Annual Report -2019

Water Licence: 3BM-PEL 1929

Hamlet of Kugaaruk, NU

Date: Feb 06, 2020

Submitted to:

Nunavut Water Board (NWB)

February 05, 2020
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0
Attention: Richard Dwyer, Manager of Licensing, Manager of Licensing

RE: 3BM-PEL-1929 (previous 3BM-PEL1419)-Annual Report 2019, Hamlet of Kugaaruk

Dear Richard,

The Hamlet of Kugaaruk is pleased to submit to Nunavut Water Board the Annual Report 2019 of water uses and sewage solid waste disposal as directed under compliances of Water Licence 3BM-PEL 1929 (previous 3BM-PEL1419). Copies of samples test reports are appended here.

The Licensee has made some effective measures for sewage, solid waste management during the summer - fall which include drainage of ponding water, clan up of debris & loose waste from access roads, bulk metal segregation, hazardous waste and waste batteries storage in secure containments. Facilities monitor and waste water & effluent sampling program carried during July-September in compliance to the Licence. The sewage lagoon was fully emptied by decanting during July 01-15 by the contractor for lagoon repair and improvement project. Sewage sludge was deposited on a liner geotube pad and filtered effluent discharged onto wetland. Samples test result shown control on contaminants parameters within allowable limits. We summarized those conditions and requirements outlined **in Parts B - H**.

We hope that Nunavut Water Board will find this report and supporting test results valuable to Annual Report in operating the Water Licence for water, sewage and solid waste facilities in Kugaaruk, Nunavut.

CGS is submitting this Annual Report 2019 on behalf of the Hamlet of Kugaaruk.

Best Regards,

Shah Alam, P. Eng. E.P.
Municipal Planning Engineer,
Government of Nunavut, Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
Phone: 867-983-4156, fax: 867-983-4124
salam@gov.nu.ca<mailto:salam@gov.nu.ca>

CC: John Ivey, Chief Administrative Officer, Hamlet of Kugaaruk, NU
Baba Pedersen, Resource Management Officer, AANDC

EXECUTIVE SUMMARY:

This Annual Report 2019 for the Nunavut Water License 3BM-PEL1929, prepared by the Hamlet of Kugaaruk to meet requirements of conditions to Monitoring program. This report covers the period January 01 to December 31, 2019.

Raw water intake through twin intake pumps from the river location marked at PEL- 1, treated by Cartage filters using 20 micron (M) through 1 micron (M), followed by UV system, and chlorination before supply to community household tanks by hamlet operated water trucks. Quantity of water uses during this period is about **37,094** m3, within the allowable limit of 45,000 m3 (previous). The new Licence 3BM-PEL1929 has increased the intake limits to 60,000 m3 annually.

Raw sewage water collected from household sewage tanks using hamlet operated vacuum trucks, hauled to sewage lagoon where it discharged through discharge flute. Raw sewage stayed inside the lagoon for almost 9 months frozen. Decanting of lagoon water carried during early July this year to empty the lagoon to increase capacity by blasting and cleaning lagoon bottom and sides. Sewage sludge was pumped out into a geotube pad to the north west of the lagoon. Samples were collected before, during and after decanting and tested at Taiga Laboratory for parameter values to verify compliance to Environmental regulation.

Household wastes were collected by hamlet operated covered truck and hauled to community waste dump site. Wastes from private user and commercial users were hauled by their trucks to the waste facility under hamlet administration. Major cleanup to solid waste facility were done during July-Sep and items clean included waste fuel drums, wood products, plastic products, metal products, aluminum, tin, animal carcass, and household waste components . Dumps from school burn items cleaned up from inside location of the metal dump at owner cost. There is no separate facility for spills or hazardous materials, but these liner cells temporary storage. Waste oil, waste paint drums and waste batteries replaced into C-cans and waiting for shipping out.

Construction work will resume in summer 2020 to complete the lagoon improvement work which will require re-empty the lagoon through mechanical pump. The licensee is working with GN- CGS to stay compliance with regulations during the construction improvement works.

General Conditions:

- Water quantity intake from all sources and supplied to community residents, commercial, institutional and other uses are shown from monthly records, and sewage volume estimated as maximum percentage of possible water volume, measured on daily basis.
- No modification to sewage waste disposal, wetland or solid waste site during this period.
- No other unauthorized discharge to water or waste but continuous leak at sewage lagoon.
- No changes to O&M manuals for water system, sewage & solid waste facilities Monitoring
- No changes to Spill Contingency Plans for sewage and solid waste management as approved.
- Plan of Compliances were followed as approved for summer, spring, fall and winter.
- Annual quantity of **37, 094 m3** water drawn from the river is within the allowable annual limit **45,000** m3 (previous) and **60,000** m3 (new limit). Water supply to household tanks by Hamlet operated trucks 7days a week.
- Truckfill area and turn around area were levelled, graded with hamlet operator and clear the intake point at river water mark. Signs were re-firmed at intake point and inside the treatment plant building as directed by the Inspector.

Waste Disposal

- Sewage waste both grey and black combined from urinal, toilet flush and shower and kitchen water are stored in the household tank and collected by vacuum truck which is hauled to community sewage lagoon and discharged.
- Amount of sewage generated during this period is less than 32,000 m3 which is calculated considering 90-95 % of water supply by truck.
- Due to lagoon improvement work, lagoon emptied about a month earlier than as usual.
- All sewage and waste effluent samples were tested for parameters before decanting outside.
- Freeboard at sewage lagoon maintained more than1.0 m and decanted twice using a pump.
- The existing wetland and control pond facilities used for final polishing and remediation of sewage water. Test results are attached.

Non-hazardous domestic Solid Waste:

- Residents store household waste at the prescribed bins by the hamlet, and hamlet operated trucks hauled them to the dump site 3-4 days a week. Hazardous waste are separated from regular waste and secured inside the C-can for shipping out.
- All the loose waste other than heavier bulk were burn and buried inside trenches along with small debris pieces by pushing down and covered by gravels.
- Waste batteries were secured inside the C-can in wooden boxes wrap with plastic sheets.
- Paper board, cloth, light wood product and loose materials were reduced by slow burning time to time and animal carcass buried under sand-pit inside the facility.
- Annual monitoring of water source, sewage and solid waste effluent were carried by the hamlet operators during summer - fall. Samples were collected from monitoring stations as part of QA/QC plan implementation and tested for parameters at Taiga Laboratory.

