ANNUAL REPORT
FOR GN-CGS RANKIN INLET

YEAR BEING REPORTED: 2017

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 (m^3)	Quantity of Sewage Waste Discharged (Estimated, m^3)
January	52,821.99	Same
February	48,589.00	Same
March	60,209.00	Same
April	60,485.81	Same
May	66,105.24	Same
June	61,114.00	Same
July	59,199.22	Same
August	61,118.00	Same
September	58,895.78	Same
October	60,089.00	Same
November	60,056.00	Same
December	65,228.58	Same
ANNUAL TOTAL	**713911.62**	Same

Below are the results for Monitoring Program Station GRA-6. There was a total water volume of 174,301 m^3 transferred from Char River to Nipissar Lake between June 01 and October, 2017.

Month Reported	Water Transferred from Char River to Nipissar Lake (m^3)
June	74,275
July	44,472.00
August	8,078
September	47,476
October	7,909
SEASONAL TOTAL	**174,301**

Below are the results for Monitoring Program Station GRA-1. The water level in Nipissar Lake increased by 20.65 cm from June 21, 2017 to September 25, 2017.

Date	Nipissar Lake Elevation (m)	Change in Nipissar Lake Elevation (m)
June 12, 2017	3.082925	-
June 21, 2017	3.038475	-0.04445
June 29, 2017	3.04165	0.003175
July 11, 2017	3.04165	0
July 21, 2017	3.13055	0.0889
August 16, 2017	3.1877	0.05715
September 25, 2017	3.24485	0.05715

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 m^3 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**

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;

- NA

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

Spills:

Spill No.	Date	Site Description	Commodity	Quantity
2017179	2017-05-25	Rankin Inlet	Fuel Oil	236 L
2017185	2017-05-30	Rankin Inlet, 145-24 Inukshuk Avenue	Fuel Oil	5 L
2017326	2017-08-30	Rankin Inlet	Smoke	0 L
2017334	2017-09-05	Rankin Inlet Con Shed Fuel Tank	Heating Fuel P-50	50 L
2017370	2017-09-30	Rankin Inlet	Unknown	0 L
2017377	2017-10-05	Rankin Inlet Municipal Solide Waste Site, 62 48 06N 92 05 04W	De-icing Agent + Mixed Hydrocarbons	0 L
2017445	2017-12-11	Rankin Inlet - Residence #142 -24	Diesel Fuel	5 L

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

- No abandonment and restoration work was completed in 2017.

- Minor work to piping/valves and treated water storage tank to be undertaken in 2018.

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

- A Wastewater Effluent Characterization Study will be undertaken, beginning in 2018, as per Environment and Climate Change Canada Fisheries Act Direction. The Terms of Reference is currently being review by Environment and Climate Change Canada.
- Water Pumping Adaptive Management Plan has been updated March 2018 and is submitted with this Annual Report.

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

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- NIRB Screening Decision Report issued November 3, 2017 for the relocation of the resupply pipeline from Char River to Lower Landing Lake.

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

- none

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- Amendment application for the relocation of the resupply pipeline from Char River to Lower Landing Lake was submitted to the NWB February 14, 2018.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- The INAC Inspection took place on June 05, 2017. A copy of the inspection report has not been received from INAC.

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Char River Water Pumped to Nipissar Lake

Water Licence No. 3AM-GRA1624

GRA-6

Date	Flow Meter Reading (m3)	Daily Volume Pumped (m3)	Nipissar Lake Elevations (m)	Change In Elevation (m)
12-Jun-17			3.082925	
21-Jun-17			3.038475	-0.04445
29-Jun-17	68855	68855	3.04165	0.003175
11-Jul-17	99177	2211	3.04165	0
12-Jul-17	101662	2485		
13-Jul-17	104234	2572		
14-Jul-17	106729	2495		
15-Jul-17	109107	2378		
16-Jul-17	111600	2493		
17-Jul-17	114498	2898		
18-Jul-17	116716	2218		
19-Jul-17	118747	2031		
21-Jul-17			3.13055	0.0889
16-Aug-17			3.1877	0.05715
15-Sep-17	126825			
16-Sep-17	128942	2117		
17-Sep-17	131502	2560		
18-Sep-17	134210	2708		
19-Sep-17	136934	2724		
20-Sep-17	139509	2575		
21-Sep-17	142193	2684		
22-Sep-17	144949	2756		
23-Sep-17	147452	2503		
24-Sep-17	150114	2662		
25-Sep-17	153390	3276	3.24485	0.05715
26-Sep-17	156285	2895		
27-Sep-17	158976	2691		
28-Sep-17	161103	2127		
29-Sep-17	163790	2687		
30-Sep-17	166392	2602		
01-Oct-17	168914	2522		
02-Oct-17	171676	2762		
03-Oct-17	174301	2625		

Hazardous Materials Spill Database

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

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

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
2017179	2017-05-25	NU	KEE	Rankin Inlet	Rankin Inlet	Fuel Oil	236 L	ST<	GN
2017185	2017-05-30	NU	KEE	Rankin Inlet	Rankin Inlet, 145-24 Inukshuk Avenue	Fuel Oil	5 L	ST<	GN
2017326	2017-08-30	NU	KEE	Rankin Inlet	Rankin Inlet	Smoke	0 L	UK	GN
2017334	2017-09-05	NU	KEE	Rankin Inlet	Rankin Inlet Con Shed Fuel Tank	Heating Fuel P-50	50 L	ST<	GN
2017370	2017-09-30	NU	KEE	Rankin Inlet	Rankin Inlet	Unknown	0 L	MV	CCG
2017377	2017-10-05	NU	KEE	Rankin Inlet	Rankin Inlet Municipal Solide Waste Site, 62 48 06N 92 05 04W	De-icing Agent + Mixed Hydrocarbons	0 L	DRUM	INAC
2017445	2017-12-11	NU	KEE	Rankin Inlet	Rankin Inlet - Residence #142 -24	Diesel Fuel	5 L	PL	GN

Total Spills on this Report: 7

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

LEGEND

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

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

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

Parameters	Units	Detection Limit	05-Jun-17			Guidelines for Canadian Drinking Water Quality
			Nipissar Lake GRA-1	Char River GRA-6	Lower Landing Lake GRA-7	
Miscellaneous Parameters						
Ammonia Total (as N)	mg/L	0.010	0.052	0.01	0.01	None required
Phosphorus (P)	mg/L	0.010	0.012	0.011	0.011	
Total Kjeldahl Nitrogen	mg/L	0.20				
Fecal Coliforms	MPN/100mL	3	10	10	10	
Total Suspended Solids	mg/L	5	5	5	5	
Alkalinity						
Alkalinity, Total (as CaCO3)	mg/L	20	46.8	23.1	20.4	
Bicarbonate (HCO3)	mg/L	24	57.1	28.2	24.9	
Carbonate (CO3)	mg/L	12	0.6	0.6	0.6	
Hydroxide (OH)	mg/L	6.8	0.34	0.34	0.34	
Chloride by Ion Chromatography						
Chloride (Cl)	mg/L	0.50	36.9	13.8	12.6	AO: ≤ 250 mg/L
Conductivity						
Conductivity	umhos/cm	20	246	96.6	88.2	
Hardness Calculated						
Hardness (as CaCO3)	mg/L	0.30	72.5	27.7	25.6	None required
Nitrate as N by Ion Chromatography						
Nitrate (as N)	mg/L	0.05	0.02	0.02	0.02	
Nitrate+Nitrite						
Nitrate and Nitrite as N	mg/L	0.071	0.07	0.07	0.07	10 mg/L as nitrate-nitrogen
Nitrite as N by Ion Chromatography						
Nitrite (as N)	mg/L	0.050	0.01	0.01	0.01	
Sulfate by Ion Chromatography						
Sulfate (SO4)	mg/L	0.50	20.8	4.32	3.94	AO: ≤ 500 mg/L
TDS Calculated						
TDS (Calculated)	mg/L	5.0				AO: < 500 mg/L
Total Metals by ICP-MS						
Aluminium (Al)	mg/L	0.02	0.0135	0.0289	0.0469	OG: <0.1 mg/L (conventional); <0.2 mg/L (other treatment types)
Antimony (Sb)	mg/L	0.001				MAC: 0.006 mg/L
Arsenic (As)	mg/L	0.001	0.00052	0.00033	0.00029	MAC: 0.010 mg/L
Barium (Ba)	mg/L	0.0005				MAC: 1.0 mg/L
Beryllium (Be)	mg/L	0.001				
Bismuth (Bi)	mg/L	0.0005				
Boron (B)	mg/L	0.03				MAC: 5 mg/L
Cadmium (Cd)	mg/L	0.0002	0.00001	0.00001	0.00001	MAC: 0.005 mg/L
Calcium (Ca)	mg/L	0.2	21	8.28	7.64	None required
Cesium (Cs)	mg/L	0.0005				
Chromium (Cr)	mg/L	0.002	0.001	0.001	0.001	MAC: 0.05 mg/L
Cobalt (Co)	mg/L	0.0005	0.0002	0.0002	0.0002	
Copper (Cu)	mg/L	0.002	0.00087	0.00081	0.00074	AO: ≤ 1.0 mg/L
Iron (Fe)	mg/L	0.1	0.029	0.176	0.19	AO: ≤ 0.3 mg/L
Lead (Pb)	mg/L	0.001	0.00009	0.00009	0.00009	MAC: 0.010 mg/L
Lithium (Li)	mg/L	0.002				

Magnesium (Mg)	mg/L	0.05	4.9	1.72	1.58	None required
Manganese (Mn)	mg/L	0.001	0.0283	0.0106	0.0156	AO: ≤ 0.05 mg/L
Molybdenum (Mo)	mg/L	0.0005				
Nickel (Ni)	mg/L	0.002	0.002	0.002	0.002	
Phosphorus (P)	mg/L	0.5	0.012	0.011	0.011	
Potassium (K)	mg/L	0.1	2.61	1.4	1.33	
Rubidium (Rb)	mg/L	0.0005				
Selenium (Se)	mg/L	0.005				MAC: 0.01 mg/L
Silicon (Si)	mg/L	0.3				
Silver (Ag)	mg/L	0.001				None required
Sodium (Na)	mg/L	0.05	22.5	7.35	6.65	AO: ≤ 200 mg/L
Strontium (Sr)	mg/L	0.0005				
Tellurium (Te)	mg/L	0.001				
Thallium (Tl)	mg/L	0.005				
Thorium (Th)	mg/L	0.001				
Tin (Sn)	mg/L	0.0006				
Titanium (Ti)	mg/L	0.001				
Tungsten (W)	mg/L	0.002				
Uranium (U)	mg/L	0.0005				MAC: 0.02 mg/L
Vanadium (V)	mg/L	0.002				
Zinc (Zn)	mg/L	0.02	0.002	0.002	0.002	AO: ≤ 5.0 mg/L
Zirconium (Zr)	mg/L	0.001				
pH						
pH	pH Units	0.1	7.34	7.43	7.31	6.5-8.5

Summary of Hydrocarbon Contamination Analysis

Parameters	Units	Detection Limit	05-Jun-17			Guidelines for Canadian Drinking Water Quality
			Nipissar Lake	Char River	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	<0.000040 *	<0.000020	<0.000020	
2-Methyl Naphthalene	mg/L	0.000020	<0.000040 *	<0.000020	<0.000020	
Acenaphthene	mg/L	0.000020	<0.000040 *	<0.000020	<0.000020	
Acenaphthylene	mg/L	0.000020	<0.000040 *	<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	<0.000040 *	<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	0.0001 *	<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	<0.000040 *	<0.000020	<0.000020	
B(a)P Total Potency Equivalent	mg/L	0.000030	<0.000030	<0.000030	<0.000030	

* Detection limit was modified by ALS Environmental
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

Summary of GRA-3 Wastewater Effluent Analysis												
Parameters (From ALS)	Unit	28-Feb-17	29-Mar-17	26-Apr-17	29-May-17	29-Jun-17	20-Jul-17	05-Sep-17	26-Sep-17	25-Oct-17	30-Nov-17	18-Dec-17
Total Suspended Solids	mg/L	76	575	140	90	88	160	98	140	56	85	90
Biochemical Oxygen Demand	mg/L	112	392	182	58	94	164	98	128	59	153	146
BOD Carbonaceous	mg/L	111	390	159	47	82	169	82	115	53	138	110
Hardness (as CaCO3)	mg/L	121	134	129	127	75	87.2	83.3	199	86.6	96.8	100
Bicarbonate (HCO3)	mg/L	139	232	179	135	118	127	121	147	99.4	143	127
Carbonate (CO3)	mg/L	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
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
Total (as CaCO3)	mg/L	114	190	146	111	96.9	104	99	120	81.5	117	104
Conductivity	uS/cm	574	753	682	549	392	417	410	507	379	537	491
pH	pH Units	7.06	6.47	7.13	7.12	7.07	6.95	7.02	7.17	7.1	6.99	6.91
Fecal Coliforms	MPN/100 mL	110000	110000	24200	24200	/	24200	/	24200	24200	24200	24200
Total Coliforms	MPN/100 mL	/	/	/	/	/	/	/	24200	/	/	2420
Escherichia Coli	MPN/100 mL	/	/	/	/	/	/	/	24200	/	/	2420
Total Ammonia (as N)	mg/L	4.91	13.5	6.35	3.61	11.9	4.86	6.05	6.6	6.57	9.23	6.2
Nitrate (as N)	mg/L	0.02	0.058	0.02	0.02	0.02	0.02	0.02	0.02	0.047	0.02	0.02
Nitrite (as N)	mg/L	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.013	0.01	0.01
Total Nitrogen	mg/L	/	/	/	/	/	/	/	/	/	/	/
Total Organic Carbon	mg/L	91.8	109	106	44.8	61.8	68.4	47.5	50.4	42	97	85.9
Phosphorus (P)	mg/L	3.05	6.16	3.78	1.51	2.03	3.03	1.46	2.55	1.05	2.71	1.82
Calcium (Ca)	mg/L	34.1	38.9	37	36.6	21.2	24.2	24.3	62.2	24	24.5	27.7
Chloride (Cl)	ug/L	75100	75900	86400	74700	49000	52700	56200	62400	51100	64800	63000
Fluoride (F)	mg/L	/	/	/	/	/	/	0.067	0.129	/	/	0.053
Magnesium (Mg)	mg/L	8.84	8.97	8.86	8.59	5.36	6.48	5.48	10.6	6.47	8.62	7.53
Potassium (K)	mg/L	12.1	14.7	11.9	8.19	8	10.7	6.53	13.4	8.53	12.5	9.53
Sodium (Na)	mg/L	49.5	49.5	47	59.8	30.9	35.1	27.3	45.4	33.9	46.1	40.7
Sulfate (SO4)	mg/L	34.7	37	40.5	35.7	16.3	19.5	28	30.3	26.5	30.8	29.4
Aluminium (Al)	ug/L	203	224	156	134	240	290	113	233	194	258	161
Antimony (Sb)	ug/L	/	/	/	/	/	/	/	0.23	/	/	/
Arsenic (As)	ug/L	0.95	1.06	1.06	1.12	0.71	0.9	0.98	13.9	0.76	1.04	0.9
Barium (Ba)	ug/L	/	/	/	/	/	/	/	66.9	/	/	/
Beryllium (Be)	ug/L	/	/	/	/	/	/	/	0.1	/	/	/
Cadmium (Cd)	ug/L	0.081	0.066	0.069	0.085	0.071	0.0881	0.0408	0.0946	0.0458	0.0816	0.054
Cesium (Cs)	ug/L	/	/	/	/	/	/	/	0.099	/	/	/
Chromium (Cr)	ug/L	1	1	1	1.2	1.1	1.45	0.54	0.65	0.65	1.02	0.84
Cobalt (Co)	ug/L	0.2	0.27	0.2	0.34	0.43	0.3	0.26	1.84	0.2	0.27	0.19
Copper (Cu)	ug/L	191	316	223	162	122	156	83.8	117	88.8	209	166
Iron (Fe)	ug/L	1370	952	543	443	338	490	265	6020	195	243	167
Lead (Pb)	ug/L	1.49	2.13	1.56	3.94	2.63	2.27	2.13	1.51	1.6	8.38	1.02
Lithium (Li)	ug/L	/	/	/	/	/	/	/	6.4	/	/	/
Manganese (Mn)	ug/L	40.8	47.3	52.2	77.1	33.7	44.4	39.9	468	24.5	47.1	36.3

Molybdenum (Mo)	ug/L	/	/	/	/	/	/	/	0.387	/	/	/
Nickel (Ni)	ug/L	3.5	3.6	3.1	4.7	3	3.45	3.47	4.05	2.01	3.45	2.46
Rubidium (Rb)	ug/L	/	/	/	/	/	/	/	12.5	/	/	/
Selenium (Se)	ug/L	/	/	/	/	/	/	/	0.246	/	/	/
Silver (Ag)	ug/L	/	/	/	/	/	/	/	0.043	/	/	/
Strontium (Sr)	ug/L	/	/	/	/	/	/	/	346	/	/	/
Thallium (Tl)	ug/L	/	/	/	/	/	/	/	0.011	/	/	/
Titanium (Ti)	ug/L	/	/	/	/	/	/	/	1.04	/	/	/
Uranium (U)	ug/L	/	/	/	/	/	/	/	0.376	/	/	/
Vanadium (V)	ug/L	/	/	/	/	/	/	/	1.6	/	/	/
Zinc (Zn)	ug/L	72	147	91.9	66	62.2	124	60.6	133	51.3	93.5	76.1
Phenols	mg/L	0.0249	0.0471	0.0102	0.0071	0.01	0.01	0.0102	0.0096	0.005	0.0118	0.0084
Oil and Grease	mg/L	40.1	44.3	33.3	22.6	29.9	93.6	22.1	34.3	9.9	25	28
Total Hydrocarbons (C6-C50)	mg/L	12.4	22.9	18.7	11.3	15.5	/	/	/	11.4	17.7	13.9

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

Date Received: 03-MAR-17
Report Date: 20-MAR-17 14:02 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1897103

Project P.O. #: NOT SUBMITTED
Job Reference: RANKIN INLET WWTP - NUNAVUT
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1897103-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 28-FEB-17 @ 13:30							
Matrix: WASTEWATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		09-MAR-17	R3672926
Toluene	0.0044		0.0010	mg/L		09-MAR-17	R3672926
Ethyl benzene	<0.00050		0.00050	mg/L		09-MAR-17	R3672926
o-Xylene	<0.00050		0.00050	mg/L		09-MAR-17	R3672926
m+p-Xylenes	<0.00050		0.00050	mg/L		09-MAR-17	R3672926
F1 (C6-C10)	<0.10		0.10	mg/L		09-MAR-17	R3672926
Surrogate: 4-Bromofluorobenzene (SS)	91.3		70-130	%		09-MAR-17	R3672926
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.42		0.10	mg/L	08-MAR-17	08-MAR-17	R3671663
F3 (C16-C34)	8.45		0.25	mg/L	08-MAR-17	08-MAR-17	R3671663
F4 (C34-C50)	3.54		0.25	mg/L	08-MAR-17	08-MAR-17	R3671663
Surrogate: 2-Bromobenzotrifluoride	95.6		60-140	%	08-MAR-17	08-MAR-17	R3671663
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		14-MAR-17	
F2-Naphth	0.42		0.10	mg/L		14-MAR-17	
F3-PAH	8.45		0.25	mg/L		14-MAR-17	
Total Hydrocarbons (C6-C50)	12.4		0.38	mg/L		14-MAR-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00071		0.00071	mg/L		10-MAR-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000029		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
2-Methyl Naphthalene	0.000035		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Acenaphthene	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Acenaphthylene	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Anthracene	<0.000010		0.000010	mg/L	08-MAR-17	13-MAR-17	R3674394
Acridine	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Benzo(a)anthracene	<0.000010		0.000010	mg/L	08-MAR-17	13-MAR-17	R3674394
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	08-MAR-17	13-MAR-17	R3674394
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	08-MAR-17	13-MAR-17	R3674394
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	08-MAR-17	13-MAR-17	R3674394
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	08-MAR-17	13-MAR-17	R3674394
Chrysene	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Dibenzo(a,h)anthracene	<0.00010	DLM	0.00010	mg/L	08-MAR-17	13-MAR-17	R3674394
Fluoranthene	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Fluorene	<0.000020		0.000020	mg/L	08-MAR-17	13-MAR-17	R3674394
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	08-MAR-17	13-MAR-17	R3674394
Naphthalene	<0.000050		0.000050	mg/L	08-MAR-17	13-MAR-17	R3674394
Phenanthrene	<0.000050		0.000050	mg/L	08-MAR-17	13-MAR-17	R3674394
Pyrene	<0.000010		0.000010	mg/L	08-MAR-17	13-MAR-17	R3674394
Quinoline	<0.000050	DLM	0.000050	mg/L	08-MAR-17	13-MAR-17	R3674394
B(a)P Total Potency Equivalent	<0.000060		0.000060	mg/L	08-MAR-17	13-MAR-17	R3674394
Surrogate: Acenaphthene d10	67.5		40-130	%	08-MAR-17	13-MAR-17	R3674394
Surrogate: Acridine d9	96.1		40-130	%	08-MAR-17	13-MAR-17	R3674394
Surrogate: Chrysene d12	55.4		40-130	%	08-MAR-17	13-MAR-17	R3674394
Surrogate: Naphthalene d8	108.6		40-130	%	08-MAR-17	13-MAR-17	R3674394
Surrogate: Phenanthrene d10	83.0		40-130	%	08-MAR-17	13-MAR-17	R3674394
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	139		1.2	mg/L		06-MAR-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1897103-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 28-FEB-17 @ 13:30							
Matrix: WASTEWATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		06-MAR-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		06-MAR-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	114		1.0	mg/L		03-MAR-17	R3668196
Ammonia by colour							
Ammonia, Total (as N)	4.91		0.10	mg/L		04-MAR-17	R3668928
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	112		20	mg/L		03-MAR-17	R3672063
Carbonaceous BOD							
BOD Carbonaceous	111		20	mg/L		03-MAR-17	R3672063
Chloride in Water by IC							
Chloride (Cl)	75.1		0.50	mg/L		03-MAR-17	R3669031
Conductivity							
Conductivity	574		1.0	umhos/cm		03-MAR-17	R3668196
Fecal Coliform							
Fecal Coliforms	>110000	PEHR	3	MPN/100mL		03-MAR-17	R3669004
Hardness Calculated							
Hardness (as CaCO3)	121	HTC	0.25	mg/L		08-MAR-17	
Mercury Total							
Mercury (Hg)-Total	0.0000130		0.0000050	mg/L	17-MAR-17	20-MAR-17	R3679923
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		03-MAR-17	R3669031
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		07-MAR-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		03-MAR-17	R3669031
Oil & Grease - Gravimetric							
Oil and Grease	40.1		5.0	mg/L		11-MAR-17	R3673490
Phenol (4AAP)							
Phenols (4AAP)	0.0249		0.0010	mg/L		09-MAR-17	R3672955
Phosphorus, Total							
Phosphorus (P)-Total	3.05		0.050	mg/L		08-MAR-17	R3669983
Sulfate in Water by IC							
Sulfate (SO4)	34.7		0.30	mg/L		03-MAR-17	R3669031
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.203		0.0050	mg/L	07-MAR-17	07-MAR-17	R3669328
Arsenic (As)-Total	0.00095		0.00020	mg/L	07-MAR-17	07-MAR-17	R3669328
Cadmium (Cd)-Total	0.000081		0.000010	mg/L	07-MAR-17	07-MAR-17	R3669328
Calcium (Ca)-Total	34.1		0.10	mg/L	07-MAR-17	07-MAR-17	R3669328
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	07-MAR-17	07-MAR-17	R3669328
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	07-MAR-17	07-MAR-17	R3669328
Copper (Cu)-Total	0.191		0.00020	mg/L	07-MAR-17	07-MAR-17	R3669328
Iron (Fe)-Total	1.37		0.010	mg/L	07-MAR-17	07-MAR-17	R3669328
Lead (Pb)-Total	0.00149		0.000090	mg/L	07-MAR-17	07-MAR-17	R3669328
Magnesium (Mg)-Total	8.84		0.010	mg/L	07-MAR-17	07-MAR-17	R3669328
Manganese (Mn)-Total	0.0408		0.00030	mg/L	07-MAR-17	07-MAR-17	R3669328
Nickel (Ni)-Total	0.0035		0.0020	mg/L	07-MAR-17	07-MAR-17	R3669328
Potassium (K)-Total	12.1		0.020	mg/L	07-MAR-17	07-MAR-17	R3669328
Sodium (Na)-Total	49.5		0.030	mg/L	07-MAR-17	07-MAR-17	R3669328
Zinc (Zn)-Total	0.0720		0.0020	mg/L	07-MAR-17	07-MAR-17	R3669328
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
L1897103-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT on 28-FEB-17 @ 13:30							
Matrix: WASTEWATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	91.8		2.5	mg/L		08-MAR-17	R3672916
Total Suspended Solids							
Total Suspended Solids	76		10	mg/L		06-MAR-17	R3669850
pH							
pH	7.06		0.10	pH units		03-MAR-17	R3668196

