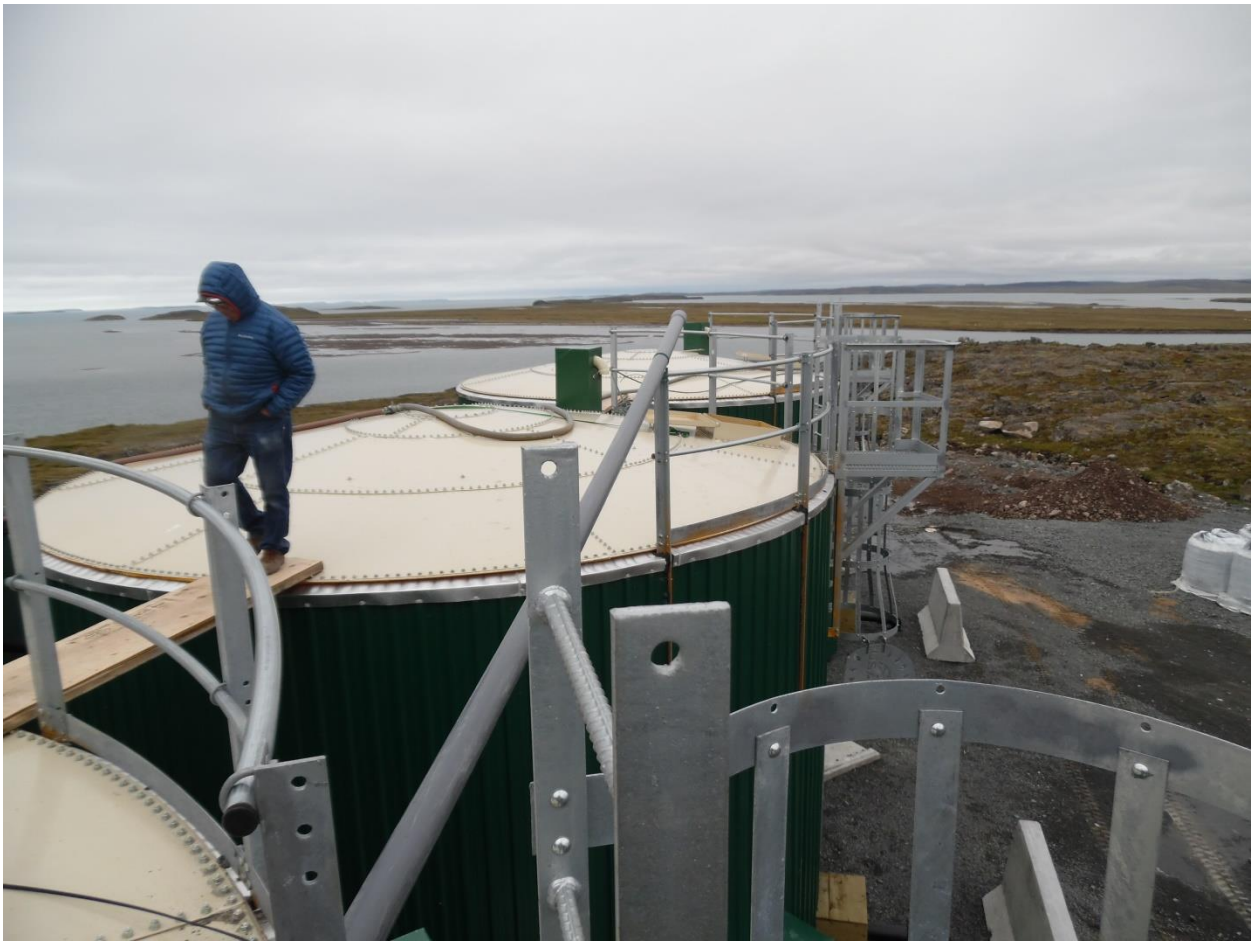
Annual Report -2017

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU



Date: March 10, 2018

Submitted to:

Nunavut Water Board

March 10, 2018

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0

Attention: Karen Kharatyan, PhD, Manager of Licensing

RE: Annual Report 2017 - Hamlet of Kugluktuk Water Licence: 3BM-KUG 1520

Dear Mr. Karen,

The Hamlet of Kugluktuk is pleased to submit to Nunavut Water Board the enclosed file of "Annual Report 2017" of water uses and sewage solid waste disposal as required under the compliance of Water Licence; 3BM-KUG120. Copies of required tests reports are attached herewith for your reference.

The Licensee remains in operation of those facilities and adhere the compliance requirements with the help Community Support of CGS, Government of Nunavut. Samples test result shown excellent remediation of contamination parameters within allowable limit comprising BOD, TSS, E-coli and Toxicity components and quality control on effluent.

We summarized those conditions and requirements outlined in Part B through part H.

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

Best Regards,

Donald LeBlanc

Senior Administrative Officer,
Hamlet of Kugluktuk

P.O. Box 271 NU,
X0B 0E0
Phone 1-867-982-6505
Fax 1-867-982-3060

Cc:

Baba Pedersen, Resource management Officer, AANDC
Technical Advisor, NWB

3BM KUG 1520

Annual Report-2017

TABLE OF CONTENTS

EXECUTIVE SUMMARY:

This Annual Report 2017 for the Hamlet of Kugluktuk (the Licensee) to the Nunavut Water Board (NWB) has been prepared to meet requirements of the Nunavut Water Board Licence 3BM-KUG 1520, Part B General Conditions, through part H conditions to the monitoring program. This report covers the period from 01 January to 31 December 2017.

Water intake from Coppermine River through twin intake pumps, and mobile shake (as convenient) and delivered to the treatment plant of cartage filtration followed by chlorination and then truck-fill supplied to household tank by Hamlet operated water trucks. Quantity of water was drawn approximately **64,200m3** which is about 83.38 % of the allowable limit **77,000** annually.

Raw sewage waste collected from household sewage tanks using hamlet operated vacuum trucks, hauled to the sewage lagoon and discharged at the designated dropping point. Raw sewage stayed inside the lagoon during the period Sep - June for almost 10 months freezing where they received primary treatment naturally. Annual decanting carried during July-Sep to reduce water quantity inside and make room for new candidate sewage waste. Samples collected from decanting point of monitoring station and tested at Taiga Laboratory Yellowknife for parameters compliance.

Municipal waste disposed at the solid waste facility using hamlet operated trucks and compacted down with grader and covered with sand-gravels time to time in summer. Loose papers, boxes, waste cloths and light woods were burn with control burning process and safe from flown away.

Earthen buttress constructed on berm toe at east side noted leak area of effluent over the years. Buttress construction completed, visible leak still continued but reduced a bit. Slumping on berm top and slopes on other sides also repaired as part of the buttress contract. The lagoon was built with HDPE liner on inner sides, but some bubbles developed to the base liner at location caused island type floats which could not be eliminated.

Water system upgrade:

The new Water Treatment Plant construction completed and started operation. With this addition, water intake and quality has increased in regards to turbidity issue and salinity concerns. Water intakes for Kugluktuk using two intake pump houses, a mobile shack for ice water when needed and storage reservoir for temporary holding water before directing to treatment plant when salt intrusion increases. Issues on turbidity and excess salt wedge are causing higher cost for operation and frequency of filters change. Water samples are sending to EHO, Cambridge Bay for EC and FC test on a monthly basis and whenever necessary. No issues or concern to during this period.

Conditions and Compliances: Licence 3BM-KUG1520

Part B: General Conditions

- The Tabular Form of Annual water consumptions are filled from daily water distribution and sewage quantity estimated from daily sewage disposal in the lagoon. No device Meter was used for volume measurements, however, truck-fill uses as precise for water, sewage and solid waste quantities round up.
- New Water Treatment plant added to water supply. Water intake from the Coppermine River using pump houses and mobile shake as convenient and as needed.
- Sewage disposal carried in the engineered lagoon at the designated drop off point.
- Decanting of sewage water from the lagoon cell to wetland (KUG-3) using a mechanical pump during July-Sep.
- New earthen buttress to the sewage lagoon at east side leak area, which connected part of the old sewage facility by leaked water flow towards the wetland.
- O&M manuals for water treatment plant in progress, but no changes to sewage and solid waste facilities O&M.
- Sampling and summer monitoring program continued during June - September and was available for sampling as described in the Compliance Plan. No other amendment required to the Compliance Plan.
- No adverse sign of salt and high turbidity noticed during this year and thus minimal uses of mobile shake.

Part C: Water Use:

- Water drawn from the Coppermine River using pump houses and auxiliary mobile shack as needed. The annual quantity of 64,200 cubic metres within allowable limit of 77,000 cubic metres.
- Water intake system integrated a screen at the very last point to separate fish & debris, and thus protect the intake from any larger particles coming into the water.

Part D: Waste Disposal

- Raw sewage collect from household sewage tank by hamlet operated vacuum trucks and discharge into the lagoon at designated drop off location through discharge flute. Annual decanting carried from lagoon to wetland using a mechanical pump during July - Sep.
- Samples of effluent water collected during the period July and August and tested at Taiga laboratory, Yellowknife. All samples results shown contaminant parameters within allowable limits, set out in the Licence.

Conditions and Compliances: Licence 3BM-KUG1520

Part E-G: Modification, construction, operation, A&R

- Improvement work to mobile water intake structures with new shake, pipe and pump.
- No changes to A&R plan of sewage facility, sludge removal be necessary when sludge thickness comes to a minimum 2 ft thickness.

Part H: Monitoring Program

- Annual monitoring of sewage & waste effluent carried from station KUG-2, KUG-3, KUG-4 and KUG-5 during July and August. Samples were taken from stations where available and convenient. Test results included in this report.
- Sewage truck operator keeps record for each load of sewage disposes-full load of sewage truck is 10,000 liters and 3 trucks in operation with one standby back up.

Monitoring Stations of sewage and solid waste sample collection

Sampling Station	Description	comments
KUG-1	Raw Water source intake location at Coppermine River	Volume of water intake annually
KUG-2	Discharge from Solid Waste water retention	Monitoring station, outside of solid waste facility
KUG-3	Discharge point from Sewage Disposal facility to wetland	Sampling point at sewage lagoon inside
KUG-4	Effluent outfall from wetland	Before meeting to Coronation Gulf
KUG-5	Effluent discharge and run-off from land farm	Sampling point outside of land farm collection sump

ANNUAL REPORT-2017

YEAR BEING REPORTED: 2017

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-KUG1520** issued to **Kugluktuk.**

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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 Fluid Manager 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	5,535,759.10	
February	4,943,586.10	
March	5,578,098.80	
April	5,201,906.80	
May	5,317,098.80	
June	5,065,329.50	
July	5,279,728.40	
August	5,449,650.90	
September	5,542,099.30	
October	5,744,558.90	
November	5,331,092.20	
December	5,103,056.10	
ANNUAL TOTAL	**64,091,964.90**	

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 Supply:

- The new treatment plant substantially completed in Dec 31st, and started operation.
- Connection and activation of UV system will be mainly between the new treated water tank and old two tanks recirculation line is expecting completion by next July 2018.
- The new treatment process comprises Roughing Sand filtration, Slow Sand filtration and Flocculation (as needed when turbidity in water) to refine the turbidity in 3-Logs process followed by Chlorination before the truckfill
- Two new truckfill facilities at the new plant added. The existing old truckfill facility at the old plant still exists as the old plant still working as a backup but will be decommissioned once the full integration of old components to the new treatment facility completed.
- **Intake though mobile shack:** Upgrading to the line and a new mobile shake with pump for ice water intake at the point of reachable distance from the shoreline when high salt wedge in river bed water is completed. This system will be useful mostly during Nov-May before the ice breaks. Water normally collected from a depth of 3-4 m of ice surface to a distance available with no salt or less salt wedges. This intake water also has less turbidity then the river bed intake, thus reduces the load on filters for the treatment plant.
- No maintenance and upgrading carried to intake pump houses during this period. Water intakes from the higher depth using twin lines are mostly useful in summer and fall. These two pump houses are the main water intake system of permanent structures.
- Storage reservoir uses mostly for diverting intake water through a temporary storing and Allow the natural settling of salt wedge and larger suspended particles before sending to the treatment plant. Reservoir bed was cleaned and pumped out sludge during this period.

Sewage and Solid waste:

- Sewage leak prevention and berm protection measure buttress construction completed.
- Repair to bubbles on liner could not be eliminated, but not posing a threat to lagoon containment or capacity since annual decanting makes room for new candidate sewage
- Erosion protection measure carried at sewage drop-off pad by placing couple of salvaged RCC sections horizontally on ground supported by about 6 RCC sections by bore-holes. Similarly, the truck turn around at the sewage drop-off right edge protection by placing salvaged RCC sections and concrete blocks.
- Intensive improvement on solid waste area carried with sand gravel grading and packing and pushing down loose waste materials. The waste facility operation remains active and monitors by dump segregation and control burning to loose papers.

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

The Licensee is monitoring the ongoing leak issue at the east side where buttress construction

completed but could not stop leak fully, but some improvement observed.
Annual decanting of sewage water onto wetland using a pump took place during the summer as part of annual monitoring of the lagoon. Effluent samples were taken from lagoon at the decant point to verify the requirement of BOD, E. coli, TSS and other basic parameters as identified in the licence. AANDC inspector was consulted for approval before the decanting s

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

- No abandonment of water supply, treatment, waste management or sewage facility this year.
- Improvement restoration to berm protection at the east side leak affected area, localized slumping, ponding and depression areas were completed by using locally collected materials by the contract.