ANNUAL REPORT

YEAR BEING REPORTED: 2019

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-PEL1929** (previous 3BM-PEL 1419**)** issued to the **Hamlet of Kugaaruk**

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 quantities of water used as reported in our On Tap Water Delivery System and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged
January	3,331,469.70	Same
February	3,058,858.80	Same
March	3,245,792.10	Same
April	3,067,672.80	Same
May	3,140,051.50	Same
June	2,622,309.00	Same
July	3,358,285.30	Same
August	3,079,999.40	Same
September	3,145,845.90	Same
October	3,051,461.70	Same
November	2,990,407.40	Same
December	3,021,553.90	Same
ANNUAL TOTAL	**37,093,707.50**	Same

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

Water Treatment and supply:

- No major works for water treatment plant but replaced the water outlet pipe section that connects to truckfill arm feed to water trucks outside by using a Pendant.
- Cartage filters changes in 2-3 months and UV tube lights (after 1000 hours running) or as needed which is part of treatment plant operation.
- Depression and potholes on truckfill and truck turn around area were filled by gravel sands locally collected and graded by hamlet operator. Accidentally the grader hits one of the truckfill arm that resulted a water shut-off from plant to truckfill but has ponded inside the building. The operator of the WTP has noticed the issue on the following day and notified the Chief Administrative officer and GN-CGS. Water truckfill resumed on the following evening after the torn pipe piece replaced and connected by the Hamlet operator.

Water intake:
Kugaaruk Water Treatment system integrates with twin intake lines housed in 300 mm HDPE casings, connected to cylindrical screen (Johnson Screen) inside the Kugajuk River. Twin pumps of 15 hp (Grundfos Canada) capable for water intake at a rate of 18.9 L/s.

Water treatment:
comprises with cartage filtration system ranging 10 M-1M in two trains followed by UV disinfection (Neotech) system with recirculation pump of 0.41 L/s flowrate.

Control:
Intake control salinity sensor (Walchem), turbidity sensor (HF Scientific) & flow meter, auto dialling telephone system to transmit and alarm for operators.
Chlorination: using mixing tank (66 L) and holding tank (114 L) in two steps Cl2 dosing

Power:
The treatment system and intake run by 3-phase power line and a generator for backup power (in old treatment building) when grid power (3p) fails

Tanks:
Sanitary tank of 1200 L and domestic water tank of 114 L for plant building uses
Truckfill: two truckfill arms, one on each side of the building - operation from outside / inside

Sewage facility:
Built in 2008 with capacity 46,600 m3 for upto 12 months sewage deposition inside serving 20

years (2008-2028) period. This existing lagoon was built on the foot-print of the previous lagoon (small cell type) with bentonite liner on berm inner sides and keyed into trench to permafrost, while the other end keyed inside the berm centre near the top. The inner slope and liner of the berm is secured with gravels pitching in riprap and the outer slope is covered with gravel layer. Raw sewage deposit into the lagoon from sewage truck and decant from lagoon to wetland when thaw in July–September.

- To initiate the improvement works and necessary blasting on floor, the decanting took place this year during 1st week of Jun but used a geotube for temporary holding of decanted sewage water before diverting onto wetland. Samples test results were verified for the compliances of parameters values.

Kugaaruk Solid waste facility receives household refuse waste with metal waste and hazardous waste from hamlet truckloads and any other client dumps under the administration of the hamlet. Since the operation in 2008, solid waste and metal dump area were separated, fenced, isolated cell for hazardous waste. The hamlet has made some waste reduction process time to time in the facility including loose burning, waste segregation, packing and burying, boxing hazardous and batteries and crushing bulk metals to smaller pieces.

- The hamlet has proposed to reinstate the fence around the facility, a metal gate, big facility signage and watch shade to better control of the facility and waste management program.

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

- Sewage lagoon leak continued at south side and north side localized and spreaded on the grassy surface. Leak sewage heaped on locations while frozen in winter and will flow down again when thaws in coming summer and lagoon improvement work resume.
- Dillon Consultant had provided direction to the contractor to better management plan of the leak sewage which may include geo-filtration, aeration and diversion of flow over the wetland to maximize the benefits of holding time on sunlight and oxygen. Sampling will be carried continuously on monthly basis as part of monitoring program.
- The CIRNAC inspector had concern of the residual sludge on geotube pad after the repair works completed which may require multi-year clean up and sampling from the location of storage if not dry fully.
- The project works included this concern and a plan for A&R of the geotube pad and/or repurpose for sludge drying facility in future when needed.

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 facility abandoned during this year, but anticipated restoration completion of the lagoon structure and berm by the end of 2020.
A fence will be built around the sewage facility and solid waste facility to better manage these facilities operation as acknowledged to the inspector of his concern.

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**;

Sewage lagoon has been leaking since 2014 and the Board is aware of the issue and current improvement steps in compliance to environmental regulation. Although, berm leak was a concern but not indicated a failure of the lagoon.
Once the lagoon repair completed, a better understanding can be established about the efficiency of natural wetland or any diversion, a plan to update the wetland study and the geotechnical report.

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

No specific request by the Board or the inspector but to monitor effluent quality.

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

- O&M manuals of solid waste, metal dump, sewage lagoon remains active since 2014 and the last update in August 2019 with the Renewal Application follow up.
- Expected an update to sewage lagoon O&M manual when contract completed.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

Debris and burnt metals from the Kugaaruk school were placed inside the facility and were removed and reduced by the owner management. The Hamlet is now working with Housing Corporation to manage another house burn materials stored inside the facility.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

CGS is working on funding arrangement to fence and gate the waste facility.

