2017 FIRST QUARTER REPORT
FOR GN-CGS RANKIN INLET

QUARTER BEING REPORTED: January – March 2017

The following information is compiled pursuant to the requirements of Part B, Item 2 of Water Licence No. **3AM-GRA1624** issued to **Government of Nunavut, Department of Community and Government Services (GN-CGS)**.

a) Tabular summaries of all data generated under the Monitoring Program; and
b) Monthly quantities of fresh water obtained from all sources;

Below are results for Monitoring Program Stations GRA-1 and GRA-3.

Month Reported	Quantity of Water Obtained from all Sources (m^3)	Quantity of Sewage Waste Discharged (Estimated, m^3)
January	52,821.99	52,821.99
February	48,589.00	48,589.00
March	60,209.00	60,209.00
QUARTER TOTAL	**161,619.99**	**161,619.99**

As per Part H, Item 5 of the Licence, below is a summary of solids removed from the 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
QUARTER TOTAL	**12**

c) Quarterly sampling results from Monitoring Program Station GRA-3;

Refer to attached sampling results for GRA-3 (Appendix B).

d) The current estimated volume of Nipissar Lake based on water elevation determined at Monitoring Program Station GRA-5.

As per Part H, Item 6 of the Licence, the Licensee shall record water elevation monthly, during periods of open water at Monitoring Program Station GRA-5. There was **no open water** during the quarter being reported.

e) An executive summary of any studies conducted to date during the Calendar Quarter, pending completion.

N/A

f) Other

Environment and Climate Change Canada (ECCC) issued a written Fisheries Act Direction (FAD) on April 6, 2017 pertaining to the disposal of wastewater effluent from the Rankin Inlet Sewage Treatment Facility into Prairie Bay.

List of Appendixes

Appendix A: Daily Record of Nipissar Lake Volumes GRA-1 – 2 pages
Appendix B: Summary of GRA-3 Sampling Parameters – 1 page
Appendix C: Certificate of Analysis, February 28, 2017 – 7 pages
Appendix D: Certificate of Analysis, March 29, 2017- 7 pages
Appendix E: Fisheries Act Direction, April 6, 2017 – 8 pages