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**;

- AANDC inspector has indicated a concern of continuous leak of the lagoon although the buttress construction almost completed, but not effective in leak stop. Also, noticeable cracks on the newly built buttress slope.
- Huge numbers of used oil drums waiting at the dump either for incineration or needs to ship out. Waste batteries are on open areas inside the dump site, which normally be stored inside wooden box with plastic wrap and be secured inside a C-can.
- The land farm facility is over borne by excess soils than its capacity and be secured on a lined cell.
- Monitoring station sign is not visible for KUG-2, and KUG -5

The inspector has recommended for a removal plan of waste oil drums, batteries and excess soils

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 requests for submission of report or plan, but to plan and implement those requirements for sewage management, effluent containment and waste reduction from facilities. Uncontrolled bubbles at the sewage lagoon required a remediation or removal plan.

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

New Water Treatment Plant has been completed, but O&M manual yet to be received and reviewed. The old Water treatment plant still remains active as a backup for new plant, and therefore the existing O&M manual has not changed.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

Water Treatment Plant operators training arranged by GN CGS hired trainer under the Water Treatment project for the hamlet operators to help getting their Level of certification and carry out the plant operation works. Module of the training comprises both theoretical, video and in hand in different sessions. A group of 3-6 operators are attending in this training session.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

The AANDC inspector has indicated huge numbers of cartage filters coming out from the existing old treatment process and dumps at the solid waste facility.
The new Water treatment plant will not be required cartage filters and therefore, a big savings is expected for the Hamlet in terms of filters and thus no dump at the solid waste facility.

HDPE containers set up at the solid waste site to burn the waste oil slowly and in control. This will reduce the waste oil issue at the waste dump site and assist the loose papers burning as well.

Item	parameter	units	Raw	Truckfill	Tank-2	GCDWQ guideline
1	Alkalinity $CaCo_3$	mg/L	50.7	48.5	82.9	
2	Conductivity	µS/cm		118	239	
3	P^H		7.80	7.84	8.02	7- 10.5
4	TSS	mg/L	13	7	7	
5	TDS	mg/L	81	96	83	AO based on taste
6	Organic carbon	mg/L	5.0	5.3	5.1	
7	Nitrate Nitrogen	mg/L	0.1	0.10	0.1	
8	Nitrite Nitrogen	mg/L	<0.01	< 0.01	0.1	
9	Colour	CU	72	86		
10	Calcium	mg/L	11.4	11.2	11.2	Not much restriction
11	Chloride	mg/L	1.5	5.1	4.6	For taste issue only
12	Fluoride	mg/L	<0.1	< 0.1	< 0.1	1.5 mg/L
13	Hardness	mg/L	50.7	50	50	None required, acceptable
14	Potassium	mg/L	0.6	0.6	0.6	
15	Sodium	mg/L	1.3	4.1	3.8	Based on taste
16	Sulphide	µg/L				AO: ≤ 50 µg/L
17	Selenium	µg/L	<0.5	< 0.5	<0.5	50 µg/L
18	Aluminium	µg/L	715	606	635	200 µg/L
19	Arsenic	µg/L	0.4	0.3	0.4	10 µg/L
20	Barium	µg/L	30.3	26.7	27.9	100 µg/L
21	Cadmium	µg/L	<0.1	< 0.1	<0.1	5 µg/L
22	Chromium	µg/L	1.2	1.3	1.2	5 µg/L
23	sulphate	mg/L	3	3	3	AO: ≤ 500 mg/L
24	Copper	µg/L	2.4	10.3	9	100 µg/L
25	Cyanide	mg/L				
26	Iron	mg/L	684	552	586	300 µg/L based on taste and stain
27	Lead	mg/L	0.3	0.3	0.7	10 µg/L
28	Manganese	µg/L	14	11.3	11.6	50 µg/L
29	Nickel	µg/L				
30	Zinc	µg/	10.7	15.1	< 5	AO based on taste. Leaching from
31	Mercury	µg/	<0.01	< 0.01	< 0.01	1.0 µg/L
32	Benzene	mg/L				
33	Toluene	mg/L				
34	Xylene	mg/L				
35	Phenol	mg/L				
36	E. Coli	MPN	2.0	< 1.0	< 1.0	None detectable /100 mL
37	Total Coliform	MPN	14.1	< 1.0	< 1.0	None detectable /100 mL
38	Turbidity	mg/L	16.1	13	12.9	≤ 1.0 for Slow sand Filtration
39	THM					o.1 mg/L , chlorinated water

Item	parameter	units	Raw	After SSF	Truckfill	GCDWQ guideline
1	Alkalinity $CaCo_3$	mg/L	34.5	48.1	47.4	
2	Conductivity	µS/cm	80.2		114	
3	P^H		7.61	8.38	8.10	7- 10.5
4	TSS	mg/L	6	<3	<3	
5	TDS	mg/L	40	61	52	AO based on taste
6	Organic carbon	mg/L	3.4	3.0	3.4	
7	Nitrate Nitrogen	mg/L	0.1	0.12	0.13	
8	Nitrite Nitrogen	mg/L	0.1	0.12	0.13	
9	Colour	CU	75	13	14	
10	Calcium	mg/L	8.7	11	11.4	Not much restriction
11	Chloride	mg/L	2.0	2.4	4.7	For taste issue only
12	Fluoride	mg/L	<0.1	<0.1	<0.1	1.5 mg/L
13	Hardness	mg/L	36.3	43.9	45.3	None required, acceptable
14	Potassium	mg/L	0.5	1.4	1.3	
15	Sodium	mg/L	1.6	3.6	5.3	Based on taste
16	Sulphide	µg/L	3	4	5	AO: ≤ 50 µg/L
17	Selenium	µg/L	<0.5	<0.5	<0.5	50 µg/L
18	Aluminium	µg/L	304	130	130	200 µg/L
19	Arsenic	µg/L	0.3	1.4	1.1	10 µg/L
20	Barium	µg/L	20.5	3.7	5.2	100 µg/L
21	Cadmium	µg/L	<0.1	<0.1	<0.1	5 µg/L
22	Chromium	µg/L	0.5	<0.1	<0.1	5 µg/L
23	sulphate	mg/L	3	4	5	AO: ≤ 500 mg/L
24	Copper	µg/L	7.6	3.5	3.1	100 µg/L
25	Cyanide	mg/L		0.005	0.005	
26	Iron	mg/L	291	68	76	300 µg/L based on taste and stain
27	Lead	mg/L	0.7	0.2	<0.1	10 µg/L
28	Manganese	µg/L	8.1	1.2	4.1	50 µg/L
29	Nickel	µg/L	0.7	0.4	0.5	
30	Zinc	µg/	7.2	< 5.0	< 5.0	AO based on taste. Leaching from
31	Mercury	µg/	<0.01	< 0.01	< 0.01	1.0 µg/L
32	Benzene	mg/L			< 0.002	
33	Toluene	mg/L			<0.002	
34	Xylene	mg/L			<0.002	
35	Phenol	mg/L		0.001	0.001	
36	E. Coli	MPN	< 1.0		<1.0	None detectable /100 mL
37	Total Coliform	MPN	5.2		< 1.0	None detectable /100 mL
38	Turbidity	mg/L	6.08	1.02	1.67	≤ 1.0 for Slow sand Filtration
39	THM					o.1 mg/L , chlorinated water
40	HAAs					

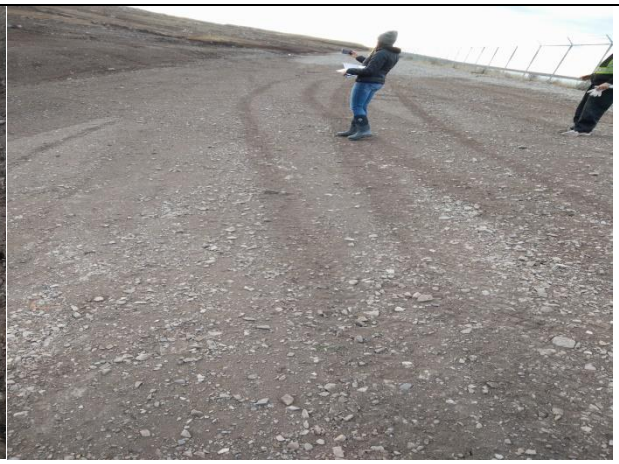
Table: Summary of samples results (June 16, 2017)
Sewage and solid waste effluent samples from Kugluktuk SL and MSW

Parameter	MAC Limits	units	June 16, 2017 (Preliminary results) KUG-2	KUG-3	KUG-4	Leak Sewage	Comments / Reference Water Licence
Alkalinity		mg/L	102	168	48.2		
Conductivity		µS/cm	632	511	257	3360	
P^H	6-9	number	**7.4**	7.05	7.42	6.9	
TSS	180	mg/L	**9**	22	<3	85	
Ammonia as N2		mg/L		40.3	0.055		
BOD_5	120	mg/L					
CBOD		mg/L					
Organic C, dissolved		mg/L				40	
Organic C, Total		mg/L				50.5	
Nitrate as N2	45	mg/L		0.29		3.74	
Nitrite as N2	3.2	mg/L		0.06		3.42	
Calcium	32	mg/L	59.3	6.6	11.3		
Chloride	100	mg/L	93.2	31.6	44.3		
Hardness	500	mg/L	274	30.2	60.9	593	
Magnesium		mg/L	30.7	3.3	8	89.8	
Potassium		mg/L	1.7	11.9	1.9	24	
Sodium	200	mg/L	18	26.9	27.4	390	
Sulphate	500	mg/L	39	5	11	85	
Fecal Coliform	$1x10^6$	CFU/100mL	<1.0	$4.4x10^5$	4	$5.79x10^4$	
Oil and Gas	5000	µg/L	none	none	None		
Aluminium	200	µg/L	57.3	154	130	116	
Arsenic	25	µg/L	0.3	0.3	0.4	9.5	
Cadmium	5	µg/L	<0.04	< 0.1	<0.1	<0.1	
Chromium	50	µg/L	0.4	0.5	0.4	2.7	
Cobalt	50	µg/L	0.1	0.4	0.2	6.3	
Copper	200	µg/L	7.3	34	1.4	7.7	
Iron	500	µg/L	93	328	560	32800	
Lead	10	µg/L	0.2	1.2	0.1	1.4	
Manganese	50	µg/L	3.4	28.1	27.8	5260	
Nickel	200	µg/L	1.1	1.3	1.3	16.9	
Zinc	500	µg/L	5.4	33.3	< 5	<5.0	

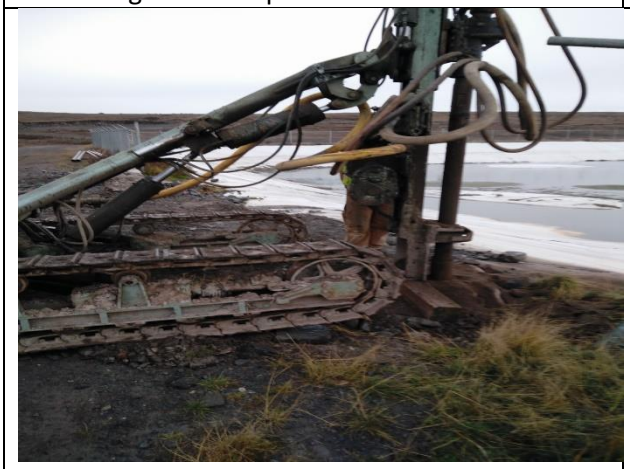
MAC: maximum Allowable Concentration of parameters.
KUG-4 is Final Discharge Point (End-of-pipe) to water body.