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

FC-MPN-WP	Water	Fecal Coliform	APHA 9221E

The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. Aliquots from three or more decimal dilutions of a sample are inoculated into tubes containing enrichment media and incubated at 35C for 48 – 3 hours. Sample aliquots exhibiting the characteristic positive response are transferred to various selective media for the coliform group(s) of interest and incubated at specific temperatures and times. The Most Probable Number for each target group is statistically derived from a standard MPN table based on the combinations of positive outcomes at each dilution.
The fecal (thermotolerant) coliform group may include organisms not originating in the intestines of warm-blooded animals.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

Reference Information

Test Method References:

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

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

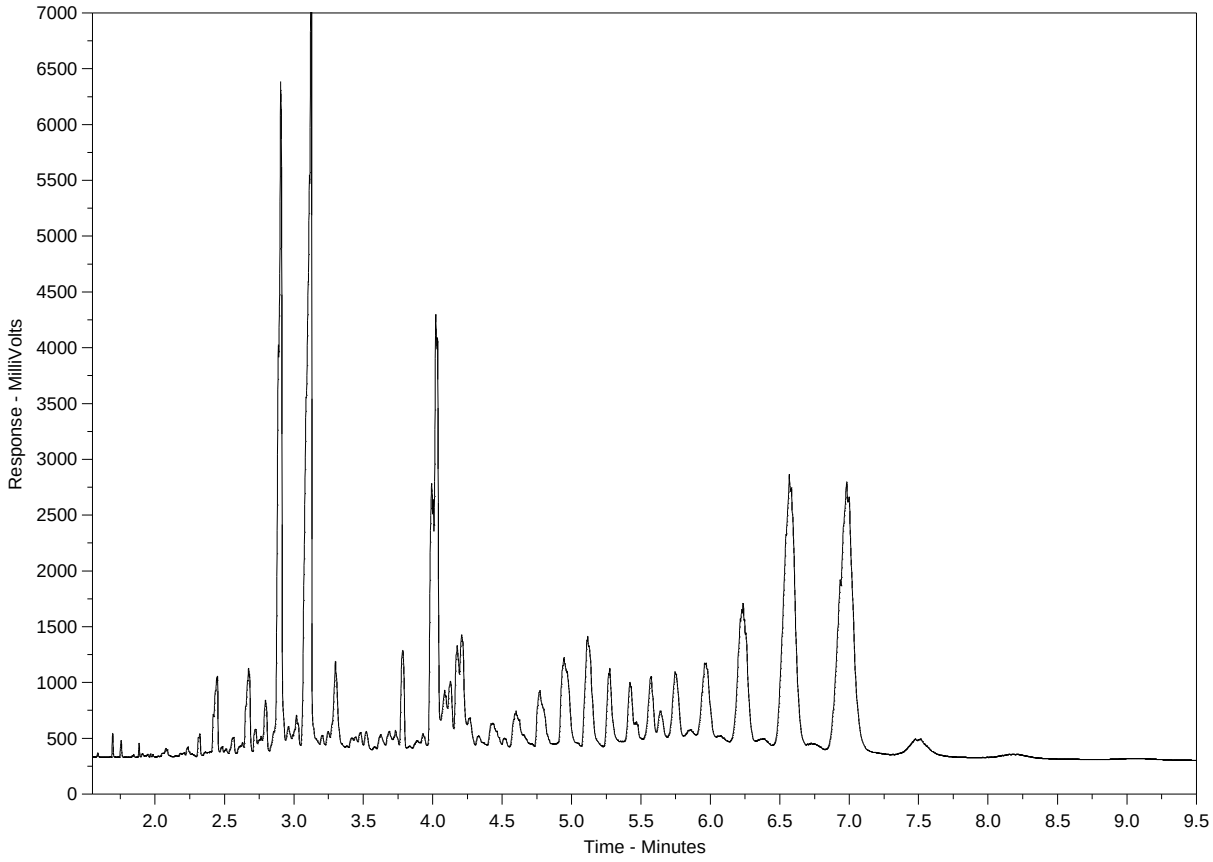
GLOSSARY OF REPORT TERMS

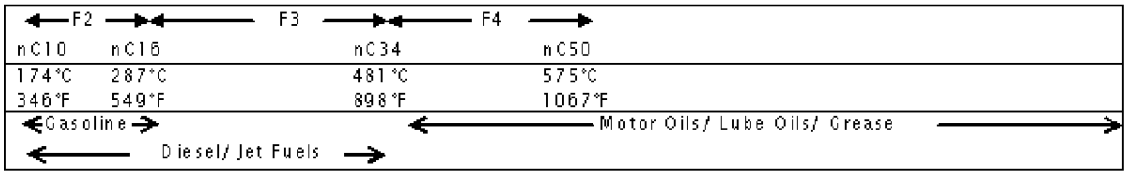
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1897103-1
Client Sample ID: RANKIN INLET EFFLUENT





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

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

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

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

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1897103-COFC

COC Number: 15 - 570909

Page of L1897103

Report To	Contact and company name below will appear on the final report
Company:	CGS RANKIN
Contact:	S. DOIRON
Phone:	867 645 8155
	Company address below will appear on the final report
Street:	BOX 490
City/Province:	RANKIN INLET NU
Postal Code:	X0C 0G0

Report Format / Distribution	
Select Report Format:	PDF EXCEL EDD (DIGITAL)
Quality Control (QC) Report with Report	YES NO
Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	EMAIL MAIL FAX
Email 1 or Fax	sdoiron@gov.nu.ca
Email 2	
Email 3	

Invoice To		
	Same as Report To	YES NO
	Copy of Invoice with Report	YES NO
Company:		
Contact:		

Invoice Distribution	
Select Invoice Distribution:	EMAIL MAIL FAX
Email 1 or Fax	
Email 2	

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

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☑		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine	BTEX/VOC	PAH/EPH/cc-F4	T.C Ecoli	BOD	F2-F4	MERCURY	Oil grease	Nutrients	Metals	Number of Containers
	RANKIN INLET EFFLUENT	28/02/17	13:30	WASTE WATER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO	
Are samples for human drinking water use? ☐ YES ☒ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
5.8					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: KELLY ADAMS	Date: FEB 27/17	Time: 13:30	Received by:	Date: 12:10	Time: 3-3-17	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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

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

5 8°

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

Date Received: 31-MAR-17
Report Date: 12-APR-17 10:00 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1907517

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1907517-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAR-17 @ 10:00							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		11-APR-17	R3696817
Toluene	0.0026		0.0010	mg/L		11-APR-17	R3696817
Ethyl benzene	<0.00050		0.00050	mg/L		11-APR-17	R3696817
o-Xylene	<0.00050		0.00050	mg/L		11-APR-17	R3696817
m+p-Xylenes	<0.00050		0.00050	mg/L		11-APR-17	R3696817
F1 (C6-C10)	<0.10		0.10	mg/L		11-APR-17	R3696817
Surrogate: 4-Bromofluorobenzene (SS)	84.0		70-130	%		11-APR-17	R3696817
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.97		0.10	mg/L	05-APR-17	05-APR-17	R3694227
F3 (C16-C34)	16.4		0.25	mg/L	05-APR-17	05-APR-17	R3694227
F4 (C34-C50)	5.52		0.25	mg/L	05-APR-17	05-APR-17	R3694227
Surrogate: 2-Bromobenzotrifluoride	84.1		60-140	%	05-APR-17	05-APR-17	R3694227
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		11-APR-17	
F2-Naphth	0.97		0.10	mg/L		11-APR-17	
F3-PAH	16.4		0.25	mg/L		11-APR-17	
Total Hydrocarbons (C6-C50)	22.9		0.38	mg/L		11-APR-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00071		0.00071	mg/L		11-APR-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000065		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
2-Methyl Naphthalene	0.000083		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Acenaphthene	0.000022		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Acenaphthylene	<0.000020		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Anthracene	<0.000010		0.000010	mg/L	03-APR-17	03-APR-17	R3691722
Acridine	<0.000020		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Benzo(a)anthracene	<0.000010		0.000010	mg/L	03-APR-17	03-APR-17	R3691722
Benzo(a)pyrene	<0.000050	DLM	0.000050	mg/L	03-APR-17	03-APR-17	R3691722
Benzo(b&j)fluoranthene	<0.00010	DLM	0.00010	mg/L	03-APR-17	03-APR-17	R3691722
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	03-APR-17	03-APR-17	R3691722
Benzo(k)fluoranthene	<0.00010	DLM	0.00010	mg/L	03-APR-17	03-APR-17	R3691722
Chrysene	<0.000020		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Dibenzo(a,h)anthracene	<0.00010	DLM	0.00010	mg/L	03-APR-17	03-APR-17	R3691722
Fluoranthene	0.000036		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Fluorene	0.000025		0.000020	mg/L	03-APR-17	03-APR-17	R3691722
Indeno(1,2,3-cd)pyrene	<0.00020	DLM	0.00020	mg/L	03-APR-17	03-APR-17	R3691722
Naphthalene	<0.000050		0.000050	mg/L	03-APR-17	03-APR-17	R3691722
Phenanthrene	0.000087		0.000050	mg/L	03-APR-17	03-APR-17	R3691722
Pyrene	<0.000010		0.000010	mg/L	03-APR-17	03-APR-17	R3691722
Quinoline	<0.000050	DLM	0.000050	mg/L	03-APR-17	03-APR-17	R3691722
B(a)P Total Potency Equivalent	<0.000097		0.000097	mg/L	03-APR-17	03-APR-17	R3691722
Surrogate: Acenaphthene d10	74.5		40-130	%	03-APR-17	03-APR-17	R3691722
Surrogate: Acridine d9	89.5		40-130	%	03-APR-17	03-APR-17	R3691722
Surrogate: Chrysene d12	52.9		40-130	%	03-APR-17	03-APR-17	R3691722
Surrogate: Naphthalene d8	106.8		40-130	%	03-APR-17	03-APR-17	R3691722
Surrogate: Phenanthrene d10	82.8		40-130	%	03-APR-17	03-APR-17	R3691722
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	232		1.2	mg/L		03-APR-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1907517-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAR-17 @ 10:00							
Matrix: WASTE WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		03-APR-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		03-APR-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	190		1.0	mg/L		31-MAR-17	R3690848
Ammonia by colour							
Ammonia, Total (as N)	13.5		1.0	mg/L		04-APR-17	R3692851
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	392		50	mg/L		31-MAR-17	R3694537
Carbonaceous BOD							
BOD Carbonaceous	390		50	mg/L		31-MAR-17	R3694537
Chloride in Water by IC							
Chloride (Cl)	75.9		1.0	mg/L		31-MAR-17	R3694397
Conductivity							
Conductivity	753		1.0	umhos/cm		31-MAR-17	R3690848
Fecal Coliform							
Fecal Coliforms	>110000		3	MPN/100mL		31-MAR-17	R3692140
Hardness Calculated							
Hardness (as CaCO3)	134	HTC	0.25	mg/L		05-APR-17	
Mercury Total							
Mercury (Hg)-Total	0.0000159		0.0000050	mg/L	03-APR-17	04-APR-17	R3692552
Nitrate in Water by IC							
Nitrate (as N)	0.058		0.040	mg/L		31-MAR-17	R3694397
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		06-APR-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLM	0.020	mg/L		31-MAR-17	R3694397
Oil & Grease - Gravimetric							
Oil and Grease	44.3		5.0	mg/L		05-APR-17	R3692778
Phenol (4AAP)							
Phenols (4AAP)	0.0471		0.0010	mg/L		06-APR-17	R3694880
Phosphorus, Total							
Phosphorus (P)-Total	6.16		0.10	mg/L		04-APR-17	R3692515
Sulfate in Water by IC							
Sulfate (SO4)	37.0		0.60	mg/L		31-MAR-17	R3694397
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.224		0.0050	mg/L	03-APR-17	03-APR-17	R3692031
Arsenic (As)-Total	0.00106		0.00020	mg/L	03-APR-17	03-APR-17	R3692031
Cadmium (Cd)-Total	0.000066		0.000010	mg/L	03-APR-17	03-APR-17	R3692031
Calcium (Ca)-Total	38.9		0.10	mg/L	03-APR-17	03-APR-17	R3692031
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	03-APR-17	03-APR-17	R3692031
Cobalt (Co)-Total	0.00027		0.00020	mg/L	03-APR-17	03-APR-17	R3692031
Copper (Cu)-Total	0.316		0.00020	mg/L	03-APR-17	03-APR-17	R3692031
Iron (Fe)-Total	0.952		0.010	mg/L	03-APR-17	03-APR-17	R3692031
Lead (Pb)-Total	0.00213		0.000090	mg/L	03-APR-17	03-APR-17	R3692031
Magnesium (Mg)-Total	8.97		0.010	mg/L	03-APR-17	03-APR-17	R3692031
Manganese (Mn)-Total	0.0437		0.00030	mg/L	03-APR-17	03-APR-17	R3692031
Nickel (Ni)-Total	0.0036		0.0020	mg/L	03-APR-17	03-APR-17	R3692031
Potassium (K)-Total	14.7		0.020	mg/L	03-APR-17	03-APR-17	R3692031
Sodium (Na)-Total	49.5		0.030	mg/L	03-APR-17	03-APR-17	R3692031
Zinc (Zn)-Total	0.147		0.0020	mg/L	03-APR-17	03-APR-17	R3692031
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
L1907517-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAR-17 @ 10:00							
Matrix: WASTE WATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	109		2.5	mg/L		04-APR-17	R3692537
Total Suspended Solids							
Total Suspended Solids	575		25	mg/L		06-APR-17	R3695083
pH							
pH	6.47		0.10	pH units		31-MAR-17	R3690848

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

FC-MPN-WP	Water	Fecal Coliform	APHA 9221E

The Most Probable Number (MPN) method is based on the Multiple Tube Fermentation technique. Aliquots from three or more decimal dilutions of a sample are inoculated into tubes containing enrichment media and incubated at 35C for 48 – 3 hours. Sample aliquots exhibiting the characteristic positive response are transferred to various selective media for the coliform group(s) of interest and incubated at specific temperatures and times. The Most Probable Number for each target group is statistically derived from a standard MPN table based on the combinations of positive outcomes at each dilution.
The fecal (thermotolerant) coliform group may include organisms not originating in the intestines of warm-blooded animals.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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

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 aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

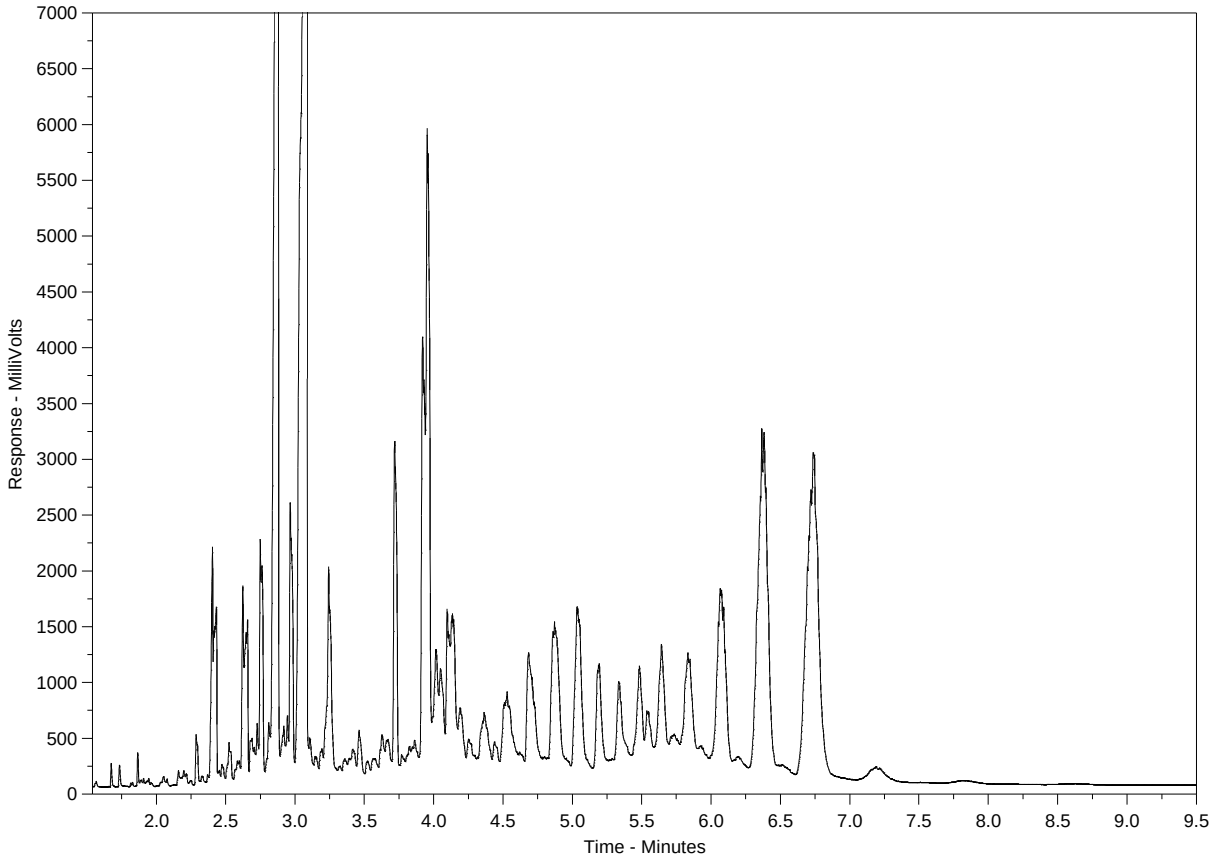
GLOSSARY OF REPORT TERMS

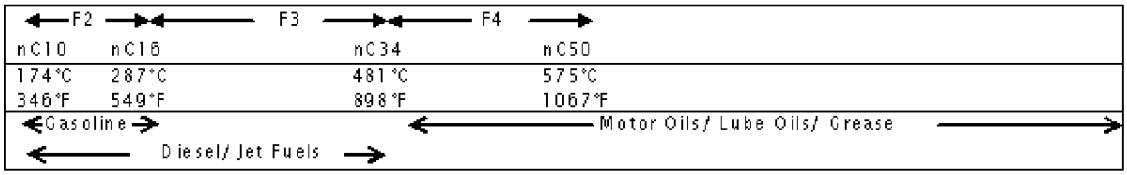
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1907517-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT





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

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

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

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

ALS Environmental

L1907517-COFC

COC # _____

Page ____ of ____

Report To				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490	Email 1: sdoiron@gov.nu.ca		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0	Email 2: mlusty@gov.nu.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155 Cell# :	Email 3:		**Analysis Request**
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #: Rankin Inlet WWTP- Monthly Effluent		
Company:		**PO / AFE:**		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
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	Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	x	x	x	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			JO	31 MAR 17	12:20	8 °C				

GENF 18.01 Front

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

Date Received: 28-APR-17
Report Date: 09-MAY-17 12:15 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1918766

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1918766-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Kelly Adams on 26-APR-17 @ 11:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		01-MAY-17	R3713689
Toluene	0.0015		0.0010	mg/L		01-MAY-17	R3713689
Ethyl benzene	<0.00050		0.00050	mg/L		01-MAY-17	R3713689
o-Xylene	<0.00050		0.00050	mg/L		01-MAY-17	R3713689
m+p-Xylenes	<0.00050		0.00050	mg/L		01-MAY-17	R3713689
F1 (C6-C10)	<0.10		0.10	mg/L		01-MAY-17	R3713689
Surrogate: 4-Bromofluorobenzene (SS)	86.9		70-130	%		01-MAY-17	R3713689
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.71		0.10	mg/L	29-APR-17	29-APR-17	R3711595
F3 (C16-C34)	13.1		0.25	mg/L	29-APR-17	29-APR-17	R3711595
F4 (C34-C50)	4.89		0.25	mg/L	29-APR-17	29-APR-17	R3711595
Surrogate: 2-Bromobenzotrifluoride	107.7		60-140	%	29-APR-17	29-APR-17	R3711595
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		08-MAY-17	
F2-Naphth	0.71		0.10	mg/L		08-MAY-17	
F3-PAH	13.1		0.25	mg/L		08-MAY-17	
Total Hydrocarbons (C6-C50)	18.7		0.38	mg/L		08-MAY-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00071		0.00071	mg/L		03-MAY-17	
Miscellaneous Parameters							
Fecal Coliforms	>24200		10	MPN/100mL		28-APR-17	R3710248
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000035		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
2-Methyl Naphthalene	0.000049		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Acenaphthene	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Acenaphthylene	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Anthracene	<0.000010		0.000010	mg/L	05-MAY-17	05-MAY-17	R3716810
Acridine	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Benzo(a)anthracene	<0.000010		0.000010	mg/L	05-MAY-17	05-MAY-17	R3716810
Benzo(a)pyrene	<0.000050	DLM	0.000050	mg/L	05-MAY-17	05-MAY-17	R3716810
Benzo(b&j)fluoranthene	<0.00010	DLM	0.00010	mg/L	05-MAY-17	05-MAY-17	R3716810
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	05-MAY-17	05-MAY-17	R3716810
Benzo(k)fluoranthene	<0.00010	DLM	0.00010	mg/L	05-MAY-17	05-MAY-17	R3716810
Chrysene	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Dibenzo(a,h)anthracene	<0.00010	DLM	0.00010	mg/L	05-MAY-17	05-MAY-17	R3716810
Fluoranthene	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Fluorene	<0.000020		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	05-MAY-17	05-MAY-17	R3716810
Naphthalene	<0.000050		0.000050	mg/L	05-MAY-17	05-MAY-17	R3716810
Phenanthrene	<0.000050		0.000050	mg/L	05-MAY-17	05-MAY-17	R3716810
Pyrene	0.000021	EMPC	0.000010	mg/L	05-MAY-17	05-MAY-17	R3716810
Quinoline	0.000048		0.000020	mg/L	05-MAY-17	05-MAY-17	R3716810
B(a)P Total Potency Equivalent	0.000137		0.000067	mg/L	05-MAY-17	05-MAY-17	R3716810
Surrogate: Acenaphthene d10	87.5		40-130	%	05-MAY-17	05-MAY-17	R3716810
Surrogate: Acridine d9	108.6		40-130	%	05-MAY-17	05-MAY-17	R3716810
Surrogate: Chrysene d12	62.5		40-130	%	05-MAY-17	05-MAY-17	R3716810
Surrogate: Naphthalene d8	115.2		40-130	%	05-MAY-17	05-MAY-17	R3716810
Surrogate: Phenanthrene d10	94.4		40-130	%	05-MAY-17	05-MAY-17	R3716810
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	179		1.2	mg/L		01-MAY-17	