Appendix A: Daily Record of Nipissar Lake Volumes GRA-1

Raw Water Supply From Nipissar Lake

Water Licence No. 3AM-GRA1624

GRA-1

Date	Volume (m^3)	Daily Volume (m^3)	Total Volume (m^3)	
01-Jan-17	2,303,387.79	1,611.10	101,451.01	
02-Jan-17	2,304,888.21	1,500.42	102,951.43	
03-Jan-17	2,306,608.96	1,720.75	104,672.18	
04-Jan-17	2,308,174.65	1,565.69	106,237.87	
05-Jan-17	2,309,839.91	1,665.26	107,903.13	
06-Jan-17				
07-Jan-17	2,313,173.48	3,333.57	111,236.70	
08-Jan-17	2,314,846.00	1,672.52	112,909.22	
09-Jan-17	2,316,724.78	1,878.78	114,788.00	
10-Jan-17	2,318,390.78	1,666.00	116,454.00	
11-Jan-17	2,320,035.78	1,645.00	118,099.00	
12-Jan-17	2,321,925.78	1,890.00	119,989.00	
13-Jan-17	2,323,588.78	1,663.00	121,652.00	
14-Jan-17	2,325,464.78	1,876.00	123,528.00	
15-Jan-17	2,327,333.78	1,869.00	125,397.00	
16-Jan-17	2,329,140.78	1,807.00	127,204.00	
17-Jan-17	2,330,964.78	1,824.00	129,028.00	
18-Jan-17	2,332,740.78	1,776.00	130,804.00	
19-Jan-17	2,334,578.78	1,838.00	132,642.00	
20-Jan-17	2,336,425.78	1,847.00	134,489.00	
21-Jan-17	2,338,344.61	1,918.83	136,407.83	
22-Jan-17	2,340,088.26	1,743.65	138,151.48	
23-Jan-17	2,342,037.13	1,948.87	140,100.35	
24-Jan-17	2,343,751.43	1,714.30	141,814.65	
25-Jan-17	2,345,435.78	1,684.35	143,499.00	
26-Jan-17	2,347,272.39	1,836.61	145,335.61	
27-Jan-17	2,349,062.85	1,790.46	147,126.07	
28-Jan-17	2,350,705.64	1,642.79	148,768.86	
29-Jan-17				
30-Jan-17	2,354,365.78	3,660.14	152,429.00	
31-Jan-17	2,356,209.78	1,844.00	154,273.00	**52,821.99**
01-Feb-17	2,357,797.78	1,588.00	155,861.00	
02-Feb-17	2,359,745.78	1,948.00	157,809.00	
03-Feb-17	2,361,745.78	2,000.00	159,809.00	
04-Feb-17	2,363,124.46	1,378.68	161,187.68	
05-Feb-17	2,364,905.01	1,780.55	162,968.23	
06-Feb-17	2,366,793.78	1,888.77	164,857.00	
07-Feb-17	2,368,491.78	1,698.00	166,555.00	
08-Feb-17	2,370,371.78	1,880.00	168,435.00	
09-Feb-17	2,371,979.78	1,608.00	170,043.00	
10-Feb-17	2,373,835.78	1,856.00	171,899.00	
11-Feb-17	2,375,893.41	2,057.63	173,956.63	
12-Feb-17	2,377,375.71	1,482.30	175,438.93	
13-Feb-17	2,379,209.78	1,834.07	177,273.00	
14-Feb-17	2,380,869.78	1,660.00	178,933.00	
15-Feb-17	2,382,591.78	1,722.00	180,655.00	
16-Feb-17	2,384,345.78	1,754.00	182,409.00	
17-Feb-17				
18-Feb-17	2,387,782.80	3,437.02	185,846.02	
19-Feb-17	2,389,447.67	1,664.87	187,510.89	
20-Feb-17	2,391,465.78	2,018.11	189,529.00	
21-Feb-17	2,393,176.78	1,711.00	191,240.00	
22-Feb-17	2,394,873.78	1,697.00	192,937.00	
23-Feb-17	2,396,678.78	1,805.00	194,742.00	
24-Feb-17	2,398,450.78	1,772.00	196,514.00	
25-Feb-17	2,400,321.78	1,871.00	198,385.00	
26-Feb-17	2,402,273.78	1,952.00	200,337.00	
27-Feb-17	2,404,282.78	2,009.00	202,346.00	
28-Feb-17	2,406,386.78	2,104.00	204,450.00	**48,589.00**
01-Mar-17	2,408,253.78	1,867.00	206,317.00	
02-Mar-17	2,410,235.78	1,982.00	208,299.00	
03-Mar-17				
04-Mar-17				
05-Mar-17				
06-Mar-17	2,417,977.78	7,742.00	216,041.00	
07-Mar-17	2,419,915.78	1,938.00	217,979.00	
08-Mar-17				
09-Mar-17				
10-Mar-17				
11-Mar-17	2,425,650.69	5,734.91	223,713.91	
12-Mar-17				
13-Mar-17	2,430,437.78	4,787.09	228,501.00	
14-Mar-17	2,432,843.78	2,406.00	230,907.00	
15-Mar-17				
16-Mar-17	2,436,936.78	4,093.00	235,000.00	
17-Mar-17	2,439,245.78	2,309.00	237,309.00	
18-Mar-17				
19-Mar-17	2,443,626.91	4,381.13	241,690.13	
20-Mar-17				
21-Mar-17				
22-Mar-17	2,449,932.78	6,305.87	247,996.00	
23-Mar-17	2,451,467.78	1,535.00	249,531.00	
24-Mar-17				
25-Mar-17	2,455,678.78	4,211.00	253,742.00	
26-Mar-17	2,457,744.78	2,066.00	255,808.00	
27-Mar-17	2,459,896.78	2,152.00	257,960.00	
28-Mar-17	2,461,930.78	2,034.00	259,994.00	
29-Mar-17	2,464,467.78	2,537.00	262,531.00	
30-Mar-17	2,466,692.78	2,225.00	264,756.00	
31-Mar-17	2,468,462.78	1,770.00	266,526.00	**60,209.00**

Appendix B: Summary of GRA-3 Sampling Parameters

GN-CGS Rankin Inlet Monitoring Stations and Sampling Parameters for Licence No. 3AM-GRA1624

