.2		%		80-120	21-AUG-19
Cobalt (Co)-Total			109.0		%		80-120	21-AUG-19
Copper (Cu)-Total			112.1		%		80-120	21-AUG-19
Iron (Fe)-Total			102.5		%		80-120	21-AUG-19
Lead (Pb)-Total			96.3		%		80-120	21-AUG-19
Magnesium (Mg)-Total			117.0		%		80-120	21-AUG-19
Manganese (Mn)-Total			106.2		%		80-120	21-AUG-19
Nickel (Ni)-Total			103.2		%		80-120	21-AUG-19
Potassium (K)-Total			102.6		%		80-120	21-AUG-19
Sodium (Na)-Total			115.0		%		80-120	21-AUG-19
Zinc (Zn)-Total			108.7		%		80-120	21-AUG-19
WG3139155-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	21-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	21-AUG-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	21-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	21-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	21-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	21-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	21-AUG-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	21-AUG-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	21-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	21-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	21-AUG-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4762873							
WG3139155-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	21-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	21-AUG-19
NH3-COL-WP	Water							
Batch	R4756488							
WG3133870-14 LCS								
Ammonia, Total (as N)			102.1		%		85-115	14-AUG-19
WG3133870-13 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	14-AUG-19
NO2-IC-N-WP	Water							
Batch	R4757306							
WG3133622-2 LCS								
Nitrite (as N)			99.2		%		90-110	15-AUG-19
WG3133622-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	15-AUG-19
NO3-IC-N-WP	Water							
Batch	R4757306							
WG3133622-2 LCS								
Nitrate (as N)			98.6		%		90-110	15-AUG-19
WG3133622-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	15-AUG-19
OG-GRAV-WP	Water							
Batch	R4759566							
WG3134989-2 LCS								
Oil and Grease			95.1		%		70-130	20-AUG-19
WG3134989-1 MB								
Oil and Grease			<5.0		mg/L		5	20-AUG-19
P-T-COL-WP	Water							
Batch	R4755950							
WG3132843-2 LCS								
Phosphorus (P)-Total			102.0		%		80-120	15-AUG-19
WG3132843-1 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	15-AUG-19
PAH,PANH-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4757673							
WG3135233-2	LCS							
1-Methyl Naphthalene			92.4		%		60-130	16-AUG-19
2-Methyl Naphthalene			85.3		%		60-130	16-AUG-19
Acenaphthene			94.0		%		60-130	16-AUG-19
Acenaphthylene			83.9		%		60-130	16-AUG-19
Anthracene			77.7		%		60-130	16-AUG-19
Acridine			90.8		%		60-130	16-AUG-19
Benzo(a)anthracene			90.6		%		60-130	16-AUG-19
Benzo(a)pyrene			87.6		%		60-130	16-AUG-19
Benzo(b&j)fluoranthene			88.0		%		60-130	16-AUG-19
Benzo(g,h,i)perylene			102.7		%		60-130	16-AUG-19
Benzo(k)fluoranthene			94.6		%		60-130	16-AUG-19
Chrysene			87.6		%		60-130	16-AUG-19
Dibenzo(a,h)anthracene			96.1		%		60-130	16-AUG-19
Fluoranthene			93.6		%		60-130	16-AUG-19
Fluorene			93.8		%		60-130	16-AUG-19
Indeno(1,2,3-cd)pyrene			87.8		%		60-130	16-AUG-19
Naphthalene			105.1		%		50-130	16-AUG-19
Phenanthrene			104.9		%		60-130	16-AUG-19
Pyrene			91.6		%		60-130	16-AUG-19
Quinoline			93.3		%		60-130	16-AUG-19
WG3135233-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	16-AUG-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	16-AUG-19
Acenaphthene			<0.000020		mg/L		0.00002	16-AUG-19
Acenaphthylene			<0.000020		mg/L		0.00002	16-AUG-19
Anthracene			<0.000010		mg/L		0.00001	16-AUG-19
Acridine			<0.000020		mg/L		0.00002	16-AUG-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	16-AUG-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	16-AUG-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	16-AUG-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	16-AUG-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	16-AUG-19
Chrysene			<0.000020		mg/L		0.00002	16-AUG-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	16-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP								
Batch R4757673								
WG3135233-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	16-AUG-19
Fluorene			<0.000020		mg/L		0.00002	16-AUG-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	16-AUG-19
Naphthalene			<0.000050		mg/L		0.00005	16-AUG-19
Phenanthrene			<0.000050		mg/L		0.00005	16-AUG-19
Pyrene			<0.000010		mg/L		0.00001	16-AUG-19
Quinoline			<0.000020		mg/L		0.00002	16-AUG-19
Surrogate: Acenaphthene d10			85.3		%		60-130	16-AUG-19
Surrogate: Acridine d9			75.4		%		60-130	16-AUG-19
Surrogate: Chrysene d12			94.3		%		60-130	16-AUG-19
Surrogate: Naphthalene d8			83.7		%		50-130	16-AUG-19
Surrogate: Phenanthrene d10			78.9		%		60-130	16-AUG-19
PH-WP								
Batch R4757241								
WG3134736-30 DUP		L2327566-1						
pH		7.27	7.28	J	pH units	0.01	0.2	15-AUG-19
WG3134736-27 LCS								
pH			7.41		pH units		7.3-7.5	15-AUG-19
PHENOLS-4AAP-WT								
Batch R4753047								
WG3132612-2 LCS								
Phenols (4AAP)			99.2		%		85-115	14-AUG-19
WG3132612-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	14-AUG-19
SO4-IC-N-WP								
Batch R4757306								
WG3133622-2 LCS								
Sulfate (SO4)			100.4		%		90-110	15-AUG-19
WG3133622-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	15-AUG-19
SOLIDS-TOTSUS-WP								
Batch R4759865								
WG3135103-6 LCS								
Total Suspended Solids			96.1		%		85-115	19-AUG-19
WG3135103-5 MB								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP	Water							
Batch	R4759865							
WG3135103-5 MB								
Total Suspended Solids			<2.0		mg/L		2	19-AUG-19
TC,EC-QT97-ENDPT-WP	Water							
Batch	R4752766							
WG3131726-2 DUP		L2327566-1						
Total Coliforms		15500000	8660000		MPN/100mL	57	65	13-AUG-19
Escherichia Coli		1020000	727000		MPN/100mL	33	65	13-AUG-19
WG3131726-1 MB								
Total Coliforms			<1		MPN/100mL		1	13-AUG-19
Escherichia Coli			<1		MPN/100mL		1	13-AUG-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	12-AUG-19 13:15	15-AUG-19 12:00	0.25	71	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2327566 were received on 13-AUG-19 13:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

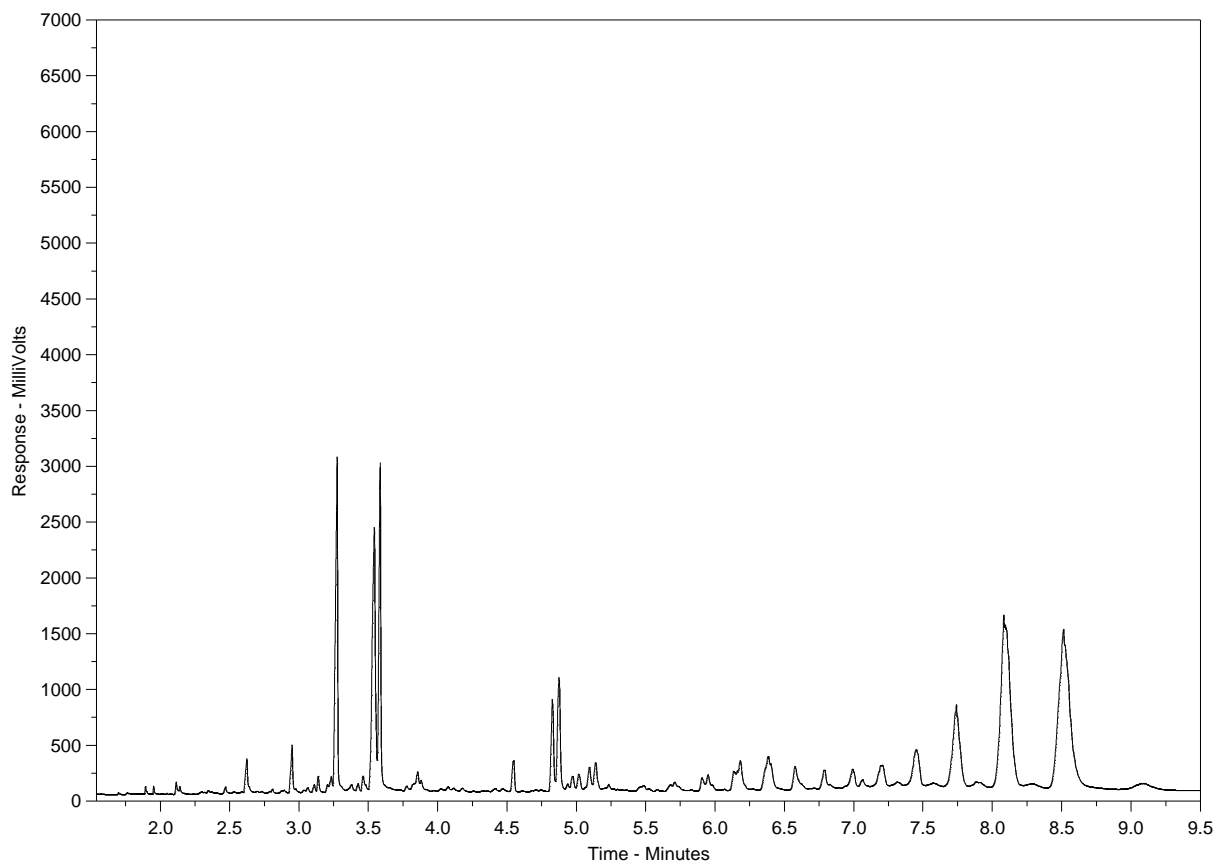
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2327566-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix T



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 21-AUG-19
Report Date: 30-AUG-19 09:06 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2332810

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2332810-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 19-AUG-19 @ 09:15							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		23-AUG-19	R4765656
Toluene	<0.0010		0.0010	mg/L		23-AUG-19	R4765656
Ethyl benzene	<0.00050		0.00050	mg/L		23-AUG-19	R4765656
o-Xylene	<0.00050		0.00050	mg/L		23-AUG-19	R4765656
m+p-Xylenes	<0.00040		0.00040	mg/L		23-AUG-19	R4765656
F1 (C6-C10)	<0.10		0.10	mg/L		23-AUG-19	R4765656
Surrogate: 4-Bromofluorobenzene (SS)	87.0		70-130	%		23-AUG-19	R4765656
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.54		0.10	mg/L	22-AUG-19	22-AUG-19	R4766908
F3 (C16-C34)	13.8		0.25	mg/L	22-AUG-19	22-AUG-19	R4766908
F4 (C34-C50)	4.91		0.25	mg/L	22-AUG-19	22-AUG-19	R4766908
Surrogate: 2-Bromobenzotrifluoride	116.4		60-140	%	22-AUG-19	22-AUG-19	R4766908
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		29-AUG-19	
F2-Naphth	0.54		0.10	mg/L		29-AUG-19	
F3-PAH	13.8		0.25	mg/L		29-AUG-19	
Total Hydrocarbons (C6-C50)	19.3		0.38	mg/L		29-AUG-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		27-AUG-19	
Miscellaneous Parameters							
Fecal Coliforms	81600	PEHR	1	MPN/100mL		21-AUG-19	R4764012
Total and E. coli to endpoint by QT97							
Total Coliforms	4110000	PEHR	1	MPN/100mL		21-AUG-19	R4764034
Escherichia Coli	146000	PEHR	1	MPN/100mL		21-AUG-19	R4764034
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
2-Methyl Naphthalene	<0.000030	DLM	0.000030	mg/L	22-AUG-19	26-AUG-19	R4770079
Acenaphthene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Acenaphthylene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Anthracene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Acridine	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Benzo(a)anthracene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	22-AUG-19	26-AUG-19	R4770079
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Chrysene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	22-AUG-19	26-AUG-19	R4770079
Fluoranthene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Fluorene	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Naphthalene	<0.000050		0.000050	mg/L	22-AUG-19	26-AUG-19	R4770079
Phenanthrene	<0.000050		0.000050	mg/L	22-AUG-19	26-AUG-19	R4770079
Pyrene	<0.000010		0.000010	mg/L	22-AUG-19	26-AUG-19	R4770079
Quinoline	<0.000020		0.000020	mg/L	22-AUG-19	26-AUG-19	R4770079
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	22-AUG-19	26-AUG-19	R4770079
Surrogate: Acenaphthene d10	93.6		60-130	%	22-AUG-19	26-AUG-19	R4770079
Surrogate: Acridine d9	109.4		60-130	%	22-AUG-19	26-AUG-19	R4770079
Surrogate: Chrysene d12	104.8		60-130	%	22-AUG-19	26-AUG-19	R4770079
Surrogate: Naphthalene d8	89.0		50-130	%	22-AUG-19	26-AUG-19	R4770079
Surrogate: Phenanthrene d10	112.3		60-130	%	22-AUG-19	26-AUG-19	R4770079

* 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
L2332810-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: AA on 19-AUG-19 @ 09:15							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	43.6		1.2	mg/L		23-AUG-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		23-AUG-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		23-AUG-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	35.7		1.0	mg/L		22-AUG-19	R4765529
Ammonia by colour							
Ammonia, Total (as N)	1.26		0.10	mg/L		21-AUG-19	R4765054
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	11.8		2.0	mg/L		21-AUG-19	R4769412
Carbonaceous BOD							
BOD Carbonaceous	9.9		2.0	mg/L		21-AUG-19	R4769412
Chloride in Water by IC							
Chloride (Cl)	33.1		0.50	mg/L		22-AUG-19	R4769733
Conductivity							
Conductivity	216		1.0	umhos/cm		22-AUG-19	R4765529
Hardness Calculated							
Hardness (as CaCO3)	117	HTC	0.20	mg/L		30-AUG-19	
Mercury Total							
Mercury (Hg)-Total	<0.000025	DLM	0.000025	mg/L	23-AUG-19	24-AUG-19	R4768415
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		22-AUG-19	R4769733
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		28-AUG-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-AUG-19	R4769733
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		27-AUG-19	R4769771
Phenol (4AAP)							
Phenols (4AAP)	0.0026		0.0010	mg/L		26-AUG-19	R4769626
Phosphorus, Total							
Phosphorus (P)-Total	0.395		0.0030	mg/L		23-AUG-19	R4766335
Sulfate in Water by IC							
Sulfate (SO4)	17.8		0.30	mg/L		22-AUG-19	R4769733
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.150		0.0030	mg/L	29-AUG-19	29-AUG-19	R4777903
Arsenic (As)-Total	0.00172		0.00010	mg/L	29-AUG-19	29-AUG-19	R4777903
Cadmium (Cd)-Total	0.000104		0.0000050	mg/L	29-AUG-19	29-AUG-19	R4777903
Calcium (Ca)-Total	34.9		0.050	mg/L	29-AUG-19	29-AUG-19	R4777903
Chromium (Cr)-Total	0.00113		0.00010	mg/L	29-AUG-19	29-AUG-19	R4777903
Cobalt (Co)-Total	0.00054		0.00010	mg/L	29-AUG-19	29-AUG-19	R4777903
Copper (Cu)-Total	0.178		0.00050	mg/L	29-AUG-19	29-AUG-19	R4777903
Iron (Fe)-Total	0.359		0.010	mg/L	29-AUG-19	29-AUG-19	R4777903
Lead (Pb)-Total	0.00207		0.000050	mg/L	29-AUG-19	29-AUG-19	R4777903
Magnesium (Mg)-Total	7.12		0.0050	mg/L	29-AUG-19	29-AUG-19	R4777903
Manganese (Mn)-Total	0.0893		0.00010	mg/L	29-AUG-19	29-AUG-19	R4777903
Nickel (Ni)-Total	0.00607		0.00050	mg/L	29-AUG-19	29-AUG-19	R4777903
Potassium (K)-Total	10.2		0.050	mg/L	29-AUG-19	29-AUG-19	R4777903
Sodium (Na)-Total	31.9		0.050	mg/L	29-AUG-19	29-AUG-19	R4777903
Zinc (Zn)-Total	0.123		0.0030	mg/L	29-AUG-19	29-AUG-19	R4777903

* 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
L2332810-1 RANKIN INLET WWTP - EFFLUENT Sampled By: AA on 19-AUG-19 @ 09:15 Matrix: WASTE Total Organic Carbon by Combustion Total Organic Carbon Total Suspended Solids Total Suspended Solids pH pH	8.84 7.9 7.68		0.50 2.0 0.10	mg/L mg/L pH units		27-AUG-19 26-AUG-19 22-AUG-19	R4771648 R4769437 R4765529

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

Reference Information

Qualifiers for Individual Samples Listed:

Lab Sample ID	Client Sample ID	Qualifier	Description
L2332810-1	RANKIN INLET WWTP - EFFI	PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

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 transferred 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			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.			
3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.			
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.			
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
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.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Escherichia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2332810