Pictures:

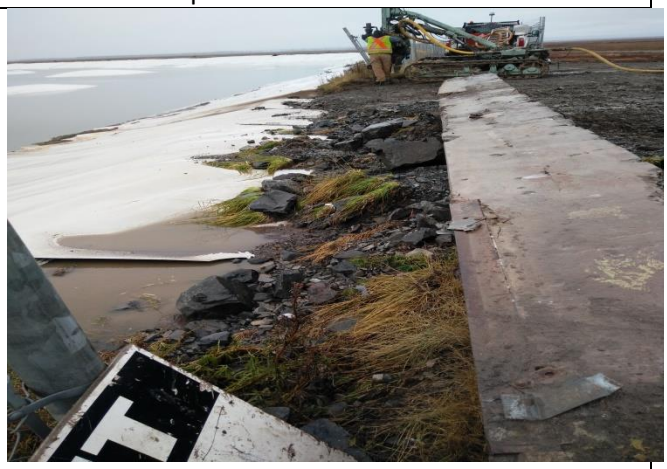
Pic 1: Lagoon Berm protection buttress



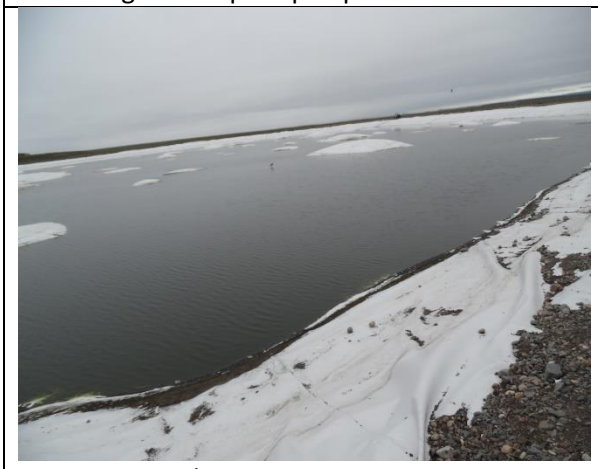
Pic 2: Buttress plan view



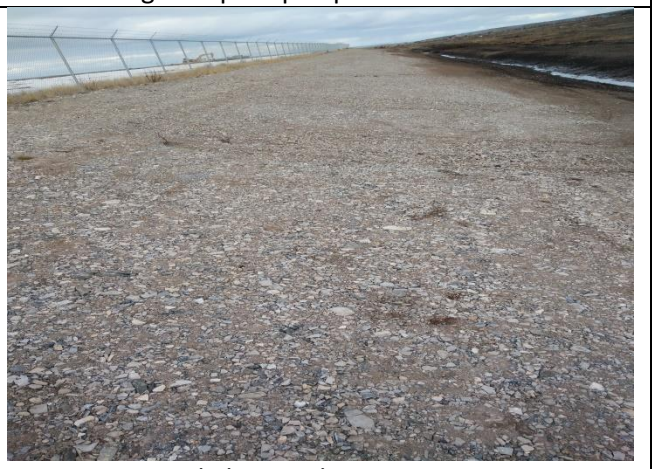
Pic 3: Lagoon drop off pad protection



Pic 4: Sewage Drop off pad protection block



Pic 5: Sewage lagoon



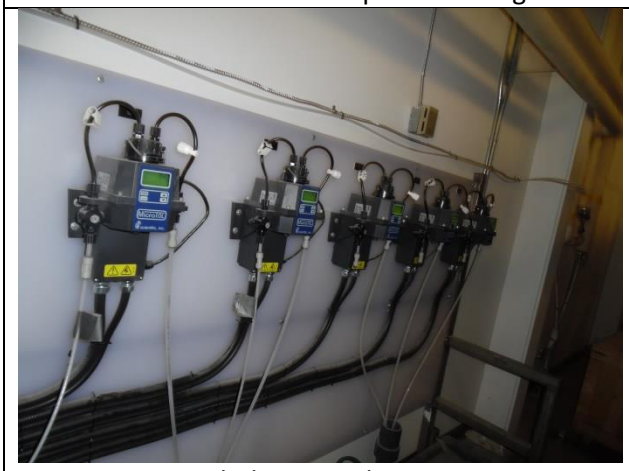
Pic 6: Lagoon side berms slumping repair

Pic 7: waste Oil reduction plan

Pic 8: Waste oil control burning

Pic 9: new Water treatment plant building

Pic 10: Water Treatment Plant inside



Pic 11: Water turbidity recording sensors

Pic 12: Sewage lagoon leak continued

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Kugluktuk	George Egotak
Licence No. / Expiry	**Representative's Title**
3BM-KUG1520	
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
July 10, 2017	Baba Pedersen

Activities Inspected

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

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

**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 10, 2017 I Inspected the Hamlet of Kugluktuk's Municipal Water Licence 3BM-KUG1520. I saw the Water Reservoir, the 2 Diversion Valve Vaults and the Heat Trace Box, the Truck Fill Station, the existing Water Treatment Plant, the Sewage Lagoon, the Main Garbage Dump, the Land Farm area, the Hazardous Waste Storage, the Metal Dump and the Sewage Effluent Outflow at the Ocean. I was accompanied by Shah Alam, GN, CG&S and George Egotak with the Hamlet of Kugluktuk.

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

1. At the existing Water Treatment Plant (Photos 1 & 2) I found that there is a very large amount of Water Filters used every year and they are all thrown away in the Garbage Dump. 2. Water Consumption Records are kept every day and are readily available upon request. The Hamlet is well within authorized limits. 3. At the Sewage Lagoon I found the Leakage continues from last year (Photos 3 & 4) and 4. There were noticeable Cracks in the Buttress (Photo 5). 5. In the Main Garbage Dump area there were many Drums of Used Oil (Photo 6) waiting to be Incinerated, the Hamlet is actively working on Incinerating as much of the Used Oil in stock. 6. I also found really lots of Drums of used oil within the fenced off Land Farm area (Photo 7). 7. I also saw many old Batteries on the ground (Photo 8) in the Main Garbage Dump. 8. Within the Metal Dump there was also a large group of Full Used Oil Drums (Photo 9) being stored with no form of Secondary Containment. 9. The Paint on the Wooden Signage at the Sewage Effluent Outflow (Photo 10) at the Ocean was completely worn off.

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

1. I recommend that the Hamlet try to find a way to send all the used Water Filters South for Recycling as they produce a large number of them annually and they take up a lot of space in the Land Fill. 3 and 4.The Hamlet must continue it's efforts to have the Leaks in the Sewage Lagoon and the cracks in the Lagoon Buttress permanently repaired. 6. All Drums and Batteries must be removed from the Land Farm area in order for the Land Farm to be used properly. 7. All the old Batteries that are lying on the Ground in the Main Dump area and the Land Farm area must be put into Lined Crates inside the Sea Can Container. 8. All Used Oil Drums in the Metal Dump area must be moved into an area with proper Secondary Containment. 9. All required Signage as per the Water License needs to be Repaired or Replaced.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	2018 Feb 19

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

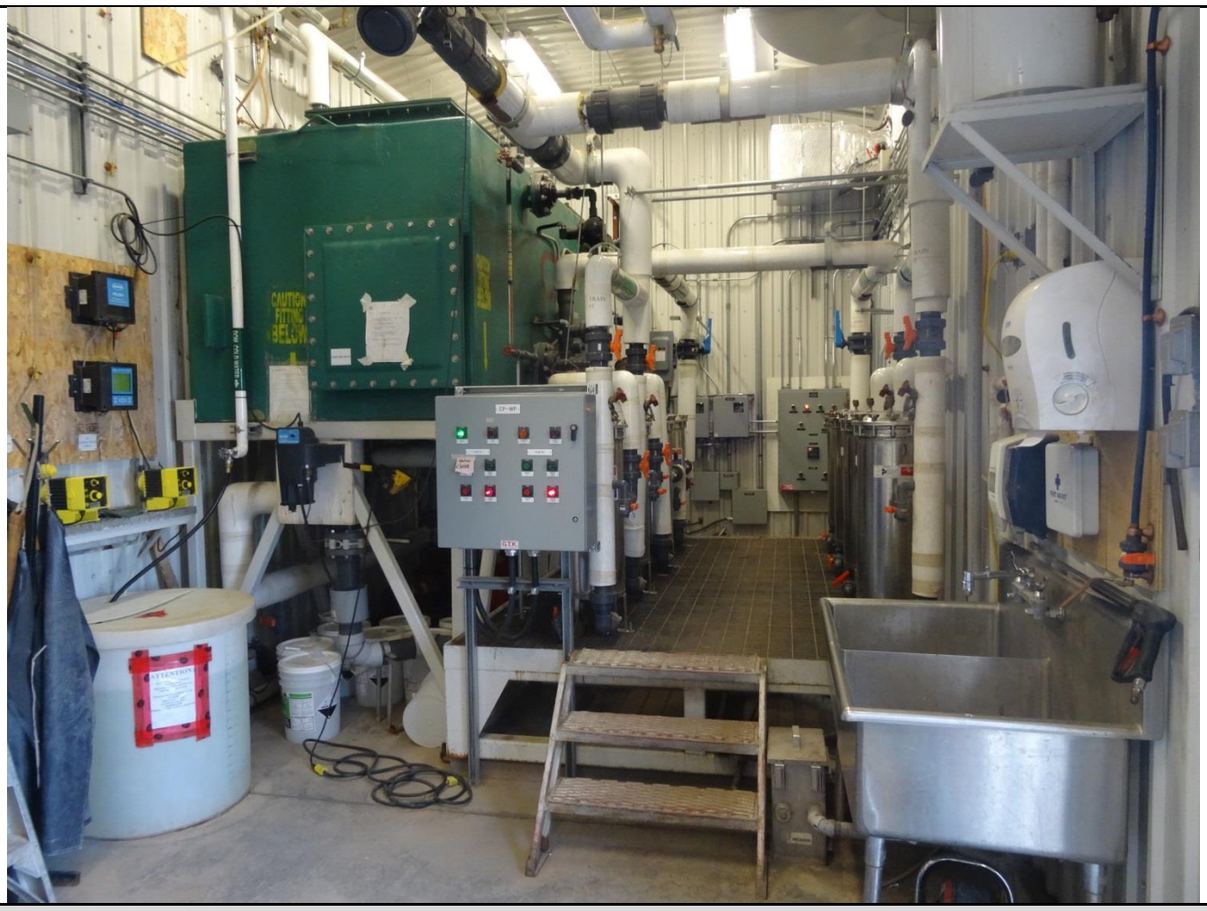
CC: licensing@nwb-oen.ca
Manager of Field Operations, INAC
Shah Alam, Municipal Engineer, Gov't of Nunavut