* 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
L1918766-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Kelly Adams on 26-APR-17 @ 11:30							
Matrix: WASTE							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		01-MAY-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		01-MAY-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	146		1.0	mg/L		28-APR-17	R3710615
Ammonia by colour							
Ammonia, Total (as N)	6.35		0.10	mg/L		28-APR-17	R3710257
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	182		50	mg/L		28-APR-17	R3714324
Carbonaceous BOD							
BOD Carbonaceous	159		50	mg/L		28-APR-17	R3714324
Chloride in Water by IC							
Chloride (Cl)	86.4		0.50	mg/L		28-APR-17	R3710825
Conductivity							
Conductivity	682		1.0	umhos/cm		28-APR-17	R3710615
Hardness Calculated							
Hardness (as CaCO3)	129	HTC	0.25	mg/L		03-MAY-17	
Mercury Total							
Mercury (Hg)-Total	0.0000164		0.0000050	mg/L	04-MAY-17	04-MAY-17	R3716728
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		28-APR-17	R3710825
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		01-MAY-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-APR-17	R3710825
Oil & Grease - Gravimetric							
Oil and Grease	33.3		5.0	mg/L		04-MAY-17	R3714774
Phenol (4AAP)							
Phenols (4AAP)	0.0102		0.0010	mg/L		08-MAY-17	R3717207
Phosphorus, Total							
Phosphorus (P)-Total	3.78		0.10	mg/L		01-MAY-17	R3710693
Sulfate in Water by IC							
Sulfate (SO4)	40.5		0.30	mg/L		28-APR-17	R3710825
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.156		0.0050	mg/L	02-MAY-17	02-MAY-17	R3713525
Arsenic (As)-Total	0.00106		0.00020	mg/L	02-MAY-17	02-MAY-17	R3713525
Cadmium (Cd)-Total	0.000069		0.000010	mg/L	02-MAY-17	02-MAY-17	R3713525
Calcium (Ca)-Total	37.0		0.10	mg/L	02-MAY-17	02-MAY-17	R3713525
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	02-MAY-17	02-MAY-17	R3713525
Cobalt (Co)-Total	0.00020		0.00020	mg/L	02-MAY-17	02-MAY-17	R3713525
Copper (Cu)-Total	0.223		0.00020	mg/L	02-MAY-17	02-MAY-17	R3713525
Iron (Fe)-Total	0.543		0.010	mg/L	02-MAY-17	02-MAY-17	R3713525
Lead (Pb)-Total	0.00156		0.000090	mg/L	02-MAY-17	02-MAY-17	R3713525
Magnesium (Mg)-Total	8.86		0.010	mg/L	02-MAY-17	02-MAY-17	R3713525
Manganese (Mn)-Total	0.0522		0.00030	mg/L	02-MAY-17	02-MAY-17	R3713525
Nickel (Ni)-Total	0.0031		0.0020	mg/L	02-MAY-17	02-MAY-17	R3713525
Potassium (K)-Total	11.9		0.020	mg/L	02-MAY-17	02-MAY-17	R3713525
Sodium (Na)-Total	47.0		0.030	mg/L	02-MAY-17	02-MAY-17	R3713525
Zinc (Zn)-Total	0.0919		0.0020	mg/L	02-MAY-17	02-MAY-17	R3713525
Total Organic Carbon by Combustion							
Total Organic Carbon	106		2.5	mg/L		02-MAY-17	R3713672
Total Suspended Solids							

* 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
L1918766-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Kelly Adams on 26-APR-17 @ 11:30							
Matrix: WASTE							
Total Suspended Solids							
Total Suspended Solids	140		100	mg/L		01-MAY-17	R3711588
pH							
pH	7.13		0.10	pH units		28-APR-17	R3710615

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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

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 aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

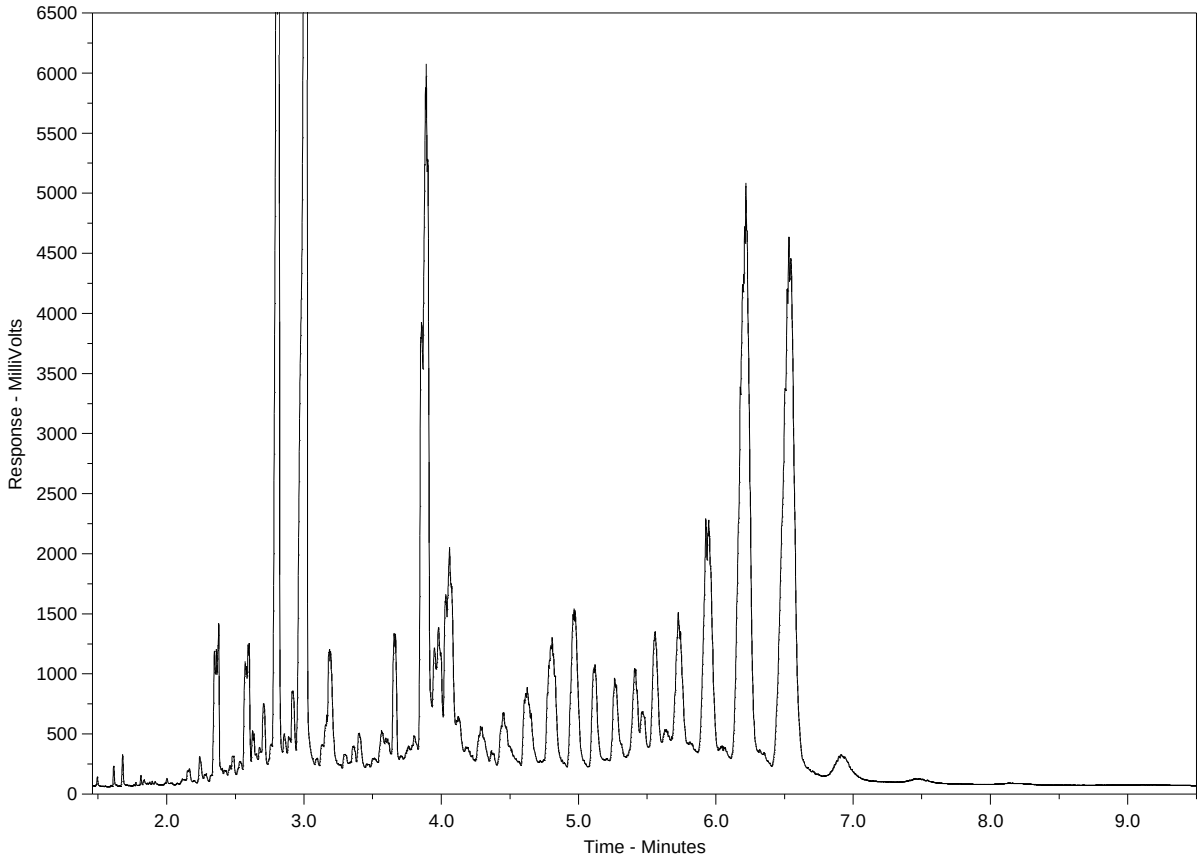
GLOSSARY OF REPORT TERMS

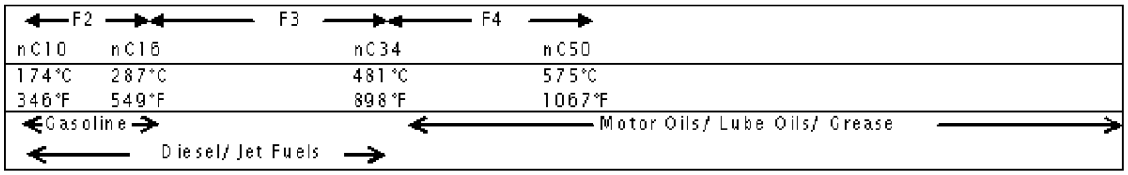
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1918766-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT





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

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

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

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

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # L1918766

Page ____ of ____

Report To		**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)	☑ Standard ☐ Other	◉ Regular (Standa
Contact:	SIMON DOIRON	☑ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Bus
Address:	Box 490	Email 1: sdoiron@gov.nu.ca	○ Emergency (1-7
	Rankin Inlet , NU, X0C 0G0	Email 2: mlusty@gov.nu.ca	○ Same Day or W
Phone:	867-645-8155 Cell# :	Email 3:	
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	Please indicate below Filtered, Preserved or Both
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #: Rankin Inlet WWTP- Monthly Effluent	
Company:		**PO / AFE:**	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Craig Riddell	**Sampled By:** Simon Doiron

L1918766-COFC

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	Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	x	x	x	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kelly Adams	26/04/17	13:30	David I	4/28/17	12:30 pm	8.4 °C				

GENF 18.01 Front

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

Date Received: 31-MAY-17
Report Date: 12-JUN-17 07:22 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1934317

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1934317-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAY-17 @ 13:00							
Matrix: Waste							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		01-JUN-17	R3737923
Toluene	0.0036		0.0010	mg/L		01-JUN-17	R3737923
Ethyl benzene	0.00164		0.00050	mg/L		01-JUN-17	R3737923
o-Xylene	0.00231		0.00050	mg/L		01-JUN-17	R3737923
m+p-Xylenes	0.00420		0.00050	mg/L		01-JUN-17	R3737923
F1 (C6-C10)	<0.10		0.10	mg/L		01-JUN-17	R3737923
Surrogate: 4-Bromofluorobenzene (SS)	93.8		70-130	%		01-JUN-17	R3737923
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.48		0.10	mg/L	01-JUN-17	01-JUN-17	R3737918
F3 (C16-C34)	7.47		0.25	mg/L	01-JUN-17	01-JUN-17	R3737918
F4 (C34-C50)	3.31		0.25	mg/L	01-JUN-17	01-JUN-17	R3737918
Surrogate: 2-Bromobenzotrifluoride	95.5		60-140	%	01-JUN-17	01-JUN-17	R3737918
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		09-JUN-17	
F2-Naphth	0.48		0.10	mg/L		09-JUN-17	
F3-PAH	7.47		0.25	mg/L		09-JUN-17	
Total Hydrocarbons (C6-C50)	11.3		0.38	mg/L		09-JUN-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00651		0.00071	mg/L		02-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000068		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
2-Methyl Naphthalene	0.000091		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Acridine	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)pyrene	0.0000060	EMPC	0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Chrysene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Dibenzo(a,h)anthracene	<0.000050	DLM	0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluoranthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluorene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	07-JUN-17	08-JUN-17	R3743483
Naphthalene	0.000139		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Phenanthrene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Pyrene	0.000015	EMPC	0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Quinoline	0.000066	EMPC	0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
B(a)P Total Potency Equivalent	0.000039		0.000035	mg/L	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acenaphthene d10	98.4		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acridine d9	106.5		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Chrysene d12	63.1		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Naphthalene d8	131.7	SOL:MI	40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Phenanthrene d10	88.6		40-130	%	07-JUN-17	08-JUN-17	R3743483
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	135		1.2	mg/L		02-JUN-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1934317-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAY-17 @ 13:00							
Matrix: Waste							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		02-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		02-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	111		1.0	mg/L		01-JUN-17	R3737831
Ammonia by colour							
Ammonia, Total (as N)	3.61		0.10	mg/L		01-JUN-17	R3737830
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	58		20	mg/L		01-JUN-17	R3740817
Carbonaceous BOD							
BOD Carbonaceous	47		20	mg/L		01-JUN-17	R3740817
Chloride in Water by IC							
Chloride (Cl)	74.7		0.50	mg/L		01-JUN-17	R3739668
Conductivity							
Conductivity	549		1.0	umhos/cm		01-JUN-17	R3737831
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		31-MAY-17	R3737044
Hardness Calculated							
Hardness (as CaCO3)	127	HTC	0.25	mg/L		06-JUN-17	
Mercury Total							
Mercury (Hg)-Total	0.0000198		0.0000050	mg/L	01-JUN-17	06-JUN-17	R3740755
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		01-JUN-17	R3739668
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		05-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		01-JUN-17	R3739668
Oil & Grease - Gravimetric							
Oil and Grease	22.6		5.0	mg/L		08-JUN-17	R3743055
Phenol (4AAP)							
Phenols (4AAP)	0.0071		0.0010	mg/L		09-JUN-17	R3743255
Phosphorus, Total							
Phosphorus (P)-Total	1.51		0.050	mg/L		02-JUN-17	R3738888
Sulfate in Water by IC							
Sulfate (SO4)	35.7		0.30	mg/L		01-JUN-17	R3739668
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.134		0.0050	mg/L	05-JUN-17	05-JUN-17	R3740322
Arsenic (As)-Total	0.00112		0.00020	mg/L	05-JUN-17	05-JUN-17	R3740322
Cadmium (Cd)-Total	0.000085		0.000010	mg/L	05-JUN-17	05-JUN-17	R3740322
Calcium (Ca)-Total	36.6		0.10	mg/L	05-JUN-17	05-JUN-17	R3740322
Chromium (Cr)-Total	0.0012		0.0010	mg/L	05-JUN-17	05-JUN-17	R3740322
Cobalt (Co)-Total	0.00034		0.00020	mg/L	05-JUN-17	05-JUN-17	R3740322
Copper (Cu)-Total	0.162		0.00020	mg/L	05-JUN-17	05-JUN-17	R3740322
Iron (Fe)-Total	0.443		0.010	mg/L	05-JUN-17	05-JUN-17	R3740322
Lead (Pb)-Total	0.00394		0.000090	mg/L	05-JUN-17	05-JUN-17	R3740322
Magnesium (Mg)-Total	8.59		0.010	mg/L	05-JUN-17	05-JUN-17	R3740322
Manganese (Mn)-Total	0.0771		0.00030	mg/L	05-JUN-17	05-JUN-17	R3740322
Nickel (Ni)-Total	0.0047		0.0020	mg/L	05-JUN-17	05-JUN-17	R3740322
Potassium (K)-Total	8.19		0.020	mg/L	05-JUN-17	05-JUN-17	R3740322
Sodium (Na)-Total	59.8		0.030	mg/L	05-JUN-17	05-JUN-17	R3740322
Zinc (Zn)-Total	0.0660		0.0020	mg/L	05-JUN-17	05-JUN-17	R3740322
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
L1934317-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon Doiron on 29-MAY-17 @ 13:00							
Matrix: Waste							
Total Organic Carbon by Combustion							
Total Organic Carbon	44.8		0.50	mg/L		02-JUN-17	R3739799
Total Suspended Solids							
Total Suspended Solids	90		17	mg/L		02-JUN-17	R3739964
pH							
pH	7.12		0.10	pH units		01-JUN-17	R3737831

* 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.
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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

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 aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

ALS Environmental

Chain of Custody / Analytical Request Form

Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

L1934317

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L1934317-COFC

Report To				Report Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8							◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490			Email 1:	sdoiron@gov.nu.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0			Email 2:	mlusty@gov.nu.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :		Email 3:				**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			
Company:				**PO / AFE:**				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:				
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	Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	X	X	X	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KELLY ADAMS	29/05/17	13:30	BT	31-MAY-17	12:30	13 °C				

ALS Environmental

L1934317-COFC

Chain of Custody / Analytical Request Form
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L1934317

Page ___ of ___

Report To				Report Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8							◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490			Email 1:	sdoiron@gov.nu.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0			Email 2:	mlusty@gov.nu.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :		Email 3:				
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				**Analysis Request**
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				**PO / AFE:**				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:				
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	Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	X	X	X	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 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.

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KELLY ADAMS	29/05/17	13:30	BT	31-MAY-17	12:30	13 °C				

Nunavut Community & Government Services - Rankin Inlet
ATTN: MEGAN LUSTY
Bag 002
Rankin Inlet NU X0C 0G0

Date Received: 06-JUN-17
Report Date: 16-JUN-17 08:50 (MT)
Version: FINAL

Client Phone: 867-645-8176

Certificate of Analysis

Lab Work Order #: L1937418

Project P.O. #: NOT SUBMITTED
Job Reference: GN-CGS RANKIN INLET
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1937418-1 GRA-7							
Sampled By: CF on 05-JUN-17 @ 02:05							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
Toluene	<0.0010		0.0010	mg/L		09-JUN-17	R3744321
Ethyl benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
o-Xylene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
m+p-Xylenes	<0.00040		0.00040	mg/L		09-JUN-17	R3744321
F1 (C6-C10)	<0.10		0.10	mg/L		09-JUN-17	R3744321
Surrogate: 4-Bromofluorobenzene (SS)	96.3		70-130	%		09-JUN-17	R3744321
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	07-JUN-17	08-JUN-17	R3743299
F3 (C16-C34)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
F4 (C34-C50)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
Surrogate: 2-Bromobenzotrifluoride	97.1		60-140	%	07-JUN-17	08-JUN-17	R3743299
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		12-JUN-17	
F2-Naphth	<0.10		0.10	mg/L		12-JUN-17	
F3-PAH	<0.25		0.25	mg/L		12-JUN-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		12-JUN-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		12-JUN-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Acridine	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Chrysene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluoranthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluorene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Naphthalene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Phenanthrene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Quinoline	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acenaphthene d10	102.9		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acridine d9	120.1		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Chrysene d12	104.5		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Naphthalene d8	95.6		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Phenanthrene d10	103.8		40-130	%	07-JUN-17	08-JUN-17	R3743483
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	24.9		1.2	mg/L		09-JUN-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1937418-1 GRA-7							
Sampled By: CF on 05-JUN-17 @ 02:05							
Matrix: WASTE WATER							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		09-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		09-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	20.4		1.0	mg/L		07-JUN-17	R3742730
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		08-JUN-17	R3743360
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	<2.0		2.0	mg/L		07-JUN-17	R3745691
Carbonaceous BOD							
BOD Carbonaceous	<2.0		2.0	mg/L		07-JUN-17	R3745691
Chloride in Water by IC							
Chloride (Cl)	12.6		0.50	mg/L		07-JUN-17	R3743972
Conductivity							
Conductivity	88.2		1.0	umhos/cm		07-JUN-17	R3742730
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		06-JUN-17	R3742105
Hardness Calculated							
Hardness (as CaCO3)	25.6	HTC	0.25	mg/L		09-JUN-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	08-JUN-17	09-JUN-17	R3743641
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		07-JUN-17	R3743972
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		13-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-17	R3743972
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		13-JUN-17	R3746217
Phenol (4AAP)							
Phenols (4AAP)	0.0021		0.0010	mg/L		15-JUN-17	R3747795
Phosphorus, Total							
Phosphorus (P)-Total	0.011		0.010	mg/L		09-JUN-17	R3743491
Sulfate in Water by IC							
Sulfate (SO4)	3.94		0.30	mg/L		07-JUN-17	R3743972
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0469		0.0050	mg/L	08-JUN-17	08-JUN-17	R3743269
Arsenic (As)-Total	0.00029		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	08-JUN-17	08-JUN-17	R3743269
Calcium (Ca)-Total	7.64		0.10	mg/L	08-JUN-17	08-JUN-17	R3743269
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	08-JUN-17	08-JUN-17	R3743269
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Copper (Cu)-Total	0.00074		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Iron (Fe)-Total	0.190		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269
Lead (Pb)-Total	<0.000090		0.000090	mg/L	08-JUN-17	08-JUN-17	R3743269
Magnesium (Mg)-Total	1.58		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269
Manganese (Mn)-Total	0.0156		0.00030	mg/L	08-JUN-17	08-JUN-17	R3743269
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
Potassium (K)-Total	1.33		0.020	mg/L	08-JUN-17	08-JUN-17	R3743269
Sodium (Na)-Total	6.65		0.030	mg/L	08-JUN-17	08-JUN-17	R3743269
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
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
L1937418-1 GRA-7							
Sampled By: CF on 05-JUN-17 @ 02:05							
Matrix: WASTE WATER							
Total Organic Carbon by Combustion							
Total Organic Carbon	4.76		0.50	mg/L		08-JUN-17	R3743705
Total Suspended Solids							
Total Suspended Solids	<5.0		5.0	mg/L		09-JUN-17	R3744998
pH							
pH	7.31		0.10	pH units		07-JUN-17	R3742730
L1937418-2 GRA-6							
Sampled By: CF on 05-JUN-17 @ 02:40							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
Toluene	<0.0010		0.0010	mg/L		09-JUN-17	R3744321
Ethyl benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
o-Xylene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
m+p-Xylenes	<0.00040		0.00040	mg/L		09-JUN-17	R3744321
F1 (C6-C10)	<0.10		0.10	mg/L		09-JUN-17	R3744321
Surrogate: 4-Bromofluorobenzene (SS)	97.6		70-130	%		09-JUN-17	R3744321
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	07-JUN-17	08-JUN-17	R3743299
F3 (C16-C34)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
F4 (C34-C50)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
Surrogate: 2-Bromobenzotrifluoride	96.6		60-140	%	07-JUN-17	08-JUN-17	R3743299
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		12-JUN-17	
F2-Naphth	<0.10		0.10	mg/L		12-JUN-17	
F3-PAH	<0.25		0.25	mg/L		12-JUN-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		12-JUN-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		12-JUN-17	
Miscellaneous Parameters							
Biochemical Oxygen Demand	<2.0		2.0	mg/L	07-JUN-17	12-JUN-17	R3745246
BOD Carbonaceous	<2.0		2.0	mg/L	07-JUN-17	12-JUN-17	R3745251
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Acridine	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Chrysene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluoranthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluorene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Naphthalene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Phenanthrene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483

* 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
L1937418-2 GRA-6							
Sampled By: CF on 05-JUN-17 @ 02:40							
Matrix: WASTE WATER							
Polyaromatic Hydrocarbons (PAHs)							
Pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Quinoline	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acenaphthene d10	100.7		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acridine d9	116.5		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Chrysene d12	101.5		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Naphthalene d8	93.7		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Phenanthrene d10	99.7		40-130	%	07-JUN-17	08-JUN-17	R3743483
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	28.2		1.2	mg/L		09-JUN-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		09-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		09-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	23.1		1.0	mg/L		07-JUN-17	R3742730
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		08-JUN-17	R3743360
Chloride in Water by IC							
Chloride (Cl)	13.8		0.50	mg/L		07-JUN-17	R3743868
Conductivity							
Conductivity	96.6		1.0	umhos/cm		07-JUN-17	R3742730
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		06-JUN-17	R3742105
Hardness Calculated							
Hardness (as CaCO3)	27.7	HTC	0.25	mg/L		09-JUN-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	08-JUN-17	09-JUN-17	R3743641
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		07-JUN-17	R3743868
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		12-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-17	R3743868
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		14-JUN-17	R3747057
Phenol (4AAP)							
Phenols (4AAP)	0.0028		0.0010	mg/L		15-JUN-17	R3747795
Phosphorus, Total							
Phosphorus (P)-Total	0.011		0.010	mg/L		09-JUN-17	R3743491
Sulfate in Water by IC							
Sulfate (SO4)	4.32		0.30	mg/L		07-JUN-17	R3743868
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0289		0.0050	mg/L	08-JUN-17	08-JUN-17	R3743269
Arsenic (As)-Total	0.00033		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	08-JUN-17	08-JUN-17	R3743269
Calcium (Ca)-Total	8.28		0.10	mg/L	08-JUN-17	08-JUN-17	R3743269
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	08-JUN-17	08-JUN-17	R3743269
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Copper (Cu)-Total	0.00081		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Iron (Fe)-Total	0.176		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269