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP								
Batch R4771648								
WG3145817-3 DUP		L2332810-1						
Total Organic Carbon		8.84	8.79		mg/L	0.6	20	27-AUG-19
WG3145817-2 LCS								
Total Organic Carbon			102.4		%		80-120	27-AUG-19
WG3145817-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	27-AUG-19
CL-IC-N-WP								
Batch R4769733								
WG3140209-3 DUP		L2332810-1						
Chloride (Cl)		33.1	32.5		mg/L	1.7	20	22-AUG-19
WG3140209-2 LCS								
Chloride (Cl)			97.8		%		90-110	22-AUG-19
WG3140209-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-AUG-19
WG3140209-4 MS		L2332810-1						
Chloride (Cl)			100.6		%		75-125	22-AUG-19
EC-WP								
Batch R4765529								
WG3141365-23 LCS								
Conductivity			99.1		%		90-110	22-AUG-19
WG3141365-21 MB								
Conductivity			<1.0		umhos/cm		1	22-AUG-19
F2-F4-FID-WP								
Batch R4766908								
WG3140141-2 LCS								
F2 (C10-C16)			87.8		%		70-130	22-AUG-19
F3 (C16-C34)			89.2		%		70-130	22-AUG-19
F4 (C34-C50)			89.8		%		70-130	22-AUG-19
WG3140141-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	22-AUG-19
F3 (C16-C34)			<0.25		mg/L		0.25	22-AUG-19
F4 (C34-C50)			<0.25		mg/L		0.25	22-AUG-19
Surrogate: 2-Bromobenzotrifluoride			94.5		%		60-140	22-AUG-19
FC-QT97-ENDPT-WP								
Batch R4766908								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC-QT97-ENDPT-WP								
Water								
Batch	R4764012							
WG3139598-2	DUP	L2332810-1						
Fecal Coliforms		81600	54800		MPN/100mL	39	65	21-AUG-19
WG3139598-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	21-AUG-19
HG-T-CVAA-WP								
Water								
Batch	R4768415							
WG3143109-2	LCS							
Mercury (Hg)-Total			97.0		%		80-120	24-AUG-19
WG3143109-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	24-AUG-19
MET-T-CCMS-WP								
Water								
Batch	R4777903							
WG3147396-2	LCS							
Aluminum (Al)-Total			107.4		%		80-120	29-AUG-19
Arsenic (As)-Total			105.3		%		80-120	29-AUG-19
Cadmium (Cd)-Total			104.5		%		80-120	29-AUG-19
Calcium (Ca)-Total			96.4		%		80-120	29-AUG-19
Chromium (Cr)-Total			103.5		%		80-120	29-AUG-19
Cobalt (Co)-Total			101.4		%		80-120	29-AUG-19
Copper (Cu)-Total			102.3		%		80-120	29-AUG-19
Iron (Fe)-Total			90.9		%		80-120	29-AUG-19
Lead (Pb)-Total			99.2		%		80-120	29-AUG-19
Magnesium (Mg)-Total			117.1		%		80-120	29-AUG-19
Manganese (Mn)-Total			105.6		%		80-120	29-AUG-19
Nickel (Ni)-Total			100.8		%		80-120	29-AUG-19
Potassium (K)-Total			102.4		%		80-120	29-AUG-19
Sodium (Na)-Total			105.2		%		80-120	29-AUG-19
Zinc (Zn)-Total			103.4		%		80-120	29-AUG-19
WG3147396-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	29-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-AUG-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	29-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	29-AUG-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	29-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	29-AUG-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	29-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OG-GRAV-WP		Water						
Batch	R4769771							
WG3143509-2	LCS							
Oil and Grease			83.3		%		70-130	27-AUG-19
WG3143509-1	MB							
Oil and Grease			<5.0		mg/L		5	27-AUG-19
P-T-COL-WP		Water						
Batch	R4766335							
WG3140690-2	LCS							
Phosphorus (P)-Total			103.0		%		80-120	23-AUG-19
WG3140690-1	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	23-AUG-19
PAH,PANH-WP		Water						
Batch	R4770079							
WG3140873-2	LCS							
1-Methyl Naphthalene			116.9		%		60-130	26-AUG-19
2-Methyl Naphthalene			108.3		%		60-130	26-AUG-19
Acenaphthene			118.1		%		60-130	26-AUG-19
Acenaphthylene			105.3		%		60-130	26-AUG-19
Anthracene			98.6		%		60-130	26-AUG-19
Acridine			100.3		%		60-130	26-AUG-19
Benzo(a)anthracene			105.5		%		60-130	26-AUG-19
Benzo(a)pyrene			111.5		%		60-130	26-AUG-19
Benzo(b&j)fluoranthene			105.5		%		60-130	26-AUG-19
Benzo(g,h,i)perylene			100.6		%		60-130	26-AUG-19
Benzo(k)fluoranthene			100.9		%		60-130	26-AUG-19
Chrysene			89.6		%		60-130	26-AUG-19
Dibenzo(a,h)anthracene			89.2		%		60-130	26-AUG-19
Fluoranthene			115.3		%		60-130	26-AUG-19
Fluorene			109.0		%		60-130	26-AUG-19
Indeno(1,2,3-cd)pyrene			98.5		%		60-130	26-AUG-19
Naphthalene			99.7		%		50-130	26-AUG-19
Phenanthrene			121.6		%		60-130	26-AUG-19
Pyrene			123.3		%		60-130	26-AUG-19
Quinoline			100.4		%		60-130	26-AUG-19
WG3140873-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	26-AUG-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	26-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WP								
Batch R4769733								
WG3140209-3	DUP	L2332810-1						
Sulfate (SO4)		17.8	17.5		mg/L	1.5	20	22-AUG-19
WG3140209-2	LCS							
Sulfate (SO4)			98.6		%		90-110	22-AUG-19
WG3140209-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	22-AUG-19
WG3140209-4	MS	L2332810-1						
Sulfate (SO4)			100.2		%		75-125	22-AUG-19
SOLIDS-TOTSUS-WP								
Batch R4769437								
WG3141927-6	LCS							
Total Suspended Solids			105.5		%		85-115	26-AUG-19
WG3141927-5	MB							
Total Suspended Solids			<2.0		mg/L		2	26-AUG-19
TC,EC-QT97-ENDPT-WP								
Batch R4764034								
WG3139603-2	DUP	L2332810-1						
Total Coliforms		4110000	2190000		MPN/100mL	61	65	21-AUG-19
Escherichia Coli		146000	146000		MPN/100mL	0.0	65	21-AUG-19
WG3139603-1	MB							
Total Coliforms			<1		MPN/100mL		1	21-AUG-19
Escherichia Coli			<1		MPN/100mL		1	21-AUG-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	19-AUG-19 09:15	22-AUG-19 12:00	0.25	75	hours	EHTR-FM
Bacteriological Tests							
Fecal Coliform to endpoint by MPN QT97	1	19-AUG-19 09:15	21-AUG-19 18:20	30	57	hours	EHTR
Total and E. coli to endpoint by QT97	1	19-AUG-19 09:15	21-AUG-19 18:20	30	57	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2332810 were received on 21-AUG-19 10:35.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

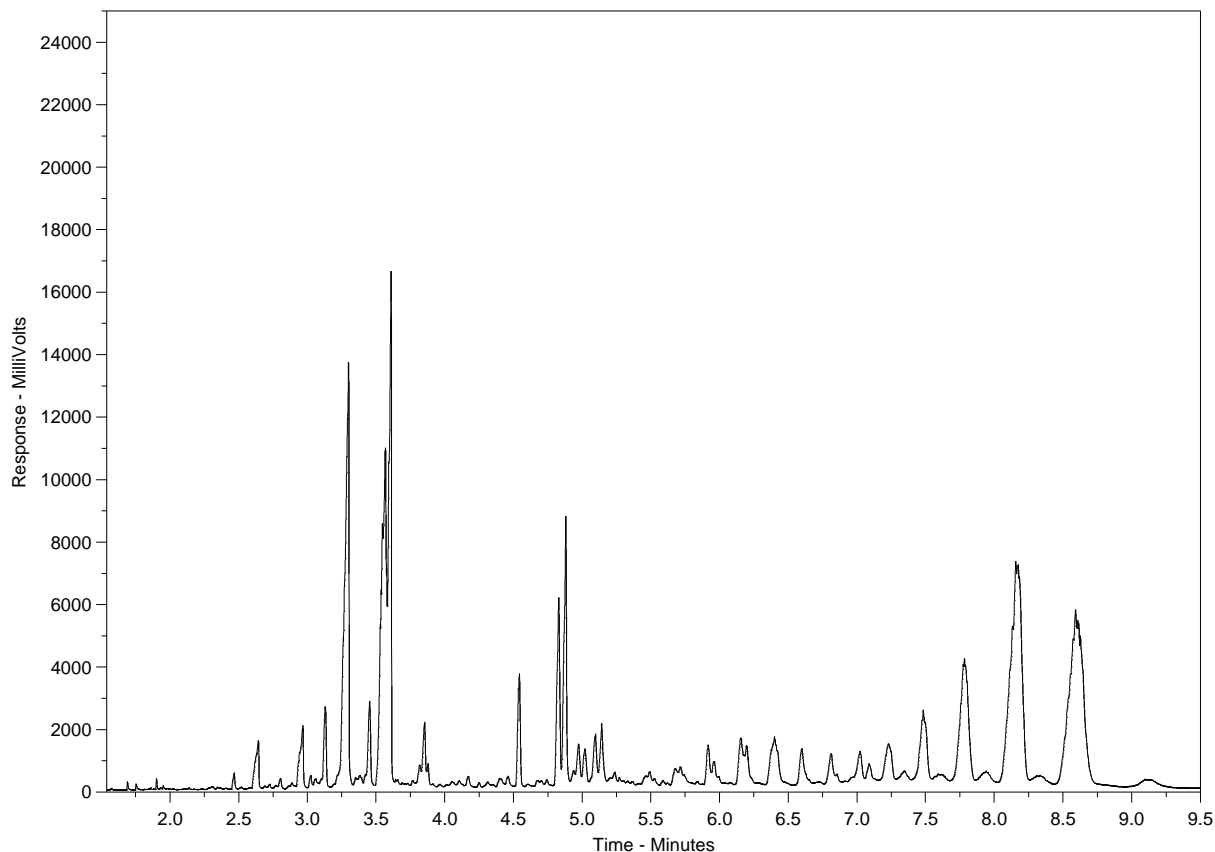
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2332810-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix U



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 30-AUG-19
Report Date: 11-SEP-19 13:58 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2339485

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2339485-1 RANKIN INLET WWTP - EFFLUENT Sampled By: CLIENT on 26-AUG-19 @ 13:15 Matrix: wastewater BTEX plus F1-F4 BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		04-SEP-19	R4794128
Toluene	<0.0010		0.0010	mg/L		04-SEP-19	R4794128
Ethyl benzene	<0.00050		0.00050	mg/L		04-SEP-19	R4794128
o-Xylene	<0.00050		0.00050	mg/L		04-SEP-19	R4794128
m+p-Xylenes	0.00041		0.00040	mg/L		04-SEP-19	R4794128
F1 (C6-C10)	<0.10		0.10	mg/L		04-SEP-19	R4794128
Surrogate: 4-Bromofluorobenzene (SS)	89.0		70-130	%		04-SEP-19	R4794128
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.34		0.10	mg/L	05-SEP-19	06-SEP-19	R4786789
F3 (C16-C34)	6.63		0.25	mg/L	05-SEP-19	06-SEP-19	R4786789
F4 (C34-C50)	4.18		0.25	mg/L	05-SEP-19	06-SEP-19	R4786789
Surrogate: 2-Bromobenzotrifluoride	99.3		60-140	%	05-SEP-19	06-SEP-19	R4786789
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		11-SEP-19	
F2-Naphth	0.34		0.10	mg/L		11-SEP-19	
F3-PAH	6.63		0.25	mg/L		11-SEP-19	
Total Hydrocarbons (C6-C50)	11.2		0.38	mg/L		11-SEP-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		11-SEP-19	
Miscellaneous Parameters							
Fecal Coliforms	8660000	PEHR	1	MPN/100mL		30-AUG-19	R4781416
Total and E. coli to endpoint by QT97							
Total Coliforms	88800000	PEHR	1	MPN/100mL		30-AUG-19	R4781424
Escherichia Coli	12100000	PEHR	1	MPN/100mL		30-AUG-19	R4781424
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000205		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
2-Methyl Naphthalene	0.000217		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Acenaphthene	0.000070		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Acenaphthylene	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Anthracene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Acridine	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Benzo(a)anthracene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	31-AUG-19	06-SEP-19	R4789969
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Chrysene	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Dibenzo(a,h)anthracene	0.0000100		0.0000050	mg/L	31-AUG-19	06-SEP-19	R4789969
Fluoranthene	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Fluorene	0.000041	EMPC	0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Naphthalene	0.000270		0.000050	mg/L	31-AUG-19	06-SEP-19	R4789969
Phenanthrene	<0.000050		0.000050	mg/L	31-AUG-19	06-SEP-19	R4789969
Pyrene	<0.000010		0.000010	mg/L	31-AUG-19	06-SEP-19	R4789969
Quinoline	<0.000020		0.000020	mg/L	31-AUG-19	06-SEP-19	R4789969
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	31-AUG-19	06-SEP-19	R4789969
Surrogate: Acenaphthene d10	120.1		60-130	%	31-AUG-19	06-SEP-19	R4789969
Surrogate: Acridine d9	111.0		60-130	%	31-AUG-19	06-SEP-19	R4789969
Surrogate: Chrysene d12	118.7		60-130	%	31-AUG-19	06-SEP-19	R4789969
Surrogate: Naphthalene d8	117.0		50-130	%	31-AUG-19	06-SEP-19	R4789969
Surrogate: Phenanthrene d10	115.0		60-130	%	31-AUG-19	06-SEP-19	R4789969

* 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
L2339485-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 26-AUG-19 @ 13:15							
Matrix: wastewater							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	114		1.2	mg/L		05-SEP-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		05-SEP-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		05-SEP-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	93.7		1.0	mg/L		04-SEP-19	R4783324
Ammonia by colour							
Ammonia, Total (as N)	5.69		0.20	mg/L		09-SEP-19	R4795431
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	124		20	mg/L		31-AUG-19	R4784617
Carbonaceous BOD							
BOD Carbonaceous	99		20	mg/L		31-AUG-19	R4784617
Chloride in Water by IC							
Chloride (Cl)	55.7		0.50	mg/L		31-AUG-19	R4783564
Conductivity							
Conductivity	416		1.0	umhos/cm		04-SEP-19	R4783324
Hardness Calculated							
Hardness (as CaCO3)	100	HTC	0.20	mg/L		10-SEP-19	
Mercury Total							
Mercury (Hg)-Total	0.0000070		0.0000050	mg/L	05-SEP-19	09-SEP-19	R4792194
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		31-AUG-19	R4783564
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		05-SEP-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		31-AUG-19	R4783564
Oil & Grease - Gravimetric							
Oil and Grease	24.7		5.0	mg/L		09-SEP-19	R4791490
Phenol (4AAP)							
Phenols (4AAP)	0.0097	DLM	0.0050	mg/L		04-SEP-19	R4783340
Phosphorus, Total							
Phosphorus (P)-Total	1.81		0.0060	mg/L		05-SEP-19	R4783693
Sulfate in Water by IC							
Sulfate (SO4)	28.7		0.30	mg/L		31-AUG-19	R4783564
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.275		0.0030	mg/L	09-SEP-19	09-SEP-19	R4791470
Arsenic (As)-Total	0.00115		0.00010	mg/L	09-SEP-19	09-SEP-19	R4791470
Cadmium (Cd)-Total	0.0000700		0.0000050	mg/L	09-SEP-19	09-SEP-19	R4791470
Calcium (Ca)-Total	29.8		0.050	mg/L	09-SEP-19	09-SEP-19	R4791470
Chromium (Cr)-Total	0.00079		0.00010	mg/L	09-SEP-19	09-SEP-19	R4791470
Cobalt (Co)-Total	0.00044		0.00010	mg/L	09-SEP-19	09-SEP-19	R4791470
Copper (Cu)-Total	0.140		0.00050	mg/L	09-SEP-19	09-SEP-19	R4791470
Iron (Fe)-Total	0.285		0.010	mg/L	09-SEP-19	09-SEP-19	R4791470
Lead (Pb)-Total	0.00251		0.000050	mg/L	09-SEP-19	09-SEP-19	R4791470
Magnesium (Mg)-Total	6.32		0.0050	mg/L	09-SEP-19	09-SEP-19	R4791470
Manganese (Mn)-Total	0.0811		0.00010	mg/L	09-SEP-19	09-SEP-19	R4791470
Nickel (Ni)-Total	0.00454		0.00050	mg/L	09-SEP-19	09-SEP-19	R4791470
Potassium (K)-Total	8.02		0.050	mg/L	09-SEP-19	09-SEP-19	R4791470
Sodium (Na)-Total	31.7		0.050	mg/L	09-SEP-19	09-SEP-19	R4791470
Zinc (Zn)-Total	0.0628		0.0030	mg/L	09-SEP-19	09-SEP-19	R4791470

* 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
L2339485-1 RANKIN INLET WWTP - EFFLUENT Sampled By: CLIENT on 26-AUG-19 @ 13:15 Matrix: wastewater Total Organic Carbon by Combustion Total Organic Carbon Total Suspended Solids Total Suspended Solids pH pH	 71.8 87.4 7.22		 2.5 3.0 0.10	 mg/L mg/L pH units		 09-SEP-19 03-SEP-19 04-SEP-19	 R4793368 R4782515 R4783324

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L.			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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**
<p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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.			
FC-QT97-ENDPT-WP	Water	Fecal Coliform to endpoint by MPN QT97	APHA 9223B QT97
This analysis is carried out using procedures adapted from APHA Method 9223B "Enzyme Substrate Coliform Test". The sample is mixed with a mixture of hydrolyzable substrates and then sealed 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 a positive response are counted. The final result is 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 CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.			
TC,EC-QT97-ENDPT-WP	Water	Total and E. coli to endpoint by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Escherichia coli bacteria are simultaneously determined by mixing serial dilutions of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 35.0 – 0.5°C for 18 or 24 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.			
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.