PHOTO LOG

Date	Camera	Inspector	Authorization
2017 July 10		Baba Pedersen	3BM-KUG1520

Photo Log # DSC09860 **Location Water Treatment Plant**

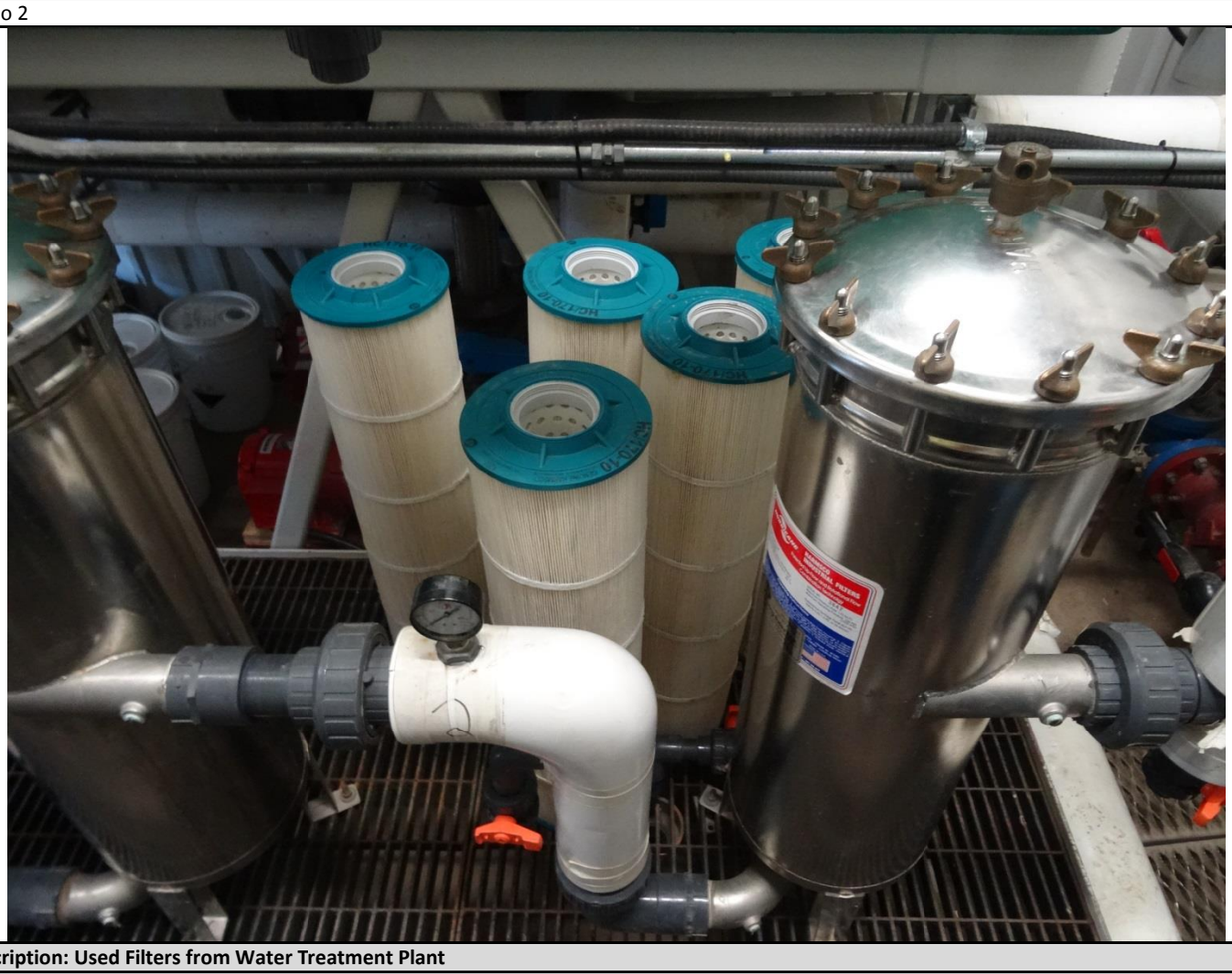
Photo 1



Description: Inside view of existing Water Treatment Plant

Photo Log # DSC09864 **Location Water Treatment Plant**

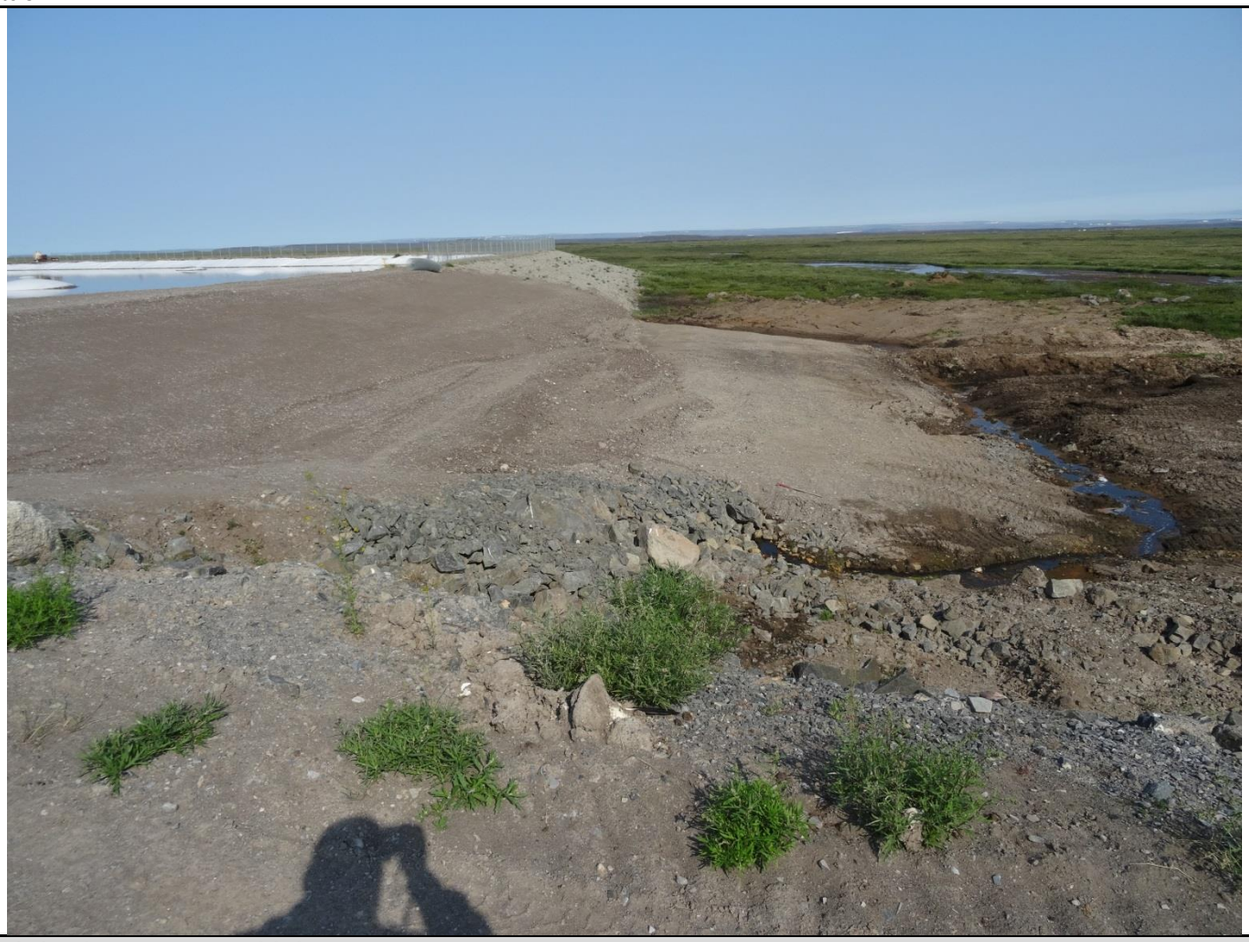
Photo 2



Description: Used Filters from Water Treatment Plant

Photo Log # DSC09875	Location Sewage Lagoon Leak

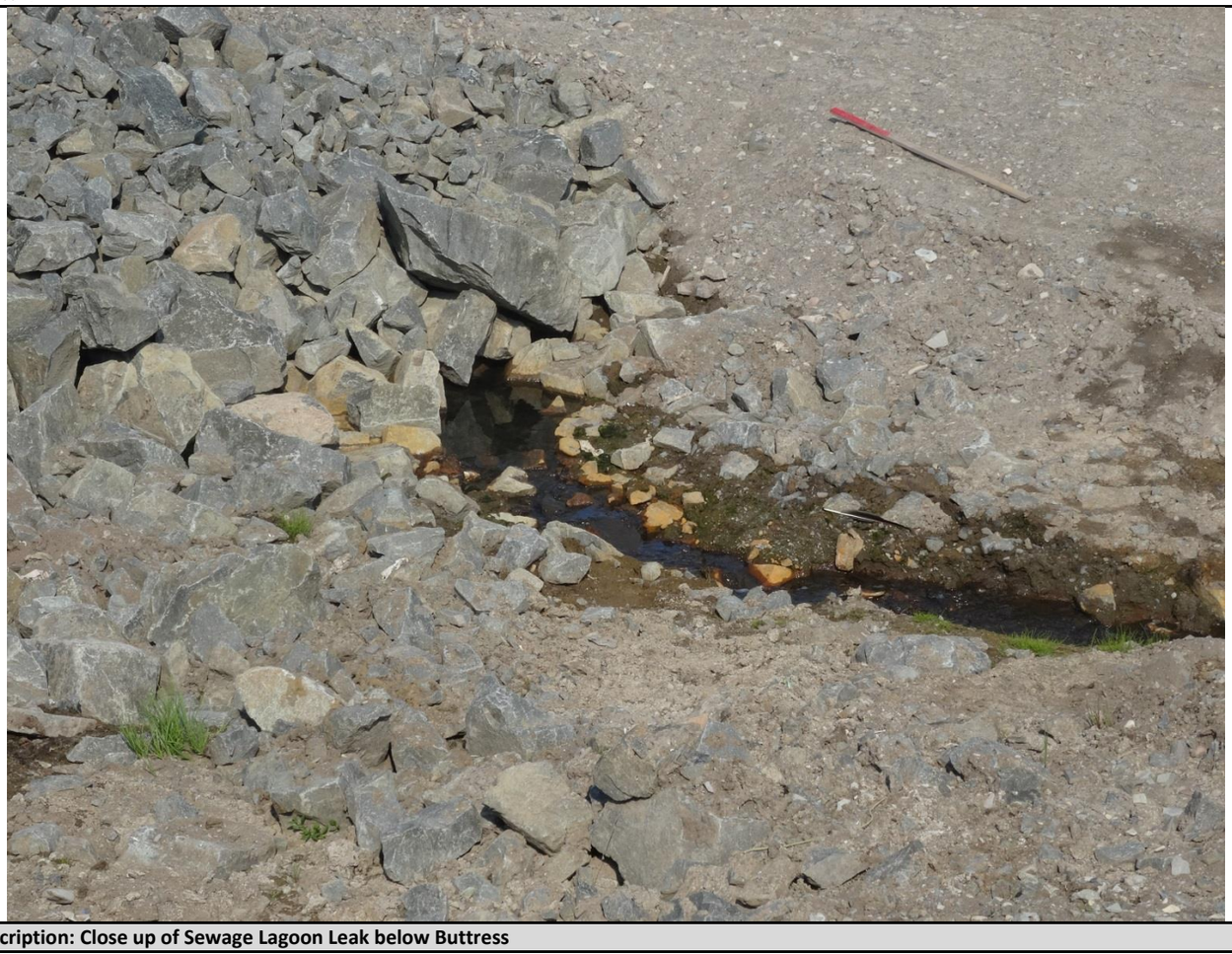
Photo 3



Description: Sewage Lagoon Leak below Buttress

Photo Log # DSC09879	Location Sewage Lagoon Leak

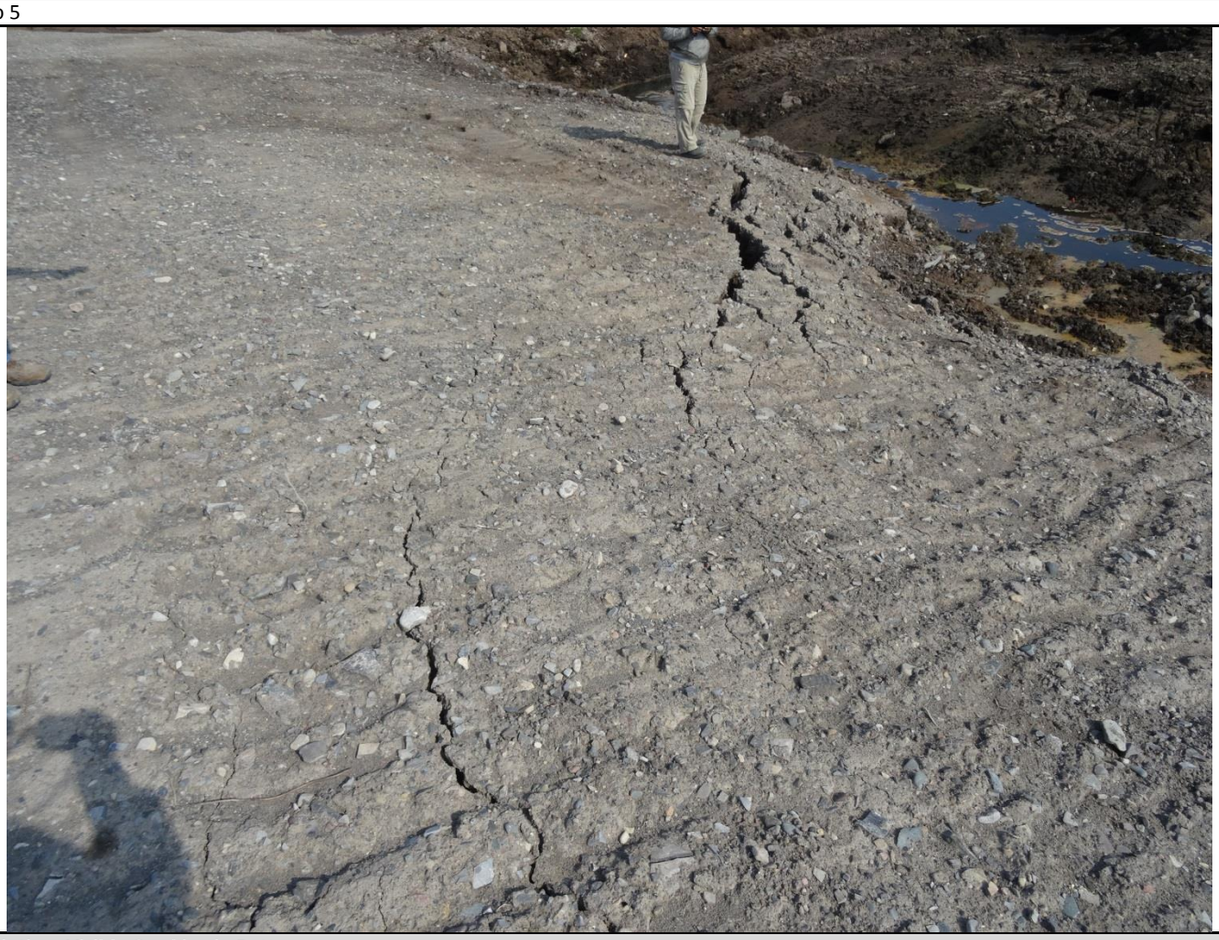
Photo 4



Description: Close up of Sewage Lagoon Leak below Buttress

Photo Log # DSC09926	Location Sewage Lagoon – North facing slope

Photo 5



Description: Visible Cracking in Buttress

Photo Log # DSC09934	Location inside Main Garbage Dump

Photo 6

Description: Drums of Used Oils waiting to be Incinerated

Photo Log # DSC09939	Location Land Farm area

Photo 7

Description: Used Oil Drums need to be removed from Land Farm area to ensure proper use of Land Farm for Contaminated Soils