* 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
L1937418-2 GRA-6							
Sampled By: CF on 05-JUN-17 @ 02:40							
Matrix: WASTE WATER							
Total Metals by ICP-MS							
Lead (Pb)-Total	<0.000090		0.000090	mg/L	08-JUN-17	08-JUN-17	R3743269
Magnesium (Mg)-Total	1.72		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269
Manganese (Mn)-Total	0.0106		0.00030	mg/L	08-JUN-17	08-JUN-17	R3743269
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
Potassium (K)-Total	1.40		0.020	mg/L	08-JUN-17	08-JUN-17	R3743269
Sodium (Na)-Total	7.35		0.030	mg/L	08-JUN-17	08-JUN-17	R3743269
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
Total Organic Carbon by Combustion							
Total Organic Carbon	5.04		0.50	mg/L		08-JUN-17	R3743705
Total Suspended Solids							
Total Suspended Solids	<5.0		5.0	mg/L		09-JUN-17	R3744998
pH							
pH	7.43		0.10	pH units		07-JUN-17	R3742730
L1937418-3 GRA-1							
Sampled By: CF on 05-JUN-17 @ 03:25							
Matrix: WASTE WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
Toluene	<0.0010		0.0010	mg/L		09-JUN-17	R3744321
Ethyl benzene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
o-Xylene	<0.00050		0.00050	mg/L		09-JUN-17	R3744321
m+p-Xylenes	<0.00040		0.00040	mg/L		09-JUN-17	R3744321
F1 (C6-C10)	<0.10		0.10	mg/L		09-JUN-17	R3744321
Surrogate: 4-Bromofluorobenzene (SS)	87.1		70-130	%		09-JUN-17	R3744321
CCME PHC F2-F4 in Water							
F2 (C10-C16)	<0.10		0.10	mg/L	07-JUN-17	08-JUN-17	R3743299
F3 (C16-C34)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
F4 (C34-C50)	<0.25		0.25	mg/L	07-JUN-17	08-JUN-17	R3743299
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	07-JUN-17	08-JUN-17	R3743299
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		12-JUN-17	
F2-Naphth	<0.10		0.10	mg/L		12-JUN-17	
F3-PAH	<0.25		0.25	mg/L		12-JUN-17	
Total Hydrocarbons (C6-C50)	<0.38		0.38	mg/L		12-JUN-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		12-JUN-17	
Miscellaneous Parameters							
Biochemical Oxygen Demand	<2.0		2.0	mg/L	07-JUN-17	12-JUN-17	R3745246
BOD Carbonaceous	<2.0		2.0	mg/L	07-JUN-17	12-JUN-17	R3745251
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
2-Methyl Naphthalene	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthene	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
Acenaphthylene	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
Anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Acridine	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)anthracene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483

* 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
L1937418-3 GRA-1							
Sampled By: CF on 05-JUN-17 @ 03:25							
Matrix: WASTE WATER							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Chrysene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluoranthene	<0.000020		0.000020	mg/L	07-JUN-17	08-JUN-17	R3743483
Fluorene	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Naphthalene	<0.00010	DLM	0.00010	mg/L	07-JUN-17	08-JUN-17	R3743483
Phenanthrene	<0.000050		0.000050	mg/L	07-JUN-17	08-JUN-17	R3743483
Pyrene	<0.000010		0.000010	mg/L	07-JUN-17	08-JUN-17	R3743483
Quinoline	<0.000040	DLM	0.000040	mg/L	07-JUN-17	08-JUN-17	R3743483
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acenaphthene d10	38.7	SOL:MI	40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Acridine d9	48.9		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Chrysene d12	44.2		40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Naphthalene d8	35.2	SOL:MI	40-130	%	07-JUN-17	08-JUN-17	R3743483
Surrogate: Phenanthrene d10	41.5		40-130	%	07-JUN-17	08-JUN-17	R3743483
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	57.1		1.2	mg/L		09-JUN-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		09-JUN-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		09-JUN-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	46.8		1.0	mg/L		07-JUN-17	R3742730
Ammonia by colour							
Ammonia, Total (as N)	0.052		0.010	mg/L		08-JUN-17	R3743360
Chloride in Water by IC							
Chloride (Cl)	36.9		0.50	mg/L		07-JUN-17	R3743868
Conductivity							
Conductivity	246		1.0	umhos/cm		07-JUN-17	R3742730
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	<10	MBHT	10	MPN/100mL		06-JUN-17	R3742105
Hardness Calculated							
Hardness (as CaCO3)	72.5	HTC	0.25	mg/L		09-JUN-17	
Mercury Total							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	08-JUN-17	09-JUN-17	R3743641
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		07-JUN-17	R3743868
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		12-JUN-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		07-JUN-17	R3743868
Oil & Grease - Gravimetric							
Oil and Grease	<5.0		5.0	mg/L		14-JUN-17	R3747057
Phenol (4AAP)							
Phenols (4AAP)	0.0027		0.0010	mg/L		15-JUN-17	R3747795
Phosphorus, Total							
Phosphorus (P)-Total	0.012		0.010	mg/L		09-JUN-17	R3743491
Sulfate in Water by IC							
Sulfate (SO4)	20.8		0.30	mg/L		07-JUN-17	R3743868
Total Metals by ICP-MS							

* 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
L1937418-3 GRA-1							
Sampled By: CF on 05-JUN-17 @ 03:25							
Matrix: WASTE WATER							
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0135		0.0050	mg/L	08-JUN-17	08-JUN-17	R3743269
Arsenic (As)-Total	0.00052		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	08-JUN-17	08-JUN-17	R3743269
Calcium (Ca)-Total	21.0		0.10	mg/L	08-JUN-17	08-JUN-17	R3743269
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	08-JUN-17	08-JUN-17	R3743269
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Copper (Cu)-Total	0.00087		0.00020	mg/L	08-JUN-17	08-JUN-17	R3743269
Iron (Fe)-Total	0.029		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269
Lead (Pb)-Total	<0.000090		0.000090	mg/L	08-JUN-17	08-JUN-17	R3743269
Magnesium (Mg)-Total	4.90		0.010	mg/L	08-JUN-17	08-JUN-17	R3743269
Manganese (Mn)-Total	0.0283		0.00030	mg/L	08-JUN-17	08-JUN-17	R3743269
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
Potassium (K)-Total	2.61		0.020	mg/L	08-JUN-17	08-JUN-17	R3743269
Sodium (Na)-Total	22.5		0.030	mg/L	08-JUN-17	08-JUN-17	R3743269
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	08-JUN-17	08-JUN-17	R3743269
Total Organic Carbon by Combustion							
Total Organic Carbon	4.18		0.50	mg/L		08-JUN-17	R3743705
Total Suspended Solids							
Total Suspended Solids	<5.0		5.0	mg/L		09-JUN-17	R3744998
pH							
pH	7.34		0.10	pH units		07-JUN-17	R3742730

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
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.
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference

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-MAN-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-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-MAN-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.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

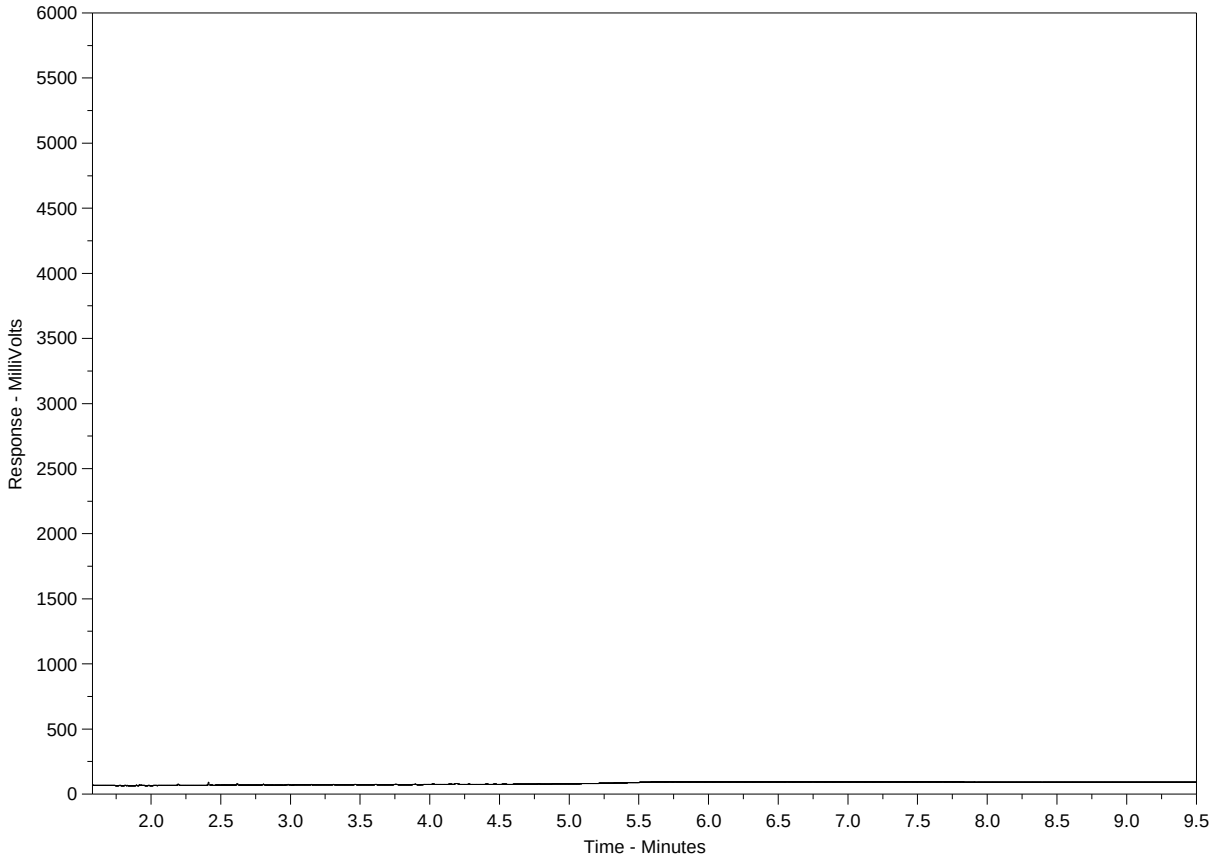
GLOSSARY OF REPORT TERMS

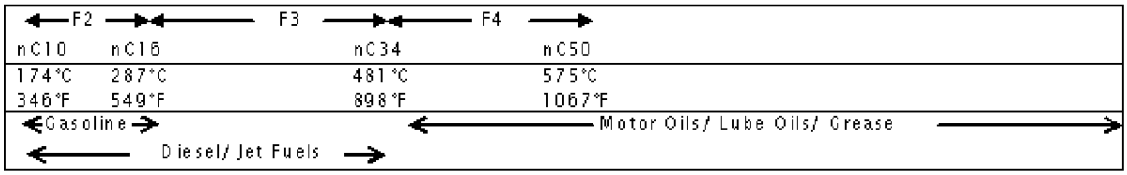
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1937418-1
Client Sample ID: GRA-7





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

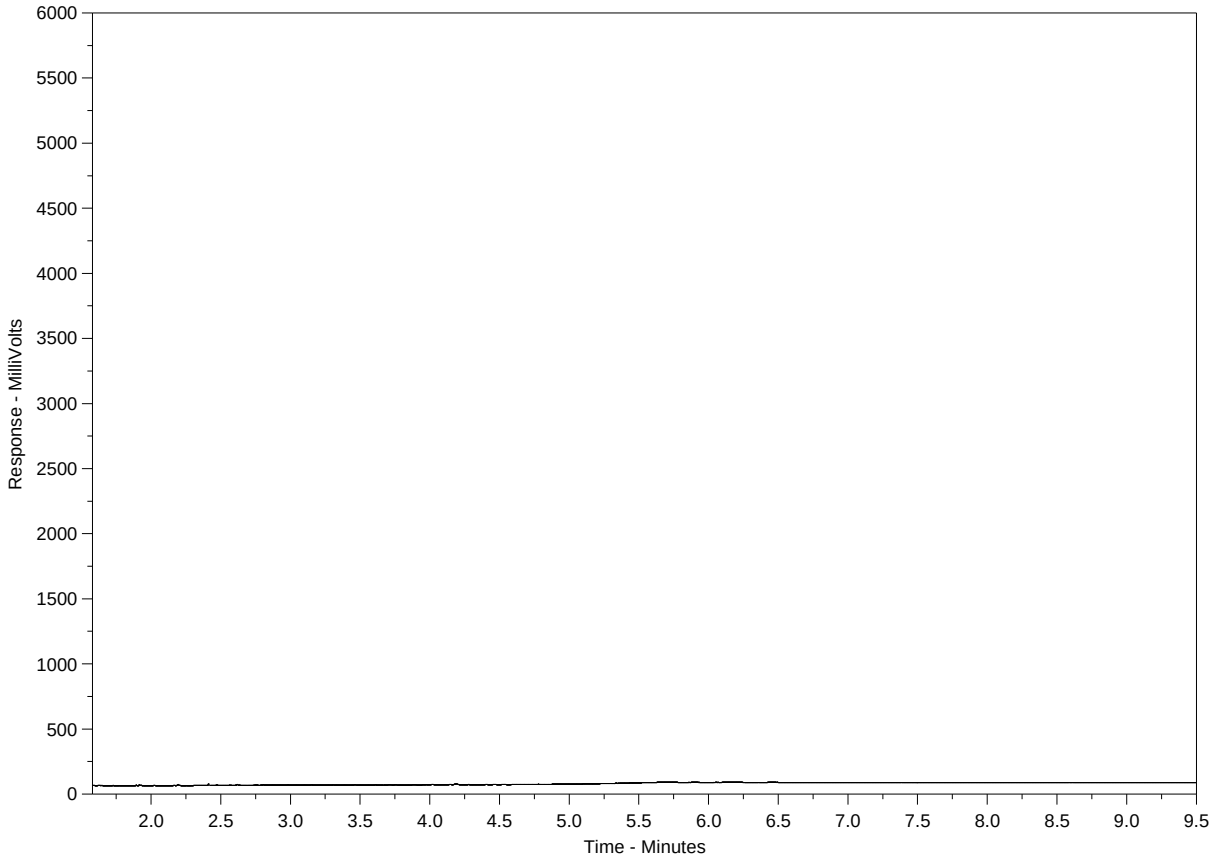
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

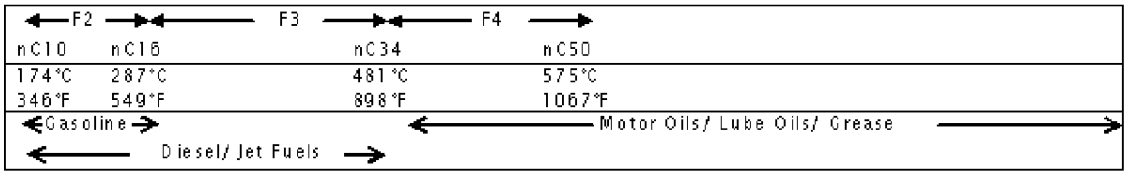
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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: L1937418-2
Client Sample ID: GRA-6





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

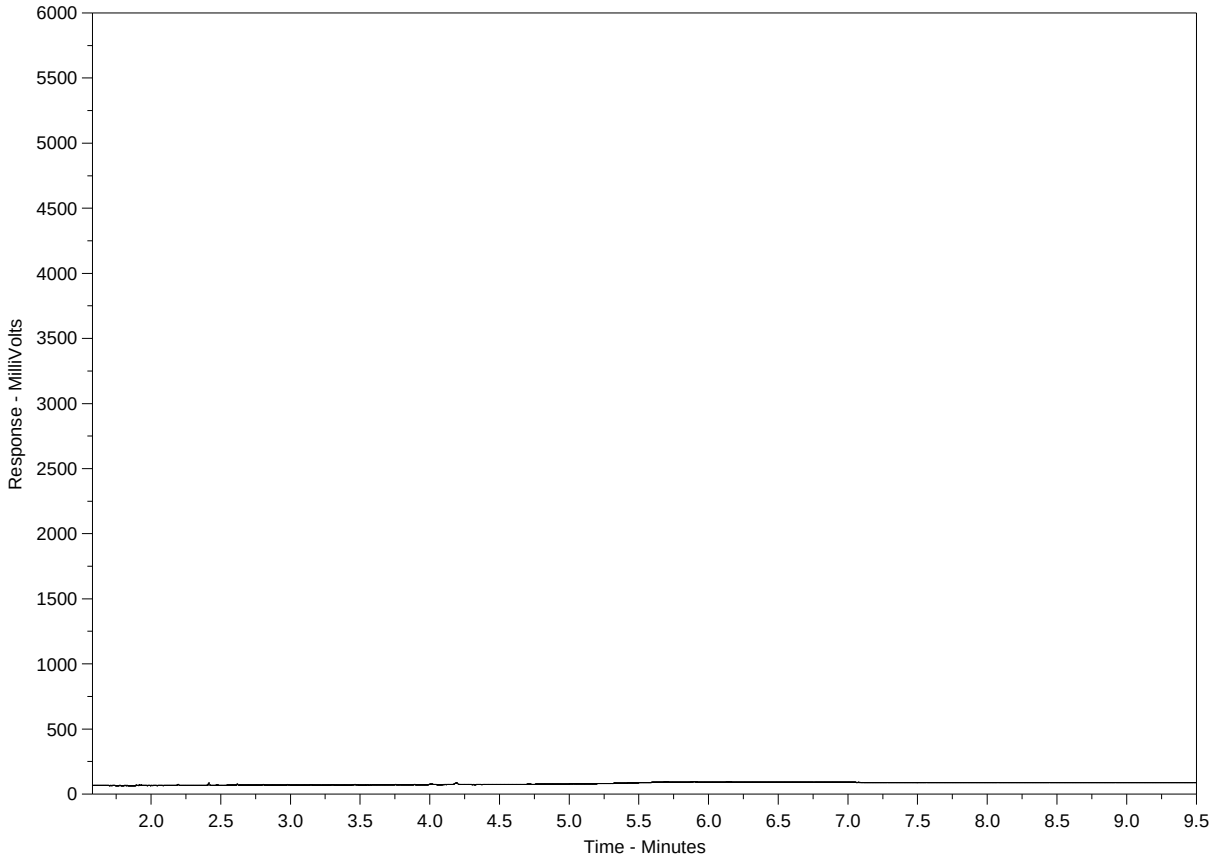
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

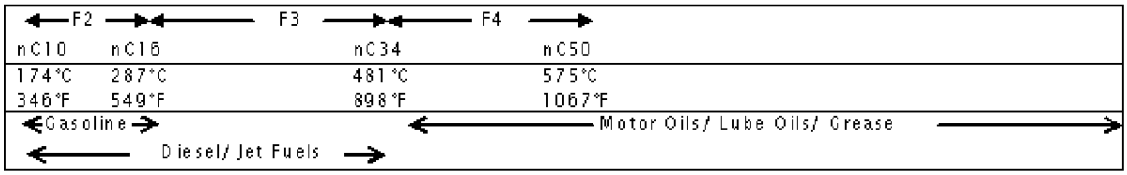
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1937418-3
Client Sample ID: GRA-1





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

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

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

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

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1937418-COFC

COC Number: 14 - 503401

Page 1 of 1

L1937418

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Government of Nunavut - CGS - Rankin Inlet	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3pm)
Contact:	Connor Faulkner / Megan Lusty	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 business days if received by 3pm)
Address:	PO Box 490 Rankin Inlet, NU X0C 0G0	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 business days if received by 3pm)
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	867-645-8103	Email 1 or Fax	CFaulkner@gov.nu.ca	Specify Date Required for E2,E or P:
		Email 2	mlusty@gov.nu.ca	

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

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	WB133	Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)	ALS Contact:	Sampler:
	Craig Riddell	Connor Faulkner

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine	BOD	Phenols	Total Metals	Total Nutrients	Oil + Grease x2	Bacteria	BTX-F1 x3	F2-F4 x2	PAH				Number of Containers
	GRA-7	05-Jun-17	02:05	water	✓	✓	P	P	P	P	P	P	P	P				15
	GRA-6	05-Jun-17	02:40	water	✓	✓	P	P	P	P	P	P	P	P				15
	GRA-1	05-Jun-17	03:25	water	✓	✓	P	P	P	P	P	P	P	P				15

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Nunavut - WW - GRP1 - WP
Are samples for human drinking water use? ☐ Yes ☑ No	BTX, F1-F4
	PAH

SAMPLE CONDITION AS RECEIVED (lab use only)

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

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	05-Jun-17	3:45 PM		06/06/17	9:15			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0336e v09 Front04 January 2014

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

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

10°C

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

Date Received: 01-JUL-17
Report Date: 14-JUL-17 06:53 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1952291

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1952291-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT							
Matrix: WASTE							
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	118		1.2	mg/L		07-JUL-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		07-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		07-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	96.9		1.0	mg/L		05-JUL-17	R3766342
Ammonia by colour							
Ammonia, Total (as N)	11.9		2.0	mg/L		11-JUL-17	R3769974
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	94		20	mg/L		01-JUL-17	R3767196
Carbonaceous BOD							
BOD Carbonaceous	82		20	mg/L		01-JUL-17	R3767196
Chloride in Water by IC							
Chloride (Cl)	49.0		0.50	mg/L		04-JUL-17	R3766502
Conductivity							
Conductivity	392		1.0	umhos/cm		05-JUL-17	R3766342
Hardness Calculated							
Hardness (as CaCO3)	75.0	HTC	0.25	mg/L		07-JUL-17	
Mercury Total							
Mercury (Hg)-Total	0.0000084		0.0000050	mg/L	05-JUL-17	07-JUL-17	R3769516
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		04-JUL-17	R3766502
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		06-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		04-JUL-17	R3766502
Oil & Grease - Gravimetric							
Oil and Grease	29.9		5.0	mg/L		10-JUL-17	R3768790
Phenol (4AAP)							
Phenols (4AAP)	0.0100		0.0010	mg/L		13-JUL-17	R3771332
Phosphorus, Total							
Phosphorus (P)-Total	2.03		0.050	mg/L		07-JUL-17	R3767086
Sulfate in Water by IC							
Sulfate (SO4)	16.3		0.30	mg/L		04-JUL-17	R3766502
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.240		0.0050	mg/L	06-JUL-17	06-JUL-17	R3766914
Arsenic (As)-Total	0.00071		0.00020	mg/L	06-JUL-17	06-JUL-17	R3766914
Cadmium (Cd)-Total	0.000071		0.000010	mg/L	06-JUL-17	06-JUL-17	R3766914
Calcium (Ca)-Total	21.2		0.10	mg/L	06-JUL-17	06-JUL-17	R3766914
Chromium (Cr)-Total	0.0011		0.0010	mg/L	06-JUL-17	06-JUL-17	R3766914
Cobalt (Co)-Total	0.00043		0.00020	mg/L	06-JUL-17	06-JUL-17	R3766914
Copper (Cu)-Total	0.122		0.00020	mg/L	06-JUL-17	06-JUL-17	R3766914
Iron (Fe)-Total	0.338		0.010	mg/L	06-JUL-17	06-JUL-17	R3766914
Lead (Pb)-Total	0.00263		0.000090	mg/L	06-JUL-17	06-JUL-17	R3766914
Magnesium (Mg)-Total	5.36		0.010	mg/L	06-JUL-17	06-JUL-17	R3766914
Manganese (Mn)-Total	0.0337		0.00030	mg/L	06-JUL-17	06-JUL-17	R3766914
Nickel (Ni)-Total	0.0030		0.0020	mg/L	06-JUL-17	06-JUL-17	R3766914
Potassium (K)-Total	8.00		0.020	mg/L	06-JUL-17	06-JUL-17	R3766914
Sodium (Na)-Total	30.9		0.030	mg/L	06-JUL-17	06-JUL-17	R3766914

* 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
L1952291-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CLIENT							
Matrix: WASTE							
Total Metals by ICP-MS							
Zinc (Zn)-Total	0.0622		0.0020	mg/L	06-JUL-17	06-JUL-17	R3766914
Total Organic Carbon by Combustion							
Total Organic Carbon	61.8		0.50	mg/L		11-JUL-17	R3769947
Total Suspended Solids							
Total Suspended Solids	88		20	mg/L		07-JUL-17	R3768512
pH							
pH	7.07		0.10	pH units		05-JUL-17	R3766342