Kugaaruk Water Licence: 3BM-PEL 1419 — Monitoring Stations (recommended)

Station (current)	Station (new)	Description of station/well uses	Station coordinates: Latitude	Station coordinates: Longitude	Sampling and duration Frequency	Status and Quality Control
PEL-1	**PEL-1**	Water intake point from Kugajuk River			Daily	Active (Volume)
PEL-2	**PEL-2**	Raw Sewage drop-off station at lagoon	68°31'13.66 N	89°49'49.25"W	Daily	Active (Volume)
PEL 3-1	**PEL 3-1**	Effluent decanting station from lagoon	68°31'16.2"N	89°50'02.2"W	Prior to decanting	Active (Quality)
PEL 3-2	**PEL 3-2**	Effluent discharge from waiting cell	68°31'17.91"N	89°50'03.19"W	During decanting	Active (Quality)
PEL- 4	**PEL-4**	Effluent Final discharge to Ocean	68°31'21.38"N	89°50'16.06"W	Monthly (Jun-Sep)	Active (Quality)
PEL-5	**x**	Effluent mixing 5m water in Ocean				Not required
PEL-6	**PEL -6**	Station for run-off from Solid Waste	68°31'14.01"N	89°49'43.67"W	Monthly (Jun-Sep)	Active (Quality)
PEL -7	**PEL-7**	Well at Up-gradient of Metal Dump	68°31'03.65"N	89°49'03.14"W	Once, during ground thaws	Active (Quality)
PEL 8-1	**x**					Not required
PEL 8-2	**x**					Not required
PEL 9-1	**PEL 8-1**	Well at Down gradient of Metal Dump	68°30'58.76"N	89°49'24.04"W	Once, during ground thaws	Active (Quality)
PEL 9-2	**PEL-5**	Station for Run-off from Metal Dump	68°30'59.94"N	89°49'26.21"W	Monthly (Jun-Sep)	Active (Quality)
PEL 10-1	**x**					Not required
PEL 10-2	**PEL 8-2**	Well at Down gradient of Solid Waste	68°31'09.61"N	89°49'41.99"W	Once during ground thaws	Active (Quality)

Sewage Effluent Results: Kugaaruk 2019

Test type	Parameters	Units	MAC Limits PEL-3	MAC Limits PEL-4	17-Jun-19			04-Jul-19										
					PEL 3-1 Lagoon Decant	PEL 3-2 Outercell	PEL-4 Final	PEL 3-1 Lagoon	PEL 3-2 Outercell	PEL-4 Final	PEL-6 Solid	PEL-7 Metal	PEL 3-1 Lagoon	PEL 3-2 Outercell	PEL-4 Final	PEL-6 Solid Runoff	PEL-7 Metal Run-off	PEL-8 Run-off
Physicals	Alkalinity	mg/L			453	183	148	402	409	395	297	36.7	409	411	408	306	39.5	43.3
	Conductivity	µS/cm			1300	537	424	1190	1200	1120	1050	119	1170	1180	1160	1020	136	138
	P^h	p^h	6-9	6-9	7.27	7.41	7.46	7.52	7.55	7.55	7.39	7.34	7.52	7.56	7.62	7.33	7.33	7.04
	TSS	mg/L	180	45	32	< 3	18	403	393	386		61	27	27	32		4	6
Nutrients	Ammonia as N_2	mg/L			93.6	26.6	25.7						91.1	84.7	80.7	3.4	< 0.0050	< 0.0050
	BOD_5	mg/L	120	45	365	9	63	313	300	187	17	3	290	292	226	16	2	3
	CBOD	mg/L			340	8	57	331	304	197								
	Dissolved, C	mg/L										3.1	142	135	112	24.9	3.6	3.2
	Total, C	mg/L			204	23.9	36.6					3.1	175	172	145	29.2	3.3	3.1
Major Ions	Nitrate as N_2	mg/L	45	45	0.08	0.48	0.15							0.61	0.62	0.91	0.31	0.32
	Nitrite as N_2	mg/L	3	3	< 0.01	0.09	< 0.01							< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Calcium	mg/L	32	32	19.8	19.3	14.1	19.4	21.2	26.9	135	11	19.2	18.6	21	129	12.6	13.4
	Chloride	mg/L	100	100	89.3	45.5	30	81.4	80.1	78.1	52.2	7.4	80.6	80.5	80	52.3	9.6	9.1
	Hardness	mg/L	500	500	90.6	74.3	51.6	88.3	91.5	107	399	36.2	85	83.3	89.8	380	41.8	43.8
	Magnesium	mg/L			10	6.4	4	9.6	9.3	9.6	14.8	2.1	9	8.9	9.1	14.2	2.5	2.5
	Potassium	mg/L			28.2	13.8	8.7	25.1	25.1	24.2	12	1.2	25.1	25.2	25.1	11.6	1.3	1.1
	Sodium	mg/L	200	200	67.2	35.3	22.6	59.8	59.8	58.9	59.1	8	59.9	60.2	60	60.2	9.3	9.3
	Sulphate	mg/L	500	500	8	11	7	11	12	9	< 1	1	4	4	4	178	12	12
Microbiology	Total, Coliforms																	
	Escherichia Coli																	
	Fecal Coliform	CFU/100m	$1x10^6$	$1x10^6$	2.2 x 10^6	2	2.4 x 10^4	1.27 X 10^4	1.2 x 10^5	7 x 10^4	120	< 1	2000	3 x 10^5	1.8 x 10^5	200	< 1	< 1
Organics	Oil & Grease, Visible	Visibility			Non-visable	Non-visable	Non-visable						Non-visible	Non-visible	Non-visible	Non-visible	Non-visible	Non-visible
	Total Cyanide				< 0.0050	< 0.0050	< 0.0050											
	Total Phenols				0.601	0.0033	0.0828	0.537	0.511	0.38	0.0015	< 0.0010	0.58	0.575	0.531	0.0047	< 0.0010	< 0.0010
	Ethylbenzene															< 0.002	< 0.002	< 0.002
	Toluene																< 0.002	< 0.002
	Xylenes																< 0.002	< 0.002
Metals(T)	Aluminium	µg/L		200	214	36.2	69	207	175	84.8	64.4	73	169	161	108	53.1	104	43.7
	Arsenic	µg/L		25	1.4	1.7	0.9	1.2	1.4	1.9	1.6	0.3	1.3	1.3	1.6	1.5	0.4	0.5
	Barium	µg/L						5.6	5.7	6.1	47.5	6						
	Cadmium	µg/L		5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
	Chromium	µg/L		50	0.9	0.2	0.2	1.1	0.1	0.6	2	0.2	0.8	0.8	1	1.1	0.2	0.1
	Cobalt	µg/L		50	0.6	1.2	0.7	0.6	0.9	1.6	1.7	< 0.1	0.7	0.7	1.2	1.6	< 0.1	< 0.1
	Copper	µg/L		200	91.4	6.4	23.6	89.2	0.8	55.5	35.8	2.4	84	83	70.6	25.9	2.1	1.8
	Iron	µg/L		500	482	1060	207	607	569	1210	17300	65	591	556	757	13900	111	41
	Lead	µg/L		10	1	0.5	0.7						1.2	1.2	1.3	6	0.4	< 0.1
	Manganese	µg/L		50	83.6	277	129	86.4	569	309	1620	1.7	93.3	97.1	235	1530	3	3.4
	Mercury	µg/L			0.02	< 0.01	< 0.01	0.01	134	0.02	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Nickel	µg/L		200	2.4	2.5	1.1	2.5	2.7	3.8	5.9	0.3	2.4	2.4	3.1	5	0.4	0.3
	Silver	µg/L						0.4	0.3	0.2	< 0.1	< 0.1						
	Zinc	µg/L		500	128	< 5	14.7	65.2	65.9	39.6	374	11	65	5	50.4	262	12.1	10.5
Inorganics	Sulphide	mg/L			0.791	< 0.0018	0.091	2.2	12		0.0659	0.0032						