Quality Control Report

Workorder: L2339485

Report Date: 11-SEP-19

Page 1 of 9

Client: Nunavut Community & Government Services - Rankin Inlet

P.O. Box 490

Rankin Inlet NU X0C 0G0

Contact: SIMON DOIRON

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP								
Water								
Batch	R4783324							
WG3152408-10 DUP		L2339485-1						
Alkalinity, Total (as CaCO ₃)		93.7	95.3		mg/L	1.7	20	04-SEP-19
WG3152408-9 LCS								
Alkalinity, Total (as CaCO ₃)			102.6		%		85-115	04-SEP-19
WG3152408-6 MB								
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	04-SEP-19
BOD-CBOD-WP								
Water								
Batch	R4784617							
WG3149313-2 LCS								
BOD Carbonaceous			103.9		%		85-115	31-AUG-19
WG3149313-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	31-AUG-19
BOD-WP								
Water								
Batch	R4784617							
WG3149313-2 LCS								
Biochemical Oxygen Demand			108.6		%		85-115	31-AUG-19
WG3149313-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	31-AUG-19
BTEXS+F1-HSMS-WP								
Water								
Batch	R4794128							
WG3151995-10 DUP		L2339485-1						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	04-SEP-19
Toluene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	04-SEP-19
Ethyl benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	04-SEP-19
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	04-SEP-19
m+p-Xylenes		0.00041	0.00041		mg/L	1.4	30	04-SEP-19
F1 (C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	04-SEP-19
WG3151995-8 LCS								
Benzene			89.9		%		70-130	05-SEP-19
Toluene			89.2		%		70-130	05-SEP-19
Ethyl benzene			98.3		%		70-130	05-SEP-19
o-Xylene			89.1		%		70-130	05-SEP-19
m+p-Xylenes			94.3		%		70-130	05-SEP-19
WG3151995-9 LCS								
F1 (C6-C10)			103.5		%		70-130	05-SEP-19
WG3151995-7 MB								
Benzene			<0.00050		mg/L		0.0005	05-SEP-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP								
Batch R4794128								
WG3151995-7 MB								
Toluene			<0.0010		mg/L		0.001	05-SEP-19
Ethyl benzene			<0.00050		mg/L		0.0005	05-SEP-19
o-Xylene			<0.00050		mg/L		0.0005	05-SEP-19
m+p-Xylenes			<0.00040		mg/L		0.0004	05-SEP-19
F1 (C6-C10)			<0.10		mg/L		0.1	05-SEP-19
Surrogate: 4-Bromofluorobenzene (SS)			84.0		%		70-130	05-SEP-19
C-TOC-HTC-WP								
Batch R4793368								
WG3157291-2 LCS								
Total Organic Carbon			102.2		%		80-120	09-SEP-19
WG3157291-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	09-SEP-19
CL-IC-N-WP								
Batch R4783564								
WG3149385-2 LCS								
Chloride (Cl)			100.0		%		90-110	31-AUG-19
WG3149385-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	31-AUG-19
EC-WP								
Batch R4783324								
WG3152408-10 DUP		L2339485-1						
Conductivity		416	415		umhos/cm	0.2	10	04-SEP-19
WG3152408-8 LCS								
Conductivity			98.0		%		90-110	04-SEP-19
WG3152408-6 MB								
Conductivity			<1.0		umhos/cm		1	04-SEP-19
F2-F4-FID-WP								
Batch R4786789								
WG3152656-2 LCS								
F2 (C10-C16)			94.8		%		70-130	06-SEP-19
F3 (C16-C34)			91.2		%		70-130	06-SEP-19
F4 (C34-C50)			101.4		%		70-130	06-SEP-19
WG3152656-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	06-SEP-19
F3 (C16-C34)			<0.25		mg/L		0.25	06-SEP-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-FID-WP								
Water								
Batch	R4786789							
WG3152656-1 MB								
F4 (C34-C50)			<0.25		mg/L		0.25	06-SEP-19
Surrogate: 2-Bromobenzotrifluoride			104.9		%		60-140	06-SEP-19
FC-QT97-ENDPT-WP								
Water								
Batch	R4781416							
WG3149047-2 DUP		L2339485-1						
Fecal Coliforms		8660000	6870000		MPN/100mL	23	65	30-AUG-19
WG3149047-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	30-AUG-19
HG-T-CVAA-WP								
Water								
Batch	R4792194							
WG3156852-2 LCS								
Mercury (Hg)-Total			96.0		%		80-120	09-SEP-19
WG3156852-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	09-SEP-19
MET-T-CCMS-WP								
Water								
Batch	R4791470							
WG3155977-2 LCS								
Aluminum (Al)-Total			105.2		%		80-120	09-SEP-19
Arsenic (As)-Total			102.6		%		80-120	09-SEP-19
Cadmium (Cd)-Total			101.7		%		80-120	09-SEP-19
Calcium (Ca)-Total			101.3		%		80-120	09-SEP-19
Chromium (Cr)-Total			104.0		%		80-120	09-SEP-19
Cobalt (Co)-Total			102.5		%		80-120	09-SEP-19
Copper (Cu)-Total			102.7		%		80-120	09-SEP-19
Iron (Fe)-Total			94.8		%		80-120	09-SEP-19
Lead (Pb)-Total			101.7		%		80-120	09-SEP-19
Magnesium (Mg)-Total			115.2		%		80-120	09-SEP-19
Manganese (Mn)-Total			104.8		%		80-120	09-SEP-19
Nickel (Ni)-Total			100.3		%		80-120	09-SEP-19
Potassium (K)-Total			93.6		%		80-120	09-SEP-19
Sodium (Na)-Total			103.5		%		80-120	09-SEP-19
Zinc (Zn)-Total			103.2		%		80-120	09-SEP-19
WG3155977-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	09-SEP-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	09-SEP-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4791470							
WG3155977-1 MB								
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	09-SEP-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	09-SEP-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	09-SEP-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	09-SEP-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	09-SEP-19
Iron (Fe)-Total			<0.010		mg/L		0.01	09-SEP-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	09-SEP-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	09-SEP-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	09-SEP-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	09-SEP-19
Potassium (K)-Total			<0.050		mg/L		0.05	09-SEP-19
Sodium (Na)-Total			<0.050		mg/L		0.05	09-SEP-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	09-SEP-19
NH3-COL-WP		Water						
Batch	R4795431							
WG3157733-2 LCS								
Ammonia, Total (as N)			99.6		%		85-115	09-SEP-19
WG3157733-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	09-SEP-19
NO2-IC-N-WP		Water						
Batch	R4783564							
WG3149385-2 LCS								
Nitrite (as N)			102.4		%		90-110	31-AUG-19
WG3149385-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	31-AUG-19
NO3-IC-N-WP		Water						
Batch	R4783564							
WG3149385-2 LCS								
Nitrate (as N)			100.4		%		90-110	31-AUG-19
WG3149385-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	31-AUG-19
OG-GRAV-WP		Water						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OG-GRAV-WP								
Batch R4791490								
WG3153149-2 LCS								
Oil and Grease			89.8		%		70-130	09-SEP-19
WG3153149-1 MB								
Oil and Grease			<5.0		mg/L		5	09-SEP-19
P-T-COL-WP								
Batch R4783693								
WG3150683-6 LCS								
Phosphorus (P)-Total			100.6		%		80-120	05-SEP-19
WG3150683-5 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	05-SEP-19
WG3150683-8 MS		L2339485-1						
Phosphorus (P)-Total			N/A	MS-B	%		-	05-SEP-19
PAH,PANH-WP								
Batch R4789969								
WG3150142-2 LCS								
1-Methyl Naphthalene			117.5		%		60-130	06-SEP-19
2-Methyl Naphthalene			110.3		%		60-130	06-SEP-19
Acenaphthene			116.3		%		60-130	06-SEP-19
Acenaphthylene			97.3		%		60-130	06-SEP-19
Anthracene			83.0		%		60-130	06-SEP-19
Acridine			95.7		%		60-130	06-SEP-19
Benzo(a)anthracene			91.6		%		60-130	06-SEP-19
Benzo(a)pyrene			96.7		%		60-130	06-SEP-19
Benzo(b&j)fluoranthene			102.2		%		60-130	06-SEP-19
Benzo(g,h,i)perylene			101.4		%		60-130	06-SEP-19
Benzo(k)fluoranthene			115.9		%		60-130	06-SEP-19
Chrysene			105.3		%		60-130	06-SEP-19
Dibenzo(a,h)anthracene			99.3		%		60-130	06-SEP-19
Fluoranthene			116.6		%		60-130	06-SEP-19
Fluorene			99.2		%		60-130	06-SEP-19
Indeno(1,2,3-cd)pyrene			84.1		%		60-130	06-SEP-19
Naphthalene			119.0		%		50-130	06-SEP-19
Phenanthrene			113.7		%		60-130	06-SEP-19
Pyrene			116.8		%		60-130	06-SEP-19
Quinoline			101.8		%		60-130	06-SEP-19
WG3150142-1 MB								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP								
Water								
Batch	R4789969							
WG3150142-1 MB								
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	06-SEP-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	06-SEP-19
Acenaphthene			<0.000020		mg/L		0.00002	06-SEP-19
Acenaphthylene			<0.000020		mg/L		0.00002	06-SEP-19
Anthracene			<0.000010		mg/L		0.00001	06-SEP-19
Acridine			<0.000020		mg/L		0.00002	06-SEP-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	06-SEP-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	06-SEP-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	06-SEP-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	06-SEP-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	06-SEP-19
Chrysene			<0.000020		mg/L		0.00002	06-SEP-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	06-SEP-19
Fluoranthene			<0.000020		mg/L		0.00002	06-SEP-19
Fluorene			<0.000020		mg/L		0.00002	06-SEP-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	06-SEP-19
Naphthalene			<0.000050		mg/L		0.00005	06-SEP-19
Phenanthrene			<0.000050		mg/L		0.00005	06-SEP-19
Pyrene			<0.000010		mg/L		0.00001	06-SEP-19
Quinoline			<0.000020		mg/L		0.00002	06-SEP-19
Surrogate: Acenaphthene d10			117.9		%		60-130	06-SEP-19
Surrogate: Acridine d9			105.6		%		60-130	06-SEP-19
Surrogate: Chrysene d12			107.4		%		60-130	06-SEP-19
Surrogate: Naphthalene d8			116.7		%		50-130	06-SEP-19
Surrogate: Phenanthrene d10			113.0		%		60-130	06-SEP-19
PH-WP								
Water								
Batch	R4783324							
WG3152408-10 DUP		L2339485-1						
pH		7.22	7.23	J	pH units	0.01	0.2	04-SEP-19
WG3152408-7 LCS								
pH			7.36		pH units		7.3-7.5	04-SEP-19
PHENOLS-4AAP-WT								
Water								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4783340								
WG3151296-6	LCS							
Phenols (4AAP)			96.9		%		85-115	04-SEP-19
WG3151296-5	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	04-SEP-19
SO4-IC-N-WP								
Batch R4783564								
WG3149385-2	LCS							
Sulfate (SO4)			101.0		%		90-110	31-AUG-19
WG3149385-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	31-AUG-19
SOLIDS-TOTSUS-WP								
Batch R4782515								
WG3148717-14	LCS							
Total Suspended Solids			109.6		%		85-115	03-SEP-19
WG3148717-13	MB							
Total Suspended Solids			<2.0		mg/L		2	03-SEP-19
TC,EC-QT97-ENDPT-WP								
Batch R4781424								
WG3149048-2	DUP	L2339485-1						
Total Coliforms		88800000	67700000		MPN/100mL	27	65	30-AUG-19
Escherichia Coli		12100000	10800000		MPN/100mL	11	65	30-AUG-19
WG3149048-1	MB							
Total Coliforms			<1		MPN/100mL		1	30-AUG-19
Escherichia Coli			<1		MPN/100mL		1	30-AUG-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Suspended Solids	1	26-AUG-19 13:15	03-SEP-19 14:00	7	8	days	EHT
pH	1	26-AUG-19 13:15	04-SEP-19 12:00	0.25	215	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC	1	26-AUG-19 13:15	31-AUG-19 15:00	3	5	days	EHTR
Nitrite in Water by IC	1	26-AUG-19 13:15	31-AUG-19 15:00	3	5	days	EHTR
Bacteriological Tests							
Fecal Coliform to endpoint by MPN QT97	1	26-AUG-19 13:15	30-AUG-19 18:25	30	101	hours	EHTR
Total and E. coli to endpoint by QT97	1	26-AUG-19 13:15	30-AUG-19 18:25	30	101	hours	EHTR
Aggregate Organics							
Biochemical Oxygen Demand (BOD)	1	26-AUG-19 13:15	31-AUG-19 07:00	48	114	hours	EHTR
Carbonaceous BOD	1	26-AUG-19 13:15	31-AUG-19 07:00	48	114	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2339485 were received on 30-AUG-19 16:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

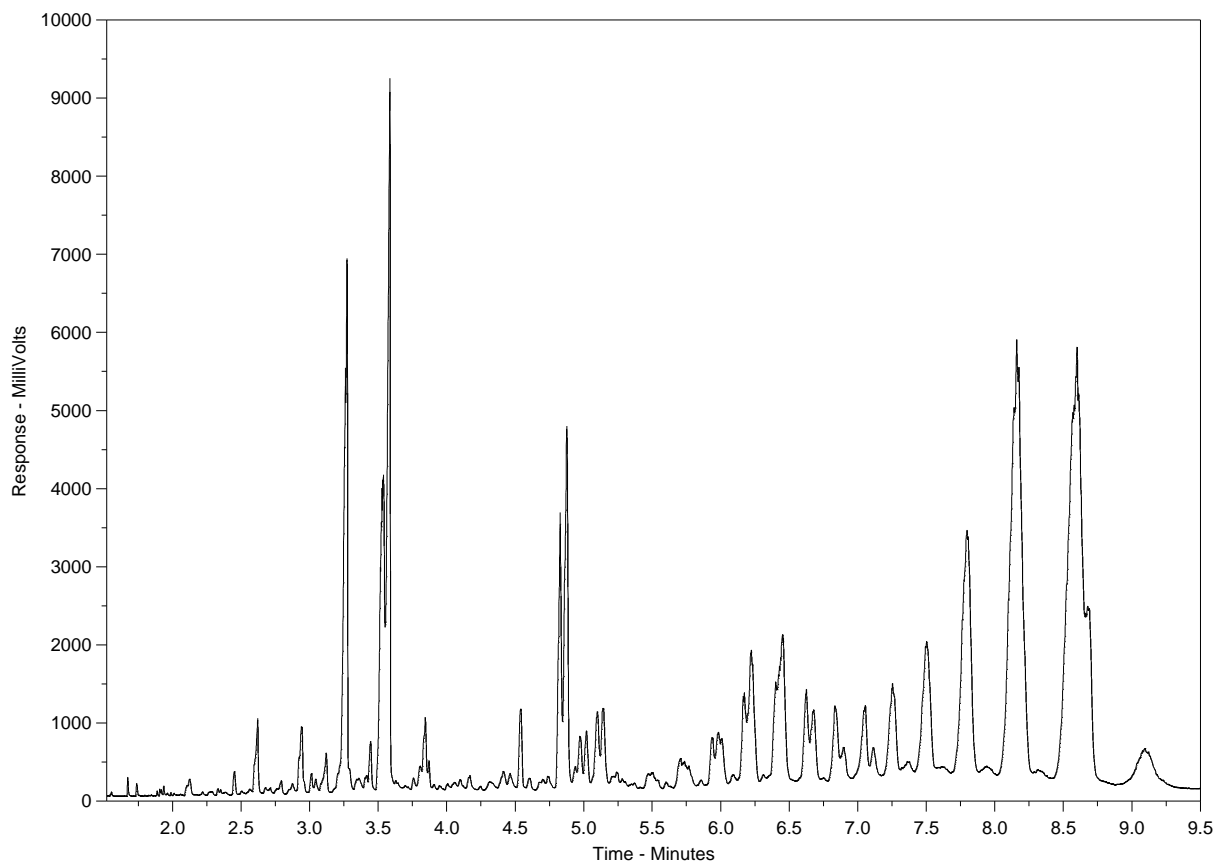
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2339485-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



Environmental

Chain of Custody / Analytical Request Form

COC #

L233948

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L2339485-COFC

[illegible]

GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix V



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 03-OCT-19
Report Date: 18-OCT-19 14:11 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2359342
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2359342-1 WWTP							
Sampled By: CLIENT on 02-OCT-19 @ 14:00							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		17-OCT-19	R4873346
Toluene	0.0041		0.0010	mg/L		17-OCT-19	R4873346
Ethyl benzene	<0.00050		0.00050	mg/L		17-OCT-19	R4873346
o-Xylene	<0.00050		0.00050	mg/L		17-OCT-19	R4873346
m+p-Xylenes	<0.00040		0.00040	mg/L		17-OCT-19	R4873346
F1 (C6-C10)	<0.10		0.10	mg/L		17-OCT-19	R4873346
Surrogate: 4-Bromofluorobenzene (SS)	87.0		70-130	%		17-OCT-19	R4873346
CCME PHC F2-F4 in Water							
F2 (C10-C16)	2.04		0.10	mg/L	07-OCT-19	10-OCT-19	R4871231
F3 (C16-C34)	11.4		0.25	mg/L	07-OCT-19	10-OCT-19	R4871231
F4 (C34-C50)	9.46		0.25	mg/L	07-OCT-19	10-OCT-19	R4871231
Surrogate: 2-Bromobenzotrifluoride	128.1		60-140	%	07-OCT-19	10-OCT-19	R4871231
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		18-OCT-19	
F2-Naphth	2.04		0.10	mg/L		18-OCT-19	
F3-PAH	11.4		0.25	mg/L		18-OCT-19	
Total Hydrocarbons (C6-C50)	22.9		0.38	mg/L		18-OCT-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		18-OCT-19	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000163		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
2-Methyl Naphthalene	0.000196		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Acenaphthene	0.000047		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Acenaphthylene	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Anthracene	<0.000010		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Acridine	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Benzo(a)anthracene	<0.000010		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	08-OCT-19	18-OCT-19	R4867488
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Chrysene	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	08-OCT-19	18-OCT-19	R4867488
Fluoranthene	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Fluorene	0.000027	EMPC	0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Naphthalene	0.000486		0.000050	mg/L	08-OCT-19	18-OCT-19	R4867488
Phenanthrene	<0.000050		0.000050	mg/L	08-OCT-19	18-OCT-19	R4867488
Pyrene	0.000015		0.000010	mg/L	08-OCT-19	18-OCT-19	R4867488
Quinoline	<0.000020		0.000020	mg/L	08-OCT-19	18-OCT-19	R4867488
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	08-OCT-19	18-OCT-19	R4867488
Surrogate: Acenaphthene d10	122.8		60-130	%	08-OCT-19	18-OCT-19	R4867488
Surrogate: Acridine d9	117.9		60-130	%	08-OCT-19	18-OCT-19	R4867488
Surrogate: Chrysene d12	120.2		60-130	%	08-OCT-19	18-OCT-19	R4867488
Surrogate: Naphthalene d8	118.0		50-130	%	08-OCT-19	18-OCT-19	R4867488
Surrogate: Phenanthrene d10	122.6		60-130	%	08-OCT-19	18-OCT-19	R4867488
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	75.6		1.2	mg/L		07-OCT-19	
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
L2359342-1 WWTP							
Sampled By: CLIENT on 02-OCT-19 @ 14:00							
Matrix: WASTE WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		07-OCT-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		07-OCT-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	62.0		1.0	mg/L		04-OCT-19	R4860614
Ammonia by colour							
Ammonia, Total (as N)	2.38		0.10	mg/L		11-OCT-19	R4869837
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	68		20	mg/L		04-OCT-19	R4865393
Carbonaceous BOD							
BOD Carbonaceous	86		20	mg/L		04-OCT-19	R4865393
Chloride in Water by IC							
Chloride (Cl)	46.6		0.50	mg/L		04-OCT-19	R4859929
Conductivity							
Conductivity	325		1.0	umhos/cm		04-OCT-19	R4860614
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		03-OCT-19	R4859135
Hardness Calculated							
Hardness (as CaCO3)	90.1	HTC	0.20	mg/L		16-OCT-19	
Mercury Total							
Mercury (Hg)-Total	0.0000050		0.0000050	mg/L	10-OCT-19	10-OCT-19	R4866644
Nitrate in Water by IC							
Nitrate (as N)	0.029		0.020	mg/L		04-OCT-19	R4859929
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		08-OCT-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		04-OCT-19	R4859929
Oil & Grease - Gravimetric							
Oil and Grease	41.1		5.0	mg/L		11-OCT-19	R4867520
Phenol (4AAP)							
Phenols (4AAP)	0.0065		0.0010	mg/L		07-OCT-19	R4861668
Phosphorus, Total							
Phosphorus (P)-Total	1.05		0.0060	mg/L		08-OCT-19	R4861381
Sulfate in Water by IC							
Sulfate (SO4)	24.9		0.30	mg/L		04-OCT-19	R4859929
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.128		0.0030	mg/L	10-OCT-19	11-OCT-19	R4869129
Arsenic (As)-Total	0.00114		0.00010	mg/L	10-OCT-19	11-OCT-19	R4869129
Cadmium (Cd)-Total	0.0000567		0.0000050	mg/L	10-OCT-19	11-OCT-19	R4869129
Calcium (Ca)-Total	27.1		0.050	mg/L	10-OCT-19	11-OCT-19	R4869129
Chromium (Cr)-Total	0.00086		0.00010	mg/L	10-OCT-19	11-OCT-19	R4869129
Cobalt (Co)-Total	0.00035		0.00010	mg/L	10-OCT-19	11-OCT-19	R4869129
Copper (Cu)-Total	0.0843		0.00050	mg/L	10-OCT-19	11-OCT-19	R4869129
Iron (Fe)-Total	0.420		0.010	mg/L	10-OCT-19	11-OCT-19	R4869129
Lead (Pb)-Total	0.00318		0.000050	mg/L	10-OCT-19	11-OCT-19	R4869129
Magnesium (Mg)-Total	5.47		0.0050	mg/L	10-OCT-19	11-OCT-19	R4869129
Manganese (Mn)-Total	0.0478		0.00010	mg/L	10-OCT-19	11-OCT-19	R4869129
Nickel (Ni)-Total	0.00301		0.00050	mg/L	10-OCT-19	11-OCT-19	R4869129
Potassium (K)-Total	5.39		0.050	mg/L	10-OCT-19	11-OCT-19	R4869129
Sodium (Na)-Total	24.8		0.050	mg/L	10-OCT-19	11-OCT-19	R4869129
Zinc (Zn)-Total	0.0483		0.0030	mg/L	10-OCT-19	11-OCT-19	R4869129
Total Organic Carbon by Combustion							