* 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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-T-CVAF-WP	Water	Mercury Total	EPA245.7 V2.0
Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.			
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	APHA 3030E/EPA 6020A-TL
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

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.			
NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
OG-GRAV-WP	Water	Oil & Grease - Gravimetric	EPA 1664 (modified)
Water samples are acidified and extracted with hexane; the hexane extract is collected in a pre-weighed vial. The solvent is evaporated and Total Oil & Grease is determined from the weight of the residue in the vial.			
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

ALS Environmental

L1952291-COFC

COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490			Email 1:	sdoiron@gov.nu.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0			Email 2:	mlusty@gov.nu.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :		Email 3:				
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				**Analysis Request**
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				**PO / AFE:**				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:				

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	Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	x	x	x	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 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/m-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kadn	29/06/17	13:30	CHB	01 JULY	1:15 pm	10.1 °C				

GENF 18.01 Front

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

Date Received: 05-JUL-17
Report Date: 19-JUL-17 15:23 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1953319

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1953319-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: CF on 04-JUL-17 @ 16:00							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		07-JUL-17	R3767225
Toluene	0.0018		0.0010	mg/L		07-JUL-17	R3767225
Ethyl benzene	<0.00050		0.00050	mg/L		07-JUL-17	R3767225
o-Xylene	0.00052		0.00050	mg/L		07-JUL-17	R3767225
m+p-Xylenes	<0.0010	DLB	0.0010	mg/L		07-JUL-17	R3767225
F1 (C6-C10)	<0.10		0.10	mg/L		07-JUL-17	R3767225
Surrogate: 4-Bromofluorobenzene (SS)	97.2		70-130	%		07-JUL-17	R3767225
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.51		0.10	mg/L	06-JUL-17	06-JUL-17	R3767089
F3 (C16-C34)	9.96		0.25	mg/L	06-JUL-17	06-JUL-17	R3767089
F4 (C34-C50)	5.07		0.25	mg/L	06-JUL-17	06-JUL-17	R3767089
Surrogate: 2-Bromobenzotrifluoride	79.4		60-140	%	06-JUL-17	06-JUL-17	R3767089
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		19-JUL-17	
F2-Naphth	0.51		0.10	mg/L		19-JUL-17	
F3-PAH	9.96		0.25	mg/L		19-JUL-17	
Total Hydrocarbons (C6-C50)	15.5		0.38	mg/L		19-JUL-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.0011		0.0011	mg/L		07-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000061		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
2-Methyl Naphthalene	0.000069		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Acenaphthene	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Acenaphthylene	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Anthracene	<0.000010		0.000010	mg/L	14-JUL-17	17-JUL-17	R3774263
Acridine	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Benzo(a)anthracene	<0.000010		0.000010	mg/L	14-JUL-17	17-JUL-17	R3774263
Benzo(a)pyrene	<0.000050	DLM	0.000050	mg/L	14-JUL-17	17-JUL-17	R3774263
Benzo(b&j)fluoranthene	<0.00010	DLM	0.00010	mg/L	14-JUL-17	17-JUL-17	R3774263
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	14-JUL-17	17-JUL-17	R3774263
Benzo(k)fluoranthene	<0.00010	DLM	0.00010	mg/L	14-JUL-17	17-JUL-17	R3774263
Chrysene	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Dibenzo(a,h)anthracene	<0.000050	DLM	0.000050	mg/L	14-JUL-17	17-JUL-17	R3774263
Fluoranthene	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Fluorene	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	14-JUL-17	17-JUL-17	R3774263
Naphthalene	0.000059		0.000050	mg/L	14-JUL-17	17-JUL-17	R3774263
Phenanthrene	<0.000050		0.000050	mg/L	14-JUL-17	17-JUL-17	R3774263
Pyrene	<0.000020	DLM	0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
Quinoline	<0.000020		0.000020	mg/L	14-JUL-17	17-JUL-17	R3774263
B(a)P Total Potency Equivalent	<0.000067		0.000067	mg/L	14-JUL-17	17-JUL-17	R3774263
Surrogate: Acenaphthene d10	86.4		40-130	%	14-JUL-17	17-JUL-17	R3774263
Surrogate: Acridine d9	92.2		40-130	%	14-JUL-17	17-JUL-17	R3774263
Surrogate: Chrysene d12	62.0		40-130	%	14-JUL-17	17-JUL-17	R3774263
Surrogate: Naphthalene d8	135.3	SOL:MI	40-130	%	14-JUL-17	17-JUL-17	R3774263
Surrogate: Phenanthrene d10	79.0		40-130	%	14-JUL-17	17-JUL-17	R3774263

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

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

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.

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

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

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

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

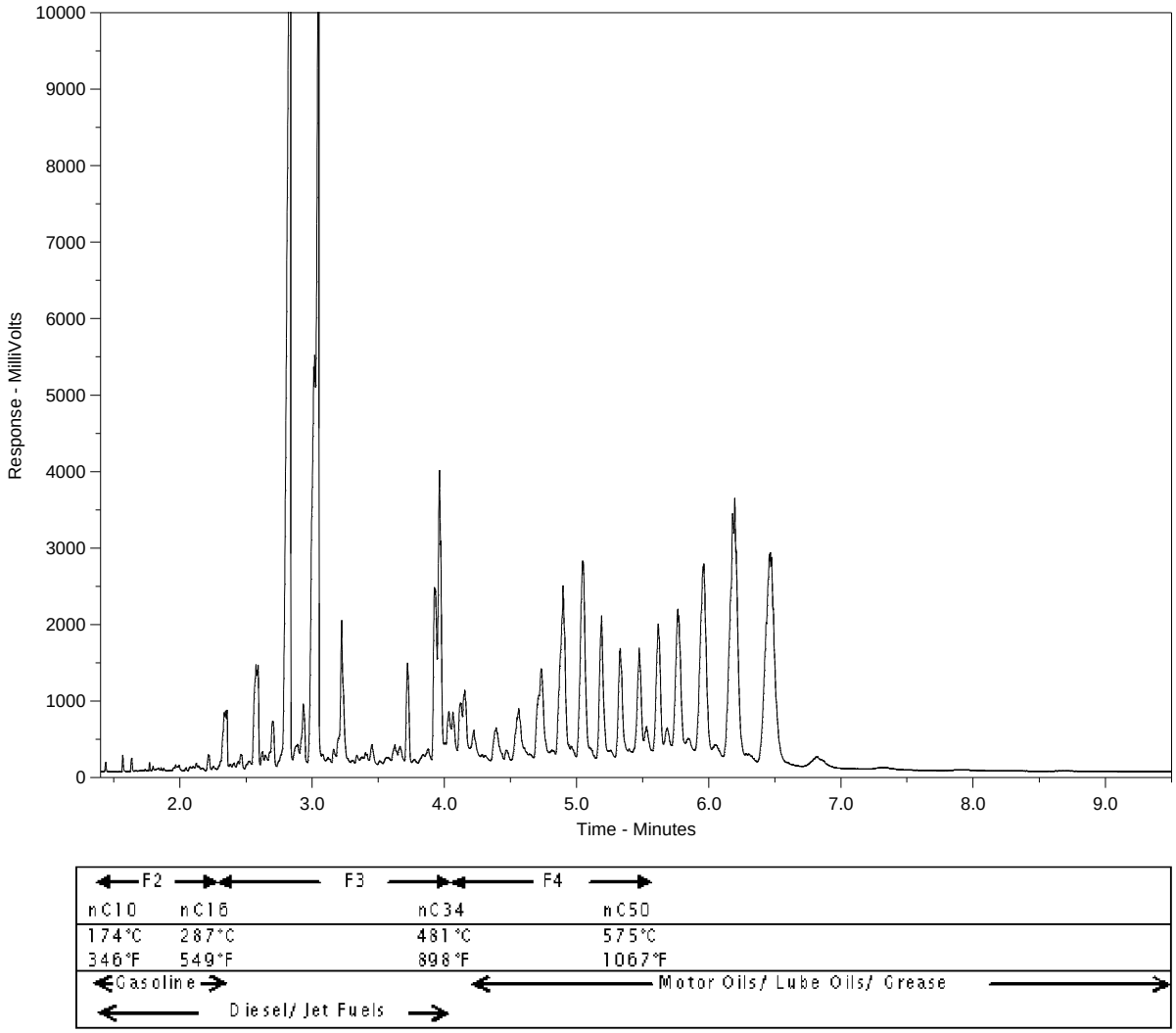
GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1953319-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT



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

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

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

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

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # L1953319

Page ____ of ____

Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)		☑ Standard	☐ Other			◉ Regular (Stand... Times - Business Days)
Contact:	SIMON DOIRON		☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 B...
Address:	Box 490		Email 1:	sdoiron@gov.nu.ca			○ Emergency (...
	Rankin Inlet , NU, X0C 0G0		Email 2:	mlusty@gov.nu.ca			○ Same Day or...
Phone:	867-645-8155	Cell# :	Email 3:				
Invoice To	Same as Report ?	☑ Yes ☐ No	Client / Project Information				Please indicate below...
Hardcopy of Invoice with Report?		☐ Yes ☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			
Company:			PO / AFE:				
Contact:			LSD:				
Address:							
Phone:		Fax:	Quote #:				
Lab Work Order # (lab use only)			ALS Contact:	Craig Riddell	Sampled By: ~~Simon Doiron~~ C. Faulkner		

L1953319-COFC

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~~	Number of Containers
	Rankin Inlet WWTP - Effluent	May 4	4:00	Waste	x	x	x	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			CM	5-7-17	12:30	10.6 °C				

GENF 18.01 Front

Hamlet of Rankin Inlet
ATTN: SIMON DOIRON
PO Box 310
Rankin Inlet NU X0C 0G0

Date Received: 21-JUL-17
Report Date: 01-AUG-17 14:42 (MT)
Version: FINAL

Client Phone: 867-645-2895

Certificate of Analysis

Lab Work Order #: L1962661

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1962661-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 20-JUL-17							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		28-JUL-17	R3783613
Toluene	0.0034		0.0010	mg/L		28-JUL-17	R3783613
Ethyl benzene	<0.00050		0.00050	mg/L		28-JUL-17	R3783613
o-Xylene	<0.00050		0.00050	mg/L		28-JUL-17	R3783613
m+p-Xylenes	<0.00040		0.00040	mg/L		28-JUL-17	R3783613
F1 (C6-C10)	<0.10		0.10	mg/L		28-JUL-17	R3783613
Surrogate: 4-Bromofluorobenzene (SS)	104.1		70-130	%		28-JUL-17	R3783613
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		01-AUG-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		31-JUL-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000033		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
2-Methyl Naphthalene	0.000043		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Acenaphthene	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Acenaphthylene	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Anthracene	<0.000010		0.000010	mg/L	27-JUL-17	29-JUL-17	R3786488
Acridine	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Benzo(a)anthracene	<0.000010		0.000010	mg/L	27-JUL-17	29-JUL-17	R3786488
Benzo(a)pyrene	<0.000050	DLM	0.000050	mg/L	27-JUL-17	29-JUL-17	R3786488
Benzo(b&j)fluoranthene	<0.00010	DLM	0.00010	mg/L	27-JUL-17	29-JUL-17	R3786488
Benzo(g,h,i)perylene	<0.00020	DLM	0.00020	mg/L	27-JUL-17	29-JUL-17	R3786488
Benzo(k)fluoranthene	<0.00010	DLM	0.00010	mg/L	27-JUL-17	29-JUL-17	R3786488
Chrysene	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Dibenzo(a,h)anthracene	<0.00010	DLM	0.00010	mg/L	27-JUL-17	29-JUL-17	R3786488
Fluoranthene	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Fluorene	<0.000020		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
Indeno(1,2,3-cd)pyrene	<0.00010	DLM	0.00010	mg/L	27-JUL-17	29-JUL-17	R3786488
Naphthalene	<0.000050		0.000050	mg/L	27-JUL-17	29-JUL-17	R3786488
Phenanthrene	<0.000050		0.000050	mg/L	27-JUL-17	29-JUL-17	R3786488
Pyrene	<0.000010		0.000010	mg/L	27-JUL-17	29-JUL-17	R3786488
Quinoline	0.000032		0.000020	mg/L	27-JUL-17	29-JUL-17	R3786488
B(a)P Total Potency Equivalent	0.000098		0.000067	mg/L	27-JUL-17	29-JUL-17	R3786488
Surrogate: Acenaphthene d10	97.8		40-130	%	27-JUL-17	29-JUL-17	R3786488
Surrogate: Acridine d9	93.8		40-130	%	27-JUL-17	29-JUL-17	R3786488
Surrogate: Chrysene d12	75.5		40-130	%	27-JUL-17	29-JUL-17	R3786488
Surrogate: Naphthalene d8	94.8		40-130	%	27-JUL-17	29-JUL-17	R3786488
Surrogate: Phenanthrene d10	102.1		40-130	%	27-JUL-17	29-JUL-17	R3786488
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	127		1.2	mg/L		26-JUL-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		26-JUL-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		26-JUL-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	104		1.0	mg/L		22-JUL-17	R3781711
Ammonia by colour							
Ammonia, Total (as N)	4.86		0.10	mg/L		26-JUL-17	R3783260
Biochemical Oxygen Demand (BOD)							

* 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
L1962661-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 20-JUL-17							
Matrix: WASTE							
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	164		50	mg/L		22-JUL-17	R3784306
Carbonaceous BOD							
BOD Carbonaceous	169		50	mg/L		22-JUL-17	R3784306
Chloride in Water by IC							
Chloride (Cl)	52.7		0.50	mg/L		22-JUL-17	R3782810
Conductivity							
Conductivity	417		1.0	umhos/cm		22-JUL-17	R3781711
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		21-JUL-17	R3780067
Hardness Calculated							
Hardness (as CaCO3)	87.2	HTC	0.20	mg/L		26-JUL-17	
Mercury Total							
Mercury (Hg)-Total	0.0000137		0.0000050	mg/L	24-JUL-17	27-JUL-17	R3784534
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		22-JUL-17	R3782810
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		26-JUL-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		22-JUL-17	R3782810
Oil & Grease - Gravimetric							
Oil and Grease	93.6		5.0	mg/L		31-JUL-17	R3785820
Phenol (4AAP)							
Phenols (4AAP)	<0.010	DLM	0.010	mg/L		26-JUL-17	R3782295
Phosphorus, Total							
Phosphorus (P)-Total	3.03		0.050	mg/L		25-JUL-17	R3781672
Sulfate in Water by IC							
Sulfate (SO4)	19.5		0.30	mg/L		22-JUL-17	R3782810
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.290		0.0030	mg/L	25-JUL-17	25-JUL-17	R3782339
Arsenic (As)-Total	0.00090		0.00010	mg/L	25-JUL-17	25-JUL-17	R3782339
Cadmium (Cd)-Total	0.0000881		0.0000050	mg/L	25-JUL-17	25-JUL-17	R3782339
Calcium (Ca)-Total	24.2		0.050	mg/L	25-JUL-17	25-JUL-17	R3782339
Chromium (Cr)-Total	0.00145		0.00010	mg/L	25-JUL-17	25-JUL-17	R3782339
Cobalt (Co)-Total	0.00030		0.00010	mg/L	25-JUL-17	25-JUL-17	R3782339
Copper (Cu)-Total	0.156		0.00050	mg/L	25-JUL-17	25-JUL-17	R3782339
Iron (Fe)-Total	0.490		0.010	mg/L	25-JUL-17	25-JUL-17	R3782339
Lead (Pb)-Total	0.00227		0.000050	mg/L	25-JUL-17	25-JUL-17	R3782339
Magnesium (Mg)-Total	6.48		0.0050	mg/L	25-JUL-17	25-JUL-17	R3782339
Manganese (Mn)-Total	0.0444		0.00010	mg/L	25-JUL-17	25-JUL-17	R3782339
Nickel (Ni)-Total	0.00345		0.00050	mg/L	25-JUL-17	25-JUL-17	R3782339
Potassium (K)-Total	10.7		0.050	mg/L	25-JUL-17	25-JUL-17	R3782339
Sodium (Na)-Total	35.1		0.050	mg/L	25-JUL-17	25-JUL-17	R3782339
Zinc (Zn)-Total	0.124		0.0030	mg/L	25-JUL-17	25-JUL-17	R3782339
Total Organic Carbon by Combustion							
Total Organic Carbon	68.4		5.0	mg/L		30-JUL-17	R3785424
Total Suspended Solids							
Total Suspended Solids	160		20	mg/L		24-JUL-17	R3781717
pH							
pH	6.95		0.10	pH units		22-JUL-17	R3781711

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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

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

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

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L1962661-COFC

COC # _____

Page ____ of ____

Report To			Report Format / Distributio				tush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)		☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON		☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490		Email 1:	sdoiron@gov.nu.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0		Email 2:	mlusty@gov.nu.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :	Email 3:				
Invoice To	Same as Report ?	☑ Yes ☐ No	Client / Project Information				Analysis Request
Hardcopy of Invoice with Report?		☐ Yes ☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:			PO / AFE:				
Contact:			LSD:				
Address:							
Phone:		Fax:	Quote #:				
Lab Work Order # (lab use only)		L1962661	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									Number of Containers
	Rankin Inlet WWTP - Effluent			Waste	x	x	x									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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kelly Adams	20/07/17	14:00	DRD.	21-7-17	12:00	4.2 °C				

GENF 18.01 Front

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

Date Received: 07-SEP-17
Report Date: 20-SEP-17 14:04 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1987621

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

Comments: NOTE: Cooler with drinking water bottles was sent by mistake instead of Waste Water bottles - No PAH Bottles, F2-F4 amber vials or O&G

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1987621-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon doiron on 05-SEP-17 @ 13:30							
Matrix: Waste							
Miscellaneous Parameters							
F1-BTEX	<0.10		0.10	mg/L		14-SEP-17	
Fluoride (F)	0.067		0.020	mg/L		08-SEP-17	R3823739
Xylenes (Total)	<0.00064		0.00064	mg/L		13-SEP-17	
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		12-SEP-17	R3826286
Toluene	0.0011		0.0010	mg/L		12-SEP-17	R3826286
Ethyl benzene	<0.00050		0.00050	mg/L		12-SEP-17	R3826286
o-Xylene	<0.00050		0.00050	mg/L		12-SEP-17	R3826286
m+p-Xylenes	<0.00040		0.00040	mg/L		12-SEP-17	R3826286
F1 (C6-C10)	<0.10		0.10	mg/L		12-SEP-17	R3826286
Surrogate: 4-Bromofluorobenzene (SS)	89.3		70-130	%		12-SEP-17	R3826286
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	121		1.2	mg/L		11-SEP-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		11-SEP-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		11-SEP-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	99.0		1.0	mg/L		08-SEP-17	R3823061
Ammonia by colour							
Ammonia, Total (as N)	6.05		0.20	mg/L		13-SEP-17	R3828199
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	98		20	mg/L		08-SEP-17	R3829125
Carbonaceous BOD							
BOD Carbonaceous	82		20	mg/L		08-SEP-17	R3829125
Chloride in Water by IC							
Chloride (Cl)	56.2		0.50	mg/L		08-SEP-17	R3823739
Conductivity							
Conductivity	410		1.0	umhos/cm		08-SEP-17	R3823061
Hardness Calculated							
Hardness (as CaCO3)	83.3	HTC	0.20	mg/L		12-SEP-17	
Mercury Total							
Mercury (Hg)-Total	0.0000074		0.0000050	mg/L	19-SEP-17	20-SEP-17	R3833477
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		08-SEP-17	R3823739
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		11-SEP-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		08-SEP-17	R3823739
Oil & Grease - Gravimetric							
Oil and Grease	22.1		5.0	mg/L		15-SEP-17	R3829598
Phenol (4AAP)							
Phenols (4AAP)	0.0102		0.0010	mg/L		15-SEP-17	R3829084
Phosphorus, Total							
Phosphorus (P)-Total	1.46		0.050	mg/L		12-SEP-17	R3824544
Sulfate in Water by IC							
Sulfate (SO4)	28.0		0.30	mg/L		08-SEP-17	R3823739
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.113		0.0030	mg/L	11-SEP-17	11-SEP-17	R3824181
Arsenic (As)-Total	0.00098		0.00010	mg/L	11-SEP-17	11-SEP-17	R3824181
Cadmium (Cd)-Total	0.0000408		0.0000050	mg/L	11-SEP-17	11-SEP-17	R3824181

* 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
L1987621-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: Simon doiron on 05-SEP-17 @ 13:30							
Matrix: Waste							
Total Metals in Water by CRC ICPMS							
Calcium (Ca)-Total	24.3		0.050	mg/L	11-SEP-17	11-SEP-17	R3824181
Chromium (Cr)-Total	0.00054		0.00010	mg/L	11-SEP-17	11-SEP-17	R3824181
Cobalt (Co)-Total	0.00026		0.00010	mg/L	11-SEP-17	11-SEP-17	R3824181
Copper (Cu)-Total	0.0838		0.00050	mg/L	11-SEP-17	11-SEP-17	R3824181
Iron (Fe)-Total	0.265		0.010	mg/L	11-SEP-17	11-SEP-17	R3824181
Lead (Pb)-Total	0.00213		0.000050	mg/L	11-SEP-17	11-SEP-17	R3824181
Magnesium (Mg)-Total	5.48		0.0050	mg/L	11-SEP-17	11-SEP-17	R3824181
Manganese (Mn)-Total	0.0399		0.00010	mg/L	11-SEP-17	11-SEP-17	R3824181
Nickel (Ni)-Total	0.00347		0.00050	mg/L	11-SEP-17	11-SEP-17	R3824181
Potassium (K)-Total	6.53		0.050	mg/L	11-SEP-17	11-SEP-17	R3824181
Sodium (Na)-Total	27.3		0.050	mg/L	11-SEP-17	11-SEP-17	R3824181
Zinc (Zn)-Total	0.0606		0.0030	mg/L	11-SEP-17	11-SEP-17	R3824181
Total Organic Carbon by Combustion							
Total Organic Carbon	47.5		0.50	mg/L		12-SEP-17	R3827630
Total Suspended Solids							
Total Suspended Solids	98		10	mg/L		11-SEP-17	R3824398
pH							
pH	7.02		0.10	pH units		08-SEP-17	R3823061

* 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.

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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

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

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

Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.

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.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

ALS Environmental

L1987621-COFC

dy / Analytical Request Form
oll Free: 1 800 668 9878
ww.alsglobal.com

COC # L1987621

Page ___ of ___

Report To				Report Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490			Email 1:	sdoiron@gov.nu.ca			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0			Email 2:	mlusty@gov.nu.ca			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :		Email 3:				
Invoice To	Same as Report ?	☑ Yes	☐ No	Client / Project Information				Analysis Request
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:				
[redacted] Lab Work Order # (lab use only)	[redacted]			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-N-WP	TC,EC-QT97-WP	Number of Containers
[redacted]	Rankin Inlet WWTP - Effluent	SEPT 5/17	13:30	Waste	x	x	x	x	x	15
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]	**NOTE TO LOGIN - remove metals Reporting Code WP-NUNAVUT-WW-GRP1									
[redacted]	So all ICP-MS metals report.									
[redacted]										
[redacted]										
[redacted]										
[redacted]										
[redacted]										

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.

[redacted] SHIPMENT RELEASE (client use)			[redacted] SHIPMENT RECEPTION (lab use only)				[redacted] SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KELLY ADAMS	5/09/17	13:30	CM	7-9-17	1:00	16.3 °C				

GENF 18.01 Front

ALS Environmental

L1987621-COFC

dy / Analytical Request Form
oll Free: 1 800 668 9878
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COC # L1987621

Page ___ of ___

Report To			Report Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)		☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON		☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490		Email 1: sdoiron@gov.nu.ca		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0		Email 2: mlusty@gov.nu.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155 Cell# :		Email 3:		
Invoice To	Same as Report ? ☑ Yes ☐ No		Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☐ No		Job #: Rankin Inlet WWTP- Monthly Effluent		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:			PO / AFE:		
Contact:			LSD:		
Address:					
Phone:	Fax:		Quote #:		
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-N-WP	TC,EC-QT97-WP	Number of Containers
	Rankin Inlet WWTP - Effluent	SEPT 5/17	13:30	Waste	x	x	x	x	x	15
	**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.