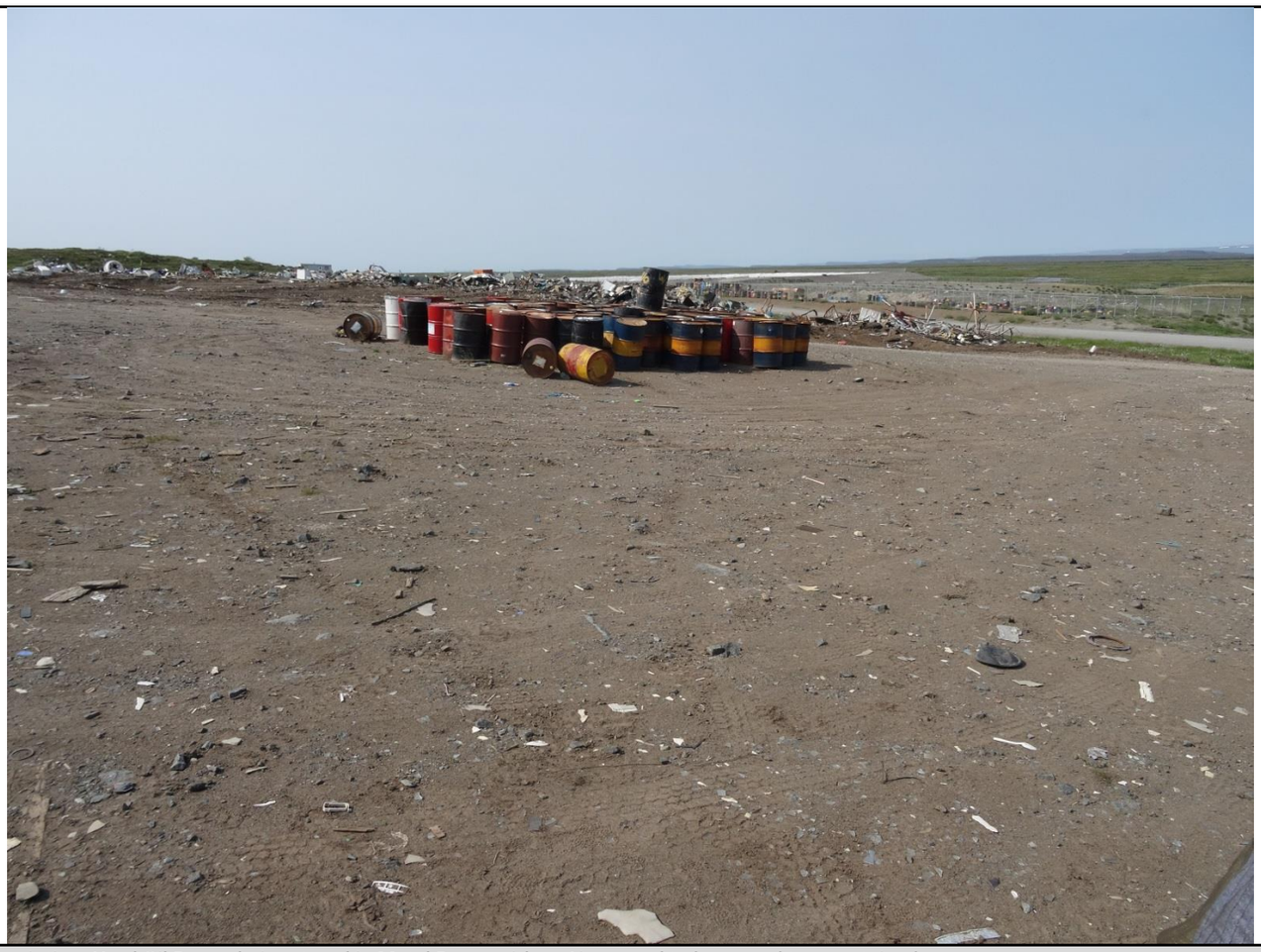
Photo Log # DSC09943	Location Main Garbage Dump

Photo 8

Description: Used Batteries on Ground need to be moved into Lined Boxes in Sea Can Container

Photo Log # DSC09951	Location Metal Dump

Photo 9



Description: Used Oil Drums being stored in Metal Dump with no Liner need to be moved to a contained area

Photo Log # DSC09974	Location (N 67* 49’ 31.9” W 115* 10’ 08.5”)

Photo 10

Description: Paint on Wood Signage has Worn Off at Effluent Outflow to Ocean

Appendix: A

Water Test Results 2017

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

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

Taiga Batch No.: 170383

- PRELIMINARY REPORT -

Prepared For: Hamlet of Kugluktuk

Address: P.O. Box 271
Kugluktuk, NU,X0B 0E0

Attn: **Don LeBlanc** **Facsimile: 867-982-3060**

Final report has been reviewed and approved by:

Judy Mah
Client Service 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:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Client Project: Water Supply
Sample Type: Raw Water
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:30
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	5.0	0.5	mg/L	20-Jun-17	SM5310:B	
Organic Carbon, Total	5.1	0.5	mg/L	21-Jun-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	50.7	0.4	mg/L	29-Jun-17	SM2320:B	
Colour, Apparent	72	5	CU	19-Jun-17	SM2120:B	
pH	7.80		pH units	29-Jun-17	SM4500-H:B	
Solids, Total Dissolved	81	10	mg/L	22-Jun-17	SM2540:C	
Solids, Total Suspended	13	3	mg/L	22-Jun-17	SM2540:D	
Turbidity	16.1	0.05	NTU	19-Jun-17	SM2130:B	
Major Ions						
Calcium	11.4	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	1.5	0.7	mg/L	20-Jun-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	20-Jun-17	SM4110:B	
Hardness	50.7	0.7	mg/L	20-Jun-17	SM4110:B	

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Magnesium	5.4	0.1	mg/L	20-Jun-17	SM4110:B
Nitrate as Nitrogen	0.10	0.01	mg/L	20-Jun-17	SM4110:B
Nitrite as Nitrogen	< 0.01	0.01	mg/L	20-Jun-17	SM4110:B
Potassium	0.6	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	1.3	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	3	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Total	14.1	1.0	MPN/100ml	16-Jun-17	SM9223:B
Escherichia coli	2.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	715	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.4	0.2	µg/L	24-Jun-17	EPA200.8
Barium	30.3	0.1	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	1.2	0.1	µg/L	24-Jun-17	EPA200.8
Copper	2.4	0.2	µg/L	24-Jun-17	EPA200.8
Iron	684	5	µg/L	24-Jun-17	EPA200.8
Lead	0.3	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	14.0	0.1	µg/L	24-Jun-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	24-Jun-17	EPA200.8
Uranium	0.3	0.1	µg/L	24-Jun-17	EPA200.8

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Zinc	10.7	5	µg/L	24-Jun-17	EPA200.8

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck-fill **Taiga Sample ID:** 002

Client Project: Water Supply
Sample Type: Treated Water
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:30
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	5.3	0.5	mg/L	20-Jun-17	SM5310:B	
Organic Carbon, Total	5.3	0.5	mg/L	21-Jun-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	48.5	0.4	mg/L	29-Jun-17	SM2320:B	
Colour, Apparent	86	5	CU	19-Jun-17	SM2120:B	
Conductivity, Specific (@25C)	118	0.4	µS/cm	29-Jun-17	SM2510:B	
pH	7.84		pH units	29-Jun-17	SM4500-H:B	
Solids, Total Dissolved	96	10	mg/L	22-Jun-17	SM2540:C	
Solids, Total Suspended	7	3	mg/L	22-Jun-17	SM2540:D	
Turbidity	13.0	0.05	NTU	19-Jun-17	SM2130:B	
Major Ions						
Calcium	11.2	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	5.1	0.7	mg/L	20-Jun-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	20-Jun-17	SM4110:B	
Hardness	50.0	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	5.3	0.1	mg/L	20-Jun-17	SM4110:B	

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck-fill **Taiga Sample ID:** 002

Nitrate as Nitrogen	0.10	0.01	mg/L	20-Jun-17	SM4110:B
Nitrite as Nitrogen	< 0.01	0.01	mg/L	20-Jun-17	SM4110:B
Potassium	0.6	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	4.1	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	3	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Total	< 1.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Organics					
Bromodichloromethane		0.005	mg/L		EPA8260B
Bromoform		0.005	mg/L		EPA8260B
Chloroform		0.005	mg/L		EPA8260B
Dibromochloromethane		0.005	mg/L		EPA8260B
Trihalomethanes, Total		0.005	mg/L		EPA8260B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	606	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.3	0.2	µg/L	24-Jun-17	EPA200.8
Barium	26.7	0.1	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	1.3	0.1	µg/L	24-Jun-17	EPA200.8
Copper	10.3	0.2	µg/L	24-Jun-17	EPA200.8
Iron	552	5	µg/L	24-Jun-17	EPA200.8

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck-fill **Taiga Sample ID:** 002

Lead	0.3	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	11.3	0.1	µg/L	24-Jun-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	24-Jun-17	EPA200.8
Uranium	0.3	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	15.1	5	µg/L	24-Jun-17	EPA200.8

ReportDate:
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Tank-2 **Taiga Sample ID:** 003

Client Project: Water Supply
Sample Type: Treated Water
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:30
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	5.1	0.5	mg/L	20-Jun-17	SM5310:B	
Organic Carbon, Total	5.1	0.5	mg/L	21-Jun-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	82.9	0.4	mg/L	29-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	239	0.4	µS/cm	29-Jun-17	SM2510:B	
pH	8.02		pH units	29-Jun-17	SM4500-H:B	
Solids, Total Dissolved	83	10	mg/L	22-Jun-17	SM2540:C	
Solids, Total Suspended	7	3	mg/L	22-Jun-17	SM2540:D	
Turbidity	12.9	0.05	NTU	19-Jun-17	SM2130:B	
Major Ions						
Calcium	11.2	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	4.6	0.7	mg/L	20-Jun-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	20-Jun-17	SM4110:B	
Hardness	50.0	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	5.3	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.10	0.01	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: ***Saturday, July 01, 2017***

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

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Tank-2 **Taiga Sample ID:** 003

Potassium	0.6	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	3.8	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	3	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Total	< 1.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Organics					
Bromodichloromethane		0.005	mg/L		EPA8260B
Bromoform		0.005	mg/L		EPA8260B
Chloroform		0.005	mg/L		EPA8260B
Dibromochloromethane		0.005	mg/L		EPA8260B
Trihalomethanes, Total		0.005	mg/L		EPA8260B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	635	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.4	0.2	µg/L	24-Jun-17	EPA200.8
Barium	27.9	0.1	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	1.2	0.1	µg/L	24-Jun-17	EPA200.8
Copper	9.0	0.2	µg/L	24-Jun-17	EPA200.8
Iron	586	5	µg/L	24-Jun-17	EPA200.8
Lead	0.7	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	11.6	0.1	µg/L	24-Jun-17	EPA200.8

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Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Tank-2 **Taiga Sample ID:** 003

Mercury	< 0.01	0.01	µg/L	24-Jun-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	24-Jun-17	EPA200.8
Uranium	0.3	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	< 5.0	5	µg/L	24-Jun-17	EPA200.8

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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Reservoir **Taiga Sample ID:** 004

Client Project: Water Supply
Sample Type: Raw Water
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 11:00
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	5.0	0.5	mg/L	20-Jun-17	SM5310:B	
Organic Carbon, Total	5.1	0.5	mg/L	21-Jun-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	48.5	0.4	mg/L	29-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	104	0.4	µS/cm	29-Jun-17	SM2510:B	
pH	7.83		pH units	29-Jun-17	SM4500-H:B	
Solids, Total Dissolved	81	10	mg/L	22-Jun-17	SM2540:C	
Solids, Total Suspended	7	3	mg/L	22-Jun-17	SM2540:D	
Turbidity	12.8	0.05	NTU	19-Jun-17	SM2130:B	
Major Ions						
Calcium	11.3	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	1.8	0.7	mg/L	20-Jun-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	20-Jun-17	SM4110:B	
Hardness	50.5	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	5.4	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.07	0.01	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: *Saturday, July 01, 2017*

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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Reservoir **Taiga Sample ID:** 004

Potassium	0.6	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	1.5	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	3	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Total	11.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jun-17	SM9223:B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	598	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.3	0.2	µg/L	24-Jun-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	1.1	0.1	µg/L	24-Jun-17	EPA200.8
Cobalt	0.3	0.1	µg/L	24-Jun-17	EPA200.8
Copper	2.7	0.2	µg/L	24-Jun-17	EPA200.8
Iron	563	5	µg/L	24-Jun-17	EPA200.8
Lead	0.2	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	9.7	0.1	µg/L	24-Jun-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-17	EPA200.8
Nickel	1.2	0.1	µg/L	24-Jun-17	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	< 5.0	5	µg/L	24-Jun-17	EPA200.8

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170383

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Reservoir **Taiga Sample ID:** 004

*** 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:

Print Date: *Saturday, July 01, 2017*

Test Results:

Water Samples Oct 27, 2017

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

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

Taiga Batch No.: 171114

- FINAL REPORT -

Prepared For: NDL Construction Ltd

Address: Box 53
Group 612 SS6, 83 Symington Lane
Winnepeg,MB
R2C 2Z3

Attn: **Peter Barg** **Facsimile:**

Final report has been reviewed and approved by:

Judy Mah
Client Service 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, November 09, 2017
Print Date: ***Thursday, November 09, 2017***

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Client Project: Kugluktuk water system
Sample Type: Raw Water
Received Date: 27-Oct-17
Sampling Date: 27-Oct-17
Sampling Time: 8:40
Location: Intake RW, Treated Storage Tank and Truckfill
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.4	0.5	mg/L	01-Nov-17	SM5310:B	
Organic Carbon, Total	3.3	0.5	mg/L	01-Nov-17	SM5310:B	
Phosphorous, Total	< 0.002	0.002	mg/L	02-Nov-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	34.5	0.4	mg/L	27-Oct-17	SM2320:B	
Colour, Apparent	75	5	CU	27-Oct-17	SM2120:B	
Conductivity, Specific (@25C)	80.2	0.4	µS/cm	27-Oct-17	SM2510:B	
pH	7.61		pH units	27-Oct-17	SM4500-H:B	
Solids, Total Dissolved	40	10	mg/L	02-Nov-17	SM2540:C	
Solids, Total Suspended	6	3	mg/L	02-Nov-17	SM2540:D	
Turbidity	6.08	0.05	NTU	03-Nov-17	SM2130:B	
Major Ions						
Calcium	8.7	0.1	mg/L	28-Oct-17	SM4110:B	
Chloride	2.0	0.7	mg/L	28-Oct-17	SM4110:B	

ReportDate: Thursday, November 09, 2017
Print Date: ***Thursday, November 09, 2017***