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2359342-1	WWTP							
Sampled By:	CLIENT on 02-OCT-19 @ 14:00							
Matrix:	WASTE WATER							
Total Organic Carbon by Combustion								
Total Organic Carbon		44.5		0.50	mg/L		09-OCT-19	R4866495
Total Suspended Solids								
Total Suspended Solids		83.2		2.0	mg/L		09-OCT-19	R4865716
pH								
pH		6.88		0.10	pH units		04-OCT-19	R4860614

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			

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

1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene. 3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges: 1. All extraction and analysis holding times were met. 2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average. 3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors. 4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511
Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.			
FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Fecal (thermotolerant) coliform bacteria are determined by mixing a 1:10 dilution of sample with a product containing hydrolyzable substrates and sealing in a 97-well packet. The packet is incubated at 44.5 – 0.2°C for 18 hours and then the number of wells exhibiting positive responses are counted. The final results are obtained by comparing the number of positive responses to a probability table.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous 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 ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2359342

Report Date: 18-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP								
Water								
Batch	R4866495							
WG3187943-2	LCS							
Total Organic Carbon			102.2		%		80-120	09-OCT-19
Batch	R4866495							
WG3187943-1	MB							
Total Organic Carbon			<0.50		mg/L		0.5	09-OCT-19
CL-IC-N-WP								
Water								
Batch	R4859929							
WG3182278-2	LCS							
Chloride (Cl)			100.2		%		90-110	04-OCT-19
Batch	R4859929							
WG3182278-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	04-OCT-19
EC-WP								
Water								
Batch	R4860614							
WG3183951-8	LCS							
Conductivity			99.3		%		90-110	04-OCT-19
Batch	R4860614							
WG3183951-6	MB							
Conductivity			<1.0		umhos/cm		1	04-OCT-19
F2-F4-FID-WP								
Water								
Batch	R4871231							
WG3183711-2	LCS							
F2 (C10-C16)			100.6		%		70-130	09-OCT-19
F3 (C16-C34)			92.9		%		70-130	09-OCT-19
F4 (C34-C50)			93.8		%		70-130	09-OCT-19
Batch	R4871231							
WG3183711-1	MB							
F2 (C10-C16)			<0.10		mg/L		0.1	09-OCT-19
F3 (C16-C34)			<0.25		mg/L		0.25	09-OCT-19
F4 (C34-C50)			<0.25		mg/L		0.25	09-OCT-19
Surrogate: 2-Bromobenzotrifluoride			116.1		%		60-140	09-OCT-19
FC10-QT97-WP								
Water								
Batch	R4859135							
WG3181337-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	03-OCT-19
HG-T-CVAA-WP								
Water								
Batch	R4866644							
WG3189293-2	LCS							
Mercury (Hg)-Total			92.0		%		80-120	10-OCT-19
Batch	R4866644							
WG3189293-1	MB							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WP								
Water								
Batch R4866644								
WG3189293-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	10-OCT-19
MET-T-CCMS-WP								
Water								
Batch R4869129								
WG3187722-2 LCS								
Aluminum (Al)-Total			103.7		%		80-120	11-OCT-19
Arsenic (As)-Total			103.1		%		80-120	11-OCT-19
Cadmium (Cd)-Total			104.2		%		80-120	11-OCT-19
Calcium (Ca)-Total			103.1		%		80-120	11-OCT-19
Chromium (Cr)-Total			104.8		%		80-120	11-OCT-19
Cobalt (Co)-Total			103.1		%		80-120	11-OCT-19
Copper (Cu)-Total			104.9		%		80-120	11-OCT-19
Iron (Fe)-Total			98.6		%		80-120	11-OCT-19
Lead (Pb)-Total			107.3		%		80-120	11-OCT-19
Magnesium (Mg)-Total			109.6		%		80-120	11-OCT-19
Manganese (Mn)-Total			102.9		%		80-120	11-OCT-19
Nickel (Ni)-Total			102.5		%		80-120	11-OCT-19
Potassium (K)-Total			102.6		%		80-120	11-OCT-19
Sodium (Na)-Total			104.2		%		80-120	11-OCT-19
Zinc (Zn)-Total			104.5		%		80-120	11-OCT-19
WG3187722-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	11-OCT-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-OCT-19
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	11-OCT-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	11-OCT-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	11-OCT-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-OCT-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	11-OCT-19
Iron (Fe)-Total			<0.010		mg/L		0.01	11-OCT-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	11-OCT-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	11-OCT-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	11-OCT-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	11-OCT-19
Potassium (K)-Total			<0.050		mg/L		0.05	11-OCT-19
Sodium (Na)-Total			<0.050		mg/L		0.05	11-OCT-19

Quality Control Report

Workorder: L2359342

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4869129							
WG3187722-1 MB								
Zinc (Zn)-Total			<0.0030		mg/L		0.003	11-OCT-19
NH3-COL-WP	Water							
Batch	R4869837							
WG3191087-6 LCS								
Ammonia, Total (as N)			103.2		%		85-115	11-OCT-19
WG3191087-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	11-OCT-19
NO2-IC-N-WP	Water							
Batch	R4859929							
WG3182278-2 LCS								
Nitrite (as N)			100.9		%		90-110	04-OCT-19
WG3182278-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	04-OCT-19
NO3-IC-N-WP	Water							
Batch	R4859929							
WG3182278-2 LCS								
Nitrate (as N)			99.3		%		90-110	04-OCT-19
WG3182278-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	04-OCT-19
OG-GRAV-WP	Water							
Batch	R4867520							
WG3186073-2 LCS								
Oil and Grease			95.4		%		70-130	11-OCT-19
WG3186073-1 MB								
Oil and Grease			<5.0		mg/L		5	11-OCT-19
P-T-COL-WP	Water							
Batch	R4861381							
WG3184297-2 LCS								
Phosphorus (P)-Total			96.6		%		80-120	08-OCT-19
WG3184297-1 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	08-OCT-19
PAH,PANH-WP	Water							

Quality Control Report

Workorder: L2359342

Report Date: 18-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4867488							
WG3186197-2	LCS							
1-Methyl Naphthalene			122.2		%		60-130	11-OCT-19
2-Methyl Naphthalene			114.6		%		60-130	11-OCT-19
Acenaphthene			116.6		%		60-130	11-OCT-19
Acenaphthylene			98.4		%		60-130	11-OCT-19
Anthracene			77.8		%		60-130	11-OCT-19
Acridine			93.9		%		60-130	11-OCT-19
Benzo(a)anthracene			85.3		%		60-130	11-OCT-19
Benzo(a)pyrene			90.9		%		60-130	11-OCT-19
Benzo(b&j)fluoranthene			87.8		%		60-130	11-OCT-19
Benzo(g,h,i)perylene			105.4		%		60-130	11-OCT-19
Benzo(k)fluoranthene			108.5		%		60-130	11-OCT-19
Chrysene			103.9		%		60-130	11-OCT-19
Dibenzo(a,h)anthracene			111.2		%		60-130	11-OCT-19
Fluoranthene			119.2		%		60-130	11-OCT-19
Fluorene			99.3		%		60-130	11-OCT-19
Indeno(1,2,3-cd)pyrene			83.2		%		60-130	11-OCT-19
Naphthalene			121.2		%		50-130	11-OCT-19
Phenanthrene			117.0		%		60-130	11-OCT-19
Pyrene			117.0		%		60-130	11-OCT-19
Quinoline			105.8		%		60-130	11-OCT-19
WG3186197-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	11-OCT-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	11-OCT-19
Acenaphthene			<0.000020		mg/L		0.00002	11-OCT-19
Acenaphthylene			<0.000020		mg/L		0.00002	11-OCT-19
Anthracene			<0.000010		mg/L		0.00001	11-OCT-19
Acridine			<0.000020		mg/L		0.00002	11-OCT-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	11-OCT-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	11-OCT-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	11-OCT-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	11-OCT-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	11-OCT-19
Chrysene			<0.000020		mg/L		0.00002	11-OCT-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	11-OCT-19

Quality Control Report

Workorder: L2359342

Report Date: 18-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch R4867488								
WG3186197-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	11-OCT-19
Fluorene			<0.000020		mg/L		0.00002	11-OCT-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	11-OCT-19
Naphthalene			<0.000050		mg/L		0.00005	11-OCT-19
Phenanthrene			<0.000050		mg/L		0.00005	11-OCT-19
Pyrene			<0.000010		mg/L		0.00001	11-OCT-19
Quinoline			<0.000020		mg/L		0.00002	11-OCT-19
Surrogate: Acenaphthene d10			109.0		%		60-130	11-OCT-19
Surrogate: Acridine d9			94.0		%		60-130	11-OCT-19
Surrogate: Chrysene d12			118.0		%		60-130	11-OCT-19
Surrogate: Naphthalene d8			116.4		%		50-130	11-OCT-19
Surrogate: Phenanthrene d10			117.6		%		60-130	11-OCT-19
PH-WP		Water						
Batch R4860614								
WG3183951-7 LCS								
pH			7.38		pH units		7.3-7.5	04-OCT-19
PHENOLS-4AAP-WT		Water						
Batch R4861668								
WG3183904-2 LCS								
Phenols (4AAP)			113.7		%		85-115	07-OCT-19
WG3183904-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	07-OCT-19
SO4-IC-N-WP		Water						
Batch R4859929								
WG3182278-2 LCS								
Sulfate (SO4)			101.5		%		90-110	04-OCT-19
WG3182278-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	04-OCT-19
SOLIDS-TOTSUS-WP		Water						
Batch R4865716								
WG3185052-10 LCS								
Total Suspended Solids			102.3		%		85-115	09-OCT-19
WG3185052-9 MB								
Total Suspended Solids			<2.0		mg/L		2	09-OCT-19

Quality Control Report

Workorder: L2359342

Report Date: 18-OCT-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2359342

Report Date: 18-OCT-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	02-OCT-19 14:00	04-OCT-19 12:00	0.25	46	hours	EHTR-FM
Volatile Organic Compounds							
BTX plus F1 by GCMS	1	02-OCT-19 14:00	17-OCT-19 18:12	14	15	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2359342 were received on 03-OCT-19 15:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

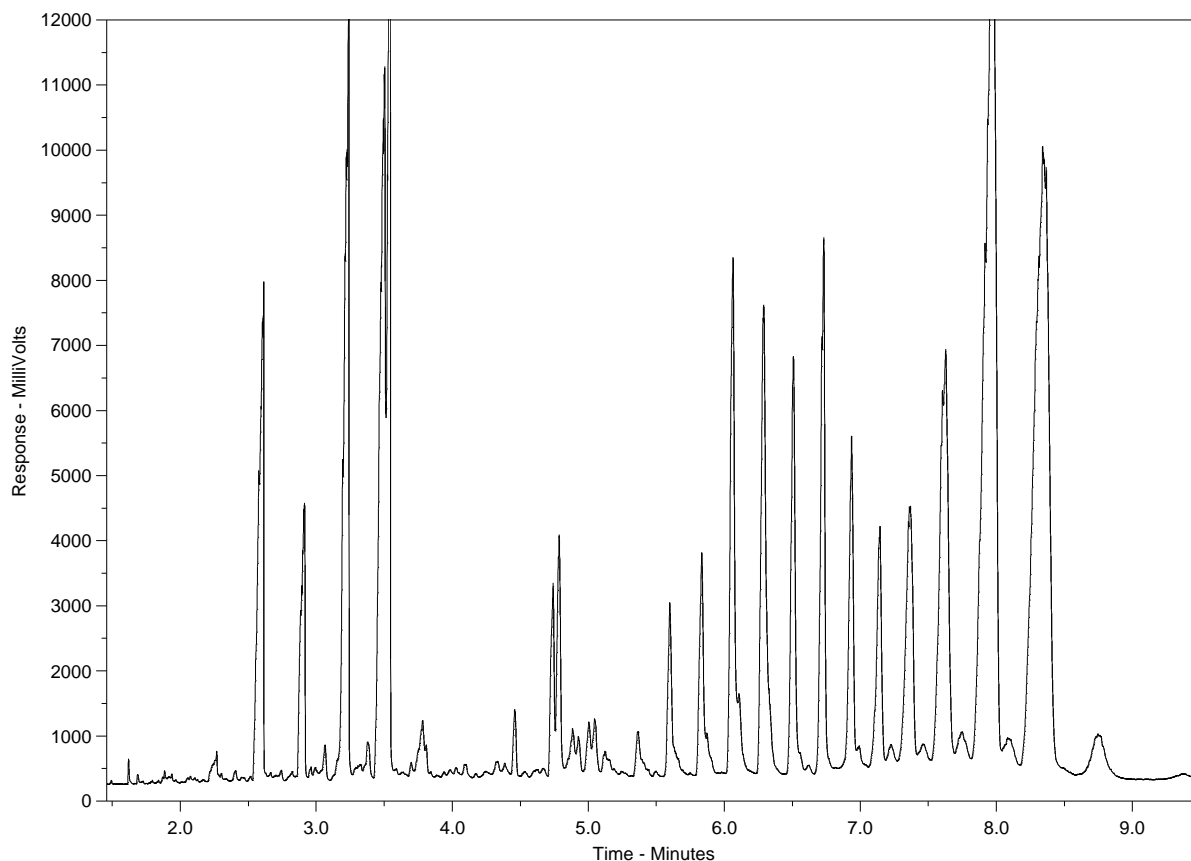
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2359342-1
Client Sample ID: WWTP



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

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

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

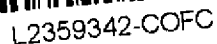
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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.



Canada Toll Free: 1 800 668 9878

www.alsglobal.com



COC Number: 17 - 750256

Page of

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

~~OCT 03 2019~~

JUNE 2018 FROM

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

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix W



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 01-NOV-19
Report Date: 14-NOV-19 13:48 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2375853

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2375853-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 31-OCT-19 @ 13:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050	VOCHS	0.00050	mg/L		06-NOV-19	R4900907
Toluene	0.0010	VOCHS	0.0010	mg/L		06-NOV-19	R4900907
Ethyl benzene	<0.00050	VOCHS	0.00050	mg/L		06-NOV-19	R4900907
o-Xylene	<0.00050	VOCHS	0.00050	mg/L		06-NOV-19	R4900907
m+p-Xylenes	<0.00040	VOCHS	0.00040	mg/L		06-NOV-19	R4900907
F1 (C6-C10)	<0.10	VOCHS	0.10	mg/L		06-NOV-19	R4900907
Surrogate: 4-Bromofluorobenzene (SS)	83.0		70-130	%		06-NOV-19	R4900907
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.51		0.10	mg/L	05-NOV-19	06-NOV-19	R4900866
F3 (C16-C34)	12.9		0.25	mg/L	05-NOV-19	06-NOV-19	R4900866
F4 (C34-C50)	4.23		0.25	mg/L	05-NOV-19	06-NOV-19	R4900866
Surrogate: 2-Bromobenzotrifluoride	83.5		60-140	%	05-NOV-19	06-NOV-19	R4900866
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		14-NOV-19	
F2-Naphth	0.51		0.10	mg/L		14-NOV-19	
F3-PAH	12.9		0.25	mg/L		14-NOV-19	
Total Hydrocarbons (C6-C50)	17.7		0.38	mg/L		14-NOV-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		13-NOV-19	
Miscellaneous Parameters							
Fluoride (F)	0.070		0.020	mg/L		02-NOV-19	R4898819
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200		10	MPN/100mL		01-NOV-19	R4896501
Escherichia Coli	>24200		10	MPN/100mL		01-NOV-19	R4896501
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000095	EMPC	0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
2-Methyl Naphthalene	0.000114		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Acenaphthene	0.000027		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Acenaphthylene	<0.000020		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Anthracene	<0.000010		0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Acridine	<0.000020		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Benzo(a)anthracene	<0.000010		0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Benzo(a)pyrene	0.0000323		0.0000050	mg/L	07-NOV-19	14-NOV-19	R4906524
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Chrysene	<0.000020		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	07-NOV-19	14-NOV-19	R4906524
Fluoranthene	<0.000020		0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Fluorene	0.000047	EMPC	0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
Indeno(1,2,3-cd)pyrene	0.000235		0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Naphthalene	0.000108		0.000050	mg/L	07-NOV-19	14-NOV-19	R4906524
Phenanthrene	<0.000050		0.000050	mg/L	07-NOV-19	14-NOV-19	R4906524
Pyrene	0.000013	EMPC	0.000010	mg/L	07-NOV-19	14-NOV-19	R4906524
Quinoline	0.000036	EMPC	0.000020	mg/L	07-NOV-19	14-NOV-19	R4906524
B(a)P Total Potency Equivalent	0.000060		0.000030	mg/L	07-NOV-19	14-NOV-19	R4906524
Surrogate: Acenaphthene d10	109.9		60-130	%	07-NOV-19	14-NOV-19	R4906524
Surrogate: Acridine d9	112.1		60-130	%	07-NOV-19	14-NOV-19	R4906524
Surrogate: Chrysene d12	112.4		60-130	%	07-NOV-19	14-NOV-19	R4906524
Surrogate: Naphthalene d8	113.2		50-130	%	07-NOV-19	14-NOV-19	R4906524
Surrogate: Phenanthrene d10	117.6		60-130	%	07-NOV-19	14-NOV-19	R4906524