			GRA-3	
Parameters	**Unit**	**Detection Limit**	**28-Feb-17**	**29-Mar-17**
Total Suspended Solids	mg/L	100	76	575
BOD5	mg/L	50	112	392
CBOD	mg/L	50	111	390
Hardness	mg/L	0.25	121	134
Alkalinity	mg/L	1.0	114	190
Conductivity	uS/cm	1.0	574	753
pH	(pH units)	0.10	7.06	6.47
Fecal Coliform	#CFU/100ml	3	>110000	>110000
Total Coliform	#MPN/100ml	/	/	/
E.Coli	#MPN/100ml	/	/	/
Ammonia-N	mg/L	0.10	4.91	13.5
Nitrate-N [NO3-N]	mg/L	0.020	<0.020	0.058
Nitrite-N [NO2-N]	mg/L	0.010	<0.010	<0.020
Total Nitrogen	mg/L	0.070	<0.070	<0.070
Tot. Org. Carbon (TOC)	mg/L	2.5	91.8	109
Total Phosphorus	mg/L	0.050	3.05	6.16
Calcium (Ca)	mg/L	0.10	34.1	38.9
Chloride (Cl)	mg/L	0.50	75.1	75.9
Fluoride (Fl)	mg/L	/	/	/
Magnesium (Mg)	mg/L	0.010	8.84	8.97
Potassium (K)	mg/L	0.020	12.1	14.7
Sodium (Na)	mg/L	0.030	49.5	49.5
Sulphate (SO4)	mg/L	0.30	34.7	37.0
Aluminium (Al)	mg/L	0.0050	0.203	0.224
Antimony (Sb)	mg/L	/	/	/
Arsenic (As)	mg/L	0.00020	0.00095	0.00106
Barium (Ba)	mg/L	/	/	/
Beryllium (Be)	mg/L	/	/	/
Cadmium (Cd)	mg/L	0.000010	0.000081	0.000066
Cesium (Cs)	mg/L	/	/	/
Chromium (Cr)	mg/L	0.0010	<0.0010	<0.0010
Cobalt (Co)	mg/L	0.00020	<0.00020	0.00027
Copper (Cu)	mg/L	0.00020	0.191	0.316
Iron (Fe)	mg/L	0.010	1.37	0.952
Lead (Pb)	mg/L	0.000090	0.00149	0.00213
Lithium (Li)	mg/L	/	/	/
Manganese (Mn)	mg/L	0.00030	0.0408	0.0437
Molybdenum (Mo)	mg/L	/	/	/
Nickel (Ni)	mg/L	0.0020	0.0035	0.0036
Rubidium (Rb)	mg/L	/	/	/
Selenium (Se)	mg/L	/	/	/
Silver (Ag)	mg/L	/	/	/
Strontium (Sr)	mg/L	/	/	/
Thallium (Tl)	mg/L	/	/	/
Titanium (Ti)	mg/L	/	/	/
Uranium (U)	mg/L	/	/	/
Vanadium (V)	mg/L	/	/	/
Zinc (Zn)	mg/L	0.0020	0.0720	0.147
Total Phenols	mg/L	0.0010	0.0249	0.0471
Oil and Grease	mg/L	5.0	40.1	44.3
Benzene	mg/L	0.00050	<0.00050	<0.00050
Toluene	mg/L	0.0010	0.0044	0.0026
Ethyl Benzene	mg/L	0.00050	<0.00050	<0.00050
o-Xylene	mg/L	0.00050	<0.00050	<0.00050
F1 (C6-C10)	mg/L	0.10	<0.10	<0.10
F2 (C10-C16)	mg/L	0.10	0.42	0.97
F3 (C16-C34)	mg/L	0.25	8.45	16.4
F4 (C34-C50)	mg/L	0.25	3.54	5.52
Total Hydrocarbons (C6-C50)	mg/L	0.38	12.4	22.9
Mercury (Hg)	mg/L	0.0000050	0.0000130	0.0000159

[1]Canadian Environmental Quality Guidelines - Water Quality Guidelines for the Protection of Aquatic Life, Marine
N/G - No Guideline

Appendix C: Certificate of Analysis, February 28, 2017

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:

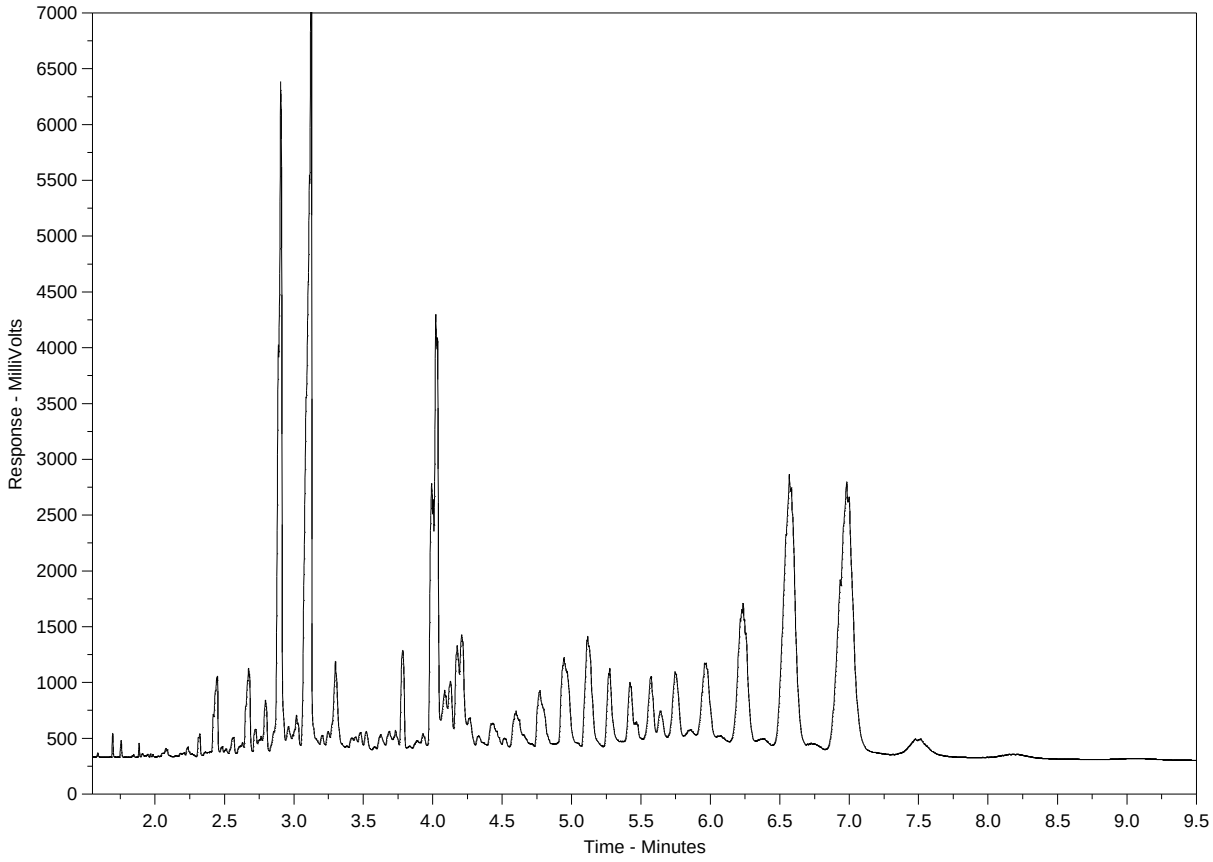
GLOSSARY OF REPORT TERMS

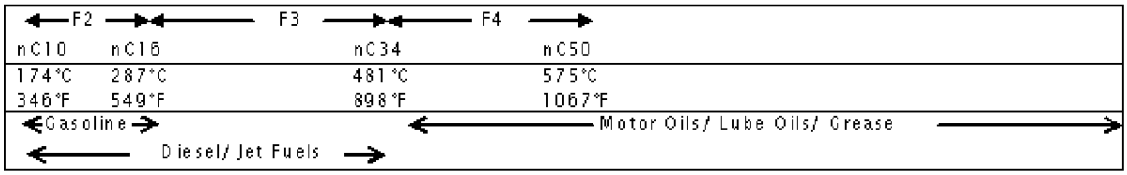
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates 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	Report Format / Distribution		Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply	
Company:	CGS RANKIN	Select Report Format:	PDF EXCEL EDD (DIGITAL)	Regular [R]	Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	S. DOIRON	Quality Control (QC) Report with Report	YES NO	PRIORITY (Business Days) 4 day [P4]	EMERGENCY 1 Business day [E1]
Phone:	867 645 8155	Compare Results to Criteria on Report - provide details below if box checked		3 day [P3]	Same Day, Weekend or Statutory holiday [E0]
	Company address below will appear on the final report	Select Distribution:	EMAIL MAIL FAX	2 day [P2]	
Street:	BOX 490	Email 1 or Fax	sdoiron@gov.nu.ca	Date and Time Required for all E&P TATs:	dd-mmm-yy hh:mm
City/Province:	RANKIN INLET NU	Email 2		For tests that can not be performed according to the service level selected, you will be contacted.	
Postal Code:	X0C 0G0	Email 3			

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

Project Information		Oil and Gas Required Fields (client use)	
ALS 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:

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 [X] NO	
Are samples for human drinking water use? YES [X] 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°

Appendix D: Certificate of Analysis, March 29, 2017

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:

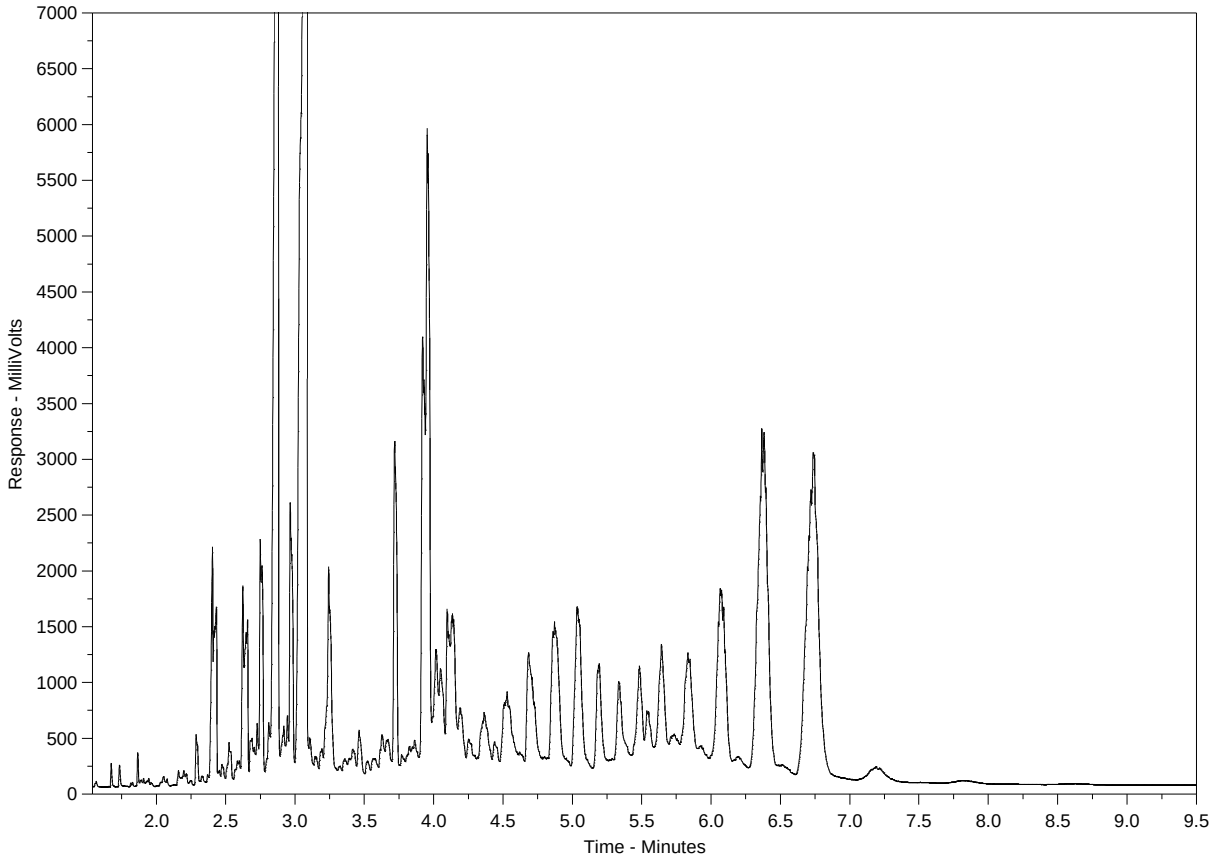
GLOSSARY OF REPORT TERMS

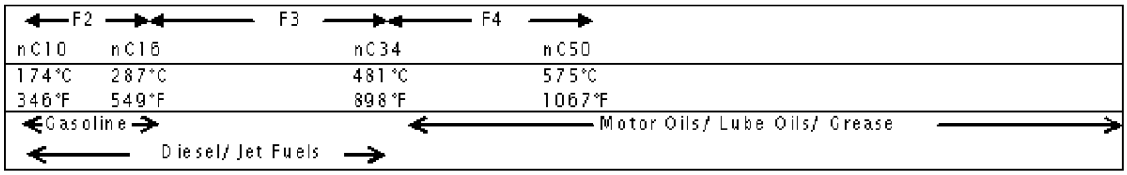
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates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

Appendix E: Fisheries Act Direction, April 6, 2017

Environment Canada Environnement Canada

ENFORCEMENT BRANCH
Environmental Enforcement

DIRECTION GÉNÉRALE DE L'APPLICATION DE LA LOI
Application de la loi en environnement

DIRECTION

FISHERIES ACT
Subsection 38(7.1)

Nemisis File: 4408-2016-06-28-001
Gavia File: 8000-2017-01-22-391553

PROTECTED B
ENFORCEMENT

April 6, 2017

Registered with acknowledgement of receipt

Her Majesty the Queen in right of Canada as represented by the Commissioner of Nunavut

c/o Lori Kimball
Deputy Minister
Community & Government Services
PO Box 1000 STN 700
4th Floor, W.G. Brown Building
Iqaluit, NU, X0A 0H0

Megan Lusty
Municipal Planning Engineer
Community and Government Services
Kivalliq Region, Government of Nunavut
P.O. Box 490
Rankin Inlet, NU, X0C 0G0

RE: *FISHERIES ACT* DIRECTION

This document constitutes a direction to the persons named above, pursuant to subsection 38(7.1) of the *Fisheries Act* as amended, hereinafter referred to as the *Fisheries Act*.

REASONABLE GROUNDS FOR BELIEF

I, Curtis Didham, an Inspector designated by the Minister of Fisheries and Oceans under subsection 38(1) of the *Fisheries Act,* have reasonable grounds to believe:

Canada

1. That there occurs a deposit of a deleterious substance in water frequented by fish that is not authorized under the *Fisheries Act.*

2. That detriment to fish habitat or fish or to the use by humans of fish results or may reasonably be expected to result from the occurrence and that immediate action is necessary in order to take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the occurrence or to counteract, mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it.

3. That all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat have not been taken as required by subsection 38(6) of the *Fisheries Act.*

4. That the Government of Nunavut, Department of Community and Government Services (GN-CGS) Rankin Inlet Sewage Treatment Facility (STF) operates 24 hours a day, 7 days a week and discharges an average 1800 cubic meters per day of sewage and wastewater effluent from the STF on a continual basis into Prairie Bay, Hudson Bay, Arctic Ocean.

5. That the GN-CGS Rankin Inlet STF is a primary treatment plant of sewage and wastewater. The STF receives sewage and wastewater from the underground pipe collection system that is connected via underground piping to the buildings in the Hamlet of Rankin Inlet and also receives sewage and wastewater that is pumped via vacuum truck from buildings in the Hamlet of Rankin Inlet and input into the piped system through the Johnson Cove Lift Station.