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Fluoride	< 0.1	0.1	mg/L	28-Oct-17	SM4110:B	
Hardness	36.3	0.7	mg/L	28-Oct-17	SM4110:B	
Magnesium	3.6	0.1	mg/L	28-Oct-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.10	0.01	mg/L	28-Oct-17	SM4110:B	
Potassium	0.5	0.1	mg/L	28-Oct-17	SM4110:B	
Sodium	1.6	0.1	mg/L	28-Oct-17	SM4110:B	
Sulphate	3	1	mg/L	28-Oct-17	SM4110:B	
Microbiology						
Coliforms, Total	5.2	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Organics						
Benzene		0.002	mg/L	01-Nov-17	EPA8260B	111
Ethylbenzene		0.002	mg/L	01-Nov-17	EPA8260B	111
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	02-Nov-17	EPA8015B	
Toluene		0.002	mg/L	01-Nov-17	EPA8260B	111
Xylenes		0.002	mg/L	01-Nov-17	EPA8260B	111
Subcontracted Organics						
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Nov-17	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	03-Nov-17	AB ENV.06537	
Trace Metals, Total						
Aluminum	304	5	µg/L	02-Nov-17	EPA200.8	
Arsenic	0.3	0.2	µg/L	02-Nov-17	EPA200.8	
Barium	20.5	0.1	µg/L	02-Nov-17	EPA200.8	
Beryllium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8	

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

Taiga Environmental Laboratory
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-1 **Taiga Sample ID:** 001

Chromium	0.5	0.1	µg/L	02-Nov-17	EPA200.8
Cobalt	0.2	0.1	µg/L	02-Nov-17	EPA200.8
Copper	7.6	0.2	µg/L	02-Nov-17	EPA200.8
Iron	291	5	µg/L	02-Nov-17	EPA200.8
Lead	0.7	0.1	µg/L	02-Nov-17	EPA200.8
Manganese	8.1	0.1	µg/L	02-Nov-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	02-Nov-17	EPA200.8
Nickel	0.7	0.1	µg/L	02-Nov-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	02-Nov-17	EPA200.8
Zinc	7.2	5	µg/L	02-Nov-17	EPA200.8

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TWT **Taiga Sample ID:** 002

Client Project: Kugluktuk water system
Sample Type: Filtered Water
Received Date: 27-Oct-17
Sampling Date: 27-Oct-17
Sampling Time: 8:40
Location: Intake RW, Treated Storage Tank and Truckfill
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.0	0.5	mg/L	01-Nov-17	SM5310:B	
Organic Carbon, Total	3.1	0.5	mg/L	01-Nov-17	SM5310:B	
Phosphorous, Total	0.020	0.002	mg/L	02-Nov-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	48.1	0.4	mg/L	27-Oct-17	SM2320:B	
Colour, Apparent	13	5	CU	27-Oct-17	SM2120:B	
Conductivity, Specific (@25C)	104	0.4	µS/cm	27-Oct-17	SM2510:B	
pH	8.38		pH units	27-Oct-17	SM4500-H:B	
Solids, Total Dissolved	61	10	mg/L	02-Nov-17	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	02-Nov-17	SM2540:D	
Turbidity	1.02	0.05	NTU	03-Nov-17	SM2130:B	
Major Ions						
Calcium	11.0	0.1	mg/L	28-Oct-17	SM4110:B	
Chloride	2.4	0.7	mg/L	28-Oct-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	28-Oct-17	SM4110:B	

ReportDate: Thursday, November 09, 2017
Print Date: ***Thursday, November 09, 2017***

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TWT **Taiga Sample ID:** 002

Hardness	43.9	0.7	mg/L	28-Oct-17	SM4110:B	
Magnesium	4.0	0.1	mg/L	28-Oct-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.12	0.01	mg/L	28-Oct-17	SM4110:B	
Potassium	1.4	0.1	mg/L	28-Oct-17	SM4110:B	
Sodium	3.6	0.1	mg/L	28-Oct-17	SM4110:B	
Sulphate	4	1	mg/L	28-Oct-17	SM4110:B	
Microbiology						
Coliforms, Total	2.0	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Organics						
Benzene		0.002	mg/L	01-Nov-17	EPA8260B	16
Bromodichloromethane		0.005	mg/L	01-Nov-17	EPA8260B	16
Bromoform		0.005	mg/L	01-Nov-17	EPA8260B	16
Chloroform		0.005	mg/L	01-Nov-17	EPA8260B	16
Dibromochloromethane		0.005	mg/L	01-Nov-17	EPA8260B	16
Ethylbenzene		0.002	mg/L	01-Nov-17	EPA8260B	16
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	02-Nov-17	EPA8015B	
Toluene		0.002	mg/L	01-Nov-17	EPA8260B	16
Trihalomethanes, Total		0.005	mg/L	01-Nov-17	EPA8260B	16
Xylenes		0.002	mg/L	01-Nov-17	EPA8260B	16
Subcontracted Organics						
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Nov-17	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	03-Nov-17	AB ENV.06537	
Trace Metals, Total						
Aluminum	130	5	µg/L	02-Nov-17	EPA200.8	

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

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Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TWT **Taiga Sample ID:** 002

Arsenic	1.4	0.2	µg/L	02-Nov-17	EPA200.8
Barium	3.7	0.1	µg/L	02-Nov-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Chromium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Cobalt	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Copper	3.5	0.2	µg/L	02-Nov-17	EPA200.8
Iron	68	5	µg/L	02-Nov-17	EPA200.8
Lead	0.2	0.1	µg/L	02-Nov-17	EPA200.8
Manganese	1.2	0.1	µg/L	02-Nov-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	02-Nov-17	EPA200.8
Nickel	0.4	0.1	µg/L	02-Nov-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	02-Nov-17	EPA200.8
Zinc	< 5.0	5	µg/L	02-Nov-17	EPA200.8

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

Client Project: Kugluktuk water system
Sample Type: Treated Water
Received Date: 27-Oct-17
Sampling Date: 27-Oct-17
Sampling Time: 8:40
Location: Intake RW, Treated Storage Tank and Truckfill
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.5	0.5	mg/L	01-Nov-17	SM5310:B	
Organic Carbon, Total	3.4	0.5	mg/L	01-Nov-17	SM5310:B	
Phosphorous, Total	0.017	0.002	mg/L	02-Nov-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	47.4	0.4	mg/L	27-Oct-17	SM2320:B	
Colour, Apparent	14	5	CU	27-Oct-17	SM2120:B	
Conductivity, Specific (@25C)	114	0.4	µS/cm	27-Oct-17	SM2510:B	
pH	8.10		pH units	27-Oct-17	SM4500-H:B	
Solids, Total Dissolved	52	10	mg/L	02-Nov-17	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	02-Nov-17	SM2540:D	
Turbidity	1.67	0.05	NTU	03-Nov-17	SM2130:B	
Major Ions						
Calcium	11.4	0.1	mg/L	28-Oct-17	SM4110:B	
Chloride	4.7	0.7	mg/L	28-Oct-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	28-Oct-17	SM4110:B	

ReportDate: Thursday, November 09, 2017
Print Date: ***Thursday, November 09, 2017***

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

Hardness	45.3	0.7	mg/L	28-Oct-17	SM4110:B	
Magnesium	4.1	0.1	mg/L	28-Oct-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.13	0.01	mg/L	28-Oct-17	SM4110:B	
Potassium	1.3	0.1	mg/L	28-Oct-17	SM4110:B	
Sodium	5.3	0.1	mg/L	28-Oct-17	SM4110:B	
Sulphate	5	1	mg/L	28-Oct-17	SM4110:B	
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	27-Oct-17	SM9223:B	
Organics						
Benzene	< 0.002	0.002	mg/L	02-Nov-17	EPA8260B	
Bromodichloromethane		0.005	mg/L	01-Nov-17	EPA8260B	1
Bromoform		0.005	mg/L	01-Nov-17	EPA8260B	1
Chloroform		0.005	mg/L	01-Nov-17	EPA8260B	1
Dibromochloromethane		0.005	mg/L	01-Nov-17	EPA8260B	1
Ethylbenzene	< 0.002	0.002	mg/L	02-Nov-17	EPA8260B	
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	02-Nov-17	EPA8015B	
Toluene	< 0.002	0.002	mg/L	02-Nov-17	EPA8260B	
Trihalomethanes, Total		0.005	mg/L	01-Nov-17	EPA8260B	1
Xylenes	< 0.002	0.002	mg/L	02-Nov-17	EPA8260B	
Subcontracted Organics						
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Nov-17	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	03-Nov-17	AB ENV.06537	
Polychlorinated Biphenyls		0.0025	mg/L	01-Nov-17	EPA3510	16
Trace Metals, Total						

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

Taiga Environmental Laboratory
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

Aluminum	130	5	µg/L	02-Nov-17	EPA200.8
Arsenic	1.1	0.2	µg/L	02-Nov-17	EPA200.8
Barium	5.2	0.1	µg/L	02-Nov-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Chromium	0.2	0.1	µg/L	02-Nov-17	EPA200.8
Cobalt	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Copper	3.1	0.2	µg/L	02-Nov-17	EPA200.8
Iron	76	5	µg/L	02-Nov-17	EPA200.8
Lead	< 0.1	0.1	µg/L	02-Nov-17	EPA200.8
Manganese	1.6	0.1	µg/L	02-Nov-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	02-Nov-17	EPA200.8
Nickel	0.5	0.1	µg/L	02-Nov-17	EPA200.8
Selenium	< 0.5	0.5	µg/L	02-Nov-17	EPA200.8
Zinc	< 5.0	5	µg/L	02-Nov-17	EPA200.8

ReportDate: Thursday, November 09, 2017
Print Date: *Thursday, November 09, 2017*

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

Taiga Batch No.: 171114

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

- DATA QUALIFERS -

Data Qualifier Descriptions:

1	*Sample received in improper container*
111	*Vial contained air bubble, analysis not possible*
16	*Test requested but no sample bottle received*

*** 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

Test Results:

Water Samples Nov 17, 2017

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

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

Taiga Batch No.: 171144

- FINAL REPORT -

Prepared For: NDL Construction Ltd

Address: Box 53
Group 612 SS6, 83 Symington Lane
Winnepeg,MB
R2C 2Z3

Attn: **Peter Barg** **Facsimile:**

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, November 17, 2017
Print Date: ***Friday, November 17, 2017***

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

Taiga Batch No.: 171144

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Intake **Taiga Sample ID:** 001

Client Project: New WTP - Kugluktuk
Sample Type: Raw Water
Received Date: 15-Nov-17
Sampling Date: 14-Nov-17
Sampling Time: 10:45
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	5.2	1.0	MPN/100ml	15-Nov-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	15-Nov-17	SM9223:B	

ReportDate: Friday, November 17, 2017
Print Date: ***Friday, November 17, 2017***

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

Taiga Batch No.: 171144

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Tank - TWS3 **Taiga Sample ID:** 002

Client Project: New WTP - Kugluktuk
Sample Type: Filter Water
Received Date: 15-Nov-17
Sampling Date: 14-Nov-17
Sampling Time: 10:45
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	4.1	1.0	MPN/100ml	15-Nov-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	15-Nov-17	SM9223:B	

ReportDate: Friday, November 17, 2017
Print Date: ***Friday, November 17, 2017***

Taiga Environmental Laboratory
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 171144

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

Client Project: New WTP - Kugluktuk
Sample Type: Treated Water
Received Date: 15-Nov-17
Sampling Date: 14-Nov-17
Sampling Time: 10:45
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result		Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology							
Coliforms, Total	<	1.0	1.0	MPN/100ml	15-Nov-17	SM9223:B	
Escherichia coli	<	1.0	1.0	MPN/100ml	15-Nov-17	SM9223:B	

ReportDate: Friday, November 17, 2017
Print Date: ***Friday, November 17, 2017***

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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 171144

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill **Taiga Sample ID:** 003

*** 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, November 17, 2017

Print Date: *Friday, November 17, 2017*

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

Taiga Batch No.:
171209

- FINAL REPORT -

Prepared For: NDL Construction Ltd

Address: Box 53
Group 612 SS6, 83 Symington Lane
Winnepeg,MB
R2C 2Z3

Attn: **John Bergen** **Facsimile:**

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, December 18, 2017
Print Date: ***Monday, December 18, 2017***

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

Taiga Batch No.: 171209

- CERTIFICATE OF ANALYSIS -

Client Sample ID: RAW WATER **Taiga Sample ID:** 001

Client Project: NDL
Sample Type: NEW WTP
Received Date: 13-Dec-17
Sampling Date: 12-Dec-17
Sampling Time: 11:40
Location: NEW WTP
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	

ReportDate: Monday, December 18, 2017
Print Date: ***Monday, December 18, 2017***

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

Taiga Batch No.: 171209

- CERTIFICATE OF ANALYSIS -

Client Sample ID: FILTERED WATER **Taiga Sample ID:** 002

Client Project: NDL
Sample Type: NEW WTP
Received Date: 13-Dec-17
Sampling Date: 12-Dec-17
Sampling Time: 11:40
Location: NEW WTP
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	

ReportDate: Monday, December 18, 2017
Print Date: ***Monday, December 18, 2017***

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

Taiga Batch No.: 171209

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TRUCK FILL **Taiga Sample ID:** 003

Client Project: NDL
Sample Type: NEW WTP
Received Date: 13-Dec-17
Sampling Date: 12-Dec-17
Sampling Time: 11:40
Location: NEW WTP
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	13-Dec-17	SM9223:B	

ReportDate: Monday, December 18, 2017
Print Date: ***Monday, December 18, 2017***

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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 171209