CIRNAC Report 2019:

Water samples results 2019

Water Licence: 3BM-PEL1929

Hamlet of Kugaaruk, NU

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Kugaaruk	Bobby Anaittuq
Licence No. / Expiry	**Representative's Title**
3BM-PEL1419	Acting Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
2019 July 3	Baba Pedersen

Activities Inspected

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

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen			Water Management Structures	A	1	Storage	C	4 & 5
Flow Measure. Device	C	2	Culverts / Bridges			Spills		
Source:			Drainage	C	8	Spill Plan		
Water Use:			Erosion / Sediment					
Recirculation (y /n)			Mitigation Measures			**Administrative**		
			Reclamation Activities	A	6	Records	C	2
			Materials Storage	A	7	Reports	A	3
Waste Disposal			Signage	A		Plans		
Waste Water	A	9				Notifications		
Solid Waste	A	6	**Monitoring**			**Other**		
Hazardous Waste	A	7	Sample Collection / Analysis	A				

**The number in the comments field will correspond with specific comments provided below.*

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

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

On July 3, 2019 I Inspected the Hamlet of Kugaaruk's Municipal Water License 3BM-PEL1419. I was accompanied by Shah Alam, GN-CGS Municipal Engineer as well as Bobby, Geaton, George and Etienne from the Hamlet of Kugaaruk.

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

We saw 1. The Raw Water Intake Pump House (photo 1), 2. The Flow Meter within the Raw Water Intake Pump House (photo 2), 3. The YTD Water Usage Sheet (photo 3), 4. The 3 Berm Cells in the Metal Dump (photo 4), 5. The various Used Oils stored in the Metal Dump (photos 5 & 6), 6. The Garbage Dump (photo 7), 7. The used Battery Program within the Garbage Dump (photos 8 & 9), 8. The Drainage Ditch just outside the Garbage Dump near the PEL-6 Sample Sign (photo 10) and 9. The Sewage Lagoon (photos 11 & 12).

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

Actions required are; 1. The Raw Water Intake Pump House/Truck Fill Station is in good working order. 2. The municipal consumption records MUST come from this Flow Meter to ensure accurate records. 3. The YTD Water Usage Sheet, produced from Daily Truck Delivery Sheets, showing 18,297 cubic meters in 6 months which is well within the 45,000 cubic meters allowable limits per year. 4. The Washed Crushed Drums in 2 of the 3 Bermed Cells MUST be removed to allow storage of Full Drums of Used Oils as in the other Cell. 5. These are the Full Used Oil Drums that need to be placed within the Bermed Cells mentioned in #4. 6. The Garbage Dump is in a very clean and organized state, thank you very much. 7. I commend the Hamlet for their efforts to Crate up Used Batteries and Store the Crates within Sea Cans ready for future shipment south for proper disposal. I encourage the Hamlet to continue these efforts. 8. This Drainage Ditch must be cleaned up and all debris removed. 9. The Sewage Lagoon is under repair construction to fix the ongoing leaks. The project is due for completion before the end of 2019. During the construction period, the Hamlet is temporarily using the Lower Cell as the Active Main Cell.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	July 3, 2019

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

cc. CIRNAC, Manager Field Operations, Iqaluit, justin.hack@canada.ca

Nunavut Water Board, Manager of Licensing, Gjoa Haven, licensing@nwb-oen.ca

Gov't of Nunavut, Municipal Engineer, Cambridge Bay, salam@gov.nu.ca

PHOTO LOG

Date	Camera	Inspector	Authorization
2019 July 3	Sony DSC-HX50V	Baba Pedersen	3BM-PEL1419