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KELLY ADAMS	5/09/17	13:30	CM	7-9-17	1:00	11.3 °C				

GENF 18.01 Front

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

Date Received: 27-SEP-17
Report Date: 06-OCT-17 10:43 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L1998526

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1998526-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 26-SEP-17 @ 14:00							
Matrix: WASTE							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		29-SEP-17	R3842447
Toluene	0.0064		0.0010	mg/L		29-SEP-17	R3842447
Ethyl benzene	<0.00050		0.00050	mg/L		29-SEP-17	R3842447
o-Xylene	<0.00050		0.00050	mg/L		29-SEP-17	R3842447
m+p-Xylenes	0.00071		0.00040	mg/L		29-SEP-17	R3842447
F1 (C6-C10)	<0.10		0.10	mg/L		29-SEP-17	R3842447
Surrogate: 4-Bromofluorobenzene (SS)	102.3		70-130	%		29-SEP-17	R3842447
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		05-OCT-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00071		0.00064	mg/L		02-OCT-17	
Miscellaneous Parameters							
Fluoride (F)	0.129		0.020	mg/L		28-SEP-17	R3842534
Total and E. coli, 1:10 dilution by QT97							
Total Coliforms	>24200		10	MPN/100mL		27-SEP-17	R3840098
Escherichia Coli	>24200		10	MPN/100mL		27-SEP-17	R3840098
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000164		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
2-Methyl Naphthalene	0.000192		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Acenaphthene	0.000036		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Acenaphthylene	<0.000020		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Anthracene	<0.000010		0.000010	mg/L	29-SEP-17	01-OCT-17	R3843371
Acridine	<0.000020		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Benzo(a)anthracene	<0.000010		0.000010	mg/L	29-SEP-17	01-OCT-17	R3843371
Benzo(a)pyrene	<0.00050	DLM	0.00050	mg/L	29-SEP-17	01-OCT-17	R3843371
Benzo(b&j)fluoranthene	<0.0010	DLM	0.0010	mg/L	29-SEP-17	01-OCT-17	R3843371
Benzo(g,h,i)perylene	<0.0020	DLM	0.0020	mg/L	29-SEP-17	01-OCT-17	R3843371
Benzo(k)fluoranthene	<0.0010	DLM	0.0010	mg/L	29-SEP-17	01-OCT-17	R3843371
Chrysene	<0.000020		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Dibenzo(a,h)anthracene	<0.00050	DLM	0.00050	mg/L	29-SEP-17	01-OCT-17	R3843371
Fluoranthene	<0.000020		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Fluorene	<0.000020		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
Indeno(1,2,3-cd)pyrene	<0.0010	DLM	0.0010	mg/L	29-SEP-17	01-OCT-17	R3843371
Naphthalene	0.000174		0.000050	mg/L	29-SEP-17	01-OCT-17	R3843371
Phenanthrene	<0.000050		0.000050	mg/L	29-SEP-17	01-OCT-17	R3843371
Pyrene	0.000011	EMPC	0.000010	mg/L	29-SEP-17	01-OCT-17	R3843371
Quinoline	0.000145		0.000020	mg/L	29-SEP-17	01-OCT-17	R3843371
B(a)P Total Potency Equivalent	<0.00066		0.00066	mg/L	29-SEP-17	01-OCT-17	R3843371
Surrogate: Acenaphthene d10	91.7		40-130	%	29-SEP-17	01-OCT-17	R3843371
Surrogate: Acridine d9	110.1		40-130	%	29-SEP-17	01-OCT-17	R3843371
Surrogate: Chrysene d12	62.9		40-130	%	29-SEP-17	01-OCT-17	R3843371
Surrogate: Naphthalene d8	143.2	SOL:MI	40-130	%	29-SEP-17	01-OCT-17	R3843371
Surrogate: Phenanthrene d10	96.4		40-130	%	29-SEP-17	01-OCT-17	R3843371
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	147		1.2	mg/L		29-SEP-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		29-SEP-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		29-SEP-17	
Alkalinity, Total (as CaCO3)							

* 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
L1998526-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 26-SEP-17 @ 14:00							
Matrix: WASTE							
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	120		1.0	mg/L		28-SEP-17	R3840815
Ammonia by colour							
Ammonia, Total (as N)	6.6		1.0	mg/L		28-SEP-17	R3841233
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	128		50	mg/L		28-SEP-17	R3846502
Carbonaceous BOD							
BOD Carbonaceous	115		50	mg/L		28-SEP-17	R3846502
Chloride in Water by IC							
Chloride (Cl)	62.4		0.50	mg/L		28-SEP-17	R3842534
Conductivity							
Conductivity	507		1.0	umhos/cm		28-SEP-17	R3840815
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		27-SEP-17	R3840093
Hardness Calculated							
Hardness (as CaCO3)	199	HTC	0.20	mg/L		03-OCT-17	
Mercury Total							
Mercury (Hg)-Total	<0.000025		0.000025	mg/L	27-SEP-17	28-SEP-17	R3840936
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		28-SEP-17	R3842534
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		02-OCT-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		28-SEP-17	R3842534
Oil & Grease - Gravimetric							
Oil and Grease	34.3		5.0	mg/L		04-OCT-17	R3846333
Phenol (4AAP)							
Phenols (4AAP)	0.0096		0.0010	mg/L		05-OCT-17	R3846807
Phosphorus, Total							
Phosphorus (P)-Total	2.55		0.050	mg/L		29-SEP-17	R3841107
Sulfate in Water by IC							
Sulfate (SO4)	30.3		0.30	mg/L		28-SEP-17	R3842534
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.233		0.0030	mg/L	02-OCT-17	02-OCT-17	R3844274
Antimony (Sb)-Total	0.00023		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Arsenic (As)-Total	0.0139		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Barium (Ba)-Total	0.0669		0.000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Bismuth (Bi)-Total	0.000259		0.000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Boron (B)-Total	0.067		0.010	mg/L	02-OCT-17	02-OCT-17	R3844274
Cadmium (Cd)-Total	0.0000946		0.0000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Calcium (Ca)-Total	62.2		0.050	mg/L	02-OCT-17	02-OCT-17	R3844274
Cesium (Cs)-Total	0.000099		0.000010	mg/L	02-OCT-17	02-OCT-17	R3844274
Chromium (Cr)-Total	0.00065		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Cobalt (Co)-Total	0.00184		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Copper (Cu)-Total	0.117		0.00050	mg/L	02-OCT-17	02-OCT-17	R3844274
Iron (Fe)-Total	6.02		0.010	mg/L	02-OCT-17	02-OCT-17	R3844274
Lead (Pb)-Total	0.00151		0.000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Lithium (Li)-Total	0.0064		0.0010	mg/L	02-OCT-17	02-OCT-17	R3844274
Magnesium (Mg)-Total	10.6		0.0050	mg/L	02-OCT-17	02-OCT-17	R3844274
Manganese (Mn)-Total	0.468		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Molybdenum (Mo)-Total	0.000387		0.000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Nickel (Ni)-Total	0.00405		0.00050	mg/L	02-OCT-17	02-OCT-17	R3844274

* 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
L1998526-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 26-SEP-17 @ 14:00							
Matrix: WASTE							
Total Metals in Water by CRC ICPMS							
Potassium (K)-Total	13.4		0.050	mg/L	02-OCT-17	02-OCT-17	R3844274
Phosphorus (P)-Total	2.31		0.050	mg/L	02-OCT-17	02-OCT-17	R3844274
Rubidium (Rb)-Total	0.0125		0.00020	mg/L	02-OCT-17	02-OCT-17	R3844274
Selenium (Se)-Total	0.000246		0.000050	mg/L	02-OCT-17	02-OCT-17	R3844274
Silicon (Si)-Total	2.38		0.10	mg/L	02-OCT-17	02-OCT-17	R3844274
Silver (Ag)-Total	0.000043		0.000010	mg/L	02-OCT-17	02-OCT-17	R3844274
Sodium (Na)-Total	45.4		0.050	mg/L	02-OCT-17	02-OCT-17	R3844274
Strontium (Sr)-Total	0.346		0.00020	mg/L	02-OCT-17	02-OCT-17	R3844274
Sulfur (S)-Total	11.4		0.50	mg/L	02-OCT-17	02-OCT-17	R3844274
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	02-OCT-17	02-OCT-17	R3844274
Thallium (Tl)-Total	0.000011		0.000010	mg/L	02-OCT-17	02-OCT-17	R3844274
Thorium (Th)-Total	<0.00010		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Tin (Sn)-Total	0.00038		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Titanium (Ti)-Total	0.00104		0.00030	mg/L	02-OCT-17	02-OCT-17	R3844274
Tungsten (W)-Total	<0.00010		0.00010	mg/L	02-OCT-17	02-OCT-17	R3844274
Uranium (U)-Total	0.000376		0.000010	mg/L	02-OCT-17	02-OCT-17	R3844274
Vanadium (V)-Total	0.00160		0.00050	mg/L	02-OCT-17	02-OCT-17	R3844274
Zinc (Zn)-Total	0.133		0.0030	mg/L	02-OCT-17	02-OCT-17	R3844274
Zirconium (Zr)-Total	0.000396		0.000060	mg/L	02-OCT-17	02-OCT-17	R3844274
Total Organic Carbon by Combustion							
Total Organic Carbon	50.4		2.5	mg/L		05-OCT-17	R3847782
Total Suspended Solids							
Total Suspended Solids	140		20	mg/L		02-OCT-17	R3846000
pH							
pH	7.17		0.10	pH units		28-SEP-17	R3840815

* 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.
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

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**

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.

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540 D (modified)
Total suspended solids in aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
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 Susbtrate 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 wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # L1998526

Page ____ of ____

L1998526-COFC

Report To			
Company:	Nunavut CGS - Rankin Inlet (W8133)		
Contact:	SIMON DOIRON		Fax
Address:	Box 490		
	Rankin Inlet , NU, X0C 0G0		
Phone:	867-645-8155 Cell# :	Email 3:	
Invoice To	Same as Report ? ☑ Yes ☐ No	**Client / Project Information**	
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #: Rankin Inlet WWTP- Monthly Effluent	
Company:		**PO / AFE:**	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Craig Riddell	**Sampled By:** Simon Doiron

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).

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-N-WP	TC,EC-QT97-WP	Number of Containers
	Rankin Inlet WWTP - Effluent	SEPT26/17	14:00	Waste	x	x	x	x	x	15
	**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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KELLY ADAMS	26/09/17	14:00	ATAL	27/09/17	4:30	10.5 °C				

GENF 18.01 Front

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

Date Received: 27-OCT-17
Report Date: 10-NOV-17 10:54 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2014380

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014380-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 25-OCT-17 @ 13:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		02-NOV-17	R3872853
Toluene	<0.0010		0.0010	mg/L		02-NOV-17	R3872853
Ethyl benzene	<0.00050		0.00050	mg/L		02-NOV-17	R3872853
o-Xylene	<0.00050		0.00050	mg/L		02-NOV-17	R3872853
m+p-Xylenes	<0.00040		0.00040	mg/L		02-NOV-17	R3872853
F1 (C6-C10)	<0.10		0.10	mg/L		02-NOV-17	R3872853
Surrogate: 4-Bromofluorobenzene (SS)	94.7		70-130	%		02-NOV-17	R3872853
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.47		0.10	mg/L	31-OCT-17	02-NOV-17	R3873470
F3 (C16-C34)	7.74		0.25	mg/L	31-OCT-17	02-NOV-17	R3873470
F4 (C34-C50)	3.15		0.25	mg/L	31-OCT-17	02-NOV-17	R3873470
Surrogate: 2-Bromobenzotrifluoride	91.8		60-140	%	31-OCT-17	02-NOV-17	R3873470
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		07-NOV-17	
F2-Naphth	0.47		0.10	mg/L		07-NOV-17	
F3-PAH	7.74		0.25	mg/L		07-NOV-17	
Total Hydrocarbons (C6-C50)	11.4		0.38	mg/L		07-NOV-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		02-NOV-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000073		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
2-Methyl Naphthalene	0.000093		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Acenaphthene	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Acenaphthylene	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Anthracene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Acridine	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Benzo(a)anthracene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	03-NOV-17	07-NOV-17	R3878115
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Chrysene	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	03-NOV-17	07-NOV-17	R3878115
Fluoranthene	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Fluorene	0.000030	EMPC	0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Naphthalene	<0.000050		0.000050	mg/L	03-NOV-17	07-NOV-17	R3878115
Phenanthrene	<0.000050		0.000050	mg/L	03-NOV-17	07-NOV-17	R3878115
Pyrene	<0.000010		0.000010	mg/L	03-NOV-17	07-NOV-17	R3878115
Quinoline	<0.000020		0.000020	mg/L	03-NOV-17	07-NOV-17	R3878115
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	03-NOV-17	07-NOV-17	R3878115
Surrogate: Acenaphthene d10	107.0		40-130	%	03-NOV-17	07-NOV-17	R3878115
Surrogate: Acridine d9	109.3		40-130	%	03-NOV-17	07-NOV-17	R3878115
Surrogate: Chrysene d12	110.6		40-130	%	03-NOV-17	07-NOV-17	R3878115
Surrogate: Naphthalene d8	69.9		40-130	%	03-NOV-17	07-NOV-17	R3878115
Surrogate: Phenanthrene d10	103.5		40-130	%	03-NOV-17	07-NOV-17	R3878115
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	99.4		1.2	mg/L		31-OCT-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014380-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 25-OCT-17 @ 13:30							
Matrix: WASTE							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		31-OCT-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		31-OCT-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	81.5		1.0	mg/L		28-OCT-17	R3871047
Ammonia by colour							
Ammonia, Total (as N)	6.57		0.20	mg/L		01-NOV-17	R3872484
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	59		20	mg/L		27-OCT-17	R3872534
Carbonaceous BOD							
BOD Carbonaceous	53		20	mg/L		27-OCT-17	R3872534
Chloride in Water by IC							
Chloride (Cl)	51.1		0.50	mg/L		27-OCT-17	R3869468
Conductivity							
Conductivity	379		1.0	umhos/cm		28-OCT-17	R3871047
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200	PEHR	10	MPN/100mL		27-OCT-17	R3868530
Hardness Calculated							
Hardness (as CaCO3)	86.6	HTC	0.20	mg/L		10-NOV-17	
Mercury Total							
Mercury (Hg)-Total	<0.000010		0.000010	mg/L	27-OCT-17	31-OCT-17	R3871205
Nitrate in Water by IC							
Nitrate (as N)	0.047		0.020	mg/L		27-OCT-17	R3869468
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		30-OCT-17	
Nitrite in Water by IC							
Nitrite (as N)	0.013		0.010	mg/L		27-OCT-17	R3869468
Oil & Grease - Gravimetric							
Oil and Grease	9.9		5.0	mg/L		03-NOV-17	R3873940
Phenol (4AAP)							
Phenols (4AAP)	0.0050		0.0010	mg/L		06-NOV-17	R3877989
Phosphorus, Total							
Phosphorus (P)-Total	1.05		0.050	mg/L		31-OCT-17	R3870696
Sulfate in Water by IC							
Sulfate (SO4)	26.5		0.30	mg/L		27-OCT-17	R3869468
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.194		0.0030	mg/L	01-NOV-17	09-NOV-17	R3880368
Arsenic (As)-Total	0.00076		0.00010	mg/L	01-NOV-17	09-NOV-17	R3880368
Cadmium (Cd)-Total	0.0000458		0.0000050	mg/L	01-NOV-17	09-NOV-17	R3880368
Calcium (Ca)-Total	24.0		0.050	mg/L	01-NOV-17	09-NOV-17	R3880368
Chromium (Cr)-Total	0.00065		0.00010	mg/L	01-NOV-17	09-NOV-17	R3880368
Cobalt (Co)-Total	0.00020		0.00010	mg/L	01-NOV-17	09-NOV-17	R3880368
Copper (Cu)-Total	0.0888		0.00050	mg/L	01-NOV-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.195		0.010	mg/L	01-NOV-17	09-NOV-17	R3880368
Lead (Pb)-Total	0.00116		0.000050	mg/L	01-NOV-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	6.47		0.0050	mg/L	01-NOV-17	09-NOV-17	R3880368
Manganese (Mn)-Total	0.0245		0.00010	mg/L	01-NOV-17	09-NOV-17	R3880368
Nickel (Ni)-Total	0.00201		0.00050	mg/L	01-NOV-17	09-NOV-17	R3880368
Potassium (K)-Total	8.53		0.050	mg/L	01-NOV-17	09-NOV-17	R3880368
Sodium (Na)-Total	33.9		0.050	mg/L	01-NOV-17	09-NOV-17	R3880368
Zinc (Zn)-Total	0.0513		0.0030	mg/L	01-NOV-17	09-NOV-17	R3880368
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
L2014380-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 25-OCT-17 @ 13:30							
Matrix: WASTE							
Total Organic Carbon by Combustion							
Total Organic Carbon	42.0		0.50	mg/L		30-OCT-17	R3870008
Total Suspended Solids							
Total Suspended Solids	56.0		5.0	mg/L		31-OCT-17	R3871672
pH							
pH	7.10		0.10	pH units		28-OCT-17	R3871047

* 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.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

Reference Information

Test Method References:

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

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

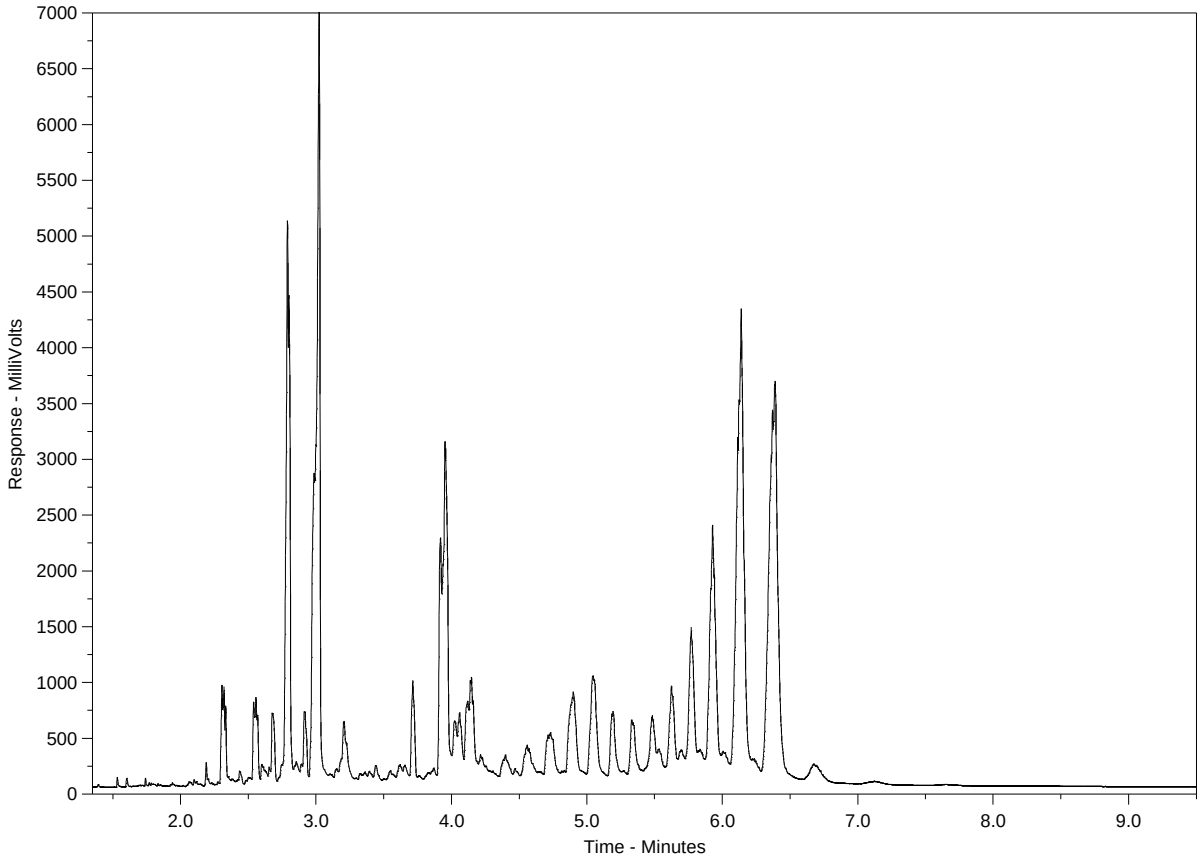
GLOSSARY OF REPORT TERMS

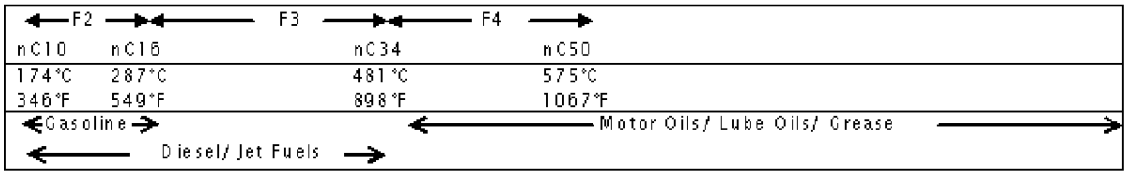
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2014380-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT





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

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

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

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

ALS Environmental

L2014380-COFC

COC # _____

Page ____ of ____

Report To				Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)			☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON			☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490			Email 1: sdoiron@gov.nu.ca		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0			Email 2: mlusty@gov.nu.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155	Cell# :		Email 3:		
Invoice To	Same as Report ? ☑ Yes	☐ No		**Client / Project Information**		**Analysis Request**
Hardcopy of Invoice with Report?	☐ Yes	☐ No		Job #: Rankin Inlet WWTP- Monthly Effluent		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:				**PO / AFE:**		
Contact:				LSD:		
Address:						
Phone:		Fax:		Quote #:		
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	Number of Containers
	Rankin Inlet WWTP - Effluent	OCT 25/17	13:30	Waste	x	x	x	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kelly Adam	25/oct		CM	27-10-17	12:30	7.8 °C				

GENF 18.01 Front

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

Date Received: 01-DEC-17
Report Date: 19-DEC-17 13:32 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2029922