6. That sewage and wastewater comes into the STF building through two pipes, and goes into a surge tank which allows for equalization of flows. From there it goes to the macerators. A vertical grinder crushes the solids, then a screw-and-screen auger system separates the solids from liquids, with the wastewater being pumped to the discharge diffuser located in Prairie Bay, Hudson Bay, Arctic Ocean. The solids/sludge have very low water content, and are collected in plastic bags for disposal. About one cubic meter goes to a dedicated section at the Rankin Inlet landfill every 3 days.

7. That during the colder winter months bleeders are used to prevent freezing of the pipe lines and this also dilutes the sewage and wastewater effluent.

8. That on June 22, 2016 Environment and Climate Change Canada (ECCC) Fishery Inspectors DIDHAM and MACDONALD conducted an on-site inspection at the Rankin Inlet STF to verify compliance under the *Fisheries Act.*

9. That Megan Lusty (GN-CGS Municipal Planning Engineer) assisted EO DIDHAM and EO MACDONALD during the Inspection.

10. That during the inspection ECCC Fishery Inspectors DIDHAM and MACDONALD collected four 20 liter white plastic pails of samples for a LC50 multi-concentration bioassay analysis and three containers of chemistry samples for total suspended solids analysis, total metals analysis, and ammonia analysis. The pH analysis was calculated using a field pH meter. All samples were collected at the sampling discharge monitoring point GRA-3 valve inside the STF building and further sent to the Environment and Climate Change Canada Prairie and Northern Region Laboratory (ECCC PNR) in Edmonton for analysis.

11. That during the inspection Megan Lusty also collected chemistry samples.

12. That on July 19, 2016 ECCC Fishery Inspector DIDHAM received final bioassay sampling results from the ECCC PNR Laboratory. The results showed that 90% of the fish had died in the 100% effluent within 24 hours. Therefore the effluent sampled was acutely lethal and thus, deleterious to fish.

13. That on September 23, 2016 ECCC Fishery Inspector DIDHAM received final chemistry sampling results from the ECCC PNR Laboratory.

14. That on January 27, 2017 Anne Wilson (ECCC Water Quality Specialist) reviewed the chemistry results for the Rankin Inlet samples taken June 22, 2016 and provided the following comments:

a. Total suspended solids (TSS) were moderate and would not be expected to contribute to toxicity at 32 mg/L.
b. The ammonia concentration in the lab sample was 10.6 mg/L. At the pH of 6.9 – 7.5 measured in the bioassay test solution (100%) and test temperature of 15 C this would contain 0.859% unionized (NH3) ammonia, or 0.091mg/L NH3-N. This is well below the mean literature LC50 for rainbow trout of 0.396 mg/L NH3-N although above the chronic effects guideline of 0.016 mg/L NH3-N.
c. Metals which would have contributed to the toxicity of the sample were aluminum (0.398 mg/L), copper (0.193 mg/L) and zinc (0.107 mg/L). The sample had low to moderate hardness, and the 100% concentration started at pH 6.9 and finished at pH 7.5. Organic matter was not tested, but can be inferred as present from the sample color and source.

- Aluminum toxicity is affected by pH, hardness and organic material; there would be minor sublethal contributions to toxicity.
- Copper and zinc concentrations are both at levels which are reported in the literature as causing acute toxicity to rainbow trout. Given the toxicity modifying factors and the difficulty teasing out the effects of mixtures, it is only safe to say that these metals would have contributed to or caused acute toxicity.

15. That information received from Fisheries and Oceans Canada Fisheries Protection Program Emily Morton on January 27, 2017 stated that the Hudson Bay and Arctic Ocean waters near Rankin Inlet are fish bearing. Sea-run Arctic Char are commercially harvested from these waters. Additionally, a number of marine mammal species are present in these waters and are subsistence harvested by Inuit, including Beluga, Ringed Seal, Bearded Seal and Walrus.

16. That on January 27, 2017 ECCC Fishery Inspector DIDHAM received information from Anne Wilson who stated:
a. She attended the GN-CGS renewal Type "A" Nunavut Water Board Water Licence No. 3AM-GRA1624 GN-CGS hearings in Rankin Inlet, Nunavut on March 16 – 17, 2016.
b. That during the Rankin Inlet STF tour on February 11, 2016, it was stated that the GN-CGS had no plans to upgrade the Rankin Inlet primary treatment STF to secondary treatment.
c. That in the course of the Nunavut Water Board water licence renewal public hearings, the GN-CGS stated it did not want the system upgrade to be a condition of the Water Licence.
c. That the GN-CGS would commit to discussions of the path forward for the upgrade outside the Water licence process, and to conduct effluent characterization by December, 2017.