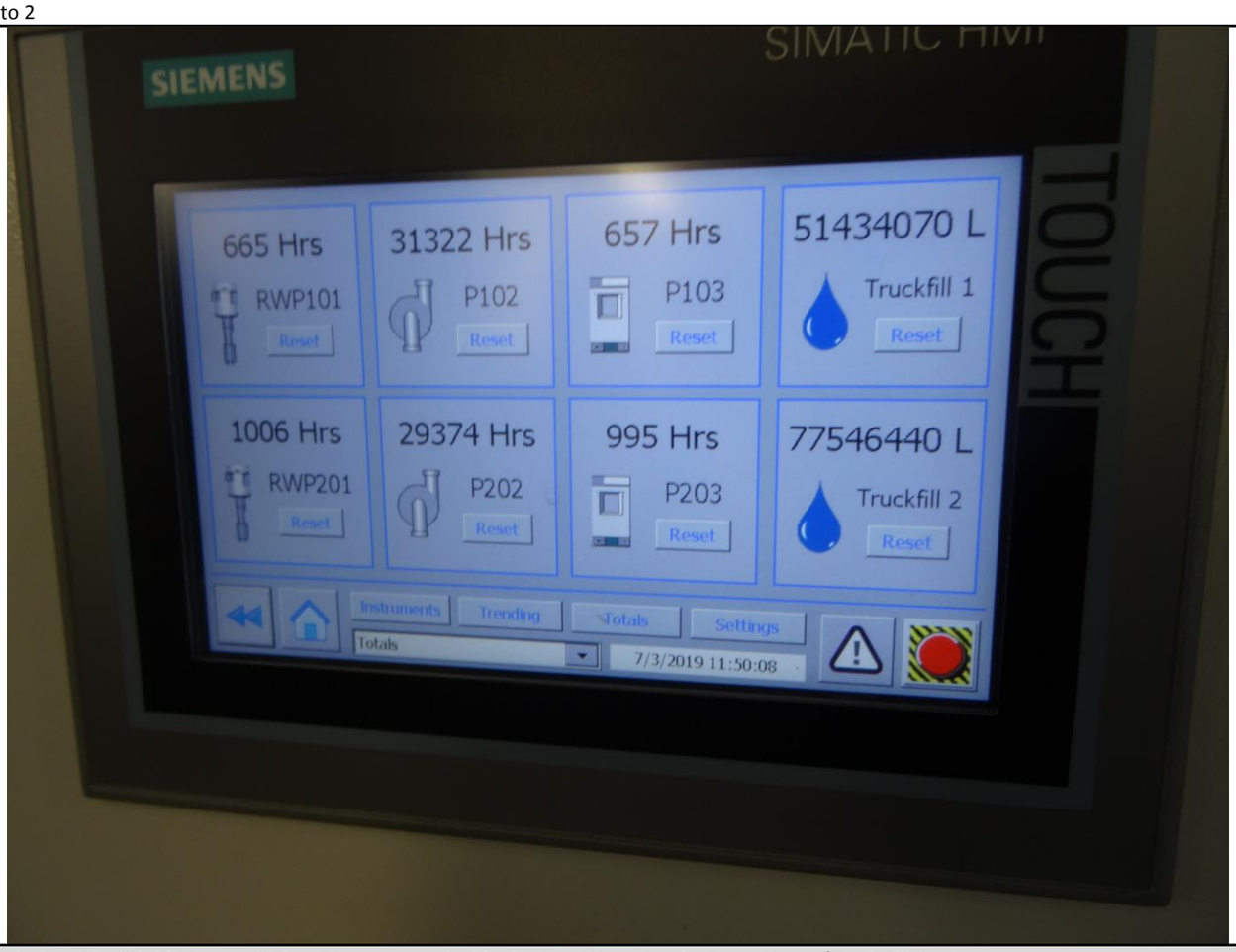
Photo Log # DSC04857

Photo 1

Description: The Raw Water Intake Pump House/Truck Fill Station

Photo Log # DSC04862

Photo 2



Description: The "Fluid Manager" Flow Meter screen inside the Raw Water Intake Pump House/Truck Fill Station

Photo Log # DSC04940

Photo 3

Description: The YTD Consumption Sheet showing 18,297 Cubic Meters in 6 months, produced from Daily Truck Delivery Sheets

Photo Log # DSC04879

Photo 4

Description: 3 Bermed Cells in the Metal Dump containing Used Oil Drums in 1 Cell and Washed Crushed Drums in the other 2 Cells

Photo Log # DSC04886

Photo 5

Description: Plastic Containers of Used Oil (some damaged) in the Metal Dump requiring clean-up

Photo Log # DSC04888

Photo 6

Description: Full Drums of Used Oils in the Metal Dump to be placed within the Bermed Cells

Photo Log # DSC04901

Photo 7

Description: Garbage Dump shown in a very nice clean and organized state

Photo Log # DSC04904

Photo 8

Description: Partial Container of Crated Used Batteries in the Garbage Dump

Photo Log # DSC04908

Photo 9

Description: Full Container of Crated Used Batteries in the Garbage Dump

Photo Log # DSC04914

Photo 10

Description: Drainage Ditch outside the Garbage Dump requiring clean-up

Photo Log # DSC04917

Photo 11

Description: Upper Cell of the Sewage Lagoon under repair construction

Photo Log # DSC04927

Photo 12

Description: Lower Cell of the Sewage Lagoon being used as the active main cell during repair construction

Appendix A:

Water samples results 2019

Water Licence: 3BM-PEL1929

Hamlet of Kugaaruk, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- FINAL REPORT -

Prepared For: Hamlet of Kugaaruk

Address: Box 205
Kugaaruk, NU,X0B 1K0

Attn: **John Ivey** **Facsimile: 867-769-6069**

Final report has been reviewed and approved by:

Glen Hudy
Quality Assurance Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
  - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
  - Environment Canada
  - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Plant **Taiga Sample ID:** 001

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:31
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: School **Taiga Sample ID:** 002

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:10
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Co-op Hotel **Taiga Sample ID:** 003

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:04
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: River **Taiga Sample ID:** 004

Client Project:
Sample Type: Raw Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:30
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	98.7	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	4.1	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Truck #2 **Taiga Sample ID:** 005

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:27
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Truck #1 **Taiga Sample ID:** 006

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:20
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Co-op Store **Taiga Sample ID:** 007

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:15
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Health Center **Taiga Sample ID:** 008

Client Project:
Sample Type: Treated Water
Received Date: 01-Oct-19
Sampling Date: 30-Sep-19
Sampling Time: 13:45
Location: Kugaaruk Water Systems
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	01-Oct-19	SM9223:B	

ReportDate: Friday, October 04, 2019
Print Date: ***Monday, October 07, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190943

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Health Center **Taiga Sample ID:** 008

*** Taiga analytical methods are based on the following standard analytical methods**

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Friday, October 04, 2019

Print Date: *Monday, October 07, 2019*

Appendix B:

Sewage and waste samples results 2019

Water Licence: 3BM-PEL1929

Hamlet of Kugaaruk, NU

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- FINAL REPORT -

Prepared For: Hamlet of Kugaaruk

Address: Box 205
Kugaaruk, NU,X0B 1K0

Attn: **John Ivey** **Facsimile: 867-769-6069**

Final report has been reviewed and approved by:

Glen Hudy
Quality Assurance Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
  - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
  - Environment Canada
  - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 001

Client Project: Kugaaruk Sewage Waste
Sample Type: Sewage Water
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:00
Location: Sewage Lagoon and Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	290	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	142	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	175	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	409	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	1170	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.52		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	27	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	19.2	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	80.6	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	85.0	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	9.0	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.64	0.01	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 001