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029922-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 30-NOV-17 @ 13:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		07-DEC-17	R3905849
Toluene	<0.0010		0.0010	mg/L		07-DEC-17	R3905849
Ethyl benzene	<0.00050		0.00050	mg/L		07-DEC-17	R3905849
o-Xylene	<0.00050		0.00050	mg/L		07-DEC-17	R3905849
m+p-Xylenes	<0.00040		0.00040	mg/L		07-DEC-17	R3905849
F1 (C6-C10)	<0.10		0.10	mg/L		07-DEC-17	R3905849
Surrogate: 4-Bromofluorobenzene (SS)	91.5		70-130	%		07-DEC-17	R3905849
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.74		0.10	mg/L	02-DEC-17	02-DEC-17	R3904673
F3 (C16-C34)	12.3		0.25	mg/L	02-DEC-17	02-DEC-17	R3904673
F4 (C34-C50)	4.63		0.25	mg/L	02-DEC-17	02-DEC-17	R3904673
Surrogate: 2-Bromobenzotrifluoride	84.5		60-140	%	02-DEC-17	02-DEC-17	R3904673
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		19-DEC-17	
F2-Naphth	0.74		0.10	mg/L		19-DEC-17	
F3-PAH	12.3		0.25	mg/L		19-DEC-17	
Total Hydrocarbons (C6-C50)	17.7		0.38	mg/L		19-DEC-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.00064		0.00064	mg/L		07-DEC-17	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000052		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
2-Methyl Naphthalene	0.000061		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Acenaphthene	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Acenaphthylene	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Anthracene	<0.000010		0.000010	mg/L	13-DEC-17	18-DEC-17	R3915886
Acridine	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Benzo(a)anthracene	<0.000010		0.000010	mg/L	13-DEC-17	18-DEC-17	R3915886
Benzo(a)pyrene	<0.00050	DLM	0.00050	mg/L	13-DEC-17	18-DEC-17	R3915886
Benzo(b&j)fluoranthene	<0.0010	DLM	0.0010	mg/L	13-DEC-17	18-DEC-17	R3915886
Benzo(g,h,i)perylene	<0.0020	DLM	0.0020	mg/L	13-DEC-17	18-DEC-17	R3915886
Benzo(k)fluoranthene	<0.0010	DLM	0.0010	mg/L	13-DEC-17	18-DEC-17	R3915886
Chrysene	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Dibenzo(a,h)anthracene	<0.00050	DLM	0.00050	mg/L	13-DEC-17	18-DEC-17	R3915886
Fluoranthene	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Fluorene	<0.000020		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
Indeno(1,2,3-cd)pyrene	<0.0010	DLM	0.0010	mg/L	13-DEC-17	18-DEC-17	R3915886
Naphthalene	<0.000050		0.000050	mg/L	13-DEC-17	18-DEC-17	R3915886
Phenanthrene	<0.000050		0.000050	mg/L	13-DEC-17	18-DEC-17	R3915886
Pyrene	<0.000010		0.000010	mg/L	13-DEC-17	18-DEC-17	R3915886
Quinoline	0.000044		0.000020	mg/L	13-DEC-17	18-DEC-17	R3915886
B(a)P Total Potency Equivalent	<0.00066		0.00066	mg/L	13-DEC-17	18-DEC-17	R3915886
Surrogate: Acenaphthene d10	86.7		40-130	%	13-DEC-17	18-DEC-17	R3915886
Surrogate: Acridine d9	102.1		40-130	%	13-DEC-17	18-DEC-17	R3915886
Surrogate: Chrysene d12	88.6		40-130	%	13-DEC-17	18-DEC-17	R3915886
Surrogate: Naphthalene d8	119.1		40-130	%	13-DEC-17	18-DEC-17	R3915886
Surrogate: Phenanthrene d10	94.0		40-130	%	13-DEC-17	18-DEC-17	R3915886
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	143		1.2	mg/L		05-DEC-17	
Alkalinity, Carbonate							

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029922-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 30-NOV-17 @ 13:30							
Matrix: WASTE							
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		05-DEC-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		05-DEC-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	117		1.0	mg/L		02-DEC-17	R3903871
Ammonia by colour							
Ammonia, Total (as N)	9.23		0.20	mg/L		05-DEC-17	R3905581
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	153		50	mg/L		02-DEC-17	R3908355
Carbonaceous BOD							
BOD Carbonaceous	138		20	mg/L		02-DEC-17	R3908355
Chloride in Water by IC							
Chloride (Cl)	64.8		0.50	mg/L		01-DEC-17	R3906438
Conductivity							
Conductivity	537		1.0	umhos/cm		02-DEC-17	R3903871
Fecal coliforms, 1:10 dilution by QT97							
Fecal Coliforms	>24200		10	MPN/100mL		01-DEC-17	R3900510
Hardness Calculated							
Hardness (as CaCO3)	96.8	HTC	0.20	mg/L		06-DEC-17	
Mercury Total							
Mercury (Hg)-Total	0.000015		0.000010	mg/L	05-DEC-17	06-DEC-17	R3905952
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		01-DEC-17	R3906438
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		07-DEC-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3906438
Oil & Grease - Gravimetric							
Oil and Grease	25.0		5.0	mg/L		08-DEC-17	R3907514
Phenol (4AAP)							
Phenols (4AAP)	0.0118		0.0010	mg/L		07-DEC-17	R3906727
Phosphorus, Total							
Phosphorus (P)-Total	2.71		0.10	mg/L		05-DEC-17	R3905383
Sulfate in Water by IC							
Sulfate (SO4)	30.8		0.30	mg/L		01-DEC-17	R3906438
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.258		0.0030	mg/L	05-DEC-17	05-DEC-17	R3905442
Arsenic (As)-Total	0.00104		0.00010	mg/L	05-DEC-17	05-DEC-17	R3905442
Cadmium (Cd)-Total	0.0000816		0.0000050	mg/L	05-DEC-17	05-DEC-17	R3905442
Calcium (Ca)-Total	24.5		0.050	mg/L	05-DEC-17	05-DEC-17	R3905442
Chromium (Cr)-Total	0.00102		0.00010	mg/L	05-DEC-17	05-DEC-17	R3905442
Cobalt (Co)-Total	0.00027		0.00010	mg/L	05-DEC-17	05-DEC-17	R3905442
Copper (Cu)-Total	0.209		0.00050	mg/L	05-DEC-17	05-DEC-17	R3905442
Iron (Fe)-Total	0.243		0.010	mg/L	05-DEC-17	05-DEC-17	R3905442
Lead (Pb)-Total	0.00838		0.000050	mg/L	05-DEC-17	05-DEC-17	R3905442
Magnesium (Mg)-Total	8.62		0.0050	mg/L	05-DEC-17	05-DEC-17	R3905442
Manganese (Mn)-Total	0.0471		0.00010	mg/L	05-DEC-17	05-DEC-17	R3905442
Nickel (Ni)-Total	0.00345		0.00050	mg/L	05-DEC-17	05-DEC-17	R3905442
Potassium (K)-Total	12.5		0.050	mg/L	05-DEC-17	05-DEC-17	R3905442
Sodium (Na)-Total	46.1		0.050	mg/L	05-DEC-17	05-DEC-17	R3905442
Zinc (Zn)-Total	0.0935		0.0030	mg/L	05-DEC-17	05-DEC-17	R3905442
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
L2029922-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SD on 30-NOV-17 @ 13:30							
Matrix: WASTE							
Total Organic Carbon by Combustion							
Total Organic Carbon	97.0		5.0	mg/L		11-DEC-17	R3911407
Total Suspended Solids							
Total Suspended Solids	85.0		6.3	mg/L		04-DEC-17	R3905474
pH							
pH	6.99		0.10	pH units		02-DEC-17	R3903871

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

Reference Information

Sample Parameter Qualifier Key:

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

Test Method References:

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

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

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

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

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

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

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

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

BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B

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

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

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

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

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

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

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

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

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

EC-WP	Water	Conductivity	APHA 2510B

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

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

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

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

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

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

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

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

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

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

HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

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

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

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 aquesous matrices is determined gravimetrically after drying the residue at 103 105°C.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

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 R3903871								
WG2677561-9 LCS								
Alkalinity, Total (as CaCO3)			101.6		%		85-115	02-DEC-17
WG2677561-6 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	02-DEC-17
BOD-CBOD-WP	**Water**							
Batch R3908355								
WG2676424-2 LCS								
BOD Carbonaceous			100.5		%		85-115	02-DEC-17
WG2676424-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	02-DEC-17
BOD-WP	**Water**							
Batch R3908355								
WG2676424-2 LCS								
Biochemical Oxygen Demand			94.2		%		85-115	02-DEC-17
WG2676424-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	02-DEC-17
BTEXS+F1-HSMS-WP	**Water**							
Batch R3905849								
WG2678443-2 LCS								
Benzene			100.4		%		70-130	06-DEC-17
Toluene			110.6		%		70-130	06-DEC-17
Ethyl benzene			114.4		%		70-130	06-DEC-17
o-Xylene			125.5		%		70-130	06-DEC-17
m+p-Xylenes			114.5		%		70-130	06-DEC-17
WG2678443-3 LCS								
F1 (C6-C10)			119.4		%		70-130	06-DEC-17
WG2678443-1 MB								
Benzene			<0.00050		mg/L		0.0005	06-DEC-17
Toluene			<0.0010		mg/L		0.001	06-DEC-17
Ethyl benzene			<0.00050		mg/L		0.0005	06-DEC-17
o-Xylene			<0.00030		mg/L		0.0003	06-DEC-17
m+p-Xylenes			<0.00040		mg/L		0.0004	06-DEC-17
F1 (C6-C10)			<0.10		mg/L		0.1	06-DEC-17
Surrogate: 4-Bromofluorobenzene (SS)			95.0		%		70-130	06-DEC-17
C-TOC-HTC-WP	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	**Water**							
Batch R3911407								
WG2682328-2 LCS								
Total Organic Carbon			100.6		%		80-120	11-DEC-17
WG2682328-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	11-DEC-17
CL-IC-N-WP	**Water**							
Batch R3906438								
WG2675901-10 LCS								
Chloride (Cl)			100.9		%		90-110	01-DEC-17
WG2675901-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	01-DEC-17
EC-WP	**Water**							
Batch R3903871								
WG2677561-8 LCS								
Conductivity			99.4		%		90-110	02-DEC-17
WG2677561-6 MB								
Conductivity			<1.0		umhos/cm		1	02-DEC-17
F2-F4-FID-WP	**Water**							
Batch R3904673								
WG2676572-2 LCS								
F2 (C10-C16)			92.0		%		70-130	02-DEC-17
F3 (C16-C34)			94.1		%		70-130	02-DEC-17
F4 (C34-C50)			95.0		%		70-130	02-DEC-17
WG2676572-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	02-DEC-17
F3 (C16-C34)			<0.25		mg/L		0.25	02-DEC-17
F4 (C34-C50)			<0.25		mg/L		0.25	02-DEC-17
Surrogate: 2-Bromobenzotrifluoride			84.2		%		60-140	02-DEC-17
FC10-QT97-WP	**Water**							
Batch R3900510								
WG2676194-1 MB								
Fecal Coliforms			<1		MPN/100mL		1	01-DEC-17
HG-T-CVAF-WP	**Water**							
Batch R3905952								
WG2678944-2 LCS								
Mercury (Hg)-Total			97.5		%		80-120	06-DEC-17
WG2678944-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAF-WP	**Water**							
Batch R3905952								
WG2678944-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	06-DEC-17
MET-T-CCMS-WP	**Water**							
Batch R3905442								
WG2677711-2 LCS								
Aluminum (Al)-Total			107.8		%		80-120	05-DEC-17
Arsenic (As)-Total			103.1		%		80-120	05-DEC-17
Cadmium (Cd)-Total			102.8		%		80-120	05-DEC-17
Calcium (Ca)-Total			102.6		%		80-120	05-DEC-17
Chromium (Cr)-Total			105.2		%		80-120	05-DEC-17
Cobalt (Co)-Total			102.7		%		80-120	05-DEC-17
Copper (Cu)-Total			103.6		%		80-120	05-DEC-17
Iron (Fe)-Total			103.3		%		80-120	05-DEC-17
Lead (Pb)-Total			103.6		%		80-120	05-DEC-17
Magnesium (Mg)-Total			113.9		%		80-120	05-DEC-17
Manganese (Mn)-Total			104.9		%		80-120	05-DEC-17
Nickel (Ni)-Total			102.0		%		80-120	05-DEC-17
Potassium (K)-Total			102.6		%		80-120	05-DEC-17
Sodium (Na)-Total			108.0		%		80-120	05-DEC-17
Zinc (Zn)-Total			100.7		%		80-120	05-DEC-17
WG2677711-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	05-DEC-17
Arsenic (As)-Total			<0.00010		mg/L		0.0001	05-DEC-17
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	05-DEC-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	05-DEC-17
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	05-DEC-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	05-DEC-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	05-DEC-17
Iron (Fe)-Total			<0.010		mg/L		0.01	05-DEC-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	05-DEC-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	05-DEC-17
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	05-DEC-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	05-DEC-17
Potassium (K)-Total			<0.050		mg/L		0.05	05-DEC-17
Sodium (Na)-Total			<0.050		mg/L		0.05	05-DEC-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	**Water**							
Batch R3905442								
WG2677711-1 MB								
Zinc (Zn)-Total			<0.0030		mg/L		0.003	05-DEC-17
NH3-COL-WP	**Water**							
Batch R3905581								
WG2678101-6 LCS								
Ammonia, Total (as N)			98.5		%		85-115	05-DEC-17
WG2678101-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	05-DEC-17
NO2-IC-N-WP	**Water**							
Batch R3906438								
WG2675901-10 LCS								
Nitrite (as N)			99.6		%		90-110	01-DEC-17
WG2675901-9 MB								
Nitrite (as N)			<0.010		mg/L		0.01	01-DEC-17
NO3-IC-N-WP	**Water**							
Batch R3906438								
WG2675901-10 LCS								
Nitrate (as N)			100.4		%		90-110	01-DEC-17
WG2675901-9 MB								
Nitrate (as N)			<0.020		mg/L		0.02	01-DEC-17
OG-GRAV-WP	**Water**							
Batch R3907514								
WG2679923-2 LCS								
Oil and Grease			92.0		%		70-130	08-DEC-17
WG2679923-1 MB								
Oil and Grease			<5.0		mg/L		5	08-DEC-17
P-T-COL-WP	**Water**							
Batch R3905383								
WG2678016-10 LCS								
Phosphorus (P)-Total			95.4		%		80-120	05-DEC-17
WG2678016-9 MB								
Phosphorus (P)-Total			<0.010		mg/L		0.01	05-DEC-17
PAH,PANH-WP	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Water**							
Batch R3915886								
WG2684541-2 LCS								
1-Methyl Naphthalene			86.2		%		60-130	18-DEC-17
2-Methyl Naphthalene			85.6		%		60-130	18-DEC-17
Acenaphthene			84.7		%		60-130	18-DEC-17
Acenaphthylene			89.5		%		60-130	18-DEC-17
Anthracene			71.1		%		60-130	18-DEC-17
Acridine			78.5		%		60-130	18-DEC-17
Benzo(a)anthracene			73.4		%		60-130	18-DEC-17
Benzo(a)pyrene			78.6		%		60-130	18-DEC-17
Benzo(b&j)fluoranthene			80.6		%		60-130	18-DEC-17
Benzo(g,h,i)perylene			87.2		%		60-130	18-DEC-17
Benzo(k)fluoranthene			83.0		%		60-130	18-DEC-17
Chrysene			87.8		%		60-130	18-DEC-17
Dibenzo(a,h)anthracene			88.5		%		60-130	18-DEC-17
Fluoranthene			81.9		%		60-130	18-DEC-17
Fluorene			77.3		%		60-130	18-DEC-17
Indeno(1,2,3-cd)pyrene			87.2		%		60-130	18-DEC-17
Naphthalene			96.0		%		50-130	18-DEC-17
Phenanthrene			76.1		%		60-130	18-DEC-17
Pyrene			82.5		%		60-130	18-DEC-17
Quinoline			71.7		%		60-130	18-DEC-17
WG2684541-1 MB								
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-DEC-17
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-DEC-17
Acenaphthene			<0.000020		mg/L		0.00002	18-DEC-17
Acenaphthylene			<0.000020		mg/L		0.00002	18-DEC-17
Anthracene			<0.000010		mg/L		0.00001	18-DEC-17
Acridine			<0.000020		mg/L		0.00002	18-DEC-17
Benzo(a)anthracene			<0.000010		mg/L		0.00001	18-DEC-17
Benzo(a)pyrene			<0.000005		mg/L		0.000005	18-DEC-17
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	18-DEC-17
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	18-DEC-17
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	18-DEC-17
Chrysene			<0.000020		mg/L		0.00002	18-DEC-17
Dibenzo(a,h)anthracene			<0.000005		mg/L		0.000005	18-DEC-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Water**							
Batch R3915886								
WG2684541-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	18-DEC-17
Fluorene			<0.000020		mg/L		0.00002	18-DEC-17
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	18-DEC-17
Naphthalene			<0.000050		mg/L		0.00005	18-DEC-17
Phenanthrene			<0.000050		mg/L		0.00005	18-DEC-17
Pyrene			<0.000010		mg/L		0.00001	18-DEC-17
Quinoline			<0.000020		mg/L		0.00002	18-DEC-17
Surrogate: Acenaphthene d10			85.6		%		40-130	18-DEC-17
Surrogate: Acridine d9			94.7		%		40-130	18-DEC-17
Surrogate: Chrysene d12			99.0		%		40-130	18-DEC-17
Surrogate: Naphthalene d8			87.2		%		40-130	18-DEC-17
Surrogate: Phenanthrene d10			82.8		%		40-130	18-DEC-17
PH-WP	**Water**							
Batch R3903871								
WG2677561-7 LCS								
pH			7.38		pH units		7.3-7.5	02-DEC-17
PHENOLS-4AAP-WT	**Water**							
Batch R3906727								
WG2679726-6 LCS								
Phenols (4AAP)			103.2		%		85-115	07-DEC-17
WG2679726-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	07-DEC-17
SO4-IC-N-WP	**Water**							
Batch R3906438								
WG2675901-10 LCS								
Sulfate (SO4)			101.3		%		90-110	01-DEC-17
WG2675901-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-DEC-17
SOLIDS-TOTSUS-WP	**Water**							
Batch R3905474								
WG2676850-6 LCS								
Total Suspended Solids			100.0		%		85-115	04-DEC-17
WG2676850-5 MB								
Total Suspended Solids			<5.0		mg/L		5	04-DEC-17

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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	30-NOV-17 13:30	02-DEC-17 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 L2029922 were received on 01-DEC-17 13:40.

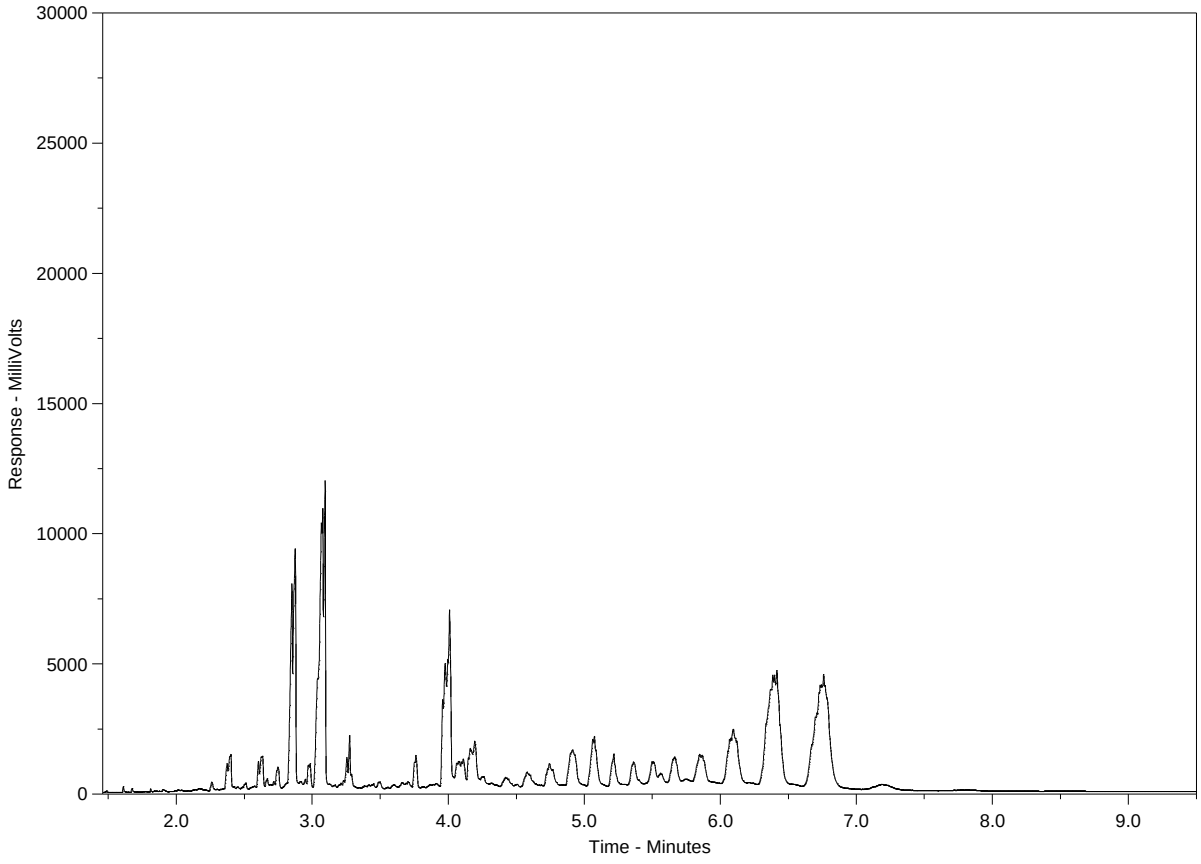
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where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

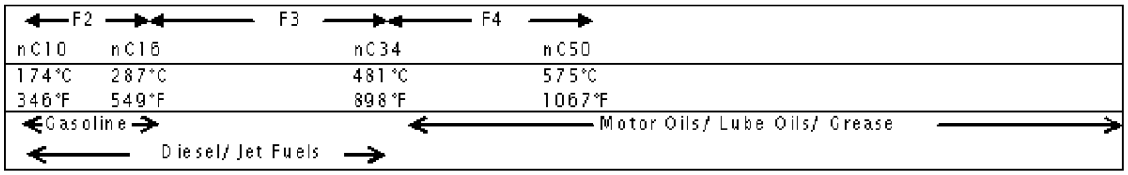
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide 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: L2029922-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT





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

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

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

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

ALS Environmental

L2029922-COFC

COC # _____

Page ____ of ____

Report To					
Company:	Nunavut CGS - Rankin Inlet (W8133)	☑ Standard	☐ Other		
Contact:	SIMON DOIRON	☑ PDF	☐ Excel	☐ Digital	☐ Fax
Address:	Box 490	Email 1:	sdoiron@gov.nu.ca		
	Rankin Inlet , NU, X0C 0G0	Email 2:	mlusty@gov.nu.ca		
Phone:	867-645-8155 Cell# :	Email 3:			
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information			
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:	Rankin Inlet WWTP- Monthly Effluent		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)	L2029922	ALS Contact:	Craig Riddell	Sampled By:	Simon Doiron

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)

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	Number of Containers
	Rankin Inlet WWTP - Effluent	11/30/17	13:30 PM	Waste	x	x	x	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 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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kelly Adams	30/11/17	13:30	AAL	1/12/17	1:40	8.4 °C				