* 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
L2375853-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 31-OCT-19 @ 13:30							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	137		1.2	mg/L		04-NOV-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		04-NOV-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		04-NOV-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	112		1.0	mg/L		01-NOV-19	R4896808
Ammonia by colour							
Ammonia, Total (as N)	9.05		0.50	mg/L		04-NOV-19	R4898963
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	195		50	mg/L		01-NOV-19	R4901810
Carbonaceous BOD							
BOD Carbonaceous	158		50	mg/L		01-NOV-19	R4901810
Chloride in Water by IC							
Chloride (Cl)	54.5		0.50	mg/L		02-NOV-19	R4898819
Conductivity							
Conductivity	463		1.0	umhos/cm		01-NOV-19	R4896808
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		01-NOV-19	R4896510
Hardness Calculated							
Hardness (as CaCO3)	473	HTC	0.20	mg/L		08-NOV-19	
Mercury Total							
Mercury (Hg)-Total	0.0000090		0.0000050	mg/L	05-NOV-19	06-NOV-19	R4901178
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-NOV-19	R4898819
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		05-NOV-19	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-NOV-19	R4898819
Oil & Grease - Gravimetric							
Oil and Grease	35.7		5.0	mg/L		08-NOV-19	R4903191
Phenol (4AAP)							
Phenols (4AAP)	0.0153	DLM	0.0050	mg/L		06-NOV-19	R4901001
Phosphorus, Total							
Phosphorus (P)-Total	3.28		0.015	mg/L		05-NOV-19	R4898746
Sulfate in Water by IC							
Sulfate (SO4)	27.0		0.30	mg/L		02-NOV-19	R4898819
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	<0.0030		0.0030	mg/L	07-NOV-19	07-NOV-19	R4903044
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Arsenic (As)-Total	0.00077		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Barium (Ba)-Total	0.0380		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	07-NOV-19	07-NOV-19	R4903044
Boron (B)-Total	0.139		0.010	mg/L	07-NOV-19	07-NOV-19	R4903044
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	07-NOV-19	07-NOV-19	R4903044
Calcium (Ca)-Total	70.9		0.050	mg/L	07-NOV-19	07-NOV-19	R4903044
Cesium (Cs)-Total	0.000010		0.000010	mg/L	07-NOV-19	07-NOV-19	R4903044
Chromium (Cr)-Total	0.00014		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Cobalt (Co)-Total	0.00022		0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Copper (Cu)-Total	0.0271		0.00050	mg/L	07-NOV-19	07-NOV-19	R4903044

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

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2375853-1	RANKIN INLET WWTP - EFFLUENT							
Sampled By:	SD on 31-OCT-19 @ 13:30							
Matrix:	WASTE							
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total	0.191			0.010	mg/L	07-NOV-19	07-NOV-19	R4903044
Lead (Pb)-Total	0.000198			0.000050	mg/L	07-NOV-19	07-NOV-19	R4903044
Lithium (Li)-Total	0.0265			0.0010	mg/L	07-NOV-19	07-NOV-19	R4903044
Magnesium (Mg)-Total	71.8			0.0050	mg/L	07-NOV-19	07-NOV-19	R4903044
Manganese (Mn)-Total	0.00839			0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Molybdenum (Mo)-Total	0.000434			0.000050	mg/L	07-NOV-19	07-NOV-19	R4903044
Nickel (Ni)-Total	0.00085			0.00050	mg/L	07-NOV-19	07-NOV-19	R4903044
Potassium (K)-Total	5.68			0.050	mg/L	07-NOV-19	07-NOV-19	R4903044
Phosphorus (P)-Total	<0.030			0.030	mg/L	07-NOV-19	07-NOV-19	R4903044
Rubidium (Rb)-Total	0.00343			0.00020	mg/L	07-NOV-19	07-NOV-19	R4903044
Selenium (Se)-Total	<0.000050			0.000050	mg/L	07-NOV-19	07-NOV-19	R4903044
Silicon (Si)-Total	5.71			0.10	mg/L	07-NOV-19	07-NOV-19	R4903044
Silver (Ag)-Total	<0.000010			0.000010	mg/L	07-NOV-19	07-NOV-19	R4903044
Sodium (Na)-Total	22.0			0.050	mg/L	07-NOV-19	07-NOV-19	R4903044
Strontium (Sr)-Total	0.252			0.00020	mg/L	07-NOV-19	07-NOV-19	R4903044
Sulfur (S)-Total	20.6			0.50	mg/L	07-NOV-19	07-NOV-19	R4903044
Tellurium (Te)-Total	<0.00020			0.00020	mg/L	07-NOV-19	07-NOV-19	R4903044
Thallium (Tl)-Total	<0.000010			0.000010	mg/L	07-NOV-19	07-NOV-19	R4903044
Thorium (Th)-Total	<0.00010			0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Tin (Sn)-Total	<0.00010			0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Titanium (Ti)-Total	<0.00030			0.00030	mg/L	07-NOV-19	07-NOV-19	R4903044
Tungsten (W)-Total	<0.00010			0.00010	mg/L	07-NOV-19	07-NOV-19	R4903044
Uranium (U)-Total	0.000283			0.000010	mg/L	07-NOV-19	07-NOV-19	R4903044
Vanadium (V)-Total	<0.00050			0.00050	mg/L	07-NOV-19	07-NOV-19	R4903044
Zinc (Zn)-Total	0.0052			0.0030	mg/L	07-NOV-19	07-NOV-19	R4903044
Zirconium (Zr)-Total	<0.00020			0.00020	mg/L	07-NOV-19	07-NOV-19	R4903044
Total Organic Carbon by Combustion								
Total Organic Carbon	86.7			5.0	mg/L		04-NOV-19	R4898931
Total Suspended Solids								
Total Suspended Solids	209			3.8	mg/L		06-NOV-19	R4902207
pH								
pH	7.00			0.10	pH units		01-NOV-19	R4896808

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
VOCHS	VOC analysis was conducted for a water sample that contained > 5% headspace. Results may be biased low.

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 transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<p>the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.</p> <p>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.</p> <p>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.</p> <p>Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:</p> <ol style="list-style-type: none"> 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. <p>Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:</p> <ol style="list-style-type: none"> 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
<p>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.</p>			
FC10-QT97-WP	Water	Fecal coliforms, 1:10 dilution by QT97	APHA 9223B QT97
<p>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.</p>			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
<p>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.</p>			
HG-T-CVAA-WP	Water	Mercury Total	EPA 1631E (mod)
<p>Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020B (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p>			
<p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>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.</p>			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
<p>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>			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
<p>This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
<p>PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.</p>			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC,EC10-QT97-WP	Water	Total and E. coli, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously 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 35.0 – 0.5°C for 18 or 24 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.			
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 ww - 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.

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Workorder: L2375853

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4898931							
WG3210721-2 LCS								
Total Organic Carbon			91.7		%		80-120	04-NOV-19
WG3210721-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	04-NOV-19
CL-IC-N-WP	Water							
Batch	R4898819							
WG3208962-2 LCS								
Chloride (Cl)			99.6		%		90-110	02-NOV-19
WG3208962-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-NOV-19
EC-WP	Water							
Batch	R4896808							
WG3209636-13 LCS								
Conductivity			98.9		%		90-110	01-NOV-19
WG3209636-11 MB								
Conductivity			<1.0		umhos/cm		1	01-NOV-19
F-IC-N-WP	Water							
Batch	R4898819							
WG3208962-2 LCS								
Fluoride (F)			102.3		%		90-110	02-NOV-19
WG3208962-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-NOV-19
F2-F4-FID-WP	Water							
Batch	R4900866							
WG3211137-2 LCS								
F2 (C10-C16)			106.9		%		70-130	06-NOV-19
F3 (C16-C34)			99.4		%		70-130	06-NOV-19
F4 (C34-C50)			102.1		%		70-130	06-NOV-19
WG3211137-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	06-NOV-19
F3 (C16-C34)			<0.25		mg/L		0.25	06-NOV-19
F4 (C34-C50)			<0.25		mg/L		0.25	06-NOV-19
Surrogate: 2-Bromobenzotrifluoride			85.3		%		60-140	06-NOV-19
FC10-QT97-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP	Water							
Batch R4896510								
WG3208665-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	01-NOV-19
HG-T-CVAA-WP	Water							
Batch R4901178								
WG3212454-2 LCS								
Mercury (Hg)-Total			98.0		%		80-120	06-NOV-19
WG3212454-1 MB								
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	06-NOV-19
MET-T-CCMS-WP	Water							
Batch R4903044								
WG3213018-2 LCS								
Aluminum (Al)-Total			102.9		%		80-120	07-NOV-19
Antimony (Sb)-Total			102.7		%		80-120	07-NOV-19
Arsenic (As)-Total			100.1		%		80-120	07-NOV-19
Barium (Ba)-Total			102.1		%		80-120	07-NOV-19
Beryllium (Be)-Total			99.6		%		80-120	07-NOV-19
Bismuth (Bi)-Total			94.9		%		80-120	07-NOV-19
Boron (B)-Total			102.1		%		80-120	07-NOV-19
Cadmium (Cd)-Total			98.8		%		80-120	07-NOV-19
Calcium (Ca)-Total			99.3		%		80-120	07-NOV-19
Cesium (Cs)-Total			99.8		%		80-120	07-NOV-19
Chromium (Cr)-Total			101.3		%		80-120	07-NOV-19
Cobalt (Co)-Total			99.5		%		80-120	07-NOV-19
Copper (Cu)-Total			100.4		%		80-120	07-NOV-19
Iron (Fe)-Total			99.9		%		80-120	07-NOV-19
Lead (Pb)-Total			96.6		%		80-120	07-NOV-19
Lithium (Li)-Total			100.7		%		80-120	07-NOV-19
Magnesium (Mg)-Total			99.7		%		80-120	07-NOV-19
Manganese (Mn)-Total			102.3		%		80-120	07-NOV-19
Molybdenum (Mo)-Total			102.0		%		80-120	07-NOV-19
Nickel (Ni)-Total			99.8		%		80-120	07-NOV-19
Potassium (K)-Total			102.2		%		80-120	07-NOV-19
Phosphorus (P)-Total			103.0		%		80-120	07-NOV-19
Rubidium (Rb)-Total			99.2		%		80-120	07-NOV-19
Selenium (Se)-Total			99.5		%		80-120	07-NOV-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4903044							
WG3213018-2	LCS							
Silicon (Si)-Total			104.6		%		80-120	07-NOV-19
Silver (Ag)-Total			103.2		%		80-120	07-NOV-19
Sodium (Na)-Total			101.2		%		80-120	07-NOV-19
Strontium (Sr)-Total			101.0		%		80-120	07-NOV-19
Sulfur (S)-Total			99.8		%		80-120	07-NOV-19
Tellurium (Te)-Total			101.4		%		80-120	07-NOV-19
Thallium (Tl)-Total			98.6		%		80-120	07-NOV-19
Thorium (Th)-Total			91.9		%		80-120	07-NOV-19
Tin (Sn)-Total			100.5		%		80-120	07-NOV-19
Titanium (Ti)-Total			99.8		%		80-120	07-NOV-19
Tungsten (W)-Total			100.5		%		80-120	07-NOV-19
Uranium (U)-Total			94.6		%		80-120	07-NOV-19
Vanadium (V)-Total			102.2		%		80-120	07-NOV-19
Zinc (Zn)-Total			99.4		%		80-120	07-NOV-19
Zirconium (Zr)-Total			98.9		%		80-120	07-NOV-19
WG3213018-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	07-NOV-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-NOV-19
Boron (B)-Total			<0.010		mg/L		0.01	07-NOV-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	07-NOV-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-NOV-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	07-NOV-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-NOV-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-NOV-19
Iron (Fe)-Total			<0.010		mg/L		0.01	07-NOV-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-NOV-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-NOV-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-NOV-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-NOV-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP		Water						
Batch	R4898819							
WG3208962-2	LCS							
Nitrate (as N)			101.1		%		90-110	02-NOV-19
WG3208962-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	02-NOV-19
OG-GRAV-WP		Water						
Batch	R4903191							
WG3211955-2	LCS							
Oil and Grease			102.4		%		70-130	08-NOV-19
WG3211955-1	MB							
Oil and Grease			<5.0		mg/L		5	08-NOV-19
P-T-COL-WP		Water						
Batch	R4898746							
WG3210251-6	LCS							
Phosphorus (P)-Total			100.2		%		80-120	05-NOV-19
WG3210251-5	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	05-NOV-19
PAH,PANH-WP		Water						
Batch	R4906524							
WG3216498-2	LCS							
1-Methyl Naphthalene			115.3		%		60-130	13-NOV-19
2-Methyl Naphthalene			107.7		%		60-130	13-NOV-19
Acenaphthene			113.4		%		60-130	13-NOV-19
Acenaphthylene			101.5		%		60-130	13-NOV-19
Anthracene			85.6		%		60-130	13-NOV-19
Acridine			106.5		%		60-130	13-NOV-19
Benzo(a)anthracene			106.4		%		60-130	13-NOV-19
Benzo(a)pyrene			103.6		%		60-130	13-NOV-19
Benzo(b&j)fluoranthene			109.2		%		60-130	13-NOV-19
Benzo(g,h,i)perylene			109.3		%		60-130	13-NOV-19
Benzo(k)fluoranthene			98.3		%		60-130	13-NOV-19
Chrysene			115.3		%		60-130	13-NOV-19
Dibenzo(a,h)anthracene			114.4		%		60-130	13-NOV-19
Fluoranthene			107.8		%		60-130	13-NOV-19
Fluorene			97.6		%		60-130	13-NOV-19
Indeno(1,2,3-cd)pyrene			111.4		%		60-130	13-NOV-19
Naphthalene			109.5		%		50-130	13-NOV-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4901001								
WG3212127-14 LCS								
Phenols (4AAP)			95.4		%		85-115	06-NOV-19
WG3212127-13 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	06-NOV-19
SO4-IC-N-WP								
Batch R4898819								
WG3208962-2 LCS								
Sulfate (SO4)			101.9		%		90-110	02-NOV-19
WG3208962-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-NOV-19
SOLIDS-TOTSUS-WP								
Batch R4902207								
WG3211709-17 LCS								
Total Suspended Solids			103.6		%		85-115	06-NOV-19
WG3211709-16 MB								
Total Suspended Solids			<2.0		mg/L		2	06-NOV-19
TC,EC10-QT97-WP								
Batch R4896501								
WG3208672-2 DUP		L2375853-1						
Total Coliforms		>24200	>24200		MPN/100mL	0.0	65	01-NOV-19
Escherichia Coli		>24200	>24200		MPN/100mL	0.0	65	01-NOV-19
WG3208672-1 MB								
Total Coliforms			<1		MPN/100mL		1	01-NOV-19
Escherichia Coli			<1		MPN/100mL		1	01-NOV-19

Quality Control Report

Workorder: L2375853

Report Date: 14-NOV-19

Page 9 of 10

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L2375853

Report Date: 14-NOV-19

Page 10 of 10

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	31-OCT-19 13:30	01-NOV-19 12:00	0.25	23	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2375853 were received on 01-NOV-19 13:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

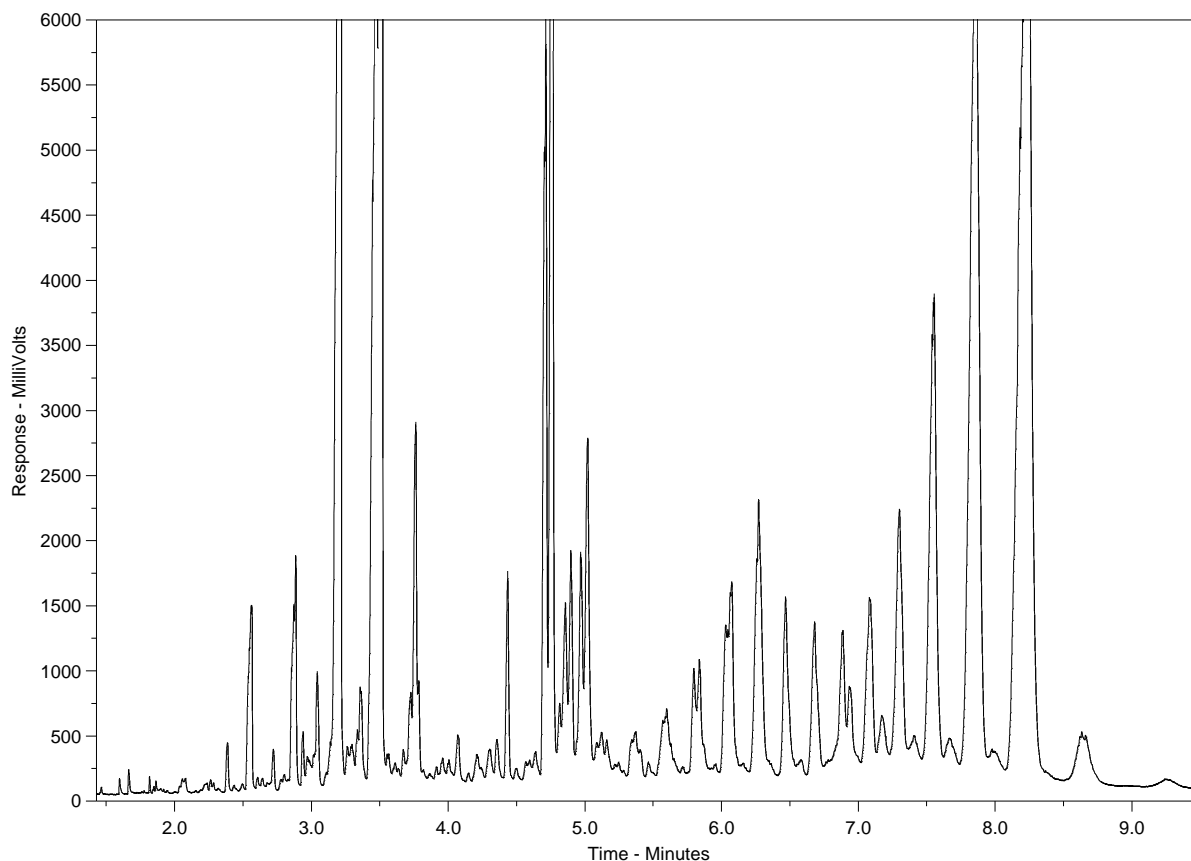
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2375853-1
 Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



L2375853-COFC

COC # _____

Page _____ of _____

Report To

Company: Nunavut CGS - Rankin Inlet (W8133)

Contact: SIMON DOIRON

Address: Box 490

Rankin Inlet, NU, X0C 0G0

Phone: 867-645-8155

Cell#:

Invoice To Same as Report? ☒ Yes ☐ NoHardcopy of Invoice with Report? ☐ Yes ☐ No

Company:

Contact:

Address:

Phone:

Fax:

Lab Work Order #

(lab use only)

ALS

Contact: Craig Riddell

Sampled By: Simon Doiron

Sample #

Sample Identification

(This description will appear on the report)

Date Sampled

Time Sampled

Sample Type

Rankin Inlet WWTP - Effluent

Oct 31/19

1:30pm

Waste

BTX,F1-F4-WP

PAH,PAH-WP

NUNAVUT-WW-GRP1-WP

F-IC-N-WP

TC,EC-QT97-WP

Number of Containers

**NOTE TO LOGIN - remove metals Reporting Code WP-NUNAVUT-WW-GRP1

So all ICP-MS metals report.

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Nunavut-WW-GRP1-WP pkg includes 1 L BOD/CBOD, 1 L Routine, 250 ml Metals, 40 ml Mercury Vial, 250 ml Amber Nutrient, 250 ml Amber Phenols, 2 x 250 ml Amber Oil & Grease, 250 ml Bacteria (9 bottles) + 5 Vials for BTX,F1-F4 and 1 L Amber for PAH's = Total of 15 Bottles per sample.

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 provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)

SHIPMENT RECEPTION (lab use only)

SHIPMENT VERIFICATION (lab use only)

Released by:

Date (dd-mm-yy)

Time (hh-mm)

Received by:

Date:

Time:

Temperature:

Verified by:

Date:

Time:

Observations:

Yes / No ?

If Yes add SIF

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix X



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 26-NOV-19
Report Date: 05-DEC-19 14:54 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2387882

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2387882-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 25-NOV-19 @ 13:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050	VOCHS	0.00050	mg/L		27-NOV-19	R4929936
Toluene	0.0012	VOCHS	0.0010	mg/L		27-NOV-19	R4929936
Ethyl benzene	<0.00050	VOCHS	0.00050	mg/L		27-NOV-19	R4929936
o-Xylene	<0.00050	VOCHS	0.00050	mg/L		27-NOV-19	R4929936
m+p-Xylenes	<0.00040	VOCHS	0.00040	mg/L		27-NOV-19	R4929936
F1 (C6-C10)	<0.10	VOCHS	0.10	mg/L		27-NOV-19	R4929936
Surrogate: 4-Bromofluorobenzene (SS)	86.0		70-130	%		27-NOV-19	R4929936
CCME PHC F2-F4 in Water							
F2 (C10-C16)	1.51		0.10	mg/L	28-NOV-19	30-NOV-19	R4929054
F3 (C16-C34)	21.6		0.25	mg/L	28-NOV-19	30-NOV-19	R4929054
F4 (C34-C50)	6.41		0.25	mg/L	28-NOV-19	30-NOV-19	R4929054
Surrogate: 2-Bromobenzotrifluoride	97.3		60-140	%	28-NOV-19	30-NOV-19	R4929054
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		05-DEC-19	
F2-Naphth	1.51		0.10	mg/L		05-DEC-19	
F3-PAH	21.6		0.25	mg/L		05-DEC-19	
Total Hydrocarbons (C6-C50)	29.5		0.38	mg/L		05-DEC-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		02-DEC-19	
Miscellaneous Parameters							
Fluoride (F)	0.155		0.020	mg/L		27-NOV-19	R4928444
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200		10	MPN/100mL		26-NOV-19	R4927006
Escherichia Coli	>24200		10	MPN/100mL		26-NOV-19	R4927006
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000291		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
2-Methyl Naphthalene	0.000287		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Acenaphthene	0.000044		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Acenaphthylene	<0.000020		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Anthracene	0.000027	EMPC	0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Acridine	<0.000020		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Benzo(a)anthracene	0.000058		0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Benzo(a)pyrene	0.0000311		0.0000050	mg/L	03-DEC-19	04-DEC-19	R4934049
Benzo(b&j)fluoranthene	0.000028		0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Chrysene	0.000058		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Dibenzo(a,h)anthracene	0.0000228	EMPC	0.0000050	mg/L	03-DEC-19	04-DEC-19	R4934049
Fluoranthene	0.000097	EMPC	0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Fluorene	0.000073	EMPC	0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Naphthalene	0.000186	EMPC	0.000050	mg/L	03-DEC-19	04-DEC-19	R4934049
Phenanthrene	0.000127		0.000050	mg/L	03-DEC-19	04-DEC-19	R4934049
Pyrene	0.000123	EMPC	0.000010	mg/L	03-DEC-19	04-DEC-19	R4934049
Quinoline	0.000034		0.000020	mg/L	03-DEC-19	04-DEC-19	R4934049
B(a)P Total Potency Equivalent	0.000064		0.000030	mg/L	03-DEC-19	04-DEC-19	R4934049
Surrogate: Acenaphthene d10	97.6		60-130	%	03-DEC-19	04-DEC-19	R4934049
Surrogate: Acridine d9	110.7		60-130	%	03-DEC-19	04-DEC-19	R4934049
Surrogate: Chrysene d12	115.0		60-130	%	03-DEC-19	04-DEC-19	R4934049
Surrogate: Naphthalene d8	107.3		50-130	%	03-DEC-19	04-DEC-19	R4934049
Surrogate: Phenanthrene d10	104.2		60-130	%	03-DEC-19	04-DEC-19	R4934049

* 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
L2387882-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: SD on 25-NOV-19 @ 13:30								
Matrix: WASTE								
Nunavut WW Group 1								
Alkalinity, Bicarbonate								
Bicarbonate (HCO3)		152		1.2	mg/L		28-NOV-19	
Alkalinity, Carbonate								
Carbonate (CO3)		<0.60		0.60	mg/L		28-NOV-19	
Alkalinity, Hydroxide								
Hydroxide (OH)		<0.34		0.34	mg/L		28-NOV-19	
Alkalinity, Total (as CaCO3)								
Alkalinity, Total (as CaCO3)		124		1.0	mg/L		27-NOV-19	R4927641
Ammonia by colour								
Ammonia, Total (as N)		13.1		1.0	mg/L		03-DEC-19	R4934147
Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand		> 150		20	mg/L		27-NOV-19	R4930316
Carbonaceous BOD								
BOD Carbonaceous		> 160		20	mg/L		27-NOV-19	R4930316
Chloride in Water by IC								
Chloride (Cl)		56.3		0.50	mg/L		27-NOV-19	R4928444
Conductivity								
Conductivity		492		1.0	umhos/cm		27-NOV-19	R4927641
Fecal coliforms, 1:10 dilution by QT97								
Fecal Coliforms		>24200		10	MPN/100mL		26-NOV-19	R4927011
Hardness Calculated								
Hardness (as CaCO3)		89.5	HTC	0.20	mg/L		05-DEC-19	
Mercury Total								
Mercury (Hg)-Total		0.0000150		0.0000050	mg/L	04-DEC-19	04-DEC-19	R4935627
Nitrate in Water by IC								
Nitrate (as N)		<0.020		0.020	mg/L		27-NOV-19	R4928444
Nitrate+Nitrite								
Nitrate and Nitrite as N		<0.070		0.070	mg/L		29-NOV-19	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		27-NOV-19	R4928444
Oil & Grease - Gravimetric								
Oil and Grease		44.7		5.0	mg/L		02-DEC-19	R4930010
Phenol (4AAP)								
Phenols (4AAP)		0.0191		0.0010	mg/L		29-NOV-19	R4929516
Phosphorus, Total								
Phosphorus (P)-Total		3.71		0.030	mg/L		28-NOV-19	R4927765
Sulfate in Water by IC								
Sulfate (SO4)		27.1		0.30	mg/L		27-NOV-19	R4928444
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		0.283		0.0030	mg/L	03-DEC-19	03-DEC-19	R4933220
Antimony (Sb)-Total		0.00020		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Arsenic (As)-Total		0.00085		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Barium (Ba)-Total		0.0290		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Beryllium (Be)-Total		<0.00010		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Bismuth (Bi)-Total		0.00258		0.000050	mg/L	03-DEC-19	03-DEC-19	R4933220
Boron (B)-Total		0.128		0.010	mg/L	03-DEC-19	03-DEC-19	R4933220
Cadmium (Cd)-Total		0.000135		0.0000050	mg/L	03-DEC-19	03-DEC-19	R4933220
Calcium (Ca)-Total		25.4		0.050	mg/L	03-DEC-19	03-DEC-19	R4933220
Cesium (Cs)-Total		0.000109		0.000010	mg/L	03-DEC-19	03-DEC-19	R4933220
Chromium (Cr)-Total		0.00085		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Cobalt (Co)-Total		0.00024		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Copper (Cu)-Total		0.191		0.00050	mg/L	03-DEC-19	03-DEC-19	R4933220

* 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
L2387882-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: SD on 25-NOV-19 @ 13:30								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total		0.276		0.010	mg/L	03-DEC-19	03-DEC-19	R4933220
Lead (Pb)-Total		0.00279		0.000050	mg/L	03-DEC-19	03-DEC-19	R4933220
Lithium (Li)-Total		0.0032		0.0010	mg/L	03-DEC-19	03-DEC-19	R4933220
Magnesium (Mg)-Total		6.33		0.0050	mg/L	03-DEC-19	03-DEC-19	R4933220
Manganese (Mn)-Total		0.0378		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Molybdenum (Mo)-Total		0.00133		0.000050	mg/L	03-DEC-19	03-DEC-19	R4933220
Nickel (Ni)-Total		0.00298		0.00050	mg/L	03-DEC-19	03-DEC-19	R4933220
Potassium (K)-Total		12.1		0.050	mg/L	03-DEC-19	03-DEC-19	R4933220
Phosphorus (P)-Total		3.90		0.030	mg/L	03-DEC-19	03-DEC-19	R4933220
Rubidium (Rb)-Total		0.0132		0.00020	mg/L	03-DEC-19	03-DEC-19	R4933220
Selenium (Se)-Total		0.000329		0.000050	mg/L	03-DEC-19	03-DEC-19	R4933220
Silicon (Si)-Total		0.39		0.10	mg/L	03-DEC-19	03-DEC-19	R4933220
Silver (Ag)-Total		0.000068		0.000010	mg/L	03-DEC-19	03-DEC-19	R4933220
Sodium (Na)-Total		34.6		0.050	mg/L	03-DEC-19	03-DEC-19	R4933220
Strontium (Sr)-Total		0.116		0.00020	mg/L	03-DEC-19	03-DEC-19	R4933220
Sulfur (S)-Total		9.12		0.50	mg/L	03-DEC-19	03-DEC-19	R4933220
Tellurium (Te)-Total		<0.00020		0.00020	mg/L	03-DEC-19	03-DEC-19	R4933220
Thallium (Tl)-Total		<0.000010		0.000010	mg/L	03-DEC-19	03-DEC-19	R4933220
Thorium (Th)-Total		<0.00010		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Tin (Sn)-Total		0.00232		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Titanium (Ti)-Total		0.00291		0.00030	mg/L	03-DEC-19	03-DEC-19	R4933220
Tungsten (W)-Total		<0.00010		0.00010	mg/L	03-DEC-19	03-DEC-19	R4933220
Uranium (U)-Total		0.000175		0.000010	mg/L	03-DEC-19	03-DEC-19	R4933220
Vanadium (V)-Total		0.00052		0.00050	mg/L	03-DEC-19	03-DEC-19	R4933220
Zinc (Zn)-Total		0.108		0.0030	mg/L	03-DEC-19	03-DEC-19	R4933220
Zirconium (Zr)-Total		0.00069		0.00020	mg/L	03-DEC-19	03-DEC-19	R4933220
Total Organic Carbon by Combustion								
Total Organic Carbon		129		5.0	mg/L		27-NOV-19	R4929906
Total Suspended Solids								
Total Suspended Solids		166		6.0	mg/L		28-NOV-19	R4929899
pH								
pH		7.30		0.10	pH units		28-NOV-19	R4928689

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
VOCHS	VOC analysis was conducted for a water sample that contained > 5% headspace. Results may be biased low.

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 transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
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.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.			
3. Linearity of gasoline response within 15% throughout the calibration range.			
Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:			
1. All extraction and analysis holding times were met.			
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.			
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.			
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.			
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 degrees 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-WP	Water	pH	APHA 4500H

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 aqueous matrices is determined gravimetrically after drying the residue at 103 ± 105°C.			
TC,EC10-QT97-WP	Water	Total and E. coli, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Escherichia coli bacteria are simultaneously 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 35.0 +/- 0.5 degrees C for 18 or 24 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.			
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.

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	Water							
Batch	R4929906							
WG3232819-2 LCS								
Total Organic Carbon			101.4		%		80-120	27-NOV-19
WG3232819-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	27-NOV-19
CL-IC-N-WP	Water							
Batch	R4928444							
WG3229533-2 LCS								
Chloride (Cl)			98.2		%		90-110	27-NOV-19
WG3229533-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	27-NOV-19
EC-WP	Water							
Batch	R4927641							
WG3230521-5 DUP		L2387882-1						
Conductivity		492	493		umhos/cm	0.2	10	27-NOV-19
WG3230521-3 LCS								
Conductivity			98.4		%		90-110	27-NOV-19
WG3230521-1 MB								
Conductivity			<1.0		umhos/cm		1	27-NOV-19
F-IC-N-WP	Water							
Batch	R4928444							
WG3229533-2 LCS								
Fluoride (F)			99.6		%		90-110	27-NOV-19
WG3229533-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	27-NOV-19
F2-F4-FID-WP	Water							
Batch	R4929054							
WG3230328-2 LCS								
F2 (C10-C16)			104.8		%		70-130	29-NOV-19
F3 (C16-C34)			96.5		%		70-130	29-NOV-19
F4 (C34-C50)			99.3		%		70-130	29-NOV-19
WG3230328-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	29-NOV-19
F3 (C16-C34)			<0.25		mg/L		0.25	29-NOV-19
F4 (C34-C50)			<0.25		mg/L		0.25	29-NOV-19
Surrogate: 2-Bromobenzotrifluoride			98.7		%		60-140	29-NOV-19
FC10-QT97-WP	Water							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP								
Batch R4927011								
WG3228979-2 DUP		L2387882-1						
Fecal Coliforms		>24200	>24200		MPN/100mL	0.0	65	26-NOV-19
WG3228979-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	26-NOV-19
HG-T-CVAA-WP								
Batch R4935627								
WG3235353-2 LCS								
Mercury (Hg)-Total			102.0		%		80-120	04-DEC-19
WG3235353-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	04-DEC-19
MET-T-CCMS-WP								
Batch R4933220								
WG3233720-2 LCS								
Aluminum (Al)-Total			101.6		%		80-120	03-DEC-19
Antimony (Sb)-Total			100.8		%		80-120	03-DEC-19
Arsenic (As)-Total			101.1		%		80-120	03-DEC-19
Barium (Ba)-Total			103.9		%		80-120	03-DEC-19
Beryllium (Be)-Total			102.5		%		80-120	03-DEC-19
Bismuth (Bi)-Total			101.9		%		80-120	03-DEC-19
Boron (B)-Total			97.5		%		80-120	03-DEC-19
Cadmium (Cd)-Total			103.5		%		80-120	03-DEC-19
Calcium (Ca)-Total			104.0		%		80-120	03-DEC-19
Cesium (Cs)-Total			108.4		%		80-120	03-DEC-19
Chromium (Cr)-Total			102.0		%		80-120	03-DEC-19
Cobalt (Co)-Total			101.1		%		80-120	03-DEC-19
Copper (Cu)-Total			101.1		%		80-120	03-DEC-19
Iron (Fe)-Total			92.5		%		80-120	03-DEC-19
Lead (Pb)-Total			103.1		%		80-120	03-DEC-19
Lithium (Li)-Total			101.6		%		80-120	03-DEC-19
Magnesium (Mg)-Total			114.4		%		80-120	03-DEC-19
Manganese (Mn)-Total			101.2		%		80-120	03-DEC-19
Molybdenum (Mo)-Total			99.3		%		80-120	03-DEC-19
Nickel (Ni)-Total			98.6		%		80-120	03-DEC-19
Potassium (K)-Total			99.1		%		80-120	03-DEC-19
Phosphorus (P)-Total			101.4		%		80-120	03-DEC-19
Rubidium (Rb)-Total			100.8		%		80-120	03-DEC-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4933220							
WG3233720-2	LCS							
Selenium (Se)-Total			104.1		%		80-120	03-DEC-19
Silicon (Si)-Total			91.6		%		80-120	03-DEC-19
Silver (Ag)-Total			100.7		%		80-120	03-DEC-19
Sodium (Na)-Total			103.7		%		80-120	03-DEC-19
Strontium (Sr)-Total			108.7		%		80-120	03-DEC-19
Sulfur (S)-Total			91.4		%		80-120	03-DEC-19
Tellurium (Te)-Total			93.9		%		80-120	03-DEC-19
Thallium (Tl)-Total			104.3		%		80-120	03-DEC-19
Thorium (Th)-Total			104.5		%		80-120	03-DEC-19
Tin (Sn)-Total			98.4		%		80-120	03-DEC-19
Titanium (Ti)-Total			96.5		%		80-120	03-DEC-19
Tungsten (W)-Total			102.0		%		80-120	03-DEC-19
Uranium (U)-Total			110.2		%		80-120	03-DEC-19
Vanadium (V)-Total			102.4		%		80-120	03-DEC-19
Zinc (Zn)-Total			99.6		%		80-120	03-DEC-19
Zirconium (Zr)-Total			98.2		%		80-120	03-DEC-19
WG3233720-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	03-DEC-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-DEC-19
Boron (B)-Total			<0.010		mg/L		0.01	03-DEC-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	03-DEC-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	03-DEC-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	03-DEC-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	03-DEC-19
Iron (Fe)-Total			<0.010		mg/L		0.01	03-DEC-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-DEC-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	03-DEC-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-DEC-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4933220							
WG3233720-1 MB								
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-DEC-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	03-DEC-19
Potassium (K)-Total			<0.050		mg/L		0.05	03-DEC-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	03-DEC-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	03-DEC-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	03-DEC-19
Silicon (Si)-Total			<0.10		mg/L		0.1	03-DEC-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	03-DEC-19
Sodium (Na)-Total			<0.050		mg/L		0.05	03-DEC-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	03-DEC-19
Sulfur (S)-Total			<0.50		mg/L		0.5	03-DEC-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	03-DEC-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-DEC-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-DEC-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	03-DEC-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-DEC-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	03-DEC-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-DEC-19
Zirconium (Zr)-Total			<0.00020		mg/L		0.0002	03-DEC-19
NH3-COL-WP		Water						
Batch	R4934147							
WG3235151-6 LCS								
Ammonia, Total (as N)			101.4		%		85-115	03-DEC-19
WG3235151-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	03-DEC-19
NO2-IC-N-WP		Water						
Batch	R4928444							
WG3229533-2 LCS								
Nitrite (as N)			101.4		%		90-110	27-NOV-19
WG3229533-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	27-NOV-19
NO3-IC-N-WP		Water						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP	Water							
Batch R4928444								
WG3229533-2 LCS								
Nitrate (as N)			101.2		%		90-110	27-NOV-19
WG3229533-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	27-NOV-19
OG-GRAV-WP	Water							
Batch R4930010								
WG3231394-2 LCS								
Oil and Grease			94.1		%		70-130	02-DEC-19
WG3231394-1 MB								
Oil and Grease			<5.0		mg/L		5	02-DEC-19
P-T-COL-WP	Water							
Batch R4927765								
WG3230456-14 LCS								
Phosphorus (P)-Total			101.0		%		80-120	28-NOV-19
WG3230456-13 MB								
Phosphorus (P)-Total			<0.0030		mg/L		0.003	28-NOV-19
PAH,PANH-WP	Water							
Batch R4934049								
WG3235119-2 LCS								
1-Methyl Naphthalene			100.9		%		60-130	04-DEC-19
2-Methyl Naphthalene			92.4		%		60-130	04-DEC-19
Acenaphthene			100.0		%		60-130	04-DEC-19
Acenaphthylene			88.2		%		60-130	04-DEC-19
Anthracene			77.2		%		60-130	04-DEC-19
Acridine			91.9		%		60-130	04-DEC-19
Benzo(a)anthracene			107.5		%		60-130	04-DEC-19
Benzo(a)pyrene			106.1		%		60-130	04-DEC-19
Benzo(b&j)fluoranthene			106.1		%		60-130	04-DEC-19
Benzo(g,h,i)perylene			98.4		%		60-130	04-DEC-19
Benzo(k)fluoranthene			101.3		%		60-130	04-DEC-19
Chrysene			99.0		%		60-130	04-DEC-19
Dibenzo(a,h)anthracene			90.5		%		60-130	04-DEC-19
Fluoranthene			110.4		%		60-130	04-DEC-19
Fluorene			88.2		%		60-130	04-DEC-19
Indeno(1,2,3-cd)pyrene			92.4		%		60-130	04-DEC-19
Naphthalene			100.8		%		50-130	04-DEC-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4934049							
WG3235119-2	LCS							
Phenanthrene			104.3		%		60-130	04-DEC-19
Pyrene			116.2		%		60-130	04-DEC-19
Quinoline			105.4		%		60-130	04-DEC-19
WG3235119-1	MB							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	04-DEC-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	04-DEC-19
Acenaphthene			<0.000020		mg/L		0.00002	04-DEC-19
Acenaphthylene			<0.000020		mg/L		0.00002	04-DEC-19
Anthracene			<0.000010		mg/L		0.00001	04-DEC-19
Acridine			<0.000020		mg/L		0.00002	04-DEC-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	04-DEC-19
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	04-DEC-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	04-DEC-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	04-DEC-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	04-DEC-19
Chrysene			<0.000020		mg/L		0.00002	04-DEC-19
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	04-DEC-19
Fluoranthene			<0.000020		mg/L		0.00002	04-DEC-19
Fluorene			<0.000020		mg/L		0.00002	04-DEC-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	04-DEC-19
Naphthalene			<0.000050		mg/L		0.00005	04-DEC-19
Phenanthrene			<0.000050		mg/L		0.00005	04-DEC-19
Pyrene			<0.000010		mg/L		0.00001	04-DEC-19
Quinoline			<0.000020		mg/L		0.00002	04-DEC-19
Surrogate: Acenaphthene d10			97.0		%		60-130	04-DEC-19
Surrogate: Acridine d9			93.7		%		60-130	04-DEC-19
Surrogate: Chrysene d12			111.4		%		60-130	04-DEC-19
Surrogate: Naphthalene d8			92.8		%		50-130	04-DEC-19
Surrogate: Phenanthrene d10			96.6		%		60-130	04-DEC-19
PH-WP		Water						
Batch	R4928689							
WG3230521-5	DUP	L2387882-1						
pH		7.30	7.29	J	pH units	0.01	0.2	28-NOV-19
WG3231568-2	LCS							
pH			7.37		pH units		7.3-7.5	28-NOV-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4929516								
WG3231641-6	LCS							
Phenols (4AAP)			108.3		%		85-115	29-NOV-19
WG3231641-5	MB							
Phenols (4AAP)			<0.0010		mg/L		0.001	29-NOV-19
SO4-IC-N-WP								
Batch R4928444								
WG3229533-2	LCS							
Sulfate (SO4)			101.2		%		90-110	27-NOV-19
WG3229533-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	27-NOV-19
SOLIDS-TOTSUS-WP								
Batch R4929899								
WG3231016-2	LCS							
Total Suspended Solids			93.4		%		85-115	28-NOV-19
WG3231016-1	MB							
Total Suspended Solids			<2.0		mg/L		2	28-NOV-19
TC,EC10-QT97-WP								
Batch R4927006								
WG3229470-2	DUP	L2387882-1						
Total Coliforms		>24200	>24200		MPN/100mL	0.0	65	26-NOV-19
Escherichia Coli		>24200	>24200		MPN/100mL	0.0	65	26-NOV-19
WG3229470-1	MB							
Total Coliforms			<1		MPN/100mL		1	26-NOV-19
Escherichia Coli			<1		MPN/100mL		1	26-NOV-19

Quality Control Report

Workorder: L2387882

Report Date: 05-DEC-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

Workorder: L2387882

Report Date: 05-DEC-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	25-NOV-19 13:30	28-NOV-19 12:00	0.25	71	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2387882 were received on 26-NOV-19 13:35.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

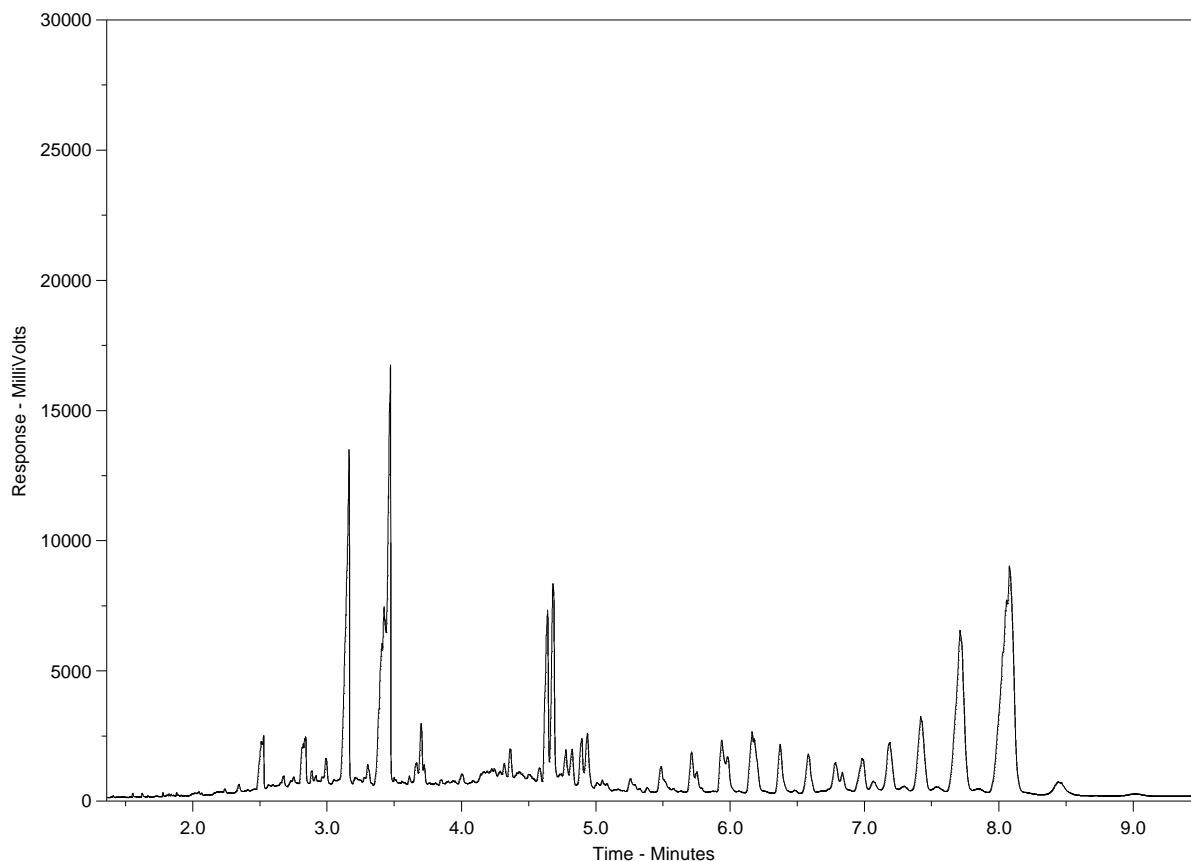
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2387882-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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



COC #

Page of

Report To						Service Requested (Rush for routine analysis subject to availability)												
Company: Nunavut CGS - Rankin Inlet (W8133)						<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Priority						<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)						
Contact: SIMON DOIRON						<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax						<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT						
Address: Box 490 Rankin Inlet, NU, X0C 0G0						Email 1: sdoiron@gov.nu.ca Email 2: scollins@gov.nu.ca Email 3: mlusty@gov.nu.ca						<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT						
Phone: 867-645-8155 Cell#:												<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT						
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No						Client / Project Information						Analysis Request						
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No						Job #: Rankin Inlet WWTP- Monthly Effluent						Please indicate below Filtered, Preserved or both (F, P, F/P)						
Company:						PO / AFE:						<div style="display: flex; justify-content: space-between;"> <div> BTX.F1-F4-WP PAH.PANH-WP NUNAVUT-WWV-GRP1-WP F-IC-N-WP TC.EC-QT97-WP </div> <div>Number of Containers</div> </div>						
Contact:						LSD:												
Address:						Quote #:												
Phone: Fax:						ALS Contact: Craig Riddell Sampled By: Simon Doiron												
Lab Work Order # (lab use only)																		
Sample #	Sample Identification (This description will appear on the report)					Date Sampled	Time Sampled	Sample Type	BTX.F1-F4-WP	PAH.PANH-WP	NUNAVUT-WWV-GRP1-WP	F-IC-N-WP	TC.EC-QT97-WP					Number of Containers
	Rankin Inlet WWTP - Effluent					Nov 25/19	1:30 pm	Waste	x	x	x	x	x					15
	**NOTE TO LOGIN - remove metals Reporting Code WP-NUNAVUT-WWV-GRP1																	
	So all ICP-MS metals report.																	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																		
Nunavut-WW-GRP1-WP pkg includes 1 L BOD/CBOD, 1 L Routine, 250 ml Metals , 40 ml Mercury Vial, 250 ml Amber Nutrient , 250 ml Amber Phenols, 2 x 250 ml Amber Oil & Grease , 250 ml Bacteria (9 bottles) + 5 Vials for BTX,F1-F4 and 1 L Amber for PAH's = Total of 15 Bottles per sample.																		
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 provided on a separate Excel tab.																		
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																		
SHIPMENT RELEASE (client use)						SHIPMENT RECEPTION (lab use only)						SHIPMENT VERIFICATION (lab use only)						
Released by: Bill Ross	Date (dd-mm-yy) Nov 25/19	Time (hh-mm) 1:30 pm	Received by: 	Date: NOV 26 2019	Time: 1:35	Temperature: 10 °C	Verified by: 	Date: NOV 26 2019	Time: 1:35	Observations: Yes / No ? If Yes add SIF								

GENF 18.01 Front

**ANNUAL REPORT
FOR GN-CGS RANKIN INLET**

Appendix Y



Nunavut Community & Government
Services - Rankin Inlet
ATTN: SIMON DOIRON
P.O. Box 490
Rankin Inlet NU X0C 0G0

Date Received: 06-DEC-19
Report Date: 23-DEC-19 07:30 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2393039

Project P.O. #: NOT SUBMITTED

Job Reference: RANKIN INLET WWTP - MONTHLY EFFLUENT

C of C Numbers:

Legal Site Desc:



Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2393039-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 04-DEC-19 @ 13:00							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		13-DEC-19	R4942527
Toluene	0.0023		0.0010	mg/L		13-DEC-19	R4942527
Ethyl benzene	<0.00050		0.00050	mg/L		13-DEC-19	R4942527
o-Xylene	0.00100		0.00050	mg/L		13-DEC-19	R4942527
m+p-Xylenes	0.00211		0.00040	mg/L		13-DEC-19	R4942527
F1 (C6-C10)	<0.10		0.10	mg/L		13-DEC-19	R4942527
Surrogate: 4-Bromofluorobenzene (SS)	84.3		70-130	%		13-DEC-19	R4942527
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.32		0.10	mg/L	07-DEC-19	07-DEC-19	R4939831
F3 (C16-C34)	8.33		0.25	mg/L	07-DEC-19	07-DEC-19	R4939831
F4 (C34-C50)	2.09		0.25	mg/L	07-DEC-19	07-DEC-19	R4939831
Surrogate: 2-Bromobenzotrifluoride	100.4		60-140	%	07-DEC-19	07-DEC-19	R4939831
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		20-DEC-19	
F2-Naphth	0.32		0.10	mg/L		20-DEC-19	
F3-PAH	8.33		0.25	mg/L		20-DEC-19	
Total Hydrocarbons (C6-C50)	10.7		0.38	mg/L		20-DEC-19	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00311		0.00064	mg/L		17-DEC-19	
Miscellaneous Parameters							
Fluoride (F)	0.108		0.020	mg/L		07-DEC-19	R4941476
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200	PEHR	10	MPN/100mL		06-DEC-19	R4937096
Escherichia Coli	>24200	PEHR	10	MPN/100mL		06-DEC-19	R4937096
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000264		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
2-Methyl Naphthalene	0.000413		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Acenaphthene	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Acenaphthylene	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Anthracene	<0.000010		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Acridine	0.000028	EMPC	0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Benzo(a)pyrene	0.0000065	EMPC	0.0000050	mg/L	12-DEC-19	19-DEC-19	R4949449
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Chrysene	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-DEC-19	19-DEC-19	R4949449
Fluoranthene	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Fluorene	0.000037	EMPC	0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Naphthalene	0.000302		0.000050	mg/L	12-DEC-19	19-DEC-19	R4949449
Phenanthrene	<0.000050		0.000050	mg/L	12-DEC-19	19-DEC-19	R4949449
Pyrene	0.000017		0.000010	mg/L	12-DEC-19	19-DEC-19	R4949449
Quinoline	<0.000020		0.000020	mg/L	12-DEC-19	19-DEC-19	R4949449
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-DEC-19	19-DEC-19	R4949449
Surrogate: Acenaphthene d10	112.6		60-130	%	12-DEC-19	19-DEC-19	R4949449
Surrogate: Acridine d9	115.0		60-130	%	12-DEC-19	19-DEC-19	R4949449
Surrogate: Chrysene d12	122.0		60-130	%	12-DEC-19	19-DEC-19	R4949449
Surrogate: Naphthalene d8	100.3		50-130	%	12-DEC-19	19-DEC-19	R4949449
Surrogate: Phenanthrene d10	106.8		60-130	%	12-DEC-19	19-DEC-19	R4949449

* 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
L2393039-1 RANKIN INLET WWTP - EFFLUENT Sampled By: SD on 04-DEC-19 @ 13:00 Matrix: WASTE Nunavut WW Group 1							
Alkalinity, Bicarbonate Bicarbonate (HCO3)	71.1		1.2	mg/L		12-DEC-19	
Alkalinity, Carbonate Carbonate (CO3)	<0.60		0.60	mg/L		12-DEC-19	
Alkalinity, Hydroxide Hydroxide (OH)	<0.34		0.34	mg/L		12-DEC-19	
Alkalinity, Total (as CaCO3) Alkalinity, Total (as CaCO3)	58.3		1.0	mg/L		11-DEC-19	R4941615
Ammonia by colour Ammonia, Total (as N)	1.97		0.10	mg/L		11-DEC-19	R4941859
Biochemical Oxygen Demand (BOD) Biochemical Oxygen Demand	63		20	mg/L		06-DEC-19	R4941414
Carbonaceous BOD BOD Carbonaceous	53		20	mg/L		06-DEC-19	R4941414
Chloride in Water by IC Chloride (Cl)	47.5		0.50	mg/L		07-DEC-19	R4941476
Conductivity Conductivity	300		1.0	umhos/cm		11-DEC-19	R4941615
Fecal coliforms, 1:10 dilution by QT97 Fecal Coliforms	>24200	PEHR	10	MPN/100mL		06-DEC-19	R4937094
Hardness Calculated Hardness (as CaCO3)	82.1	HTC	0.20	mg/L		13-DEC-19	
Mercury Total Mercury (Hg)-Total	0.0000070		0.0000050	mg/L	19-DEC-19	19-DEC-19	R4947031
Nitrate in Water by IC Nitrate (as N)	<0.020		0.020	mg/L		07-DEC-19	R4941476
Nitrate+Nitrite Nitrate and Nitrite as N	<0.070		0.070	mg/L		12-DEC-19	
Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		07-DEC-19	R4941476
Oil & Grease - Gravimetric Oil and Grease	24.0		5.0	mg/L		13-DEC-19	R4942983
Phenol (4AAP) Phenols (4AAP)	0.0032		0.0010	mg/L		10-DEC-19	R4940476
Phosphorus, Total Phosphorus (P)-Total	0.984		0.0030	mg/L		10-DEC-19	R4939913
Sulfate in Water by IC Sulfate (SO4)	24.6		0.30	mg/L		07-DEC-19	R4941476
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.118		0.0030	mg/L	12-DEC-19	12-DEC-19	R4942418
Antimony (Sb)-Total	0.00087		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Arsenic (As)-Total	0.00083		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Barium (Ba)-Total	0.0270		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Bismuth (Bi)-Total	0.00118		0.000050	mg/L	12-DEC-19	12-DEC-19	R4942418
Boron (B)-Total	0.056		0.010	mg/L	12-DEC-19	12-DEC-19	R4942418
Cadmium (Cd)-Total	0.0000371		0.0000050	mg/L	12-DEC-19	12-DEC-19	R4942418
Calcium (Ca)-Total	23.5		0.050	mg/L	12-DEC-19	12-DEC-19	R4942418
Cesium (Cs)-Total	0.000043		0.000010	mg/L	12-DEC-19	12-DEC-19	R4942418
Chromium (Cr)-Total	0.00064		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Cobalt (Co)-Total	0.00015		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Copper (Cu)-Total	0.136		0.00050	mg/L	12-DEC-19	12-DEC-19	R4942418

* 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
L2393039-1 RANKIN INLET WWTP - EFFLUENT								
Sampled By: SD on 04-DEC-19 @ 13:00								
Matrix: WASTE								
Total Metals in Water by CRC ICPMS								
Iron (Fe)-Total		0.240		0.010	mg/L	12-DEC-19	12-DEC-19	R4942418
Lead (Pb)-Total		0.00279		0.000050	mg/L	12-DEC-19	12-DEC-19	R4942418
Lithium (Li)-Total		0.0034		0.0010	mg/L	12-DEC-19	12-DEC-19	R4942418
Magnesium (Mg)-Total		5.71		0.0050	mg/L	12-DEC-19	12-DEC-19	R4942418
Manganese (Mn)-Total		0.0252		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Molybdenum (Mo)-Total		0.00104		0.000050	mg/L	12-DEC-19	12-DEC-19	R4942418
Nickel (Ni)-Total		0.00293		0.00050	mg/L	12-DEC-19	12-DEC-19	R4942418
Potassium (K)-Total		4.83		0.050	mg/L	12-DEC-19	12-DEC-19	R4942418
Phosphorus (P)-Total		1.07		0.030	mg/L	12-DEC-19	12-DEC-19	R4942418
Rubidium (Rb)-Total		0.00466		0.00020	mg/L	12-DEC-19	12-DEC-19	R4942418
Selenium (Se)-Total		0.000129		0.000050	mg/L	12-DEC-19	12-DEC-19	R4942418
Silicon (Si)-Total		0.28		0.10	mg/L	12-DEC-19	12-DEC-19	R4942418
Silver (Ag)-Total		0.000027		0.000010	mg/L	12-DEC-19	12-DEC-19	R4942418
Sodium (Na)-Total		28.1		0.050	mg/L	12-DEC-19	12-DEC-19	R4942418
Strontium (Sr)-Total		0.115		0.00020	mg/L	12-DEC-19	12-DEC-19	R4942418
Sulfur (S)-Total		9.69		0.50	mg/L	12-DEC-19	12-DEC-19	R4942418
Tellurium (Te)-Total		<0.00020		0.00020	mg/L	12-DEC-19	12-DEC-19	R4942418
Thallium (Tl)-Total		<0.000010		0.000010	mg/L	12-DEC-19	12-DEC-19	R4942418
Thorium (Th)-Total		<0.00010		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Tin (Sn)-Total		0.00067		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Titanium (Ti)-Total		0.0107		0.00030	mg/L	12-DEC-19	12-DEC-19	R4942418
Tungsten (W)-Total		<0.00010		0.00010	mg/L	12-DEC-19	12-DEC-19	R4942418
Uranium (U)-Total		0.000162		0.000010	mg/L	12-DEC-19	12-DEC-19	R4942418
Vanadium (V)-Total		0.00059		0.00050	mg/L	12-DEC-19	12-DEC-19	R4942418
Zinc (Zn)-Total		0.0473		0.0030	mg/L	12-DEC-19	12-DEC-19	R4942418
Zirconium (Zr)-Total		0.00020		0.00020	mg/L	12-DEC-19	12-DEC-19	R4942418
Total Organic Carbon by Combustion								
Total Organic Carbon		28.6		0.50	mg/L		12-DEC-19	R4942510
Total Suspended Solids								
Total Suspended Solids		97.2		6.0	mg/L		11-DEC-19	R4941843
pH								
pH		7.14		0.10	pH units		11-DEC-19	R4941615

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

Reference Information

Qualifiers for Individual Samples Listed:

Lab Sample ID	Client Sample ID	Qualifier	Description
L2393039-1	RANKIN INLET WWTP - EFFI	PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Sample Parameter Qualifier Key:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L.			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred 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-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
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.			
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L
Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.			
In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.			
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.			
In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.			
Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:			
1. All extraction and analysis holding times were met.			
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 degrees 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 200.2/6020B (mod.)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA METHOD 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.			
PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA 3511/8270D (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
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 aqueous matrices is determined gravimetrically after drying the residue at 103 105°C.			
TC,EC10-QT97-WP	Water	Total and E. coli, 1:10 dilution by QT97	APHA 9223B QT97
Analysis is carried out using procedures adapted from APHA 9223 "Enzyme Substrate Coliform Test". Total coliforms and Eschericia coli bacteria are simultaneously 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 35.0 +/- 0.5 degrees C for 18 or 24 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.			
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.

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP								
Batch R4942510								
WG3241750-3 DUP		L2393039-1						
Total Organic Carbon		28.6	27.7		mg/L	3.3	20	12-DEC-19
WG3241750-2 LCS								
Total Organic Carbon			94.2		%		80-120	12-DEC-19
WG3241750-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	12-DEC-19
CL-IC-N-WP								
Batch R4941476								
WG3237580-2 LCS								
Chloride (Cl)			100.3		%		90-110	07-DEC-19
WG3237580-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	07-DEC-19
EC-WP								
Batch R4941615								
WG3239080-13 LCS								
Conductivity			97.4		%		90-110	11-DEC-19
WG3239080-11 MB								
Conductivity			<1.0		umhos/cm		1	11-DEC-19
F-IC-N-WP								
Batch R4941476								
WG3237580-2 LCS								
Fluoride (F)			103.0		%		90-110	07-DEC-19
WG3237580-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	07-DEC-19
F2-F4-FID-WP								
Batch R4939831								
WG3237617-2 LCS								
F2 (C10-C16)			106.3		%		70-130	07-DEC-19
F3 (C16-C34)			97.7		%		70-130	07-DEC-19
F4 (C34-C50)			98.3		%		70-130	07-DEC-19
WG3237617-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	07-DEC-19
F3 (C16-C34)			<0.25		mg/L		0.25	07-DEC-19
F4 (C34-C50)			<0.25		mg/L		0.25	07-DEC-19
Surrogate: 2-Bromobenzotrifluoride			103.2		%		60-140	07-DEC-19
FC10-QT97-WP								
Batch R4939831								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC10-QT97-WP								
Water								
Batch	R4937094							
WG3237315-2	DUP	L2393039-1						
Fecal Coliforms		>24200	>24200		MPN/100mL	0.0	65	06-DEC-19
WG3237315-1	MB							
Fecal Coliforms			<1		MPN/100mL		1	06-DEC-19
HG-T-CVAA-WP								
Water								
Batch	R4947031							
WG3246670-2	LCS							
Mercury (Hg)-Total			99.0		%		80-120	19-DEC-19
WG3246670-1	MB							
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	19-DEC-19
MET-T-CCMS-WP								
Water								
Batch	R4942418							
WG3240862-2	LCS							
Aluminum (Al)-Total			103.7		%		80-120	12-DEC-19
Antimony (Sb)-Total			105.9		%		80-120	12-DEC-19
Arsenic (As)-Total			103.7		%		80-120	12-DEC-19
Barium (Ba)-Total			102.8		%		80-120	12-DEC-19
Beryllium (Be)-Total			101.3		%		80-120	12-DEC-19
Bismuth (Bi)-Total			100.3		%		80-120	12-DEC-19
Boron (B)-Total			104.8		%		80-120	12-DEC-19
Cadmium (Cd)-Total			102.6		%		80-120	12-DEC-19
Calcium (Ca)-Total			101.2		%		80-120	12-DEC-19
Cesium (Cs)-Total			109.0		%		80-120	12-DEC-19
Chromium (Cr)-Total			100.4		%		80-120	12-DEC-19
Cobalt (Co)-Total			103.1		%		80-120	12-DEC-19
Copper (Cu)-Total			103.7		%		80-120	12-DEC-19
Iron (Fe)-Total			95.4		%		80-120	12-DEC-19
Lead (Pb)-Total			104.5		%		80-120	12-DEC-19
Lithium (Li)-Total			103.6		%		80-120	12-DEC-19
Magnesium (Mg)-Total			110.9		%		80-120	12-DEC-19
Manganese (Mn)-Total			103.9		%		80-120	12-DEC-19
Molybdenum (Mo)-Total			105.3		%		80-120	12-DEC-19
Nickel (Ni)-Total			101.4		%		80-120	12-DEC-19
Potassium (K)-Total			103.6		%		80-120	12-DEC-19
Phosphorus (P)-Total			104.4		%		80-120	12-DEC-19
Rubidium (Rb)-Total			103.3		%		80-120	12-DEC-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R4942418							
WG3240862-2 LCS								
Selenium (Se)-Total			103.8		%		80-120	12-DEC-19
Silicon (Si)-Total			104.3		%		80-120	12-DEC-19
Silver (Ag)-Total			105.7		%		80-120	12-DEC-19
Sodium (Na)-Total			102.9		%		80-120	12-DEC-19
Strontium (Sr)-Total			109.3		%		80-120	12-DEC-19
Sulfur (S)-Total			110.1		%		80-120	12-DEC-19
Tellurium (Te)-Total			104.8		%		80-120	12-DEC-19
Thallium (Tl)-Total			100.8		%		80-120	12-DEC-19
Thorium (Th)-Total			104.6		%		80-120	12-DEC-19
Tin (Sn)-Total			101.6		%		80-120	12-DEC-19
Titanium (Ti)-Total			98.3		%		80-120	12-DEC-19
Tungsten (W)-Total			102.1		%		80-120	12-DEC-19
Uranium (U)-Total			102.5		%		80-120	12-DEC-19
Vanadium (V)-Total			104.3		%		80-120	12-DEC-19
Zinc (Zn)-Total			102.9		%		80-120	12-DEC-19
Zirconium (Zr)-Total			103.4		%		80-120	12-DEC-19
WG3240862-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	12-DEC-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	12-DEC-19
Boron (B)-Total			<0.010		mg/L		0.01	12-DEC-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	12-DEC-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	12-DEC-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	12-DEC-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-DEC-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	12-DEC-19
Iron (Fe)-Total			<0.010		mg/L		0.01	12-DEC-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	12-DEC-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	12-DEC-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	12-DEC-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-WP								
Water								
Batch	R4941476							
WG3237580-2	LCS							
Nitrate (as N)			100.1		%		90-110	07-DEC-19
WG3237580-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	07-DEC-19
OG-GRAV-WP								
Water								
Batch	R4942983							
WG3241703-2	LCS							
Oil and Grease			101.6		%		70-130	13-DEC-19
WG3241703-1	MB							
Oil and Grease			<5.0		mg/L		5	13-DEC-19
P-T-COL-WP								
Water								
Batch	R4939913							
WG3238472-2	LCS							
Phosphorus (P)-Total			101.4		%		80-120	10-DEC-19
WG3238472-1	MB							
Phosphorus (P)-Total			<0.0030		mg/L		0.003	10-DEC-19
PAH,PANH-WP								
Water								
Batch	R4949449							
WG3243349-2	LCS							
1-Methyl Naphthalene			109.9		%		60-130	18-DEC-19
2-Methyl Naphthalene			103.1		%		60-130	18-DEC-19
Acenaphthene			112.8		%		60-130	18-DEC-19
Acenaphthylene			99.2		%		60-130	18-DEC-19
Anthracene			87.5		%		60-130	18-DEC-19
Acridine			101.9		%		60-130	18-DEC-19
Benzo(a)anthracene			104.6		%		60-130	18-DEC-19
Benzo(a)pyrene			88.1		%		60-130	18-DEC-19
Benzo(b&j)fluoranthene			123.4		%		60-130	18-DEC-19
Benzo(g,h,i)perylene			100.0		%		60-130	18-DEC-19
Benzo(k)fluoranthene			117.0		%		60-130	18-DEC-19
Chrysene			108.8		%		60-130	18-DEC-19
Dibenzo(a,h)anthracene			112.0		%		60-130	18-DEC-19
Fluoranthene			105.8		%		60-130	18-DEC-19
Fluorene			101.9		%		60-130	18-DEC-19
Indeno(1,2,3-cd)pyrene			103.9		%		60-130	18-DEC-19
Naphthalene			106.4		%		50-130	18-DEC-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP		Water						
Batch	R4949449							
WG3243349-2		LCS						
Phenanthrene			113.3		%		60-130	18-DEC-19
Pyrene			111.0		%		60-130	18-DEC-19
Quinoline			98.6		%		60-130	18-DEC-19
WG3243349-1		MB						
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-DEC-19
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-DEC-19
Acenaphthene			<0.000020		mg/L		0.00002	18-DEC-19
Acenaphthylene			<0.000020		mg/L		0.00002	18-DEC-19
Anthracene			<0.000010		mg/L		0.00001	18-DEC-19
Acridine			<0.000020		mg/L		0.00002	18-DEC-19
Benzo(a)anthracene			<0.000010		mg/L		0.00001	18-DEC-19
Benzo(a)pyrene			<0.0000050		mg/L		0.000005	18-DEC-19
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	18-DEC-19
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	18-DEC-19
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	18-DEC-19
Chrysene			<0.000020		mg/L		0.00002	18-DEC-19
Dibenzo(a,h)anthracene			<0.0000050		mg/L		0.000005	18-DEC-19
Fluoranthene			<0.000020		mg/L		0.00002	18-DEC-19
Fluorene			<0.000020		mg/L		0.00002	18-DEC-19
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	18-DEC-19
Naphthalene			<0.000050		mg/L		0.00005	18-DEC-19
Phenanthrene			<0.000050		mg/L		0.00005	18-DEC-19
Pyrene			<0.000010		mg/L		0.00001	18-DEC-19
Quinoline			<0.000020		mg/L		0.00002	18-DEC-19
Surrogate: Acenaphthene d10			87.6		%		60-130	18-DEC-19
Surrogate: Acridine d9			83.8		%		60-130	18-DEC-19
Surrogate: Chrysene d12			109.2		%		60-130	18-DEC-19
Surrogate: Naphthalene d8			75.6		%		50-130	18-DEC-19
Surrogate: Phenanthrene d10			81.2		%		60-130	18-DEC-19
PH-WP		Water						
Batch	R4941615							
WG3239080-12		LCS						
pH			7.42		pH units		7.3-7.5	11-DEC-19
PHENOLS-4AAP-WT		Water						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT								
Batch R4940476								
WG3239134-2 LCS								
Phenols (4AAP)			110.7		%		85-115	10-DEC-19
WG3239134-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	10-DEC-19
SO4-IC-N-WP								
Batch R4941476								
WG3237580-2 LCS								
Sulfate (SO4)			101.8		%		90-110	07-DEC-19
WG3237580-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	07-DEC-19
SOLIDS-TOTSUS-WP								
Batch R4941843								
WG3239020-14 LCS								
Total Suspended Solids			95.6		%		85-115	11-DEC-19
WG3239020-13 MB								
Total Suspended Solids			<2.0		mg/L		2	11-DEC-19
TC,EC10-QT97-WP								
Batch R4937096								
WG3237333-2 DUP		L2393039-1						
Total Coliforms		>24200	>24200		MPN/100mL	0.0	65	06-DEC-19
Escherichia Coli		>24200	>24200		MPN/100mL	0.0	65	06-DEC-19
WG3237333-1 MB								
Total Coliforms			<1		MPN/100mL		1	06-DEC-19
Escherichia Coli			<1		MPN/100mL		1	06-DEC-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	04-DEC-19 13:00	11-DEC-19 12:00	0.25	167	hours	EHTR-FM
Bacteriological Tests							
Fecal coliforms, 1:10 dilution by QT97	1	04-DEC-19 13:00	06-DEC-19 17:45	30	53	hours	EHTR
Total and E. coli, 1:10 dilution by QT97	1	04-DEC-19 13:00	06-DEC-19 17:45	30	53	hours	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2393039 were received on 06-DEC-19 13:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

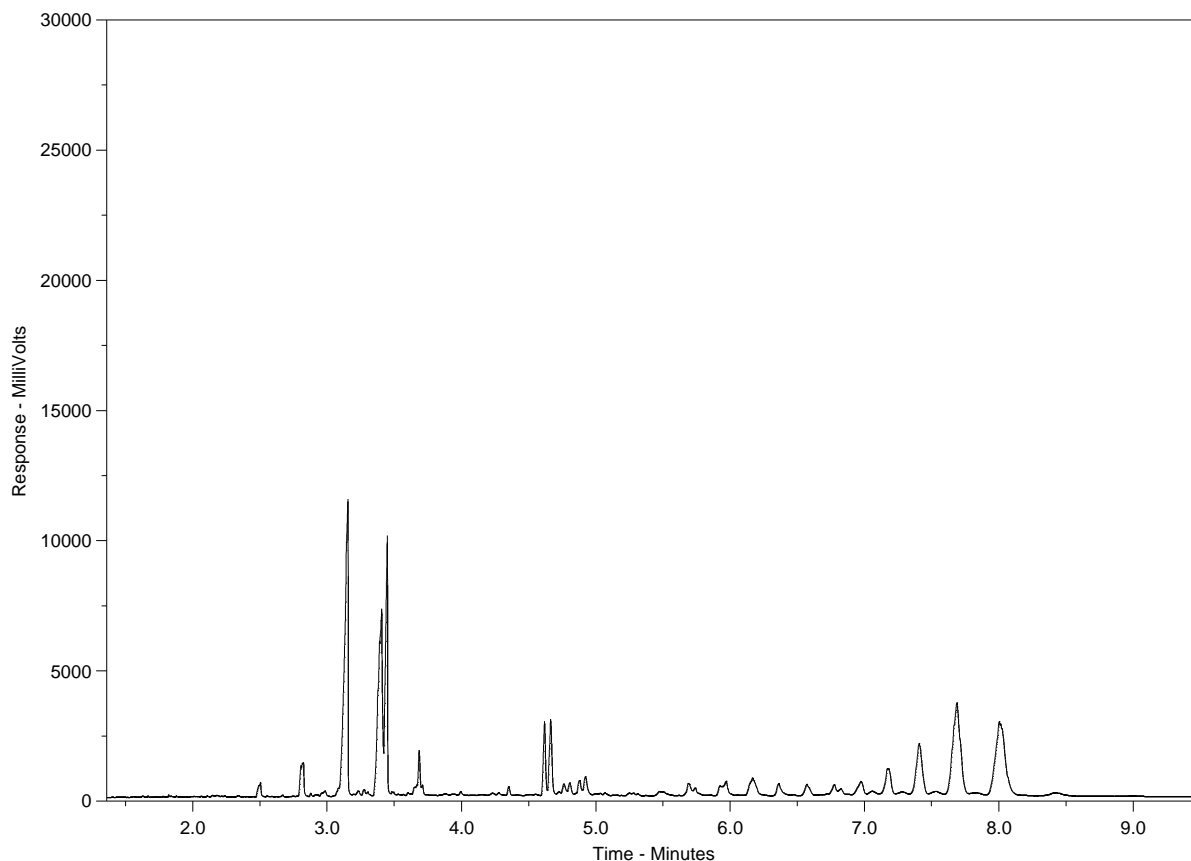
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2393039-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