Potassium	25.1	0.1	mg/L	11-Jul-19	SM4110:B	
Sodium	59.9	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	4	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	2000	100	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Subcontracted Nutrients						
Ammonia as Nitrogen	91.10	1.3	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	0.5800	0.010	mg/L	15-Jul-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	169	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	1.3	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	0.8	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	0.7	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	84.0	0.2	µg/L	22-Jul-19	EPA200.8	
Iron	591	5	µg/L	22-Jul-19	EPA200.8	
Lead	1.2	0.1	µg/L	22-Jul-19	EPA200.8	
Manganese	93.3	0.1	µg/L	22-Jul-19	EPA200.8	
Mercury	0.01	0.01	µg/L	22-Jul-19	EPA200.8	
Nickel	2.4	0.1	µg/L	22-Jul-19	EPA200.8	
Zinc	65.0	5	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-2 **Taiga Sample ID:** 002

Client Project: Kugaaruk Sewage Waste
Sample Type: Decanted Sewage
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:00
Location: Sewage Lagoon and Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	292	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	135	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	172	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	411	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	1180	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.56		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	27	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	18.6	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	80.5	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	83.3	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	8.9	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.61	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.61	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-2 **Taiga Sample ID:** 002

Potassium	25.2	0.1	mg/L	11-Jul-19	SM4110:B	
Sodium	60.2	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	4	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	300000	10000	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Subcontracted Nutrients						
Ammonia as Nitrogen	84.70	1.3	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	0.5750	0.010	mg/L	15-Jul-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	161	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	1.3	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	0.8	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	0.7	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	83.0	0.2	µg/L	22-Jul-19	EPA200.8	
Iron	556	5	µg/L	22-Jul-19	EPA200.8	
Lead	1.2	0.1	µg/L	22-Jul-19	EPA200.8	
Manganese	97.1	0.1	µg/L	22-Jul-19	EPA200.8	
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8	
Nickel	2.4	0.1	µg/L	22-Jul-19	EPA200.8	
Zinc	68.6	5	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

Client Project: Kugaaruk Sewage Waste
Sample Type: Final Discharge
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:00
Location: Sewage Lagoon and Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	226	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	112	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	145	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	408	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	1160	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.62		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	32	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	21.0	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	80.0	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	89.8	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	9.1	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.62	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.62	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-4 **Taiga Sample ID:** 003

Potassium	25.1	0.1	mg/L	11-Jul-19	SM4110:B	
Sodium	60.0	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	4	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	180000	10000	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Subcontracted Nutrients						
Ammonia as Nitrogen	80.70	1.3	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	0.5310	0.010	mg/L	15-Jul-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	108	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	1.6	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	1.0	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	1.2	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	70.6	0.2	µg/L	22-Jul-19	EPA200.8	
Iron	757	5	µg/L	22-Jul-19	EPA200.8	
Lead	1.3	0.1	µg/L	22-Jul-19	EPA200.8	
Manganese	235	0.1	µg/L	22-Jul-19	EPA200.8	
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8	
Nickel	3.1	0.1	µg/L	22-Jul-19	EPA200.8	
Zinc	50.4	5	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID:** 004

Client Project: Kugaaruk Solid Waste
Sample Type: Solid Waste Runoff
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:30
Location: Solid Waste and Metal Dump Runoffs
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	16	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	24.9	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	29.2	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	306	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	1020	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.33		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	25	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	129	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	52.3	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	380	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	14.2	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.91	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	11-Jul-19	SM4110:B	
Potassium	11.6	0.1	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID:** 004

Sodium	60.2	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	178	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	200	100	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Benzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Ethylbenzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
F2: C10-C16	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F3: C16-C34	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F4: C34-C50	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Toluene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Xylenes	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Subcontracted Nutrients						
Ammonia as Nitrogen	3.400	0.13	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	0.0047	0.001	mg/L	15-Jul-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	53.1	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	1.5	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	0.2	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	1.1	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	1.6	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	25.9	0.2	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-6 **Taiga Sample ID:** 004

Iron	13900	5	µg/L	22-Jul-19	EPA200.8
Lead	6.0	0.1	µg/L	22-Jul-19	EPA200.8
Manganese	1530	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	5.0	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	262	5	µg/L	22-Jul-19	EPA200.8

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-7 **Taiga Sample ID:** 005

Client Project: Kugaaruk Solid Waste
Sample Type: Metal Waste Runoff
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:30
Location: Solid Waste and Metal Dump Runoffs
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	2	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	3.6	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	3.3	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	39.5	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	136	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.33		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	4	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	12.6	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	9.6	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	41.8	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	2.5	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.31	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	11-Jul-19	SM4110:B	
Potassium	1.3	0.1	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-7 **Taiga Sample ID:** 005

Sodium	9.3	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	12	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Benzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Ethylbenzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
F2: C10-C16	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F3: C16-C34	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F4: C34-C50	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Toluene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Xylenes	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Subcontracted Nutrients						
Ammonia as Nitrogen	< 0.0050	0.005	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	< 0.0010	0.001	mg/L	15-Jul-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	104	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	0.4	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	0.2	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	2.1	0.2	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-7 **Taiga Sample ID:** 005

Iron	111	5	µg/L	22-Jul-19	EPA200.8
Lead	0.4	0.1	µg/L	22-Jul-19	EPA200.8
Manganese	3.0	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	0.4	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	12.1	5	µg/L	22-Jul-19	EPA200.8

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8 **Taiga Sample ID:** 006

Client Project: Kugaaruk Solid Waste
Sample Type: Run-off Down Gradient
Received Date: 11-Jul-19
Sampling Date: 10-Jul-19
Sampling Time: 10:30
Location: Solid Waste and Metal Dump Runoffs
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	3	2	mg/L	11-Jul-19	SM5210:B	
Organic Carbon, Dissolved	3.2	0.5	mg/L	16-Jul-19	SM5310:B	
Organic Carbon, Total	3.1	0.5	mg/L	17-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	43.3	0.4	mg/L	11-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	138	0.4	µS/cm	11-Jul-19	SM2510:B	
pH	7.04		pH units	11-Jul-19	SM4500-H:B	
Solids, Total Suspended	6	3	mg/L	16-Jul-19	SM2540:D	
Major Ions						
Calcium	13.4	0.1	mg/L	11-Jul-19	SM4110:B	
Chloride	9.1	0.7	mg/L	11-Jul-19	SM4110:B	
Hardness	43.8	0.7	mg/L	11-Jul-19	SM4110:B	
Magnesium	2.5	0.1	mg/L	11-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.32	0.01	mg/L	11-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	11-Jul-19	SM4110:B	
Potassium	1.1	0.1	mg/L	11-Jul-19	SM4110:B	