GENF 18.01 Front

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

Date Received: 19-DEC-17
Report Date: 02-JAN-18 15:15 (MT)
Version: FINAL

Client Phone: 867-645-8155

Certificate of Analysis

Lab Work Order #: L2037105

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

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2037105-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SIMON DOIRON on 18-DEC-17 @ 13:30							
Matrix: WASTE							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		29-DEC-17	R3927531
Toluene	<0.0010		0.0010	mg/L		29-DEC-17	R3927531
Ethyl benzene	<0.00050		0.00050	mg/L		29-DEC-17	R3927531
o-Xylene	0.00053		0.00050	mg/L		29-DEC-17	R3927531
m+p-Xylenes	0.00123		0.00040	mg/L		29-DEC-17	R3927531
F1 (C6-C10)	<0.10		0.10	mg/L		29-DEC-17	R3927531
Surrogate: 4-Bromofluorobenzene (SS)	83.8		70-130	%		29-DEC-17	R3927531
CCME PHC F2-F4 in Water							
F2 (C10-C16)	0.69		0.10	mg/L	27-DEC-17	28-DEC-17	R3923572
F3 (C16-C34)	9.13		0.25	mg/L	27-DEC-17	28-DEC-17	R3923572
F4 (C34-C50)	4.04		0.25	mg/L	27-DEC-17	28-DEC-17	R3923572
Surrogate: 2-Bromobenzotrifluoride	83.2		60-140	%	27-DEC-17	28-DEC-17	R3923572
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		02-JAN-18	
F2-Naphth	0.69		0.10	mg/L		02-JAN-18	
F3-PAH	9.13		0.25	mg/L		02-JAN-18	
Total Hydrocarbons (C6-C50)	13.9		0.38	mg/L		02-JAN-18	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00177		0.00064	mg/L		02-JAN-18	
Miscellaneous Parameters							
Fecal Coliforms	>24200		10	MPN/100mL		19-DEC-17	R3916572
Fluoride (F)	0.053		0.020	mg/L		19-DEC-17	R3917224
Total Coliform and E.coli by MPN QT97							
Total Coliforms	>2420		1	MPN/100mL		19-DEC-17	R3916512
Escherichia Coli	>2420		1	MPN/100mL		19-DEC-17	R3916512
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000064		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
2-Methyl Naphthalene	0.000073		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Acenaphthene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Acenaphthylene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Anthracene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Acridine	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Benzo(a)anthracene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	22-DEC-17	22-DEC-17	R3924752
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Chrysene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	22-DEC-17	22-DEC-17	R3924752
Fluoranthene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Fluorene	<0.000020		0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Naphthalene	<0.000050		0.000050	mg/L	22-DEC-17	22-DEC-17	R3924752
Phenanthrene	<0.000050		0.000050	mg/L	22-DEC-17	22-DEC-17	R3924752
Pyrene	<0.000010		0.000010	mg/L	22-DEC-17	22-DEC-17	R3924752
Quinoline	0.000038	EMPC	0.000020	mg/L	22-DEC-17	22-DEC-17	R3924752
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	22-DEC-17	22-DEC-17	R3924752
Surrogate: Acenaphthene d10	59.0		40-130	%	22-DEC-17	22-DEC-17	R3924752
Surrogate: Acridine d9	112.7		40-130	%	22-DEC-17	22-DEC-17	R3924752
Surrogate: Chrysene d12	59.1		40-130	%	22-DEC-17	22-DEC-17	R3924752
Surrogate: Naphthalene d8	87.2		40-130	%	22-DEC-17	22-DEC-17	R3924752

* 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
L2037105-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SIMON DOIRON on 18-DEC-17 @ 13:30							
Matrix: WASTE							
Polyaromatic Hydrocarbons (PAHs)							
Surrogate: Phenanthrene d10	88.1		40-130	%	22-DEC-17	22-DEC-17	R3924752
Nunavut WW Group 1							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	127		1.2	mg/L		22-DEC-17	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		22-DEC-17	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		22-DEC-17	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	104		1.0	mg/L		21-DEC-17	R3917959
Ammonia by colour							
Ammonia, Total (as N)	6.2		1.0	mg/L		21-DEC-17	R3918427
Biochemical Oxygen Demand (BOD)							
Biochemical Oxygen Demand	146	BODF	20	mg/L		22-DEC-17	R3924391
Carbonaceous BOD							
BOD Carbonaceous	110	BODF	20	mg/L		22-DEC-17	R3924391
Chloride in Water by IC							
Chloride (Cl)	63.0		0.50	mg/L		19-DEC-17	R3917224
Conductivity							
Conductivity	491		1.0	umhos/cm		21-DEC-17	R3917959
Hardness Calculated							
Hardness (as CaCO3)	100	HTC	0.20	mg/L		21-DEC-17	
Mercury Total							
Mercury (Hg)-Total	<0.000050		0.000050	mg/L	19-DEC-17	28-DEC-17	R3923911
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		19-DEC-17	R3917224
Nitrate+Nitrite							
Nitrate and Nitrite as N	<0.070		0.070	mg/L		21-DEC-17	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		19-DEC-17	R3917224
Oil & Grease - Gravimetric							
Oil and Grease	28.0		5.0	mg/L		27-DEC-17	R3923567
Phenol (4AAP)							
Phenols (4AAP)	0.0084		0.0010	mg/L		21-DEC-17	R3917747
Phosphorus, Total							
Phosphorus (P)-Total	1.82		0.050	mg/L		27-DEC-17	R3921089
Sulfate in Water by IC							
Sulfate (SO4)	29.4		0.30	mg/L		19-DEC-17	R3917224
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.161		0.0030	mg/L	20-DEC-17	20-DEC-17	R3917051
Arsenic (As)-Total	0.00090		0.00010	mg/L	20-DEC-17	20-DEC-17	R3917051
Cadmium (Cd)-Total	0.0000540		0.0000050	mg/L	20-DEC-17	20-DEC-17	R3917051
Calcium (Ca)-Total	27.7		0.050	mg/L	20-DEC-17	20-DEC-17	R3917051
Chromium (Cr)-Total	0.00084		0.00010	mg/L	20-DEC-17	20-DEC-17	R3917051
Cobalt (Co)-Total	0.00019		0.00010	mg/L	20-DEC-17	20-DEC-17	R3917051
Copper (Cu)-Total	0.166		0.00050	mg/L	20-DEC-17	20-DEC-17	R3917051
Iron (Fe)-Total	0.167		0.010	mg/L	20-DEC-17	20-DEC-17	R3917051
Lead (Pb)-Total	0.00102		0.000050	mg/L	20-DEC-17	20-DEC-17	R3917051
Magnesium (Mg)-Total	7.53		0.0050	mg/L	20-DEC-17	20-DEC-17	R3917051
Manganese (Mn)-Total	0.0363		0.00010	mg/L	20-DEC-17	20-DEC-17	R3917051
Nickel (Ni)-Total	0.00246		0.00050	mg/L	20-DEC-17	20-DEC-17	R3917051
Potassium (K)-Total	9.53		0.050	mg/L	20-DEC-17	20-DEC-17	R3917051

* 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
L2037105-1 RANKIN INLET WWTP - EFFLUENT							
Sampled By: SIMON DOIRON on 18-DEC-17 @ 13:30							
Matrix: WASTE							
Total Metals in Water by CRC ICPMS							
Sodium (Na)-Total	40.7		0.050	mg/L	20-DEC-17	20-DEC-17	R3917051
Zinc (Zn)-Total	0.0761		0.0030	mg/L	20-DEC-17	20-DEC-17	R3917051
Total Organic Carbon by Combustion							
Total Organic Carbon	85.9		5.0	mg/L		28-DEC-17	R3923569
Total Suspended Solids							
Total Suspended Solids	90.0		5.0	mg/L		20-DEC-17	R3917096
pH							
pH	6.91		0.10	pH units		21-DEC-17	R3917959

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
BODF	BOD analyzed from frozen (preserved) sample. Hold time for unpreserved samples was exceeded, but freezing extends hold time to at least 1 month [ISO 5667-3 (2012)].
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
BOD-CBOD-WP	Water	Carbonaceous BOD	APHA 5210 B
Samples are diluted and seeded, have TCMP added to inhibit nitrogenous demands, and then are incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
Samples are diluted and seeded and then incubated in airtight bottles at 20°C for 5 days. Dissolved oxygen is measured initially and after incubation, and results are computed from the difference between initial and final DO.			
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A
The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
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**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PH-WP	Water	pH	APHA 4500H

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

Reference Information

Test Method References:

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

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 R3917959								
WG2689449-5 DUP		**L2037105-1**						
Alkalinity, Total (as CaCO3)		104	104		mg/L	0.0	20	21-DEC-17
WG2689449-4 LCS								
Alkalinity, Total (as CaCO3)			100.0		%		85-115	21-DEC-17
WG2689449-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-DEC-17
BOD-CBOD-WP	**Water**							
Batch R3924391								
WG2689405-2 LCS								
BOD Carbonaceous			92.4		%		85-115	22-DEC-17
WG2689405-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-DEC-17
BOD-WP	**Water**							
Batch R3924391								
WG2689405-2 LCS								
Biochemical Oxygen Demand			95.1		%		85-115	22-DEC-17
WG2689405-1 MB								
Biochemical Oxygen Demand			<2.0		mg/L		2	22-DEC-17
BTEXS+F1-HSMS-WP	**Water**							
Batch R3927531								
WG2691906-2 LCS								
Benzene			98.1		%		70-130	29-DEC-17
Toluene			107.2		%		70-130	29-DEC-17
Ethyl benzene			108.4		%		70-130	29-DEC-17
o-Xylene			119.6		%		70-130	29-DEC-17
m+p-Xylenes			116.5		%		70-130	29-DEC-17
WG2691906-3 LCS								
F1 (C6-C10)			101.6		%		70-130	29-DEC-17
WG2691906-1 MB								
Benzene			<0.00050		mg/L		0.0005	29-DEC-17
Toluene			<0.0010		mg/L		0.001	29-DEC-17
Ethyl benzene			<0.00050		mg/L		0.0005	29-DEC-17
o-Xylene			<0.00030		mg/L		0.0003	29-DEC-17
m+p-Xylenes			<0.00040		mg/L		0.0004	29-DEC-17
F1 (C6-C10)			<0.10		mg/L		0.1	29-DEC-17
Surrogate: 4-Bromofluorobenzene (SS)			88.8		%		70-130	29-DEC-17
C-TOC-HTC-WP	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOC-HTC-WP	**Water**							
Batch R3923569								
WG2691557-7 DUP		**L2037105-1**						
Total Organic Carbon		85.9	98.2		mg/L	13	20	28-DEC-17
WG2691557-6 LCS								
Total Organic Carbon			97.3		%		80-120	28-DEC-17
WG2691557-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	28-DEC-17
CL-IC-N-WP	**Water**							
Batch R3917224								
WG2687136-2 LCS								
Chloride (Cl)			99.5		%		90-110	19-DEC-17
WG2687136-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	19-DEC-17
EC-WP	**Water**							
Batch R3917959								
WG2689449-5 DUP		**L2037105-1**						
Conductivity		491	491		umhos/cm	0.0	10	21-DEC-17
WG2689449-3 LCS								
Conductivity			100.7		%		90-110	21-DEC-17
WG2689449-1 MB								
Conductivity			<1.0		umhos/cm		1	21-DEC-17
F-IC-N-WP	**Water**							
Batch R3917224								
WG2687136-2 LCS								
Fluoride (F)			101.9		%		90-110	19-DEC-17
WG2687136-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	19-DEC-17
F2-F4-FID-WP	**Water**							
Batch R3923572								
WG2690730-2 LCS								
F2 (C10-C16)			87.5		%		70-130	28-DEC-17
F3 (C16-C34)			94.5		%		70-130	28-DEC-17
F4 (C34-C50)			95.1		%		70-130	28-DEC-17
WG2690730-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	28-DEC-17
F3 (C16-C34)			<0.25		mg/L		0.25	28-DEC-17
F4 (C34-C50)			<0.25		mg/L		0.25	28-DEC-17
Surrogate: 2-Bromobenzotrifluoride			86.3		%		60-140	28-DEC-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAF-WP	**Water**							
Batch R3923911								
WG2691360-2 LCS								
Mercury (Hg)-Total			94.7		%		80-120	28-DEC-17
WG2691360-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	28-DEC-17
MET-T-CCMS-WP	**Water**							
Batch R3917051								
WG2687994-2 LCS								
Aluminum (Al)-Total			103.0		%		80-120	20-DEC-17
Arsenic (As)-Total			102.2		%		80-120	20-DEC-17
Cadmium (Cd)-Total			101.6		%		80-120	20-DEC-17
Calcium (Ca)-Total			101.9		%		80-120	20-DEC-17
Chromium (Cr)-Total			102.2		%		80-120	20-DEC-17
Cobalt (Co)-Total			101.6		%		80-120	20-DEC-17
Copper (Cu)-Total			102.8		%		80-120	20-DEC-17
Iron (Fe)-Total			97.4		%		80-120	20-DEC-17
Lead (Pb)-Total			100.6		%		80-120	20-DEC-17
Magnesium (Mg)-Total			108.1		%		80-120	20-DEC-17
Manganese (Mn)-Total			103.6		%		80-120	20-DEC-17
Nickel (Ni)-Total			101.9		%		80-120	20-DEC-17
Potassium (K)-Total			102.6		%		80-120	20-DEC-17
Sodium (Na)-Total			102.0		%		80-120	20-DEC-17
Zinc (Zn)-Total			100.5		%		80-120	20-DEC-17
WG2687994-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	20-DEC-17
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-DEC-17
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	20-DEC-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	20-DEC-17
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	20-DEC-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	20-DEC-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	20-DEC-17
Iron (Fe)-Total			<0.010		mg/L		0.01	20-DEC-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	20-DEC-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	20-DEC-17
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	20-DEC-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-DEC-17
Potassium (K)-Total			<0.050		mg/L		0.05	20-DEC-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	**Water**							
Batch R3917051								
WG2687994-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	20-DEC-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-DEC-17
NH3-COL-WP	**Water**							
Batch R3918427								
WG2689708-6 LCS								
Ammonia, Total (as N)			101.7		%		85-115	21-DEC-17
WG2689708-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	21-DEC-17
NO2-IC-N-WP	**Water**							
Batch R3917224								
WG2687136-2 LCS								
Nitrite (as N)			101.7		%		90-110	19-DEC-17
WG2687136-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	19-DEC-17
NO3-IC-N-WP	**Water**							
Batch R3917224								
WG2687136-2 LCS								
Nitrate (as N)			100.2		%		90-110	19-DEC-17
WG2687136-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	19-DEC-17
OG-GRAV-WP	**Water**							
Batch R3923567								
WG2690464-2 LCS								
Oil and Grease			96.8		%		70-130	27-DEC-17
WG2690464-1 MB								
Oil and Grease			<5.0		mg/L		5	27-DEC-17
P-T-COL-WP	**Water**							
Batch R3921089								
WG2690501-6 LCS								
Phosphorus (P)-Total			96.8		%		80-120	27-DEC-17
WG2690501-5 MB								
Phosphorus (P)-Total			<0.010		mg/L		0.01	27-DEC-17
PAH,PANH-WP	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Water**							
Batch R3924752								
WG2690839-2 LCS								
1-Methyl Naphthalene			91.1		%		60-130	22-DEC-17
2-Methyl Naphthalene			89.0		%		60-130	22-DEC-17
Acenaphthene			77.6		%		60-130	22-DEC-17
Acenaphthylene			87.5		%		60-130	22-DEC-17
Anthracene			71.1		%		60-130	22-DEC-17
Acridine			80.6		%		60-130	22-DEC-17
Benzo(a)anthracene			71.0		%		60-130	22-DEC-17
Benzo(a)pyrene			75.5		%		60-130	22-DEC-17
Benzo(b&j)fluoranthene			77.4		%		60-130	22-DEC-17
Benzo(g,h,i)perylene			89.7		%		60-130	22-DEC-17
Benzo(k)fluoranthene			84.9		%		60-130	22-DEC-17
Chrysene			89.5		%		60-130	22-DEC-17
Dibenzo(a,h)anthracene			84.1		%		60-130	22-DEC-17
Fluoranthene			75.8		%		60-130	22-DEC-17
Fluorene			86.7		%		60-130	22-DEC-17
Indeno(1,2,3-cd)pyrene			75.2		%		60-130	22-DEC-17
Naphthalene			83.3		%		50-130	22-DEC-17
Phenanthrene			73.5		%		60-130	22-DEC-17
Pyrene			81.6		%		60-130	22-DEC-17
Quinoline			79.7		%		60-130	22-DEC-17
WG2690839-1 MB								
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	22-DEC-17
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	22-DEC-17
Acenaphthene			<0.000020		mg/L		0.00002	22-DEC-17
Acenaphthylene			<0.000020		mg/L		0.00002	22-DEC-17
Anthracene			<0.000010		mg/L		0.00001	22-DEC-17
Acridine			<0.000020		mg/L		0.00002	22-DEC-17
Benzo(a)anthracene			<0.000010		mg/L		0.00001	22-DEC-17
Benzo(a)pyrene			<0.000005		mg/L		0.000005	22-DEC-17
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	22-DEC-17
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	22-DEC-17
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	22-DEC-17
Chrysene			<0.000020		mg/L		0.00002	22-DEC-17
Dibenzo(a,h)anthracene			<0.000005		mg/L		0.000005	22-DEC-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Water**							
Batch R3924752								
WG2690839-1 MB								
Fluoranthene			<0.000020		mg/L		0.00002	22-DEC-17
Fluorene			<0.000020		mg/L		0.00002	22-DEC-17
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	22-DEC-17
Naphthalene			<0.000050		mg/L		0.00005	22-DEC-17
Phenanthrene			<0.000050		mg/L		0.00005	22-DEC-17
Pyrene			<0.000010		mg/L		0.00001	22-DEC-17
Quinoline			<0.000020		mg/L		0.00002	22-DEC-17
Surrogate: Acenaphthene d10			112.1		%		40-130	22-DEC-17
Surrogate: Acridine d9			123.4		%		40-130	22-DEC-17
Surrogate: Chrysene d12			112.0		%		40-130	22-DEC-17
Surrogate: Naphthalene d8			105.2		%		40-130	22-DEC-17
Surrogate: Phenanthrene d10			120.4		%		40-130	22-DEC-17
PH-WP	**Water**							
Batch R3917959								
WG2689449-5 DUP		**L2037105-1**						
pH		6.91	6.91	J	pH units	0.00	0.2	21-DEC-17
WG2689449-2 LCS								
pH			7.38		pH units		7.3-7.5	21-DEC-17
PHENOLS-4AAP-WT	**Water**							
Batch R3917747								
WG2688905-2 LCS								
Phenols (4AAP)			93.8		%		85-115	21-DEC-17
WG2688905-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	21-DEC-17
SO4-IC-N-WP	**Water**							
Batch R3917224								
WG2687136-2 LCS								
Sulfate (SO4)			100.5		%		90-110	19-DEC-17
WG2687136-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	19-DEC-17
SOLIDS-TOTSUS-WP	**Water**							
Batch R3917096								
WG2687755-6 LCS								
Total Suspended Solids			100.7		%		85-115	20-DEC-17
WG2687755-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP	**Water**							
Batch R3917096								
WG2687755-5 MB								
Total Suspended Solids			<5.0		mg/L		5	20-DEC-17
TC,EC-QT97-WP	**Water**							
Batch R3916512								
WG2687345-2 DUP		**L2037105-1**						
Total Coliforms		>2420	>2420		MPN/100mL	0.0	65	19-DEC-17
Escherichia Coli		>2420	>2420		MPN/100mL	0.0	65	19-DEC-17
WG2687345-1 MB								
Total Coliforms			<1		MPN/100mL		1	19-DEC-17
Escherichia Coli			<1		MPN/100mL		1	19-DEC-17

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

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	18-DEC-17 13:30	21-DEC-17 12:00	0.25	71	hours	EHTR-FM
Aggregate Organics							
Biochemical Oxygen Demand (BOD)							
	1	18-DEC-17 13:30	22-DEC-17 07:00	48	90	hours	EHT
Carbonaceous BOD							
	1	18-DEC-17 13:30	22-DEC-17 07:00	48	90	hours	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 L2037105 were received on 19-DEC-17 12:00.

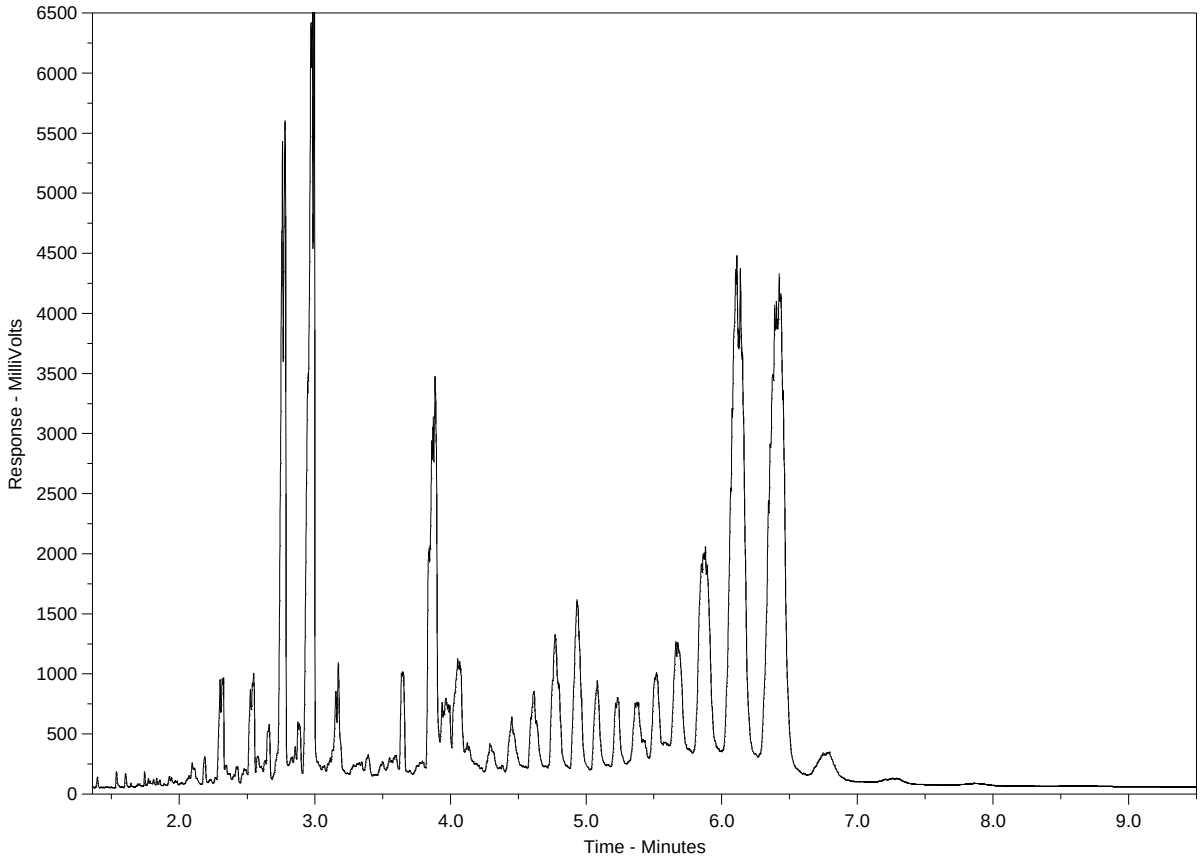
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where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

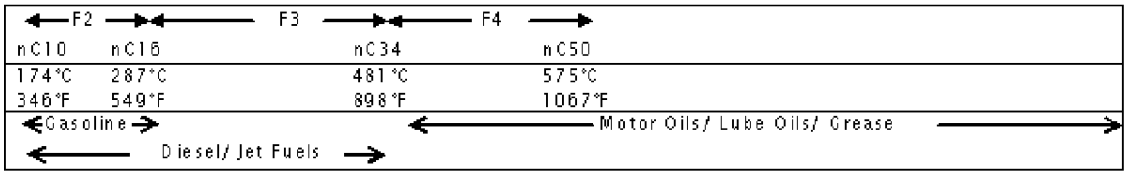
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide 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: L2037105-1
Client Sample ID: RANKIN INLET WWTP - EFFLUENT





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

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

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

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

ALS Environmental

L2037105-COFC

COC # 2037105 Page ___ of ___

Report To				Service Requested (Rush for routine analysis subject to availability)
Company:	Nunavut CGS - Rankin Inlet (W8133)	☑ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	SIMON DOIRON	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	Box 490	Email 1: sdoiron@gov.nu.ca		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Rankin Inlet , NU, X0C 0G0	Email 2: mlusty@gov.nu.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-645-8155 Cell# :	Email 3:		Analysis Request
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #: Rankin Inlet WWTP- Monthly Effluent		
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
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-N-WP	TC,EC-QT97-WP	Number of Containers
	Rankin Inlet WWTP - Effluent	Dec 18/17	13:30	Waste	x	x	x	x	x	15
	**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-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Kelly ADAMS	18/12/17	13:30PM		Dec 19/17	12	8 °C				

GENF 18.01 Front