17. That a ECCC February 26, 2016 document titled "ECCC's Intervention to the Nunavut Water Board on the Hamlet of Rankin Inlet's water licence renewal 3AM-GRA1015" stated in 4.2 future infrastructure upgrades that:
a. The installation of secondary treatment is not being considered by the GN; the primary treatment system was installed approximately four years ago and is functioning.
b. It is acknowledged that the water licence does not regulate effluent quality for marine discharges, as was identified by the GN. ECCC and the GN have agreed to continue discussing the matter outside the water licence renewal process. However, the necessary improvement of effluent quality will require upgrading of facilities which are regulated under water licence 3AM-GRA1015. ECCC seeks a commitment from the GN to identify options for secondary treatment, and to develop a plan to implement secondary treatment within a specific time frame, to ensure compliance with the *Fisheries Act.*

18. That on January 31, 2017 Fishery Inspector DIDHAM was informed by Megan Lusty that:

a. The GN-CGS for several years has been conducting general effluent characterization for many locations across Nunavut.

b. The GN-CGS is still committed to conducting the general effluent characterization for Rankin Inlet however it has not been started yet and therefore will not be completed by the original committed date of December, 2017.
c. That during the June 22, 2016 inspection sampling the bleeders were not on.
d. That after the June 22, 2016 meeting with ECCC the GN-CGS was waiting to receive the FAD sooner than expected and wanted to make sure that any further actions taken by the GN-CGS would be in line with ECCC requirements on upgrading the Rankin Inlet STF from primary treatment to secondary treatment.

MEASURES TO BE TAKEN

Under the authority given to me pursuant to subsection 38(7.1) of the Fisheries Act, I hereby direct the persons named above to immediately take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the above mentioned occurrence or to counteract, mitigate, or remedy, any adverse effects that result from the above mentioned occurrence or might reasonably be expected to result from it, including:

1. Design a sewage and wastewater effluent characterization study from the Rankin Inlet STF and submit it to ECCC for discussion prior to **July 31, 2017**. Components of the sewage and wastewater effluent characterization study must include:
• Collection of monthly composite samples in such a fashion that samples are representative of overall effluent quality;
• Parameters should include those listed in Table 1;
• Provide estimated daily flow volumes of effluent discharges, along with estimates of quantity of bleeder water and auger wash water used.
• Proposed outline of the study report format.

2. From **November 1, 2017 to November 1, 2018** conduct the sewage and wastewater effluent characterization study on effluent from the Rankin Inlet STF in accordance with the study design.

3. By **March 31, 2019** provide a copy of the sewage and wastewater effluent characterization study to ECCC.

4. By **March 31, 2020** present a discussion document outlining treatment options to ECCC for upgrading the Rankin Inlet STF. The document must include estimated costs and performance for each of the options, as well as time frames needed for construction and commissioning.

5. Inform ECCC in writing 30 days after the end of the second quarter of 2017 and each calendar quarter thereafter of the actions which were taken in the previous calendar quarter until **March 31, 2020**, and provide a summary of results.

Table 1 Sampling Parameters (Monthly unless otherwise noted)
Physical/Chemical:
TSS mg/L
BOD5 mg/L
CBOD mg/L
Hardness mg/L
Alkalinity mg/L
Conductivity uS/cm
pH (pH units)

Bacteriological:
Fecal Coliform #CFU/100ml
Total Coliform #MPN/100ml
E. Coli #MPN/100ml

Nutrients:
Ammonia-N mg/L
Nitrate-N [NO3-N] mg/L
Nitrite-N [NO2-N] mg/L
Total Nitrogen mg/L
Tot. Org. Carbon (TOC) mg/L
Total Phosphorous mg/L

Major Ions:
Calcium (Ca) mg/L
Chloride (Cl) ug/L
Fluoride (F) mg/L
Magnesium (Mg) mg/L
Potassium (K) mg/L
Sodium mg/L
Sulphate (SO4) mg/L

Metals (Total):*
Aluminium (Al) ug/L
Antimony (Sb) ug/L
Arsenic (As) ug/L
Barium (Ba) ug/L
Beryllium (Be) ug/L
Cadmium (Cd) ug/L
Cesium (Cs) ug/L
Chromium (Cr) ug/L
Cobalt (Co) ug/L
Copper (Cu) ug/L
Iron (Fe) ug/L
Lead (Pb) ug/L
Lithium (Li) ug/L
Manganese (Mn) ug/L
Molybdenum (Mo) ug/L
Nickel (Ni) ug/L
Rubidium (Rb) ug/L
Selenium (Se) ug/L
Silver (Ag) ug/L
Strontium (Sr) ug/L
Thallium (Tl) ug/L
Titanium (Ti) ug/L
Uranium (U) ug/L
Vanadium (V) ug/L
Zinc (Zn) ug/L

Other:
Total Phenols mg/L
Oil and Grease mg/L
Total Petroleum Hydrocarbons mg/L

Bioassay:**
Rainbow Trout bioassay test (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13 July 1990, published by the Department of the Environment, as amended in December 2000)

If toxicity is observed, there is the option to do additional bioassay testing using the Procedure for pH Stabilization EPS 1/RM/50.

* Quarterly and no less than 60 days between samples.
** Annually, unless requested by ECCC to increase frequency to quarterly due to significant variability in effluent quality.

THE LAW

Fisheries Act

Deposit of deleterious substance prohibited

36(3) Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Duty to notify – deleterious substance

38(5) If there occurs a deposit of a deleterious substance in water frequented by fish that is not authorized under this Act, or if there is a serious and imminent danger of such an occurrence, and detriment to fish habitat or fish or to the use by humans of fish results or may reasonably be expected to result from the occurrence, then every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations if the person at any material time

(a) owns or has the charge, management or control of
  (i) the deleterious substance, or
  (ii) the work, undertaking or activity that resulted in the deposit or the danger of the deposit; or
(b) causes or contributes to the occurrence or the danger of the occurrence.

Duty to take corrective measures

38(6) Any person described in paragraph (4)*(a)* or *(b)* or 5(a) or (b) shall, as soon as feasible, take all reasonable measures consistent with public safety and with the conservation and protection of fish and fish habitat to prevent the occurrence or to counteract, mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it.

Report

38(7) As soon as feasible after the occurrence or after learning of the danger of the occurrence, the person shall provide an inspector, fishery officer or an authority prescribed by the regulations with a written report on the occurrence or danger of the occurrence.

Corrective measures

38(7.1) If an inspector or fishery officer, whether or not they have been notified under subsection (4) or (5) or provided with a report under subsection (7), is satisfied on reasonable grounds that immediate action is necessary in order to take any measures referred to in subsection (6), the inspector or officer may, subject to subsection (7.2), take any of those measures at the expense of any person described in paragraph (4)(a) or (b) or (5)(a) or (b) or direct such person to take them at that person's expense.

Offence and punishment

40(2) Every person who contravenes subsection 36(1) or (3) is guilty of an offence and liable

(a) on conviction on indictment,

(i) in the case of an individual,
(A) for a first offence, to a fine of not less than $15,000 and not more than $1,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $30,000 and not more than $2,000,000, or to imprisonment for a term not exceeding three years, or to both,

(ii) in the case of a person, other than an individual or a corporation referred to in subparagraph (iii),
(A) for a first offence, to a fine of not less than $500,000 and not more than $6,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $1,000,000 and not more than $12,000,000, and

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,
(A) for a first offence, to a fine of not less than $75,000 and not more than $4,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $150,000 and not more than $8,000,000; or

(b) on summary conviction,

(i) in the case of an individual,
(A) for a first offence, to a fine of not less than $5,000 and not more than $300,000, and
(B) for a second or subsequent offence, to a fine of not less than $10,000 and not more than $600,000, or to imprisonment for a term not exceeding six months, or to both,

(ii) in the case of a person, other than an individual or a corporation referred to in subparagraph (iii),
(A) for a first offence, to a fine of not less than $100,000 and not more than $4,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $200,000 and not more than $8,000,000, and

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,
(A) for a first offence, to a fine of not less than $25,000 and not more than $2,000,000, and
(B) for a second or subsequent offence, to a fine of not less than $50,000 and not more than $4,000,000.

Other offences

40(3) Every person who

(*g*) fails to comply with the whole or any part of a direction of an inspector or a fishery officer under subsection 38(7.1).

is guilty of an offence punishable on summary conviction and liable, for a first offence, to a fine not exceeding two hundred thousand dollars and, for any subsequent offence, to a fine not exceeding two hundred thousand dollars or to imprisonment for a term not exceeding six months, or to both.

Power to recover costs

42(2) All the costs and expenses referred to in subsection (1) are recoverable by Her Majesty in right of Canada or a province with costs in proceedings brought or taken therefor in the name of Her Majesty in any such right in any court of competent jurisdiction.

Continuing offences

78.1 Where any contravention of this Act or the regulations is committed or continued on more than one day, it constitutes a separate offence for each day on which the contravention is committed or continued.

CONCLUSION

This direction is without prejudice to any further course of action that Environment and Climate Change Canada may take with respect to any violation of the *Fisheries Act*, including an amended Direction, prosecution, or the seeking of an injunction from the court under the *Fisheries Act*, or any other Act.

This direction and the circumstances to which it refers will form part of Environment and Climate Change Canada's records of the Government of Nunavut, Community and Government Services, and will be taken into account in future responses to alleged violations and for internal purposes such as setting the frequency of inspections. Environment and Climate Change Canada will consider taking further action if you do not take all necessary corrective steps to comply.

This direction is issued in accordance with the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*. The complete text of this policy is available on Environment and Climate Change Canada's website : http://www.ec.gc.ca/alef-ewe/default.asp?lang=En&n=D6B74D58-1

The complete text of the *Fisheries Act* is available on the Department of Justice website : http://laws-lois.justice.gc.ca/Search/

For more information or to respond to the alleged facts contained in this direction, please call or write the undersigned. Your comments will be considered, and where appropriate, a response provided. Any comments you make, as well as Environment and Climate Change Canada's response, will be maintained on file with this direction in Environment and Climate Change Canada's records.

Curtis Didham

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