ReportDate: Monday, July 29, 2019
Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8 **Taiga Sample ID:** 006

Sodium	9.3	0.1	mg/L	11-Jul-19	SM4110:B	
Sulphate	12	1	mg/L	11-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL	11-Jul-19	SM9222:D	
Organics						
Benzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Ethylbenzene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
F2: C10-C16	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F3: C16-C34	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
F4: C34-C50	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	18-Jul-19	EPA8015B	
Oil and Grease, visible	Non-visible			11-Jul-19	Visual Exam	
Toluene	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Xylenes	< 0.002	0.002	mg/L	16-Jul-19	EPA8260B	110
Subcontracted Nutrients						
Ammonia as Nitrogen	< 0.0050	0.005	mg/L	15-Jul-19	SM4500 NH3	
Subcontracted Organics						
Phenols, Total	< 0.0010	0.001	mg/L	15-Jul-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	43.7	5	µg/L	22-Jul-19	EPA200.8	
Arsenic	0.5	0.2	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Chromium	0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Copper	1.8	0.2	µg/L	22-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8 **Taiga Sample ID:** 006

Iron	41	5	µg/L	22-Jul-19	EPA200.8
Lead	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Manganese	3.4	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	0.3	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	10.5	5	µg/L	22-Jul-19	EPA200.8

ReportDate: Monday, July 29, 2019
Print Date: *Monday, July 29, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190498

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL-8 **Taiga Sample ID:** 006

- DATA QUALIFERS -

Data Qualifier Descriptions:

110 *Reported result uncertain, due to air in vial.*

224 *Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

*** Taiga analytical methods are based on the following standard analytical methods**

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate: Monday, July 29, 2019

Print Date: ***Monday, July 29, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- FINAL REPORT -

Prepared For: Hamlet of Kugaaruk

Address: Box 205
Kugaaruk, NU,X0B 1K0

Attn: John Ivey **Facsimile:** 867-769-6069

Final report has been reviewed and approved by:

Glen Hudy
Quality Assurance Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
  - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
  - Environment Canada
  - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 001

Client Project:
Sample Type: Lagoon Decant
Received Date: 18-Jun-19
Sampling Date: 17-Jun-19
Sampling Time: 10:30
Location: Kugaaruk Sewage and Solid Waste Facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	93.6	0.005	mg/L	18-Jun-19	SM4500-NH3:G	
Biochemical Oxygen Demand	365	2	mg/L	18-Jun-19	SM5210:B	
CBOD	340	2	mg/L	18-Jun-19	SM5210:B	
Organic Carbon, Total	204	0.5	mg/L	25-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	453	0.4	mg/L	18-Jun-19	SM2320:B	
Conductivity, Specific (@25C)	1300	0.4	µS/cm	18-Jun-19	SM2510:B	
pH	7.27		pH units	18-Jun-19	SM4500-H:B	
Solids, Total Suspended	32	3	mg/L	24-Jun-19	SM2540:D	
Major Ions						
Calcium	19.8	0.1	mg/L	19-Jun-19	SM4110:B	
Chloride	89.3	0.7	mg/L	19-Jun-19	SM4110:B	
Hardness	90.6	0.7	mg/L	19-Jun-19	SM4110:B	
Magnesium	10.0	0.1	mg/L	19-Jun-19	SM4110:B	

ReportDate: Thursday, July 04, 2019
Print Date: ***Thursday, July 04, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 001

Nitrate as Nitrogen	0.08	0.01	mg/L	19-Jun-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.08	0.01	mg/L	19-Jun-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	19-Jun-19	SM4110:B	
Potassium	28.2	0.1	mg/L	19-Jun-19	SM4110:B	
Sodium	67.2	0.1	mg/L	19-Jun-19	SM4110:B	
Sulphate	8	1	mg/L	19-Jun-19	SM4110:B	
Microbiology						
Coliforms, Fecal	2200000	10000	CFU/100mL	18-Jun-19	SM9222:D	
Organics						
Oil and Grease, visible	Non-visible			18-Jun-19	Visual Exam	
Subcontracted Inorganics						
Sulphide	0.791	0.0015	mg/L	26-Jun-19	APHA4500-S2	
Subcontracted Organics						
Cyanide, Total	< 0.0050	0.005	mg/L	29-Jun-19	APHA4500-CN	
Phenols, Total	0.6010	0.020	mg/L	28-Jun-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	214	5	µg/L	24-Jun-19	EPA200.8	
Arsenic	1.4	0.2	µg/L	24-Jun-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8	
Chromium	0.9	0.1	µg/L	24-Jun-19	EPA200.8	
Cobalt	0.6	0.1	µg/L	24-Jun-19	EPA200.8	
Copper	91.4	0.2	µg/L	24-Jun-19	EPA200.8	
Iron	482	5	µg/L	24-Jun-19	EPA200.8	
Lead	1.0	0.1	µg/L	24-Jun-19	EPA200.8	
Manganese	83.6	0.1	µg/L	24-Jun-19	EPA200.8	

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-1 **Taiga Sample ID:** 001

Mercury	0.02	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	2.4	0.1	µg/L	24-Jun-19	EPA200.8
Zinc	128	5	µg/L	24-Jun-19	EPA200.8