- CERTIFICATE OF ANALYSIS -

Client Sample ID: TRUCK FILL **Taiga Sample ID:** 003

*** 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, December 18, 2017

Print Date: *Monday, December 18, 2017*

Appendix: B

Effluent Waste Test Results 2017

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

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

Taiga Batch No.: 170384

- PRELIMINARY REPORT -

Prepared For: Hamlet of Kugluktuk

Address: P.O. Box 271
Kugluktuk, NU,X0B 0E0

Attn: **Don LeBlanc** **Facsimile: 867-982-3060**

Final report has been reviewed and approved by:

Judy Mah
Client Service 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:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID:** 001

Client Project: Solid Waste
Sample Type: Solid Waste
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:00
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.009	0.005	mg/L	22-Jun-17	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	
CBOD		2	mg/L		SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	102	0.4	mg/L	19-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	632	0.4	µS/cm	19-Jun-17	SM2510:B	
pH	7.40		pH units	19-Jun-17	SM4500-H:B	
Solids, Total Suspended	9	3	mg/L	22-Jun-17	SM2540:D	
Major Ions						
Calcium	59.3	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	93.2	0.7	mg/L	20-Jun-17	SM4110:B	
Hardness	274	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	30.7	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate as Nitrogen	11.0	0.01	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID:** 001

Nitrite as Nitrogen	0.08	0.01	mg/L	20-Jun-17	SM4110:B
Potassium	1.7	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	18.0	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	39	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Fecal	< 1	1	CFU/100mL	16-Jun-17	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			20-Jun-17	Visual Exam
Trace Metals, Total					
Aluminum	57.3	0.6	µg/L	24-Jun-17	EPA200.8
Arsenic	0.3	0.2	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.04	0.04	µg/L	24-Jun-17	EPA200.8
Chromium	0.4	0.1	µg/L	24-Jun-17	EPA200.8
Cobalt	0.1	0.1	µg/L	24-Jun-17	EPA200.8
Copper	7.3	0.2	µg/L	24-Jun-17	EPA200.8
Iron	93	5	µg/L	24-Jun-17	EPA200.8
Lead	0.2	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	3.4	0.1	µg/L	24-Jun-17	EPA200.8
Nickel	1.1	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	5.4	0.4	µg/L	24-Jun-17	EPA200.8

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 **Taiga Sample ID:** 002

Client Project: Solid Waste
Sample Type: Sewage Disposal
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:00
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	40.3	0.005	mg/L	22-Jun-17	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	
CBOD		2	mg/L		SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	168	0.4	mg/L	19-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	511	0.4	µS/cm	19-Jun-17	SM2510:B	
pH	7.05		pH units	19-Jun-17	SM4500-H:B	
Solids, Total Suspended	22	3	mg/L	22-Jun-17	SM2540:D	
Major Ions						
Calcium	6.6	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	31.6	0.7	mg/L	20-Jun-17	SM4110:B	
Hardness	30.2	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	3.3	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate as Nitrogen	0.07	0.01	mg/L	20-Jun-17	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	20-Jun-17	SM4110:B	
Potassium	11.9	0.1	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 **Taiga Sample ID:** 002

Sodium	26.9	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	5	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Fecal	64000	1000	CFU/100mL	16-Jun-17	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			20-Jun-17	Visual Exam
Trace Metals, Total					
Aluminum	154	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.3	0.2	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	0.5	0.1	µg/L	24-Jun-17	EPA200.8
Cobalt	0.4	0.1	µg/L	24-Jun-17	EPA200.8
Copper	34.0	0.2	µg/L	24-Jun-17	EPA200.8
Iron	328	5	µg/L	24-Jun-17	EPA200.8
Lead	1.2	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	28.1	0.1	µg/L	24-Jun-17	EPA200.8
Nickel	1.3	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	33.3	5	µg/L	24-Jun-17	EPA200.8

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

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

Client Project: Solid Waste
Sample Type: Outfall Wetland
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:00
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.055	0.005	mg/L	22-Jun-17	SM4500-NH3:G	
Biochemical Oxygen Demand		2	mg/L		SM5210:B	
CBOD		2	mg/L		SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	48.2	0.4	mg/L	19-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	257	0.4	µS/cm	19-Jun-17	SM2510:B	
pH	7.42		pH units	19-Jun-17	SM4500-H:B	
Solids, Total Suspended	< 3	3	mg/L	22-Jun-17	SM2540:D	
Major Ions						
Calcium	11.3	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	44.3	0.7	mg/L	20-Jun-17	SM4110:B	
Hardness	60.9	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	8.0	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate as Nitrogen	0.29	0.01	mg/L	20-Jun-17	SM4110:B	
Nitrite as Nitrogen	0.06	0.01	mg/L	20-Jun-17	SM4110:B	
Potassium	1.9	0.1	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: ***Saturday, July 01, 2017***

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

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

Sodium	27.4	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	11	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Fecal	4	1	CFU/100mL	16-Jun-17	SM9222:D
Organics					
Oil and Grease, visible	Non-visible			20-Jun-17	Visual Exam
Trace Metals, Total					
Aluminum	130	5	µg/L	24-Jun-17	EPA200.8
Arsenic	0.4	0.2	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	0.4	0.1	µg/L	24-Jun-17	EPA200.8
Cobalt	0.2	0.1	µg/L	24-Jun-17	EPA200.8
Copper	1.4	0.2	µg/L	24-Jun-17	EPA200.8
Iron	560	5	µg/L	24-Jun-17	EPA200.8
Lead	0.1	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	27.8	0.1	µg/L	24-Jun-17	EPA200.8
Nickel	1.3	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	< 5.0	5	µg/L	24-Jun-17	EPA200.8

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Effluent **Taiga Sample ID:** 004

Client Project: Solid Waste
Sample Type: Leak
Received Date: 16-Jun-17
Sampling Date: 16-Jun-17
Sampling Time: 10:00
Location:
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L		SM5210:B	
CBOD		2	mg/L		SM5210:B	
Organic Carbon, Dissolved	40.0	0.5	mg/L	20-Jun-17	SM5310:B	
Organic Carbon, Total	50.5	0.5	mg/L	21-Jun-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	470	0.4	mg/L	19-Jun-17	SM2320:B	
Conductivity, Specific (@25C)	3360	0.4	µS/cm	19-Jun-17	SM2510:B	
pH	6.90		pH units	19-Jun-17	SM4500-H:B	
Solids, Total Suspended	85	3	mg/L	22-Jun-17	SM2540:D	
Major Ions						
Calcium	89.4	0.1	mg/L	20-Jun-17	SM4110:B	
Chloride	784	0.7	mg/L	20-Jun-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	20-Jun-17	SM4110:B	
Hardness	593	0.7	mg/L	20-Jun-17	SM4110:B	
Magnesium	89.8	0.1	mg/L	20-Jun-17	SM4110:B	
Nitrate as Nitrogen	0.32	0.01	mg/L	20-Jun-17	SM4110:B	

ReportDate:
Print Date: ***Saturday, July 01, 2017***

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Effluent **Taiga Sample ID:** 004

Nitrate+Nitrite as Nitrogen	3.74	0.01	mg/L	20-Jun-17	SM4110:B
Nitrite as Nitrogen	3.42	0.01	mg/L	20-Jun-17	SM4110:B
Potassium	24.0	0.1	mg/L	20-Jun-17	SM4110:B
Sodium	390	0.1	mg/L	20-Jun-17	SM4110:B
Sulphate	85	1	mg/L	20-Jun-17	SM4110:B
Microbiology					
Coliforms, Total	57900	100	MPN/100ml	16-Jun-17	SM9223:B
Escherichia coli	< 100000	100100	MPN/100ml	16-Jun-17	SM9223:B
Organics					
Oil and Grease, visible	Non-visible			20-Jun-17	Visual Exam
Trace Metals, Total					
Aluminum	116	5	µg/L	24-Jun-17	EPA200.8
Arsenic	9.5	0.2	µg/L	24-Jun-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Chromium	2.7	0.1	µg/L	24-Jun-17	EPA200.8
Cobalt	6.3	0.1	µg/L	24-Jun-17	EPA200.8
Copper	7.7	0.2	µg/L	24-Jun-17	EPA200.8
Iron	32800	5	µg/L	24-Jun-17	EPA200.8
Lead	1.4	0.1	µg/L	24-Jun-17	EPA200.8
Manganese	5260	0.1	µg/L	24-Jun-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-17	EPA200.8
Nickel	16.9	0.1	µg/L	24-Jun-17	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Jun-17	EPA200.8
Zinc	< 5.0	5	µg/L	24-Jun-17	EPA200.8

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Effluent **Taiga Sample ID:** 004

ReportDate:
Print Date: *Saturday, July 01, 2017*

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

Taiga Batch No.: 170384

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Effluent **Taiga Sample ID:** 004

*** 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:

Print Date: *Saturday, July 01, 2017*

Appendix: C

Pages from Water Licence

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

"**Water Retention Area**" compromises the 'Water Retention Area' as identified on Nuna Burnside Project No. N-O 09755.0 Drawing No.1," *The Hamlet of Kugluktuk, Solid Waste Disposal Facility Improvements*", record drawing dated November 18, 2008;

"**Wetland Treatment Area**" comprises the 'Expanded Wetland Treatment Area' as identified on Nuna Burnside Project No. N-O 09755.0 Drawing No.2, "*The Hamlet of Kugluktuk Sewage Lagoon Plan*" and the "*Meandering Wetland Treatment Area*" as identified on Drawing No.3, *The Hamlet of Nunavut Kugluktuk Proposed Sewage Lagoon Sections* stamped and dated June 18, 2007.

3. Enforcement

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

c. For the purpose of enforcing this Licence and with respect to the use of Water and deposit or discharge of Waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than 31st of March of the year following the calendar year being reported, containing the following information:

a. tabular summaries of all data generated under the "Monitoring Program" as described under Part H
b. the daily, monthly, and annual quantities, in cubic metres, of freshwater obtained from Monitoring Station KUG-1;
c. the daily, monthly and annual quantities in cubic metres of sewage effluent discharged at Monitoring Station KUG-3;
d. the monthly and yearly quantities of authorized Waste – bulky metal, hazardous, wood and soil—accepted at the Solid Waste Facilities;
e. 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;
f. a list of unauthorized discharges and summary of follow-up action taken;
g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year, including a summary of the Old Sewage Lagoon (Decommissioned Sewage Disposal Facility) Facility's Inspection Report in accordance with Part G, Item 1;
h. any updates or revisions for manuals and plans *(Including Operations and*

Maintenance Plans, Spill Contingency, Abandonment and Restoration, QA/QC Plans) as required by changes in operation and/or technology;

i. a summary of any studies, reports and plans requested by the Board that relate to Water use, Waste disposal or reclamation, and a brief description of any future studies planned;

j. summary of any inspections completed by federal or territorial authorities, geotechnical or municipal engineers, on undertakings related to Water use, Waste disposal or reclamation activities; and

k. any other details on Water use or Waste disposal requested by the Board by November 1st of the year being reported.

2. The Licensee shall notify the NWB of any changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall comply with the "Monitoring Program" described in this Licence, and any amendments to the "Monitoring Program" as may be made from time to time, pursuant to the conditions of this Licence.

4. The "Monitoring Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

5. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of Water volumes as required under Part H, Item 1.

6. The Licensee shall, post the necessary signs, to identify the stations of the "Monitoring Program". All signage shall be in the Official Languages of Nunavut.

7. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and/or direction. The Board or an Inspector may alter or modify a Plan if necessary to achieve legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

8. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

9. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology, and modify the Plan accordingly. Revisions to the Plans shall be submitted in the form of an Addendum to be included with the Annual Report.

10. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

11. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at

all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(a) Manager of Licensing:
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nwb-oen.ca

(b) Inspector Contact:
Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

12. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

13. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the NWB is received and acknowledged by the Manager of Licensing.

14. This Licence is assignable as provided for in Section 44 of the *Act*.

15. The expiry or cancellation of this Licence does not relieve the Licensee from any obligation imposed by the Licence, or any other regulatory requirement.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all freshwater for municipal purposes from the Coppermine River, as indicated in its Application.

2. The annual quantity of Water withdrawn for all purposes under Part C, Item 1 in this Licence shall not exceed seventy thousand (70,000) cubic metres *per year* at a maximum withdrawal rate of two-hundred and ninety-nine (299) cubic metres *per day*.

3. The Licensee shall equip all Water intake hoses with a screen of appropriate mesh size to ensure that fish are not entrained and shall withdraw Water at a rate such that fish do not become impinged on the screen.

4. Where the use of Water is of a sufficient volume that the source Water body may be drawn down, the Licensee shall submit to the Board for approval in writing, the

following:

a. details of Water volume involved;
b. hydrological overview of the Water body;
c. details of impacts; and
d. proposed mitigation measures.

5. The Licensee shall maintain the Water Supply Facility to the satisfaction of the Inspector.

6. The Licensee shall not remove any material from below the ordinary High Water Mark of any Water body unless approved by the Board in writing.

7. The Licensee shall not cause erosion to the banks of any body of Water and shall provide necessary controls to prevent such erosion.

8. The Licensee shall implement sediment and erosion control measures prior to and maintain as required during Hamlet operations, to prevent entry of sediment into Water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Disposal Facility or as otherwise approved by the Board.

2. All Effluent discharged from the Sewage Disposal Facility at the Final Discharge Point at Monitoring Program Station KUG-3 end-of-pipe to the Wetland Treatment Area, shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of any Grab Sample
BOD_5	120 mg/L
Total Suspended Solids	180 mg/L
Faecal Coliforms	1 x 10^6 CFU/100 mL
Oil and grease	No visible sheen
pH	Between 6 and 9

3. All Effluent discharged from the Old Sewage Lagoon, Monitoring Station KUG-6 shall not exceed the Effluent quality limits set under Part D, Item 2.

4. The Licensee shall maintain at all times a Freeboard limit of at least 1.0 metre, or as recommended by a qualified Geotechnical Engineer and as approved by the Board in writing, for all dams, dykes, or structures intended to contain, withhold, divert or retain Water or Waste.

5. The Sewage Disposal Facility shall be maintained and operated, to the satisfaction of an Inspector and in such a manner as to prevent structural failure.

6. All discharge of Effluent at Monitoring Program Station KUG-5, from within the perimeter of the Landfarm Facility, shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of any Grab Sample (µg/L)
pH	6 to 9 (units)
Oil and Grease	5,000 and no visible sheen
TSS	15,000
Lead (dissolved)	1
Phenols	20
Benzene	370
Toluene	2
Ethylbenzene	90

7. The Licensee shall provide at least ten (10) days' notice to an Inspector, of the intent to discharge Effluent from the Old Sewage Disposal Facility or the Landfarm Facility.

8. The Effluent under Part D, Item 7 shall be discharged at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body and where direct or indirect flow into a water body is not possible and no additional impacts are created.

9. The Licensee shall, prior to the removal of any treated soil for future use, confirm with the Government of Nunavut, Environmental Protection Service that the soils have been treated to meet all legislatively-required Treatment Objectives for its intended use.

10. The Licensee shall dispose of all Solid Wastes in such a manner as to prevent the deposition of such waste in to water.

11. The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood to prevent the deposition of Waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding Waters, unless otherwise approved by the Board in writing.

12. The Licensee shall segregate and store all hazardous materials and/or Hazardous Waste in such a manner as to prevent the deposit of Waste into Water, until such time that the material have been removed for proper disposal at an approved facility.

PART E: CONDITIONS APPLYING TO MODIFICATIONS AND CONSTRUCTION

1. The Board has, with the issuance of this Licence, approved the amendment to the Water Supply Facility.

2. The Licensee shall submit to the Board for approval in writing, for-construction design drawings, stamped and signed by a qualified Engineer registered in Nunavut, at least sixty (60) days prior to the construction of any dams, dykes or structures intended to

contain, withhold, divert or retain Water or Wastes.

3. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facility and Waste Disposal Facilities provided that such Modifications are consistent with the conditions and scope of this Licence and the following requirements are met:

   a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
   b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;
   c. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
   d. the Board has not rejected the proposed Modifications.

4. The Modifications for which all of the conditions referred to in Part E, Item 3, have not been met, may only be carried out upon written approval from the Board.

5. The Licensee shall, within ninety (90) days of completion of Modification or Construction of facilities and/or infrastructure associated with the project, submit to the Board a Construction Summary Report along with stamped as-built plans and drawings, providing explanation to reflect any deviations from the for construction drawings, taking into account construction and field decisions and how they may affect the performance of engineered facilities.

6. The Licensee shall submit to the Board for approval in writing, at least sixty (60) days prior to the construction of the new Water Treatment Plant (WTP), for-construction design drawings of the new WTP, stamped and signed by a qualified Engineer.

7. The Licensee shall within ninety (90) days of completion of modifications of the Water Supply Facility, submit to the Board for review and written acceptance a Construction Summary Report along with as-built plans and drawings of the new Water Intake Facility and the new Water Treatment Plant, stamped and signed by a qualified Engineer.

8. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

9. The Licensee shall implement and maintain sediment and erosion control measures prior to and during activities carried out under this Part, to prevent negative impacts to Water resulting from the release of sediment and to minimize erosion.

10. With respect to earthworks, the Licensee shall not deposit debris or sediment into or onto any Water body. These materials shall be disposed of at a distance of at least thirty-one (31) metres from the ordinary High Water Mark in such a fashion that they do not enter

the Water.

11. The Licensee shall only use material that is free of contaminants, for construction, operation, and maintenance activities and that is obtained from approved sources, demonstrated not to be potentially acid generating and metal leaching.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of issuance of the Licence, an updated Sewage Treatment Facility Operation and Maintenance Manual. The updated Manual shall include:

    a. a Monitoring Program, which reflects the current operating and monitoring conditions of the Licenced Facilities;
    b. the Temperature Monitoring Program for the Sewage Lagoon Dyke; and
    c. the GPS coordinates of the Monitoring Stations.

2. The Board has approved the "Spill Contingency Plan" (SCP), dated November 28, 2014, which was submitted as additional information with the Application. The Licensee shall submit to the Board for review within ninety (90) day of the date of Licence issuance an addendum to the SCP to include:

    a. a detailed description of the secondary containment used as spill prevention measure during fuel or hazardous substance transfer at the Licenced Facilities.

3. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of issuance of the Licence, an updated Solid Waste Facility Operation and Maintenance Plan prepared in accordance with the "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories" (1996). The updated Plan shall take into consideration the comments received during the renewal application review process for expired Licence No. 3BM-KUG0914 including the following information:

    a. SWF Monitoring Plan: updated sampling locations, parameters and timing required
    b. a plan for the inspection, management and monitoring for the sewage sludge, which also identifies the remediation objectives for sewage sludge treated in the Landfarm Facility

4. The Licensee shall submit to the Board for approval in writing, within ninety (90) days of beginning operations, a Water Supply Facility (WSF) Operation and Maintenance Manual. The WSF Operation and Maintenance Manual should include an Operations and Maintenance Manual for the updated Water Treatment Facility and also include the " Kugluktuk Water Intake Operations and Maintenance (O&M) Manual" dated October 2014 and submitted as additional information with the Application.

5. An inspection of all engineered facilities related to the management of Water and Waste shall be carried out by an Engineer at a minimum of once annually, and before commissioning any engineered facility related to the management of Water and Waste. The Engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to address each of the Engineer's recommendations.

6. An inspection of all engineered facilities related to the management of Water and Waste shall be conducted by a Geotechnical Engineer in accordance with the *Canadian Dam Safety Guidelines*, at least one (1) year prior to the expiry of the Licence, during the open Water period (June/July/August). The Geotechnical Engineer's report shall be submitted to the Board for review within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to address the Engineer's recommendations.

7. The Licensee shall perform more frequent inspections of the engineered facilities at the request of an Inspector.

8. If during the period of this Licence, an unauthorized discharge of Waste occurs, or if such a discharge is foreseeable, subject to the Act and the Nunavut adopted *Consolidated Spill Contingency Planning and Reporting Regulations* (R- 068-93), the Licensee shall:

    a. employ the appropriately approved Spill Contingency Plan for the Hamlet of Kugluktuk. Take whatever steps are immediately practicable to protect human life, health and the environment;
    b. report the incident immediately via the NWT/NU 24-Hour Spill Reporting Line at (867) 920-8130 and to the AANDC Manager of Field Operations at (867) 975-4295; and
    c. for each spill occurrence, submit to the Inspector not later than thirty (30) days after initially reporting the event, a detailed report that provides the necessary information on the location (including the GPS coordinates), amount and type of spilled product, initial response action, remediation/clean-up, status of response (ongoing, complete), proposed disposal options for dealing with contaminated materials and any preventative measures to be implemented.

9. The Licensee shall, in addition to Part F, Item 9, regardless of the quantity of releases of harmful substances, report to the NWT/NU Spill Line if the release is near or into a Water body.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval in writing, within ninety (90) days following the date of issuance of this Licence, an updated Abandonment and Restoration Plan for the Old Sewage Lagoon. The Plan shall include, but not be limited to:

    a. an implementation schedule for the Plan;

b. sludge treatment method and disposal options;
c. Effluent treatment and disposal;
d. Monitoring Program; and
e. Schedule of inspection and checklist.

2. The Licensee shall submit to the Board, for approval, an Abandonment and Restoration Plan, at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

a. Water intake facilities;
b. the Water treatment and Waste disposal sites and facilities;
c. abandoned Water and Waste facilities;
d. petroleum and chemical storage areas;
e. any site affected by Waste spills;
f. leachate prevention;
g. an implementation schedule;
h. maps delineating site facilities;
i. consideration of altered drainage patterns;
j. type and source of cover materials;
k. future area use;
l. Hazardous Wastes; and
m. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment related to Water use, Waste deposit to Water, or appurtenant undertakings related to Water use and/or deposit of Waste to Water, subject to the act and regulations.

3. The Licensee shall complete all restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

4. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.

5. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

6. Areas that have been contaminated by hydrocarbons shall be reclaimed to meet objectives as outlined in the Government of Nunavut's *Environmental Guideline for Site Remediation* (Revised January 2009). The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall maintain Monitoring Program Stations at the following locations:

Monitoring Program Station Identification	Description	Status
KUG-1	Raw Water Supply Intake at Coppermine River	Active (Volume)
KUG-2	Effluent discharge from the Water Retention Area in the Solid Waste Disposal Facilities	Active (Quality)
KUG-3	Effluent discharge end-of-pipe at Final Discharge Point from the Sewage Lagoon to the Wetland Treatment Area	Active (Quality)
KUG-4	Outfall area for the Wetland Treatment Area	Active (Quality)
KUG-5	Effluent discharge and run-off from the Landfarm Facility (controlled discharge)	Active (Quality)
KUG-6	Effluent discharge (controlled discharge)from the Old Sewage Lagoon	New/Active (Quality)
KUG-7	Thermistor readings in accordance with approved Temperature Monitoring Program for the Sewage Lagoon Dyke under Part F Item 2b	New/Active (Temperature)

2. The Licensee shall measure and record, in cubic metres, the daily, monthly, and annual quantities of Water extracted for all purposes at Monitoring Program Station KUG-1.

3. The Licensee shall sample monthly at Monitoring Program Station KUG-2, KUG-3 and KUG-4 during periods of observed flow and annual discharges.

4. All Samples obtained at KUG-2, KUG-3, KUG-4 and KUG-6 shall be analyzed for the following parameters:

Biological Oxygen Demand (BOD_5)	Fecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease (visual)
Nitrate-Nitrite	Ammonia Nitrogen
Chloride	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Hardness	Total Alkalinity

Total Arsenic
Total Cadmium
Total Cobalt
Total Copper
Total Lead
Total Mercury
Total Zinc
Total Phenols
Total Aluminum
Total Chromium
Total Iron
Total Manganese
Total Nickel
Carbonaceous Biochemical Oxygen Demand (CBOD)

5. The Licensee shall sample monthly at Monitoring Program Station KUG-3, during periods of observed flow and annual discharges to verify compliance with effluent quality criteria under Part D Item 2.

6. The Licensee shall carry out inspections at Monitoring Program Stations KUG-2, KUG-3 and KUG-4, weekly from May to October inclusive, to determine Effluent or water flow in order to fulfill the monitoring requirements of Part H, Item 4 and 5. A record of inspections shall be retained and made available to an Inspector upon request.

7. The Licensee shall sample prior to discharge at Monitoring Program Station KUG-5, to verify compliance with Effluent quality criteria under Part D, Item 6.

8. All samples obtained at KUG-5 shall be analyzed for the following parameters:

pH
Total Suspended Solids
Total Hardness
Oil and Grease (visual)
Total Petroleum Hydrocarbons (TPH)
Polycyclic Aromatic Hydrocarbons (PAH)
BTEX:
Benzene
Toluene
Ethylbenzene
Xylene
Conductivity
Total Copper
Total Mercury
Total Zinc
Total Chromium
Total Lead
Nickel
Total Arsenic
Total Cadmium
PCB (Polychlorinated biphenyls

9. The Licensee shall sample prior to discharge at Monitoring Program Station KUG-6, to verify compliance with Effluent quality criteria under Part D, Item 2.

10. Additional monitoring stations, sampling and analysis may be requested by an Inspector.

11. The Licensee shall submit to the Board for review, within ninety (90) days of the date of issuance of the Licence, a Quality Assurance/Quality Control Plan based on the guidance document entitled *Quality Assurance (QA) and Quality Control (QC) Guidelines For Use by Class "B" Licences in Collecting Representative Water Samples in the Field and for Submission of a QAQC Plan* INAC (1996). The submitted Plan shall include a cover letter from an accredited laboratory confirming acceptance of the Plan for the monitoring

and analyses to be performed under the Licence.

12. The Licensee shall conduct all sampling, sample preservation and analyses in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by a laboratory certified by the Canadian Association for Laboratory Accreditation (CALA) or otherwise approved by the Board.

13. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

14. The Licensee shall monitor temperature at Monitoring Station(s) KUG-7 a minimum of twice annually, in early spring and mid to late fall or in accordance with the Sewage Lagoon Dyke Monitoring Program requested under Part F, Item 1b and 1c.

15. The Licensee shall provide the temperature readings at different depths at Monitoring Station(s) KUG-7 within the annual report, due no later than March 31. An annual evaluation of the geothermal data of the Sewage Disposal Facility shall be provided as an addendum to the Annual Report.

16. The Licensee shall include all of the data and information of the Monitoring Program, as required under Part B, Item 1(a), or as requested by an Inspector.

17. Modifications to the Monitoring Program including the Monitoring Program Stations and parameters may be made only upon written approval of the Board.