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-2 **Taiga Sample ID:** 002

Client Project:
Sample Type: Outercell Wetland
Received Date: 18-Jun-19
Sampling Date: 17-Jun-19
Sampling Time: 10:30
Location: Kugaaruk Sewage and Solid Waste Facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	26.6	0.005	mg/L	18-Jun-19	SM4500-NH3:G	
Biochemical Oxygen Demand	9	2	mg/L	18-Jun-19	SM5210:B	
CBOD	8	2	mg/L	18-Jun-19	SM5210:B	
Organic Carbon, Total	23.9	0.5	mg/L	25-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	183	0.4	mg/L	18-Jun-19	SM2320:B	
Conductivity, Specific (@25C)	537	0.4	µS/cm	18-Jun-19	SM2510:B	
pH	7.41		pH units	18-Jun-19	SM4500-H:B	
Solids, Total Suspended	< 3	3	mg/L	24-Jun-19	SM2540:D	
Major Ions						
Calcium	19.3	0.1	mg/L	19-Jun-19	SM4110:B	
Chloride	45.5	0.7	mg/L	19-Jun-19	SM4110:B	
Hardness	74.3	0.7	mg/L	19-Jun-19	SM4110:B	
Magnesium	6.4	0.1	mg/L	19-Jun-19	SM4110:B	
Nitrate as Nitrogen	0.48	0.01	mg/L	19-Jun-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.56	0.01	mg/L	19-Jun-19	SM4110:B	

ReportDate: Thursday, July 04, 2019
Print Date: ***Thursday, July 04, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-2 **Taiga Sample ID:** 002

Nitrite as Nitrogen	0.09	0.01	mg/L	19-Jun-19	SM4110:B
Potassium	13.8	0.1	mg/L	19-Jun-19	SM4110:B
Sodium	35.3	0.1	mg/L	19-Jun-19	SM4110:B
Sulphate	11	1	mg/L	19-Jun-19	SM4110:B
Microbiology					
Coliforms, Fecal	2	1	CFU/100mL	18-Jun-19	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			18-Jun-19	Visual Exam
Subcontracted Inorganics					
Sulphide	< 0.0018	0.0018	mg/L	26-Jun-19	APHA4500-S2
Subcontracted Organics					
Cyanide, Total	< 0.0050	0.005	mg/L	27-Jun-19	APHA4500-CN
Phenols, Total	0.0033	0.001	mg/L	28-Jun-19	AB ENV.06537
Trace Metals, Total					
Aluminum	36.2	5	µg/L	24-Jun-19	EPA200.8
Arsenic	1.7	0.2	µg/L	24-Jun-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Chromium	0.2	0.1	µg/L	24-Jun-19	EPA200.8
Cobalt	1.2	0.1	µg/L	24-Jun-19	EPA200.8
Copper	6.4	0.2	µg/L	24-Jun-19	EPA200.8
Iron	1060	5	µg/L	24-Jun-19	EPA200.8
Lead	0.5	0.1	µg/L	24-Jun-19	EPA200.8
Manganese	277	0.1	µg/L	24-Jun-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	2.5	0.1	µg/L	24-Jun-19	EPA200.8

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 3-2 **Taiga Sample ID:** 002

Zinc	<	5.0	5	µg/L	24-Jun-19	EPA200.8

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 4 **Taiga Sample ID:** 003

Client Project:
Sample Type: Final Discharge Point
Received Date: 18-Jun-19
Sampling Date: 17-Jun-19
Sampling Time: 10:30
Location: Kugaaruk Sewage and Solid Waste Facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	25.7	0.005	mg/L	18-Jun-19	SM4500-NH3:G	
Biochemical Oxygen Demand	63	2	mg/L	18-Jun-19	SM5210:B	
CBOD	57	2	mg/L	18-Jun-19	SM5210:B	
Organic Carbon, Total	36.6	0.5	mg/L	25-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	148	0.4	mg/L	18-Jun-19	SM2320:B	
Conductivity, Specific (@25C)	424	0.4	µS/cm	18-Jun-19	SM2510:B	
pH	7.46		pH units	18-Jun-19	SM4500-H:B	
Solids, Total Suspended	18	3	mg/L	24-Jun-19	SM2540:D	
Major Ions						
Calcium	14.1	0.1	mg/L	19-Jun-19	SM4110:B	
Chloride	30.0	0.7	mg/L	19-Jun-19	SM4110:B	
Hardness	51.6	0.7	mg/L	19-Jun-19	SM4110:B	
Magnesium	4.0	0.1	mg/L	19-Jun-19	SM4110:B	
Nitrate as Nitrogen	0.15	0.01	mg/L	19-Jun-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.15	0.01	mg/L	19-Jun-19	SM4110:B	

ReportDate: Thursday, July 04, 2019
Print Date: ***Thursday, July 04, 2019***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 4 **Taiga Sample ID:** 003

Nitrite as Nitrogen	< 0.01	0.01	mg/L	19-Jun-19	SM4110:B
Potassium	8.7	0.1	mg/L	19-Jun-19	SM4110:B
Sodium	22.6	0.1	mg/L	19-Jun-19	SM4110:B
Sulphate	7	1	mg/L	19-Jun-19	SM4110:B
Microbiology					
Coliforms, Fecal	24000	1000	CFU/100mL	18-Jun-19	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			18-Jun-19	Visual Exam
Subcontracted Inorganics					
Sulphide	0.0910	0.0015	mg/L	26-Jun-19	APHA4500-S2
Subcontracted Organics					
Cyanide, Total	< 0.0050	0.005	mg/L	27-Jun-19	APHA4500-CN
Phenols, Total	0.0828	0.001	mg/L	27-Jun-19	AB ENV.06537
Trace Metals, Total					
Aluminum	69.0	5	µg/L	24-Jun-19	EPA200.8
Arsenic	0.9	0.2	µg/L	24-Jun-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Chromium	0.2	0.1	µg/L	24-Jun-19	EPA200.8
Cobalt	0.7	0.1	µg/L	24-Jun-19	EPA200.8
Copper	23.6	0.2	µg/L	24-Jun-19	EPA200.8
Iron	207	5	µg/L	24-Jun-19	EPA200.8
Lead	0.7	0.1	µg/L	24-Jun-19	EPA200.8
Manganese	129	0.1	µg/L	24-Jun-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	1.1	0.1	µg/L	24-Jun-19	EPA200.8

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 4 **Taiga Sample ID:** 003

Zinc	14.7	5	µg/L	24-Jun-19	EPA200.8

ReportDate: Thursday, July 04, 2019
Print Date: *Thursday, July 04, 2019*

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190376

- CERTIFICATE OF ANALYSIS -

Client Sample ID: PEL 4 **Taiga Sample ID:** 003

- DATA QUALIFERS -

Data Qualifier Descriptions:

224 *Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

*** Taiga analytical methods are based on the following standard analytical methods**

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency