Annual Report -2020

Water Licence: 3BM-KUG 2030

Hamlet of Kugluktuk, NU

Date: Feb 11, 2021

Submitted by: Shah Alam, P. Eng. E.P. CAPM
Municipal Planning Engineer,
Government of Nunavut
Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu

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Nunavut

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Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Kugluktuk Water Licence: 3BM-KUG 2030 Annual Report 2020

Feb 11, 2021

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

Attention: Richard Dwyer, Manager of Licensing

RE: 3BM-KUG 2030 - Annual Report 2020, Hamlet of Kugluktuk

Dear Richard,

The Hamlet of Kugluktuk is pleased to submit the "**Annual Report 2020**" of water uses and sewage solid waste disposal as required and directed under the compliance of Water Licence 3BM-KUG-2030. Copies of required tests reports are included.

The Licensee has carried facilities operation, monitoring, management and sampling of water, sewage effluent, solid waste run-off as identified in the Licence, tested at Taiga Laboratory (the CALA accredited) in Yellowknife. Test results shown satisfactory remediation of contamination parameters that are within allowable limits specifically BOD, TSS, E-coli, toxicity and trace metals as determined in the compliance requirements prior to discharge to water body. We summarized those conditions and explained the best fit to requirements outlined in the license.

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

Best Regards,

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

Cc: Baba Pedersen, Resource Management Officer, AANDC

EXECUTIVE SUMMARY:

The Annual Report 2020 for the Hamlet of Kugluktuk is prepared to meet requirements of the Nunavut Water Board Licence 3BM-KUG 2030, Part B General Conditions, through part H to the monitoring program, with information covering period from 01 January to 31 December 2020.

Potable water intakes from Coppermine river through intakes of both IPHs and deliver to new plant for treatment through coagulation, sedimentation, filtration, UV and disinfected before truck-fill by hamlet operated water trucks to community residence tanks. The old IPH is kept as backup when needed and can be abandoned if not required. During this period, water was drawn mostly using the old IPH due to salinity sensors in water from the new IPH. The old IPH also has additional scope of drawing water from ice layer using mobile hose and pump. Since the heat trace burnt in Nov 2018 by unknown cause, insulation required to reinstalled at the burnt section. The temporary water storage reservoir has been in use with sedimentation and re-intake to treatment plant when high turbidity & salinity in water source alarms. Quantity of water drawn from all sources during this period was nearly **66,137 m3** which is within the allowable limit **90,000** annually determined in the Licence.

Wastewater combines with raw sewage and grey water collects from household sewage tanks using hamlet operated vacuum trucks and hauls and discharges at the sewage lagoon using the sewage dropping pad. Raw sewage stayed frozen inside the lagoon during Nov – June, almost 8 months and receives primary treatment naturally. Frozen wastewater starts melting during late spring through July and flows inside. Sewage water decants out during July-Sep by mechanical pump to reduce water volume inside, but no sludge removal required during this period. The license has samples from decanting locating and tested at Taiga Laboratory Yellowknife for parameters compliances. Test results were reviewed by CIRNAC inspector and decanting carried with his approval consent.

Flow meter, Cl2 level sensor, water storage tank water level and water flow control at filtration system were added for treatment and truckfill monitoring through observation from plant outside as needed. Water and wastewater samples tested at Taiga Lab for parameters concentration and coliform on monthly basis during summer and fall and no issues or concern during this period. Feed water storage tank cleaned, and sludge removed from the tank floor by using wastewater trucks.

Solid waste and metal waste collected from household waste bins and hauled to dump site by the operator disposed at designated location, from where loose debris were reduced by slow burning and compacted down and covered with sand and gravels.

CGS projects is looking a cost-effective solution for the air bubbles and liner leak at sewage lagoon. A consultant will be retained this summer to review the issue, background and short term and long term solutions of the leak remediation or restoration of the lagoon.

EXECUTIVE SUMMARY:

Ukiuqtamaat Kangiqhidjutit 2020-mi Haamlatkut Kugluktumi hannaijailiqtut nalaumajaamingni uvuuna Nunavut Imakkut Laisingagut 3BM-KUG-2030, Ilanga B Qanuriniat, ilangaut H amiridjuhianit pidjutait, ilitturipkaidjutaillu tatqiqhiutinit 01 Ubluqtuhiavia uvunga Ubluiqtirvia 31, 2020.

Imiqtaaqtaq imiqtaqtauvaktuq Coppermine kuugaanit tuqhuakkut tamangnit IPHnit pappiqtaibluni halummaqtiriviannut kivittirvianut, halumaijattiarvianut , UV imaalu jaaviksiliqtuqhugu akhaluutit tatatiqtinnatik imiqtaqtaujukhat iglunut haamlatkut imiqtaqtiinit. Utuqqaq IPH pihimajaujuq himmautikhaq ihariagiktaukpat hugihuiqtauluni atuqtaujariitpat. Talvuuna, imaqtaqpaktut atuqhutik utuqqamik IPH tarjurninnirmit imarmit atuqhugu nutaaq IPH. Utuqqaq IPH aallakkut atuqtauttaarmat imaa imiqtaqtaaqhuni hikukkut ingniqutiqaqhuni pappautiqaqhuni. Uunnaqhiitaa algirmat Hikutirviani 2018-mi huuq nalujaujuq. Insaliisiriaqaqtuq iliuraffaariami algirniagut. Imaqarviulaktuq atuqtaujuq kivittiviqaqhutik imaqtaffaarvingmik halummaqhivagiagat maarlungainaliraangat tarjuqhungnilliraangallu imaq hivajalaqivaktuq. Atauttimuraaluk imaqtaqpagaat ukunani tatqiqhiutini imaa **66,137 m3** naammagijahianniittuq pittaarnianit **90,000**-ngujuq ukiuqtamaat naunaiqhimajuq laisikhami.

Anaqtautit imaijaivaktut iglunit halumaittunik imarnik anaqtaumillu milukautilingnut akhaluutinut haamlatkut akhaluutainik ajaqtauvaktuq kuvirarviannut qaliqtallingnut kuvirarvingmut. Anaqtaqtaut qiqumattaaqtuq ukiuraaluk Hikutirvianit Imaruqtirvianut, tatqiqhiut 8-ngujut naavjakpaktut halummaqtiqhiqtuq hilamit. Qiqumajuq imaq halumaittuq mahaktiliqpaktuq upin'ngaamit Taaqhivaliavianut iluaniittuni. Imaijaqtauvjakpakhuni maqijariittumik Taaqhivaliarnianit Apitirvianut pappautinut, kihimi marlungania natianit atuqhutik halumaittumik tataktaunmik. Laisikhaq uuktuqtaujukhalgit pihimajaat halumairviannit ihivriuqtaujukhaq Taiga Laboratory Yellowknife-mi agiqtilaangagut naamagiakhaa. Uuktuqtaunia ihivriuqtauhimajaat CIRNAC-tkut ihivriuqtianit halumaijarhimania nakuugijaujuq angiqtaujuq.

Kividjuhia, CI2 amiqhidjuhia, imaqarvita tatatirvia imaalu imap kivipkarvia halumaqhirviani ilaujut halumatirnianut naunaiqhaiblutik hilataanit pijaariaqaqqat. Imaq halumailrurllu ihivriuqtauvaktut Taiga Lab-mi qanurinningagut anaqariakhaalu uuktuqtauvaktut tatqiqhiut tamaat aujami ukiakhamilu imaalu ihumaalutikhaittuq ukunani tatqiqhiutini. Imaqtarviit halumajut, imaalu halumailrut ungaavaktauvaktut imaqarviit natiannit akhaluutit atuqhugit.

Anaqtaqhimajat imarlu iglunit pappiqhimajut iqqakuurviinnit agjaqhugu iqqakuurviqarvingmut, imaalu titqattaqtaaqtut ikualaaqtitaublutik kajumiittumik naniktiqtaublutiglu qaanga hiuraqtirtaubluni ujarialiaqtiqtaubluni.

CGS-tkut akikittuqhiuqtut ihuaqhariangat puviqhimaniit maqiviillu anaqtaqtit kivirarviat. Naunaiqhaijukhaq pijauniaqtuq aujaqqat ihivriuqhijukhaq ihumaaluutaujuq, qanuriningagut qanugunuakkut qanuguraalukkut ihuaqhauhikhaanik maqilvinga ihuaqhariangat anaqqarviup.

3BM KUG 2030

Annual Report-2020

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PART 'A'

Attachments: PART 'B'

PART ‘A’

Annual Report 2020

NWB Form Details

NWB submission

Inspection information

Water Licence: 3BM-KUG 2030

Hamlet of Kugluktuk, NU

ANNUAL REPORT-2020

YEAR BEING REPORTED: 2020

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence **3BM-KUG2030** 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	5,398,349.00	same
February	5,062,195.40	same
March	5,722,350.20	same
April	5,484,891.20	same
May	5,629,774.20	same
June	5,536,125.30	same
July	5,651,139.00	same
August	5,702,168.10	same
September	5,597,059.80	same
October	5,577,120.13	same
November	5,389,962.80	same
December	5,385,310.10	same
ANNUAL TOTAL	**66.136,449.23**	same

- Annual water consumptions are recorded daily basis from number of truck fills supply and volume estimated from daily number of truck loads sewage disposal in the lagoon.
- No device Meter used on truckfill but volume by truck capacity is however, considered as precise for the total water and sewage waste quantities on daily and monthly basis.
- Sewage carried to the sewage lagoon from the household tanks using hamlet operated vacuum trucks 7 days a week and disposed at the designated drop off points where the sewage stays inside the lagoon almost 9 months frozen and receive the primary treatment naturally and allow sludge built up at lagoon bottom.
- Sewage water decants out by mechanical pump and hose in July-Sep when thaw and leave sludge at the bottom. Decanted sewage enjoys polishing of colloidal substance and receive final treatment on wetland through the uses of natural resource including sunlight, oxygen ingress, airflow and nutrient enrich grassy surface of the trench on wetland.

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;

- Fixed the treated water tank roof cover and side which was buckled slightly due to negative pressure inside when water draws from tank but wasn't recovered vacuum with treated water.
- Flow meter installed for individual RSF to monitor the flow rate, pressure loss or other issues.
- Light flashing beacon alarm installed on building exterior wall in between two truckfill arms for – (i) vacuum level of treated water tank (ii) Cl_2 dosing level at mixing tank, and (iii) flow level at Roughing Sand filter tanks. (attached pictures)
- Water truck operator safety ladder step installed at truckfill with permanent support concrete pad. Operators can freely climb up, stay in safe platform, and monitor the water truckfill standing on the rigid platform, no need to climb up on truck roof.
- Waste oil burning drum type incinerator setup on site with funnel and feed line from side(Picture attached)

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

- Sewage lagoon leaks continuously but at a reduced rate since the buttress work completed at the toe support. Another new spot of leak discovered within 50 ft distance of the previous leak point; assuming both leak spots might be originated from same leak-line of lagoon interior. As noted in CIRNAC report, continuous leaking has resulted significant sewage water out of lagoon and left very low level inside the lagoon (about 30% of expected volume) to decanting by pump.
- No other unauthorized discharge during this period from water plant, or solid waste facilities.

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 abandon or restoration work done during this period for water, sewage, or solid waste.
- The old WTP building is being planned as backup to new WTP and specifically possible uses of two treated water storage tanks inside the building which has direct feed to neighbour QEC plant.
- QEC is now has house tank to be filled by truck water and has stopped the direct feed from the water storage tank at old WTP.
- As a result, these two tanks will be no other uses except keeping for other need i.e. fire storage. Also, overnight truck water is considered a fire storage and might not a usual need of storage tanks water at the old WTP.
- The hamlet is considering draining out of these two tanks but leave the building and tanks without a regular operation for now to reduce the operational cost. In future, this old WTP building might be thought of abandoned once the new WTP gets direct feed without going through surge tank at old building. Buried connection of about 10m from the last vault to the new feed line is planned for completion in summer 2021

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**;

CIRNAC inspection of Aug 17-18, 2020 to sewage lagoon, solid waste, metal dump and water supply system has mentioned some specific items to be improved by the summer and fall 2020. These are:

- The land farm facility is over borne than its capacity and needs to be emptied for new candidate soils and spills.
- Loose debris needs to be managed by control burning and packing down and cover with sand.
- Debris from sewage lagoon inside must be removed prior to freeze up.
- Used batteries must be placed inside the wooden box with plastic sheets all around and box should be placed on crated woods.
- All the waste oil pails must be secured inside container and labelled for inventory purposes.

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

The inspector has requested to do something to sewage leak remediation and liner bubbles which is concerns to sewage containment before going out towards wetland through leaks.

- The hamlet has an information from CGS projects of hiring a consultant in to do study and report for cost effective solution of the leak issue. The RFP invitation will be held by Summer 2021.

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

The Board has requested update of information, contacts and management plan of sewage and solid waste facilities O&M manuals which were previously approved 2014 but operational team and scope might change from the approved version. A standalone SC plan also has requested with update contacts and description of follow up process.

ANNUAL REPORT-2020

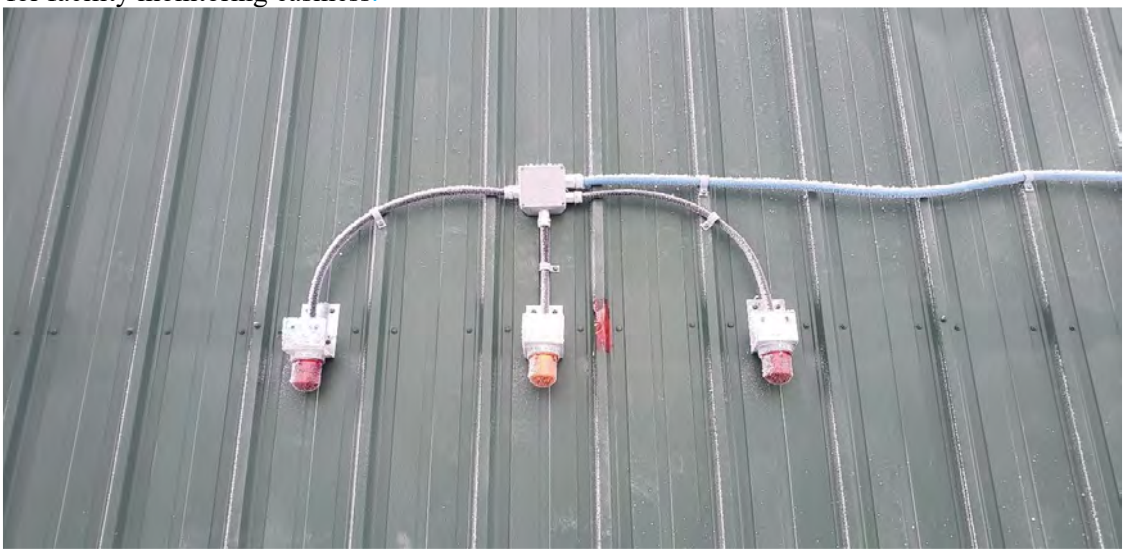
The Licensee has responded to the Board and submitted update on Sep 18, 2020 with O&M manual and SC plan as requested. Information of such correspondence are attached, but detail O&M manuals and SC plan is available at NWB website.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

Sewage lagoon decanting started on Aug 18 with the approval of the inspector. The lagoon was seen about half full as the leak has reduced substantial quantity of sewage water. Advised to do leak sampling and test for monitoring of the quality.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

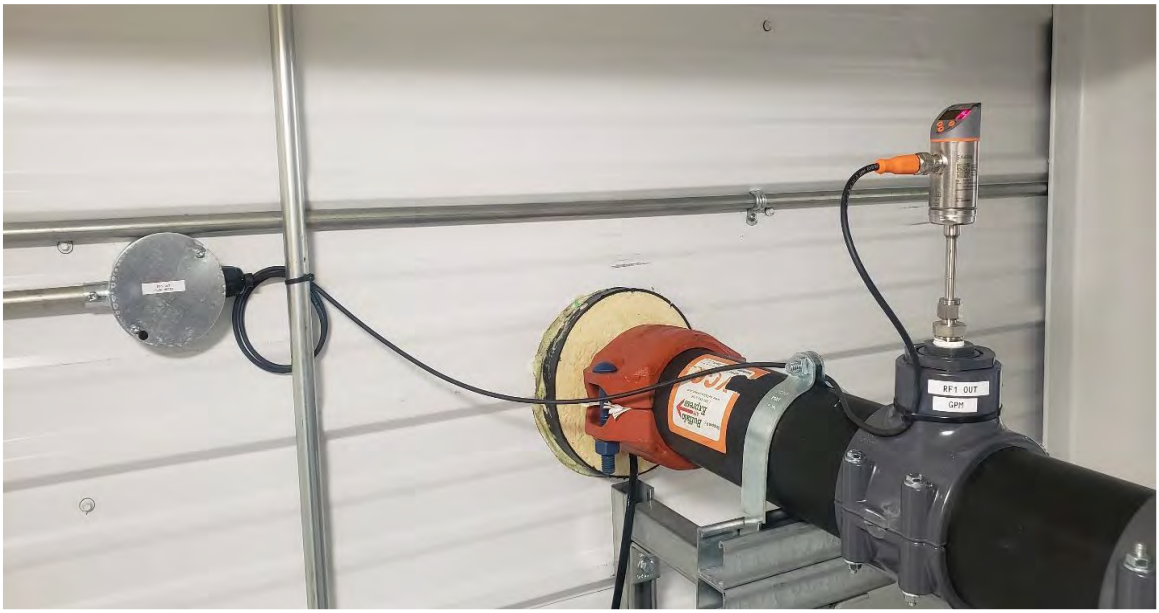
Some concern regarding water flow rate, quantity records, and operational scope at filtration system, sensors, and monitoring system of the plant. CGS retained contractor has added some additional works for facility monitoring easiness.



Three beacons installed using Teck cable on the building exterior

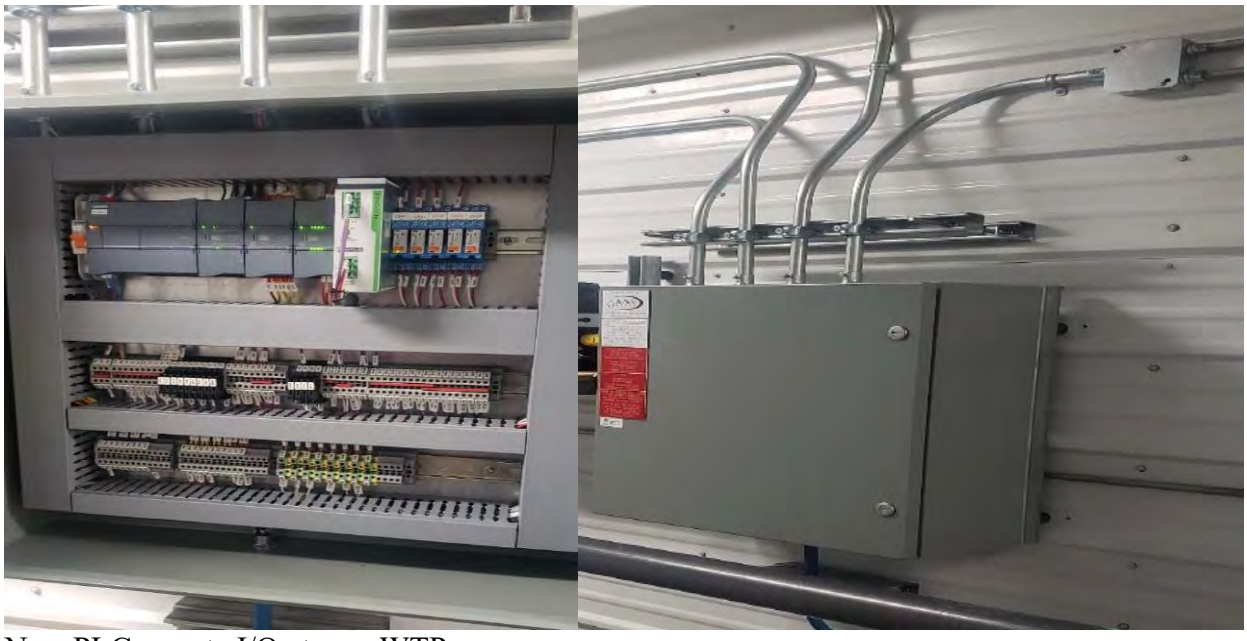
New ABB flow meter for Slow sand filter

Sensor for Cl2 level in the mixing tank



Flow sensors in pipes feeding the RSF from Filter Feed tank

Tank vacuum switch under the treated water tank.



New PLC remote I/O at new WTP


Insulation reinstates at the heat trace burnt section of the old IPH


Waste oil burn incinerator

air bubbles in lagoon liner

NWB submission

September 18, 2020

- O&M manual – Water Treatment Plant
- Addendum to O&M - Sewage Treatment
- Addendum to Spill Contingency Plan

Water Licence: 3BM-KUG 2030

Hamlet of Kugluktuk, NU

Water Licence: 3BM-KUG 1520 WTP O&M manual

September 18, 2020

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

Attention: Richard Dwer, Manager of Licensing

RE: **Water Treatment Plant O&M manual**
Ref: **NWB Letter December 08, 2015**

Dear Richard,

The Hamlet of Kugluktuk is pleased to submit to Nunavut Water Board the attached file of new Water Treatment O&M manual required to the Water Licence 3BM-KUG 1520 as requested.

We hope that Nunavut Water Board will find the O&M manual effective in practicing the water License for water, sewage, and solid waste management programs.

GN-CGS is submitting this plan on behalf of the Hamlet of Kugluktuk.

Best Regards,

Shah Alam, P. Eng. E.P, CAMP
Municipal Planning Engineer,
Government of Nunavut
Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
Phone: 867-983-4156, fax: 867-983-4123, salam@gov.nu.ca

Sewage Treatment Facility O&M manual, May 2014
Prepared by: Nuna Burnside Engineering and Environmental Ltd.

Item 1.2 Nunavut Water Board License

Current contents: License NWB3KUG0308
Replace with: License 3BM KUG 1520

Item 1.4 Sewage volumes

Item 3.1 Overview

Current contents: The lagoon will be fenced
Replace with: The lagoon berm is fully fenced with walkway inside the fence on the berm

Item 3.3.1 Existing lagoon

current: The old lagoon has yet to be commissioned
Replace: The old lagoon has been decommissioned

current: the former lagoon will be desludged with the sludge transferred
Replace: the former lagoon was desludged and level gradients towards the wetland

Current: A decommissioning plan has developed…. the topography of the area
Replace: the old sewage facility has been decommissioned. Metal spillway has been removed and berm materials were pushed to infill lagoon area and levelled.

Item 3.3.4 Gas under Synthetic Liner (1st paragraph)

Current: the remaining bubbles will not be removed……Operation of the lagoon
Replace with: remaining bubbles hopefully be removed through a maintenance work later

Item 3.7.2 Monitoring stations

Current: KUG-1 ….. KUG-4A …… WS-4
Replace with:

Station	Description	Comments
KUG-1	Raw Water intake location at Coppermine River	Volume of water intake annually
KUG-2	Solid waste run-off effluent sampling location	sampling June-Sep and as available
KUG-3	Raw sewage deposition from truck off-load	Volume of sewage deposition
KUG-3A	Decanting location from sewage lagoon inside	Sampling when decanting in plan
KUG-4	Effluent outfall from wetland to Coronation Gulf	sampling Jun-Sep as available
KUG-5	Landfill and soil storage run-off towards wetland	Sampling Jun-Sep and as available

Note: surface monitoring stations WS 1 – WS 4 were part of old sewage lagoon effluent quality control, which are no more active since the old sewage lagoon facility was decommissioned.

Item 3.7.3 (list# 4) Monitoring procedures

Current sentence starts:raw sewage samples will be collected…..several loads
Replace with: raw sewage sample collects from location at KUG-3A decanting inlet point

Spill Contingency Plan, November 28, 2014
Prepared for Hamlet of Kugluktuk, NU

Item 1.0 Introduction

Contact Person:

Existing: Don LeBlanc
Replace: Kimberley Young

Item 1.3.2 Water Treatment Plant (1st paragraph)

Existing: The water treatment plant …. Building at a safe storage.
Replace: The new water treatment plant (WTP) include sedimentation, filtration, UV and disinfection process. An additional process CFS coagulation/flocculation by using ferric chloride solution to water to sediment flocculent before entering to the sand filtration process when the high turbidity determined in raw water. The 12% sodium hypochlorite (comes in 20L pail) solution dosing into water before the truckfill for disinfection while supply water store in the resident tank for all purposes. The CFS process only used when needed, otherwise only 12% NaoCl uses followed by filtration and UV process. All these chemicals comes in plastic pails and store inside the storage room at WTP building.

Item 1.3.2 Water Treatment Plan (3rd paragraph)

Existing: The new treatment plant system will be an

Replace: The new treatment plant includes

Item 3.3.1 Existing lagoon

current: The old lagoon has yet to be commissioned
Replace: The old lagoon has been decommissioned

current: the former lagoon will be desludged with the sludge transferred
Replace: the former lagoon was desludged and level gradients towards the wetland

Current: A decommissioning plan has developed…. the topography of the area
Replace: the old sewage facility has been decommissioned. Metal spillway has been removed and berm materials were pushed to infill lagoon area and levelled.

Item 5.2 Spills Response Personnel: (Table 1st and 2nd row)

Current (1st row): Don LeBlanc
Replace: Kimberley Young

Current (2nd row): George Egotak
Replace: Kevin Klengenberg and Shaun Cummins

Samples Test Results

Tabular Summary

- Water Quality Summary 2020
- Sewage Waste Test Results 2020
- Waste Effluent Test Results 2020

Water Licence: 3BM-KUG 2030

Hamlet of Kugluktuk, NU

2020 Kugluktuk Water Quality Summary

Test Type	Parameters			October 07 2020			
		Units	MAC	Raw (KUG-1C	Tuckfill 2	Truckfill 3	Old Tanks #2
Physicals	Colour	TCU	<=15				
	pH		7.0 - 10.5	7.57	7.5	7.44	7.5
	Turbidity	NTU	<=5	3.10	0.24	0.24	3.06
	TDS			22	16	< 10	15
	TSS			< 3	< 3	< 3	< 3
	Alkalinity			29.9	28.9	29.1	29.3
	Conductivity			66.9	71.2	70.2	77
Nutrients	Dissolved C	mg/L	45	3.7	3.2	3.3	3.9
	Total C	mg/L		3.8	3.2	3.3	3.7
	P, Total	mg/L					
Organics	Cyanide	mg/L	0.2	< 0.0020	< 0.0020	< 0.0020	< 0.0020
	THMs	mg/L	0.1				< 0.0050
	Phenol, Total			< 0.0010	< 0.0010	< 0.0010	< 0.0010
	Bromo-CH4						< 0.0010
	Oil & Grease	Visibility		Non-visible	Non-visible	Non-visible	Non-visible
Major Ions	Nitrate N	mg/L		0.02	0.02	0.02	0.02
	Hardness	mg/L		32.3	31.2	31.8	31.7
	Chloride	mg/L	<=250	1.8	2.8	2.6	4.1
	Fluoride	mg/L		< 0.1	< 0.1	< 0.1	< 0.1
	Sodium	mg/L	<=200	1.32	2.53	2.44	3.94
	Sulphate	mg/L	<=500	2	2	2	2
	Magnesium			3.32	3.09	3.18	31.7
	Calcium			7.46	7.40	7.51	7.46
Microbiology	Total Coliform	CFU	none	27.2	< 1.0	< 1.0	< 1.0
	E. Coli	CFU	none	< 1.0	< 1.0	< 1.0	< 1.0
Metals(T)	Aluminium	µg/L	<100	131	35.6	35	106
	Arsenic	µg/L	100	0.2	< 0.2	0.2	0.3
	Barium	µg/L	1	15.3	10.6	10.5	17.1
	Cadmium	µg/L	5	< 0.1	< 0.04	< 0.04	0.1
	Chromium	µg/L	50	0.3	< 0.1	< 0.1	0.3
	Copper	µg/L	<=1000	1.4	3.4		59.0
	Iron	µg/L	<=300	151	12	12	193
	Lead	µg/L	10	0.1	< 0.1	< 0.1	0.4
	Manganese	µg/L	<=50	5.3	0.2	0.3	7.8
	Selenium	µg/L	50	< 0.5	< 0.3	< 0.3	< 0.5
	Uranium	µg/L	20	0.2	< 0.1	< 0.1	0.1
	Zinc	µg/L	<=5000	< 5.0	1.4	0.7	8.2
	Mercury	µg/L	1	0.01		< 0.01	0.01
	Nickel	µg/L					

2020 Kugluktuk Sewage Effluent Log

Parameters	Units	MAC Limits	MAC Limits KUG-3	24-Jun-20			
				Solid Waste Kug-2	Sewage Disposal Kug-3	Outfall Wetland Kug-4	Land farm Kug-5
Alkalinity T($CaCO_3$)	mg/L			119	96.1	54.4	
Conductivity (@25 C)	µS/cm			462	297	303	
pH	pH	6-9	6-9	8.44	7.31	7.74	7.81
TSS	mg/L	180	180	40	24	12	
Ammonia as N_2	mg/L			<0.005	24.4	0.303	
BOD	mg/L	120	120	8	97	5	
CBOD	mg/L			7	76	4	
Dissolved, C	mg/L						
Total, C	mg/L						
Nitrate as N_2	mg/L	45		<0.0200	<0.0200	0.465	
Nitrite as N_2	mg/L	3		<0.0100	<0.0100	0.023	
Calcium	mg/L	32		39.6	4.12	12.7	
Chloride	mg/L	100		41.6	18.3	54.0	
Hardness	mg/L	500		179	18.6	71.6	
Magnesium	mg/L			19.4	2.03	9.67	
Potassium	mg/L			3.68	7.79	2.36	
Sodium	mg/L	200		26.2	16.1	30.8	
Sulphate	mg/L	500		47.6	3.72	5.15	
Fecal Coliform	CFU/100mL	$1x10^6$	$1x10^6$	<1	13000	71	
Oil & Grease	Visibility		Non-Visible	Non-visible	Non-visible	Non-visible	
HC, Total Extractable	mg/L						
F2: C10-C16	mg/L						
F3: C16-C34	mg/L						
F4: C34-C50	mg/L						
Aluminium	µg/L	200		1120	84.5	156	
Arsenic	µg/L	25		1.7	0.6	0.9	2.1
Cadmium	µg/L	5		0.1	<0.1	<0.1	<0.04
Chromium	µg/L	50		1.8	0.3	0.5	0.2
Cobalt	µg/L	50		0.9	0.3	0.3	1.3
Copper	µg/L	200		11.0	18.3	1.6	0.4
Iron	µg/L	500		1130	205	743	
Lead	µg/L	10		1.3	0.2	<0.1	<0.1
Manganese	µg/L	50		132	18.2	49.9	5.6
Mercury	µg/L						0.01
Nickel	µg/L	200		2.5	0.8	1.5	
Zinc	µg/L	500		97.5	21.9	< 5.0	
Phenol, Total	µg/L			0.002	0.0974	<0.0010	<0.0010

Data Qualifier Description:

2020 Kugluktuk Sewage Effluent Log

Parameters	Units	MAC Limits	MAC Limits KUG-3	14-Jul-20			
				Solid Waste Kug-2	Sewage Disposal Kug-3	Outfall Wetland Kug-4	Land farm Kug-5
Alkalinity T($CaCO_3$)	mg/L			119	96.1	54.4	
Conductivity (@25 C)	µS/cm			462	297	303	
pH	pH	6-9	6-9	8.44	7.31	7.74	7.81
TSS	mg/L	180	180	40	24	12	
Ammonia as N_2	mg/L			<0.005	24.4		
BOD	mg/L	120	120	8	97	5	
CBOD	mg/L			7	76	4	
Dissolved, C	mg/L						
Total, C	mg/L						
Nitrate as N_2	mg/L	45		<0.0200	<0.0200	0.465	
Nitrite as N_2	mg/L	3		<0.0100	<0.0100	0.0230	
Calcium	mg/L	32		39.6	4.12	12.7	
Chloride	mg/L	100		41.6	18.3	54.0	
Hardness	mg/L	500		179	18.6	71.6	
Magnesium	mg/L			19.4	2.03	9.67	
Potassium	mg/L			3.68	7.79	2.36	
Sodium	mg/L	200		26.2	16.1	30.8	
Sulphate	mg/L	500		47.6	3.72	5.15	
Fecal Coliform	CFU/100mL	$1x10^6$	$1x10^6$	<1	13000	71	
Oil & Grease	Visibility		Non-Visible	Non-visible	Non-visible	Non-visible	
HC, Total Extractable	mg/L						
F2: C10-C16	mg/L						
F3: C16-C34	mg/L						
F4: C34-C50	mg/L						
Aluminium	µg/L	200		1120	84.5	156	
Arsenic	µg/L	25		1.7	0.6	0.9	2.1
Cadmium	µg/L	5		0.1	<0.1	<0.1	<0.04
Chromium	µg/L	50		1.8	0.3	0.5	0.2
Cobalt	µg/L	50		0.9	0.3	0.3	1.3
Copper	µg/L	200		11.0	18.3	1.6	0.4
Iron	µg/L	500		1130	205	743	
Lead	µg/L	10		1.3	0.2	<0.1	<0.1
Manganese	µg/L	50		132	18.2	49.9	
Mercury	µg/L						0.01
Nickel	µg/L	200		2.5	0.8	1.5	5.6
Zinc	µg/L	500		97.5	21.9	<5.0	
Phenol, Total	µg/L			0.0020	0.097	<0.0010	<0.0010

Data Qualifier Description:

2020 Kugluktuk Sewage Effluent Log

Parameters	Units	MAC Limits	MAC Limits KUG-3	11-Aug-20		
				Raw Water Kug-1-A	Sewage Lagoon Kug-3	Land Outfall Kug-4
Alkalinity	mg/L			36.5		
Conductivity	µS/cm					
pH	pH	6-9	6-9	7.68		
TSS	mg/L	180	180	25		
Ammonia as N_2	mg/L					
BOD	mg/L	120	120			
CBOD	mg/L			< 2	21	2
Dissolved, C	mg/L			5.0	21.5	
Total, C	mg/L			4.6	23.1	
Nitrate as N_2	mg/L	45		0.0340	<0.0200	
Nitrite as N_2	mg/L	3		<0.0100	0	
Calcium	mg/L	32			0.037	
Chloride	mg/L	100		0.77		
Hardness	mg/L	500		38.0	41.0	
Magnesium	mg/L			17.8		
Potassium	mg/L					
Sodium	mg/L	200		0.921	33.5	
Sulphate	mg/L	500		1.96		
Fecal Coliform	CFU/100mL	$1x10^6$	$1x10^6$	4	22000	24
Oil & Grease	Visibility		Non-Visible			
HC, Total Extract	mg/L					
F2: C10-C16	mg/L					
F3: C16-C34	mg/L					
F4: C34-C50	mg/L					
Aluminium	µg/L	200		417	35.4	
Arsenic	µg/L	25		0.4	0.5	
Cadmium	µg/L	5		21.6	<0.1	
Chromium	µg/L	50		0.8	0.3	
Cobalt	µg/L	50				
Copper	µg/L	200		2.1	15.8	
Iron	µg/L	500		475	156	
Lead	µg/L	10		0.2	<0.1	
Manganese	µg/L	50		17.8	28.5	
Mercury	µg/L			<0.01	<0.01	
Nickel	µg/L	200				
Zinc	µg/L	500		<5.0	11.1	
Phenol, Total	µg/L					

2020 Kugluktuk Sewage Effluent Log

Parameters	Units	MAC Limits	MAC Limits KUG-3	3-Sep-20				
				Decant Sewage Kug-3A	Final Discharge Kug-4	Leak Sewage Kug-3	Metal Dump Kug-2	Solid Waste Run
Alkalinity	mg/L			487	123	168	246	280
Conductivity	µS/cm			1980	686	55	1490	2930
pH	pH	6-9	6-9	7.20	7.45	7.87	8.19	7.3
TSS	mg/L	180	180	29	12	72	8	20
Ammonia as N_2	mg/L					31.5	0.102	0.126
BOD	mg/L	120	120	25	15	20	3	5
CBOD	mg/L			24	5	21	3	5
Dissolved, C	mg/L							
Total, C	mg/L			41.8	18.6	34.6	14.6	20.9
Nitrate as N_2	mg/L	45						
Nitrite as N_2	mg/L	3						
Calcium	mg/L	32		44.0	20.7	11.5	77.5	214
Chloride	mg/L	100			120	43.2	309	434
Hardness	mg/L	500		268	129	48.7	426	867
Magnesium	mg/L			38.5	18.7	4.82	56.6	80.6
Potassium	mg/L			22.9	6.68	17.4	3.89	36.0
Sodium	mg/L	200		208	74.3	41.9	131.0	291.0
Sulphate	mg/L	500		24	19	16.00	44.00	630.00
Fecal Coliform	CFU/100mL	$1x10^6$	$1x10^6$	900	>200	55000	<1	<1
Oil & Grease	Visibility		Non-Visible	Non-visible	Non-visible	Non-visible		Non-visible
HC, Total Extract	mg/L			<0.2				
F2: C10-C16	mg/L			<0.2				
F3: C16-C34	mg/L			<0.2				
F4: C34-C50	mg/L			<0.2				
Aluminium	µg/L	200					282	90.4
Arsenic	µg/L	25		13.5	1.2	0.6	1.0	2.4
Cadmium	µg/L	5		<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	50		3.8	0.9	0.4	0.6	0.7
Cobalt	µg/L	50						
Copper	µg/L	200		12.3	5.5	17.1	7.1	0.9
Iron	µg/L	500		14900	2050	225	462	3680
Lead	µg/L	10		2.2	0.2	0.2	0.7	0.2
Manganese	µg/L	50					58.8	640
Mercury	µg/L			0.05	0.03	0.02	0.02	0.01
Nickel	µg/L	200		20.0	4.7	1.8	1.8	4.7
Zinc	µg/L	500		10.1	5.9	18.5	97.3	<5.0
Phenol, Total	µg/L			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

CIRNAC Inspection Report

- Water facility inspection report 2020
- Sewage Waste inspection report 2020
- Waste Effluent inspection report 2020

Water Licence: 3BM-KUG 2030

Hamlet of Kugluktuk, NU

WATER LICENCE INSPECTION FORM

☒ **Original**
☐ **Follow-Up Report**

Licensee	**Licensee Representative**
Hamlet of Kugluktuk	Shawn Fitzgerald
Licence No. / Expiry	**Representative's Title**
3BM-KUG1520	Acting Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
2020 August 17 & 18	Baba Pedersen

Activities Inspected

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

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

Water Use	Condition	Comment	**Site Conditions**	Condition	Comment	**Haz/Mat Management**	Condition	Comment
Intake/Screen			Water Management Structures	U	1 & 2	Storage	C	7
Flow Measure. Device	A		Culverts / Bridges			Spills		
Source:			Drainage			Spill Plan		
Water Use:			Erosion / Sediment	C	4			
Recirculation (y /n)			Mitigation Measures	A	3	**Administrative**		
			Reclamation Activities			Records	A	13
			Materials Storage	C	10	Reports	A	14
Waste Disposal			Signage	A C	6&12 9&11	Plans		
Waste Water	C	5				Notifications	C	15
Solid Waste			**Monitoring**			**Other**		
Hazardous Waste	C	8	Sample Collection / Analysis	A	3			

**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 Monday August 17 and Tuesday August 18, 2020, I Baba Pedersen, Resource Management and Water Resources Officer with Crown-Indigenous Relations and Northern Affairs Canada, the Writer of this Report, did Inspect the holder (Hamlet of Kugluktuk) of Water Licence number 3BM-KUG1520 issued for the Municipal Use of Water and Waste Disposal in the Hamlet of Kugluktuk in the Kitikmeot Region of Nunavut.

The Inspector was accompanied by Shah Alam, Municipal Planning Engineer from the GN-CGS and Kevin Klengenberg, Charles Nivingalok, Nick Blais and Shaun Cummins with the Hamlet of Kugluktuk. The Site Inspections were followed by a meeting in the offices of the Hamlet of Kugluktuk that also included Shawn Fitzgerald, Acting Senior Administrative Officer for the Hamlet of Kugluktuk.

I also took Aerial Photos during a fly-over on July 2nd and did 2 other Site Visits on my own on September 25th and October 9th. I have incorporated some of these photos and findings into this report.

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

During the August 16 & 17 Site Inspections, the following was observed by the Inspector;

1. The 2 ongoing Leakes in the Sewage Lagoon below the Buttress (Photos 1, 2, 3, 4 & 5)
2. The Low Level of Liquid in the Sewage Lagoon (Photos 6, 7 & 8)
3. Sampling of the Sewage Lagoon (Photo 9)
4. Animal/Pest Damage to the Sewage Lagoon Berm Area (Photo 10)
5. Floating Debris within the Sewage Lagoon (Photo 11)
6. Good Signage at the Sewage Lagoon (Photo 12)
7. Temporary Used Battery Storage in the Garbage Dump (Photos 13 & 14)
8. The Bermed Land Farm Area of the Garbage Dump (Photos 15 & 16)
9. Damaged Signage at the Garbage Dump (Photo 17)
10. Product encroaching on the Road Way inside the Metal Dump (Photos 18 & 19)
11. Missing Signage at the Metal Dump (Photos 20 & also 19)
12. Good Signage all around at the Water Plant and Raw Water Intake (Photos 21 & 22)
13. YTD Water Consumption Records
14. The Licence Holder has submitted the Annual Reports to the Nunavut Water Board
15. The Water Licence is set to Expire in December of 2020

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

1. The Licence Holder must work with the Gov't of Nunavut to come up with a permanent solution to the ongoing Leakage of the Sewage Lagoon. Photos 1 through 5 taken over 3 separate Site Visits show the ongoing problem. The length of time it is taking to come up with a permanent solution is unacceptable.
2. The extremely Low Level of Product within the Sewage Lagoon, with no Decant last year and this year's Decant yet to take place during the July 2 Fly-Over and the August 17 Site Visit, shows the amount of Leakage that is continually taking place. Even after the Decant Program was complete as shown in Photo 8 from October 9th, the Product Levels only went down slightly. The high amounts of ongoing, continual leakage are a major concern that requires a Permanent Solution.
3. Sampling of the Sewage Lagoon has taken place and the Results have been provided to the Inspector. The Inspector has approved the Decant Program to start at any time. UPDATE: The Licence Holder completed the Decant Program on October 8th and the Inspector has no concerns with the process at this time.
4. All Animals digging holes into the Sewage Lagoon Berm MUST be permanently removed before Freeze-up and ensure that more Animals do not return in future. All holes dug into the Sewage Lagoon Liner by Animals MUST be filled in and covered to prevent further erosion PRIOR to Freeze-up.
5. All Debris within the Sewage Lagoon MUST be removed PRIOR to Freeze-up.
6. Very Nice Signage at the Sewage Lagoon, Thank You
7. All Used Batteries placed into the Garbage Dump waiting to be properly Crated MUST be stored within a Wooden Crate. UPDATE: As seen in Photo 14 from October 9th, the Proponent has removed all Used Batteries from the ground and provided a Wooden Crate with appropriate Signage for Temporary Storage, Thank You.
8. The Bermed Land Farm area in the Garbage Dump is only to be used to store Contaminated Soils. The Licence Holder stated that they now have parts for the Used Oil Incinerator and the Inspector has given directions to restart the Used Oil Burn Program right away which will allow for the Removal of all drums from within the Bermed area. The Inspector understands this will be a multi year project in order to complete. Progress MUST be visible PRIOR to Freeze Up. UPDATE: As seen in Photo 16 from October 9th, the Proponent has moved a substantial amount of Drums out of the Bermed Area into another section of the Garbage Dump and started their Used Oil Burn Program. Thank You.
9. The Damaged Signage at the Garbage Dump entrance MUST be replaced PRIOR to March 31, 2021.
10. The product encroaching on the Road Way into the Metal Dump MUST be pushed back right away to allow safe access. UPDATE: As seen in Photo 19 from October 9th, the Proponent has completed a major clean up of the Metal Dump and Road Way Access. Thank You.
11. The missing Signage at the Metal Dump entrance MUST be replaced PRIOR to March 31, 2021. UPDATE: As seen in Photo 19 from October 9th, the Proponent has re-installed appropriate Signage. Thank You.
12. Thank you for Installing proper Signage at the Water Plant and Raw Water Intake as directed last year
13. The Licence Holder is within Allowable Limits and the Inspector has no concerns with this at this at this time
14. The Inspector has no concerns with this
15. The Licence Holder SHALL submit an Application for Renewal to the Nunavut Water Board giving sufficient time for review and approval of a new Water Licence. UPDATE: The Proponent has submitted their Renewal Application to the Nunavut Water Board. Thank You.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	2020 November 5

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

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

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

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

PHOTO LOG

Date	Camera	Inspector	Authorization
2020 August 17 & 18	Sony DSC-HX50V	Baba Pedersen	3BM-KUG1520

Photo Log # DSC06366

Photo 1

Description: Sewage Lagoon Leak Area #1 as seen on 2020 August 17

Photo Log # DSC06368

Photo 2

Description: Sewage Lagoon Leak Area #2 as seen on 2020 August 17

Photo Log # DSC01750

Photo 3

Description: Holes appearing in Buttress due to Leakage Flow underneath from Sewage Lagoon, View 1 as seen on 2020 September 25

Photo Log # DSC01759

Photo 4

Description: Holes appearing in Buttress due to Leakage Flow underneath from Sewage Lagoon, View 2 as seen on 2020 September 25

Photo Log # DSC00932

Photo 5

Description: Leak Area 1 in the Foreground and Leak Area 2 in the Background as seen on 2020 October 9

Photo Log # DSC05850

Photo 6

Description: Aerial View of the Sewage Lagoon as seen on 2020 July 2 showing the Low Level of Product within the Lagoon

Photo Log # DSC06369

Photo 7

Description: Low Level of Product within the Sewage Lagoon BEFORE the Decant Program started, as seen at 2020 August 17

Photo Log # DSC00833

Photo 8

Description: View of Sewage Lagoon showing Level of Product taken 1 Day after the Decant Program was completed on 2020 October 9

Photo Log # DSC06378

Photo 9

Description: Gas Pump used in the Decant Program

Photo Log # DSC06372

Photo 10

Description: 1 of a number of Animal Burrow Holes found in the Sewage Lagoon Berm

Photo Log # DSC06391

Photo 11

Description: Floating Debris within the Sewage Lagoon that requires Removal

Photo Log # DSC06398

Photo 12

Description: Very Nice Signage at the Sewage Lagoon, Thank You

Photo Log # DSC06401

Photo 13

Description: Temporary Used Battery Storage Area within the Garbage Dump as seen on 2020 August 17

Photo Log # DSC01119

Photo 14

Description: Temporary Used Battery Storage Area within the Garbage Dump as seen on 2020 October 9

Photo Log # DSC06406

Photo 15

Description: Bermed Land Farm Area within the Garbage Dump as seen on 2020 August 17

Photo Log # DSC01140

Photo 16

Description: Drums from the Bermed Land Farm Area within the Garbage Dump moved and stored awaiting Burn Off in 2021 as at 2020 Oct 9

Photo Log # DSC06409

Photo 17

Description: Damaged Signage at the Entrance to the Garbage Dump that requires Replacement

Photo Log # DSC06412

Photo 18

Description: Product Encroaching onto the Roadway Entrance to the Metal Dump required to be Pushed Back as at 2020 August 17

Photo Log # DSC01326

Photo 19

Description: Metal Dump Entrance Roadway nicely Cleaned up AND new Signage as seen on 2020 October 9

Photo Log # DSC06410

Photo 20

Description: Metal Dump Signage missing at Entrance as seen on 2020 August 17

Photo Log # DSC06435

Photo 21

Description: Very good Signage at Sample Station KUG-1A, Thank you

Photo Log # DSC06439

Photo 22

Description: Very good Signage on Portable Sample Station KUG-1D, Thank you

PART ‘B’

Annual Report 2020

Test Results

Water Licence: 3BM-KUG 2030

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.: 200822

- FINAL REPORT -

Prepared For: Hamlet of Kugluktuk

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

Attn: **Mark Franche** **Facsimile: 867-982-3060**

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: Wednesday, October 07, 2020
Print Date: ***Thursday, October 08, 2020***

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

Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

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

Client Project: Kugluktuk Water System
Sample Type: Raw Water
Received Date: 25-Sep-20
Sampling Date: 24-Sep-20
Sampling Time: 9:16
Location: KUG-1 raw water, truckfills - treated water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.7	0.5	mg/L	02-Oct-20	SM5310:B	
Organic Carbon, Total	3.8	0.5	mg/L	02-Oct-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	29.9	0.4	mg/L	29-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	66.9	0.4	µS/cm	29-Sep-20	SM2510:B	
pH	7.57		pH units	29-Sep-20	SM4500-H:B	
Solids, Total Dissolved	22	10	mg/L	30-Sep-20	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	30-Sep-20	SM2540:D	
Turbidity	3.10	0.05	NTU	25-Sep-20	SM2130:B	
Major Ions						
Chloride	1.8	0.7	mg/L	25-Sep-20	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	25-Sep-20	SM4110:B	
Nitrate as Nitrogen	0.02	0.01	mg/L	25-Sep-20	SM4110:B	
Nitrite as Nitrogen	0.05	0.01	mg/L	25-Sep-20	SM4110:B	

ReportDate: Wednesday, October 07, 2020
Print Date: ***Thursday, October 08, 2020***

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

Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

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

Sulphate	2	1	mg/L	25-Sep-20	SM4110:B	
Microbiology						
Coliforms, Total	27.2	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Organics						
Oil and Grease, visible	Non-visible			25-Sep-20	Visual Exam	
Subcontracted Inorganics						
Calcium	7.46	0.05	mg/L	01-Oct-20	EPA200.2	
Hardness	32.3	0.6	mg/L	01-Oct-20	EPA200.2	
Magnesium	3.32	0.005	mg/L	01-Oct-20	EPA200.2	
Potassium	0.507	0.05	mg/L	01-Oct-20	EPA200.2	
Sodium	1.32	0.05	mg/L	01-Oct-20	EPA200.2	
Subcontracted Organics						
Bromodichloromethane		0.001	mg/L		SW-846	111
Bromoform		0.005	mg/L		SW-846	111
Chloroform		0.001	mg/L		SW-846	111
Cyanide, Weak Acid Dissociable	< 0.0020	0.002	mg/L	01-Oct-20	APHA4500-CN	
Dibromochloromethane		0.001	mg/L		SW-846	111
Phenols, Total	< 0.0010	0.001	mg/L	02-Oct-20	AB ENV.06537	
Trihalomethanes, Total		0.005	mg/L		SW-846	111
Trace Metals, Total						
Aluminum	131	5	µg/L	02-Oct-20	EPA200.8	
Arsenic	0.2	0.2	µg/L	02-Oct-20	EPA200.8	
Barium	15.3	0.1	µg/L	02-Oct-20	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8	

ReportDate: Wednesday, October 07, 2020
Print Date: *Thursday, October 08, 2020*

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

Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

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

Chromium	0.3	0.1	µg/L	02-Oct-20	EPA200.8
Copper	1.4	0.2	µg/L	02-Oct-20	EPA200.8
Iron	151	5	µg/L	02-Oct-20	EPA200.8
Lead	0.1	0.1	µg/L	02-Oct-20	EPA200.8
Manganese	5.3	0.1	µg/L	02-Oct-20	EPA200.8
Mercury	0.01	0.01	µg/L	02-Oct-20	EPA200.8
Selenium	< 0.5	0.5	µg/L	02-Oct-20	EPA200.8
Silver	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Uranium	0.2	0.1	µg/L	02-Oct-20	EPA200.8
Zinc	< 5.0	5	µg/L	02-Oct-20	EPA200.8

ReportDate: Wednesday, October 07, 2020
Print Date: *Thursday, October 08, 2020*

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

Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 2 **Taiga Sample ID:** 002

Client Project: Kugluktuk Water System
Sample Type: Potable
Received Date: 25-Sep-20
Sampling Date: 24-Sep-20
Sampling Time: 9:10
Location: KUG-1 raw water, truckfills - treated water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.2	0.5	mg/L	02-Oct-20	SM5310:B	
Organic Carbon, Total	3.2	0.5	mg/L	02-Oct-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	28.9	0.4	mg/L	29-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	71.2	0.4	µS/cm	29-Sep-20	SM2510:B	
pH	7.50		pH units	29-Sep-20	SM4500-H:B	
Solids, Total Dissolved	16	10	mg/L	30-Sep-20	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	30-Sep-20	SM2540:D	
Turbidity	0.24	0.05	NTU	25-Sep-20	SM2130:B	
Major Ions						
Chloride	2.8	0.7	mg/L	25-Sep-20	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	25-Sep-20	SM4110:B	
Nitrate as Nitrogen	0.02	0.01	mg/L	25-Sep-20	SM4110:B	
Nitrite as Nitrogen	0.05	0.01	mg/L	25-Sep-20	SM4110:B	
Sulphate	2	1	mg/L	25-Sep-20	SM4110:B	
Microbiology						

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 2 **Taiga Sample ID:** 002

Coliforms, Total	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Organics						
Oil and Grease, visible	Non-visible			25-Sep-20	Visual Exam	
Subcontracted Inorganics						
Calcium	7.40	0.05	mg/L	01-Oct-20	EPA200.2	
Hardness	31.2	0.6	mg/L	01-Oct-20	EPA200.2	
Magnesium	3.09	0.005	mg/L	01-Oct-20	EPA200.2	
Potassium	0.455	0.05	mg/L	01-Oct-20	EPA200.2	
Sodium	2.53	0.05	mg/L	01-Oct-20	EPA200.2	
Subcontracted Organics						
Bromodichloromethane		0.001	mg/L		SW-846	111
Bromoform		0.005	mg/L		SW-846	111
Chloroform		0.001	mg/L		SW-846	111
Cyanide, Weak Acid Dissociable	< 0.0020	0.002	mg/L	01-Oct-20	APHA4500-CN	
Dibromochloromethane		0.001	mg/L		SW-846	111
Phenols, Total	< 0.0010	0.001	mg/L	02-Oct-20	AB ENV.06537	
Trihalomethanes, Total		0.005	mg/L		SW-846	111
Trace Metals, Total						
Aluminum	35.6	0.6	µg/L	02-Oct-20	EPA200.8	
Arsenic	< 0.2	0.2	µg/L	02-Oct-20	EPA200.8	
Barium	10.6	0.1	µg/L	02-Oct-20	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	02-Oct-20	EPA200.8	
Chromium	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8	
Copper	3.4	0.2	µg/L	02-Oct-20	EPA200.8	

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 2 **Taiga Sample ID:** 002

Iron	12	5	ug/L	02-Oct-20	EPA200.8
Lead	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Manganese	0.2	0.1	µg/L	02-Oct-20	EPA200.8
Mercury	< 0.01	0.01	µg/L	02-Oct-20	EPA200.8
Selenium	< 0.3	0.3	µg/L	02-Oct-20	EPA200.8
Silver	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Uranium	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Zinc	1.4	0.4	µg/L	02-Oct-20	EPA200.8

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 3 **Taiga Sample ID:** 003

Client Project: Kugluktuk Water System
Sample Type: Potable
Received Date: 25-Sep-20
Sampling Date: 24-Sep-20
Sampling Time: 9:00
Location: KUG-1 raw water, truckfills - treated water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.3	0.5	mg/L	02-Oct-20	SM5310:B	
Organic Carbon, Total	3.3	0.5	mg/L	02-Oct-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	29.1	0.4	mg/L	29-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	70.2	0.4	µS/cm	29-Sep-20	SM2510:B	
pH	7.44		pH units	29-Sep-20	SM4500-H:B	
Solids, Total Dissolved	< 10	10	mg/L	30-Sep-20	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	30-Sep-20	SM2540:D	
Turbidity	0.24	0.05	NTU	25-Sep-20	SM2130:B	
Major Ions						
Chloride	2.6	0.7	mg/L	25-Sep-20	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	25-Sep-20	SM4110:B	
Nitrate as Nitrogen	0.02	0.01	mg/L	25-Sep-20	SM4110:B	
Nitrite as Nitrogen	0.05	0.01	mg/L	25-Sep-20	SM4110:B	
Sulphate	2	1	mg/L	25-Sep-20	SM4110:B	
Microbiology						

ReportDate: Wednesday, October 07, 2020
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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 3 **Taiga Sample ID:** 003

Coliforms, Total	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B	
Organics						
Oil and Grease, visible	Non-visible			25-Sep-20	Visual Exam	
Subcontracted Inorganics						
Calcium	7.51	0.05	mg/L	01-Oct-20	EPA200.2	
Hardness	31.8	0.6	mg/L	01-Oct-20	EPA200.2	
Magnesium	3.18	0.005	mg/L	01-Oct-20	EPA200.2	
Potassium	0.484	0.05	mg/L	01-Oct-20	EPA200.2	
Sodium	2.44	0.05	mg/L	01-Oct-20	EPA200.2	
Subcontracted Organics						
Bromodichloromethane		0.001	mg/L		SW-846	111
Bromoform		0.005	mg/L		SW-846	111
Chloroform		0.001	mg/L		SW-846	111
Cyanide, Weak Acid Dissociable	< 0.0020	0.002	mg/L	01-Oct-20	APHA4500-CN	
Dibromochloromethane		0.001	mg/L		SW-846	111
Phenols, Total	< 0.0010	0.001	mg/L	02-Oct-20	AB ENV.06537	
Trihalomethanes, Total		0.005	mg/L		SW-846	111
Trace Metals, Total						
Aluminum	35.0	0.6	µg/L	02-Oct-20	EPA200.8	
Arsenic	0.2	0.2	µg/L	02-Oct-20	EPA200.8	
Barium	10.5	0.1	µg/L	02-Oct-20	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	02-Oct-20	EPA200.8	
Chromium	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8	
Iron	12	5	ug/L	02-Oct-20	EPA200.8	

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truckfill 3 **Taiga Sample ID:** 003

Lead	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Manganese	0.3	0.1	µg/L	02-Oct-20	EPA200.8
Mercury	< 0.01	0.01	µg/L	02-Oct-20	EPA200.8
Selenium	< 0.3	0.3	µg/L	02-Oct-20	EPA200.8
Silver	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Uranium	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Zinc	0.7	0.4	µg/L	02-Oct-20	EPA200.8

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Old Tanks #2 **Taiga Sample ID:** 004

Client Project: Kugluktuk Water System
Sample Type: Potable
Received Date: 25-Sep-20
Sampling Date: 24-Sep-20
Sampling Time: 9:21
Location: KUG-1 raw water, truckfills - treated water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.9	0.5	mg/L	02-Oct-20	SM5310:B	
Organic Carbon, Total	3.7	0.5	mg/L	02-Oct-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	29.3	0.4	mg/L	29-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	77.0	0.4	µS/cm	29-Sep-20	SM2510:B	
pH	7.50		pH units	29-Sep-20	SM4500-H:B	
Solids, Total Dissolved	15	10	mg/L	30-Sep-20	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	30-Sep-20	SM2540:D	
Turbidity	3.06	0.05	NTU	25-Sep-20	SM2130:B	
Major Ions						
Chloride	4.1	0.7	mg/L	25-Sep-20	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	25-Sep-20	SM4110:B	
Nitrate as Nitrogen	0.02	0.01	mg/L	25-Sep-20	SM4110:B	
Nitrite as Nitrogen	0.05	0.01	mg/L	25-Sep-20	SM4110:B	
Sulphate	2	1	mg/L	25-Sep-20	SM4110:B	
Microbiology						

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Old Tanks #2 **Taiga Sample ID:** 004

Coliforms, Total	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	25-Sep-20	SM9223:B
Organics					
Oil and Grease, visible	Non-visible			25-Sep-20	Visual Exam
Subcontracted Inorganics					
Calcium	7.46	0.05	mg/L	01-Oct-20	EPA200.2
Hardness	31.7	0.6	mg/L	01-Oct-20	EPA200.2
Magnesium	3.17	0.005	mg/L	01-Oct-20	EPA200.2
Potassium	0.516	0.05	mg/L	01-Oct-20	EPA200.2
Sodium	3.94	0.05	mg/L	01-Oct-20	EPA200.2
Subcontracted Organics					
Bromodichloromethane	< 0.0010	0.001	mg/L	02-Oct-20	SW-846
Bromoform	< 0.0050	0.005	mg/L	02-Oct-20	SW-846
Chloroform	0.0041	0.001	mg/L	02-Oct-20	SW-846
Cyanide, Weak Acid Dissociable	< 0.0020	0.002	mg/L	01-Oct-20	APHA4500-CN
Dibromochloromethane	< 0.0010	0.001	mg/L	02-Oct-20	SW-846
Phenols, Total	< 0.0010	0.001	mg/L	02-Oct-20	AB ENV.06537
Trihalomethanes, Total	< 0.0050	0.005	mg/L	02-Oct-20	SW-846
Trace Metals, Total					
Aluminum	106	5	µg/L	02-Oct-20	EPA200.8
Arsenic	0.3	0.2	µg/L	02-Oct-20	EPA200.8
Barium	17.1	0.1	µg/L	02-Oct-20	EPA200.8
Cadmium	0.1	0.1	µg/L	02-Oct-20	EPA200.8
Chromium	0.3	0.1	µg/L	02-Oct-20	EPA200.8
Copper	59.0	0.2	µg/L	02-Oct-20	EPA200.8

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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Old Tanks #2 **Taiga Sample ID:** 004

Iron	193	5	µg/L	02-Oct-20	EPA200.8
Lead	0.4	0.1	µg/L	02-Oct-20	EPA200.8
Manganese	7.8	0.1	µg/L	02-Oct-20	EPA200.8
Mercury	0.01	0.01	µg/L	02-Oct-20	EPA200.8
Selenium	< 0.5	0.5	µg/L	02-Oct-20	EPA200.8
Silver	< 0.1	0.1	µg/L	02-Oct-20	EPA200.8
Uranium	0.1	0.1	µg/L	02-Oct-20	EPA200.8
Zinc	8.2	5	µg/L	02-Oct-20	EPA200.8

ReportDate: Wednesday, October 07, 2020
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Taiga Batch No.: 200822

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Old Tanks #2 **Taiga Sample ID:** 004

- DATA QUALIFERS -

Data Qualifier Descriptions:

111 *Vial contained air bubble, analysis not possible*

*** 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: Wednesday, October 07, 2020

Print Date: ***Thursday, October 08, 2020***

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

Taiga Batch No.: 200557

- FINAL REPORT -

Prepared For: Hamlet of Kugluktuk

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

Attn: **Mark Franche** **Facsimile: 867-982-3060**

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: Saturday, August 22, 2020
Print Date: *Saturday, August 22, 2020*

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

Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Raw Water
Received Date: 11-Aug-20
Sampling Date: 11-Aug-20
Sampling Time: 9:10
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
CBOD	< 2	2	mg/L	12-Aug-20	SM5210:B	
Organic Carbon, Dissolved	5.0	0.5	mg/L	17-Aug-20	SM5310:B	
Organic Carbon, Total	4.6	0.5	mg/L	18-Aug-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	36.5	0.4	mg/L	12-Aug-20	SM2320:B	
Colour, Apparent	62	5	CU	12-Aug-20	SM2120:B	
Colour, True	9	5	TCU	12-Aug-20	SM2120:B	
pH	7.68		pH units	12-Aug-20	SM4500-H:B	
Solids, Total Dissolved	48	10	mg/L	17-Aug-20	SM2540:C	
Solids, Total Suspended	25	3	mg/L	17-Aug-20	SM2540:D	
Turbidity	11.6	0.05	NTU	13-Aug-20	SM2130:B	
Microbiology						
Coliforms, Fecal	4	1	CFU/100mL	11-Aug-20	SM9222:D	
Organics						
Hexane Extractable Material		2.0	mg/L		EPA1664A	16

ReportDate: Saturday, August 22, 2020
Print Date: ***Saturday, August 22, 2020***

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

Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

Subcontracted Inorganics						
Chloride	0.77	0.5	mg/L	14-Aug-20	EPA300.1	
Fluoride	0.022	0.02	mg/L	14-Aug-20	EPA300.1	
Hardness	38.0	0.13	mg/L	18-Aug-20	EPA200.2	
Nitrate as Nitrogen	0.0340	0.020	mg/L	14-Aug-20	EPA300.1	
Nitrite as N	< 0.0100	0.010	mg/L	14-Aug-20	EPA300.1	
Sodium	0.921	0.05	mg/L	18-Aug-20	EPA200.2	
Sulphate	1.96	0.3	mg/L	14-Aug-20	EPA300.1	
Subcontracted Organics						
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN	16
Trace Metals, Total						
Aluminum	417	5	µg/L	17-Aug-20	EPA200.8	
Arsenic	0.4	0.2	µg/L	17-Aug-20	EPA200.8	
Barium	21.6	0.1	µg/L	17-Aug-20	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	17-Aug-20	EPA200.8	
Chromium	0.8	0.1	µg/L	17-Aug-20	EPA200.8	
Copper	2.1	0.2	µg/L	17-Aug-20	EPA200.8	
Iron	475	5	µg/L	17-Aug-20	EPA200.8	
Lead	0.2	0.1	µg/L	17-Aug-20	EPA200.8	
Manganese	17.8	0.1	µg/L	17-Aug-20	EPA200.8	
Mercury	< 0.01	0.01	µg/L	17-Aug-20	EPA200.8	
Selenium	< 0.5	0.5	µg/L	17-Aug-20	EPA200.8	
Uranium	0.2	0.1	µg/L	17-Aug-20	EPA200.8	
Zinc	< 5.0	5	µg/L	17-Aug-20	EPA200.8	

ReportDate: Saturday, August 22, 2020
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Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Sewage Lagoon
Received Date: 11-Aug-20
Sampling Date: 11-Aug-20
Sampling Time: 9:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
CBOD	21	2	mg/L	12-Aug-20	SM5210:B	81
Organic Carbon, Dissolved	21.5	0.5	mg/L	17-Aug-20	SM5310:B	
Organic Carbon, Total	23.1	0.5	mg/L	18-Aug-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	150	0.4	mg/L	12-Aug-20	SM2320:B	
Colour, Apparent	960	50	CU	12-Aug-20	SM2120:B	
Colour, True	49	5	TCU	12-Aug-20	SM2120:B	
pH	8.16		pH units	12-Aug-20	SM4500-H:B	
Solids, Total Dissolved	188	10	mg/L	17-Aug-20	SM2540:C	
Solids, Total Suspended	68	3	mg/L	17-Aug-20	SM2540:D	
Turbidity	28.5	0.05	NTU	13-Aug-20	SM2130:B	
Microbiology						
Coliforms, Fecal	22000	1000	CFU/100mL	11-Aug-20	SM9222:D	
Organics						
Hexane Extractable Material		2.0	mg/L		EPA1664A	16
Subcontracted Inorganics						

ReportDate: Saturday, August 22, 2020
Print Date: ***Saturday, August 22, 2020***

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Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

Hardness	41.0	0.13	mg/L	18-Aug-20	EPA200.2	
Nitrate as Nitrogen	< 0.0200	0.020	mg/L	14-Aug-20	EPA300.1	
Nitrite as N	0.0370	0.010	mg/L	14-Aug-20	EPA300.1	
Sodium	33.5	0.05	mg/L	18-Aug-20	EPA200.2	
Subcontracted Organics						
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN	16
Trace Metals, Total						
Aluminum	35.4	5	µg/L	17-Aug-20	EPA200.8	
Arsenic	0.5	0.2	µg/L	17-Aug-20	EPA200.8	
Barium	3.4	0.1	µg/L	17-Aug-20	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	17-Aug-20	EPA200.8	
Chromium	0.3	0.1	µg/L	17-Aug-20	EPA200.8	
Copper	15.8	0.2	µg/L	17-Aug-20	EPA200.8	
Iron	156	5	µg/L	17-Aug-20	EPA200.8	
Lead	< 0.1	0.1	µg/L	17-Aug-20	EPA200.8	
Manganese	28.5	0.1	µg/L	17-Aug-20	EPA200.8	
Mercury	< 0.01	0.01	µg/L	17-Aug-20	EPA200.8	
Selenium	< 0.5	0.5	µg/L	17-Aug-20	EPA200.8	
Uranium	< 0.1	0.1	µg/L	17-Aug-20	EPA200.8	
Zinc	11.1	5	µg/L	17-Aug-20	EPA200.8	

ReportDate: Saturday, August 22, 2020
Print Date: *Saturday, August 22, 2020*

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

Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Land Outfall
Received Date: 11-Aug-20
Sampling Date: 11-Aug-20
Sampling Time: 9:20
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
CBOD	2	2	mg/L	12-Aug-20	SM5210:B	
Microbiology						
Coliforms, Fecal	24	1	CFU/100mL	11-Aug-20	SM9222:D	
Organics						
Hexane Extractable Material		2.0	mg/L		EPA1664A	16

ReportDate: Saturday, August 22, 2020
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Taiga Batch No.: 200557

- CERTIFICATE OF ANALYSIS -

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

- DATA QUALIFERS -

Data Qualifier Descriptions:

16 *Test requested but no sample bottle received*

81 *Results are inconclusive due to insufficient depletion of sample, minimum 2 mg/L required over 5 days.*

*** 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: Saturday, August 22, 2020

Print Date: ***Saturday, August 22, 2020***

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

Taiga Batch No.: 200709

- FINAL REPORT -

Prepared For: Hamlet of Kugluktuk

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

Attn: **Mark Franche** **Facsimile: 867-982-3060**

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: Wednesday, September 16, 2020
Print Date: ***Wednesday, September 16, 2020***

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

Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3A **Taiga Sample ID:** 001

Client Project: Kugluktuk Sewage + Waste
Sample Type: Decant Sewage
Received Date: 04-Sep-20
Sampling Date: 03-Sep-20
Sampling Time: 9:00
Location: Lagoon inside, wetland, and facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	64.9	0.005	mg/L	08-Sep-20	SM4500-NH3:G	
Biochemical Oxygen Demand	25	2	mg/L	04-Sep-20	SM5210:B	
CBOD	24	2	mg/L	04-Sep-20	SM5210:B	
Organic Carbon, Total	41.8	0.5	mg/L	08-Sep-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	487	0.4	mg/L	04-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	1980	0.4	µS/cm	04-Sep-20	SM2510:B	
pH	7.20		pH units	04-Sep-20	SM4500-H:B	
Solids, Total Suspended	29	3	mg/L	08-Sep-20	SM2540:D	
Major Ions						
Nitrate+Nitrite as Nitrogen	0.51	0.01	mg/L	04-Sep-20	SM4110:B	
Sulphate	24	1	mg/L	04-Sep-20	SM4110:B	
Microbiology						
Coliforms, Fecal	900	100	CFU/100mL	04-Sep-20	SM9222:D	88
Organics						

ReportDate: Wednesday, September 16, 2020
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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3A **Taiga Sample ID:** 001

Benzene		0.002	mg/L		EPA8260B	111
Ethylbenzene		0.002	mg/L		EPA8260B	111
F2: C10-C16	< 0.2	0.2	mg/L	11-Sep-20	EPA8015B	
F3: C16-C34	< 0.2	0.2	mg/L	11-Sep-20	EPA8015B	
F4: C34-C50	< 0.2	0.2	mg/L	11-Sep-20	EPA8015B	
Hydrocarbons, Total Extractable	< 0.2	0.2	mg/L	11-Sep-20	EPA8015B	
Hydrocarbons, Total Purgeable		0.3	mg/L		EPA8015	111
Oil and Grease, visible	Non-visible			08-Sep-20	Visual Exam	
Toluene		0.002	mg/L		EPA8260B	111
Xylenes		0.002	mg/L		EPA8260B	111
Subcontracted Inorganics						
Calcium	44.0	0.05	mg/L	15-Sep-20	EPA200.2	
Hardness	268	0.13	mg/L	15-Sep-20	EPA200.2	
Magnesium	38.5	0.005	mg/L	15-Sep-20	EPA200.2	
Potassium	22.9	0.05	mg/L	15-Sep-20	EPA200.2	
Sodium	208	0.05	mg/L	15-Sep-20	EPA200.2	
Subcontracted Organics						
Phenols, Total	< 0.0010	0.001	mg/L	14-Sep-20	AB ENV.06537	
Trace Metals, Total						
Arsenic	13.5	0.2	µg/L	11-Sep-20	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8	
Chromium	3.8	0.1	µg/L	11-Sep-20	EPA200.8	
Copper	12.3	0.2	µg/L	11-Sep-20	EPA200.8	
Iron	14900	5	µg/L	11-Sep-20	EPA200.8	
Lead	2.2	0.1	µg/L	11-Sep-20	EPA200.8	

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3A **Taiga Sample ID:** 001

Mercury	0.05	0.01	µg/L	11-Sep-20	EPA200.8
Nickel	20.0	0.1	µg/L	11-Sep-20	EPA200.8
Zinc	10.1	5	µg/L	11-Sep-20	EPA200.8

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-4 **Taiga Sample ID:** 002

Client Project: Kugluktuk Sewage + Waste
Sample Type: Final Discharge
Received Date: 04-Sep-20
Sampling Date: 03-Sep-20
Sampling Time: 9:00
Location: Lagoon inside, wetland, and facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	7.56	0.005	mg/L	08-Sep-20	SM4500-NH3:G	
Biochemical Oxygen Demand	15	2	mg/L	04-Sep-20	SM5210:B	
CBOD	5	2	mg/L	04-Sep-20	SM5210:B	
Organic Carbon, Total	18.6	0.5	mg/L	08-Sep-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	123	0.4	mg/L	04-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	686	0.4	µS/cm	04-Sep-20	SM2510:B	
pH	7.45		pH units	04-Sep-20	SM4500-H:B	
Solids, Total Suspended	12	3	mg/L	08-Sep-20	SM2540:D	
Major Ions						
Chloride	120	0.7	mg/L	04-Sep-20	SM4110:B	
Nitrate+Nitrite as Nitrogen	1.28	0.01	mg/L	04-Sep-20	SM4110:B	
Sulphate	19	1	mg/L	04-Sep-20	SM4110:B	
Microbiology						
Coliforms, Fecal	>200	1	CFU/100mL	04-Sep-20	SM9222:D	88
Organics						

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-4 **Taiga Sample ID:** 002

Oil and Grease, visible	Non-visible			08-Sep-20	Visual Exam
Subcontracted Inorganics					
Calcium	20.7	0.05	mg/L	15-Sep-20	EPA200.2
Hardness	129	0.13	mg/L	15-Sep-20	EPA200.2
Magnesium	18.7	0.005	mg/L	15-Sep-20	EPA200.2
Potassium	6.68	0.05	mg/L	15-Sep-20	EPA200.2
Sodium	74.3	0.05	mg/L	15-Sep-20	EPA200.2
Subcontracted Organics					
Phenols, Total	< 0.0010	0.001	mg/L	14-Sep-20	AB ENV.06537
Trace Metals, Total					
Arsenic	1.2	0.2	µg/L	11-Sep-20	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8
Chromium	0.9	0.1	µg/L	11-Sep-20	EPA200.8
Copper	5.5	0.2	µg/L	11-Sep-20	EPA200.8
Iron	2050	5	µg/L	11-Sep-20	EPA200.8
Lead	0.2	0.1	µg/L	11-Sep-20	EPA200.8
Mercury	0.03	0.01	µg/L	11-Sep-20	EPA200.8
Nickel	4.7	0.1	µg/L	11-Sep-20	EPA200.8
Zinc	5.9	5	µg/L	11-Sep-20	EPA200.8

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 Leak **Taiga Sample ID:** 003

Client Project: Kugluktuk Sewage + Waste
Sample Type: Leak Sewage
Received Date: 04-Sep-20
Sampling Date: 03-Sep-20
Sampling Time: 9:00
Location: Lagoon inside, wetland, and facilities
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	31.5	0.005	mg/L	08-Sep-20	SM4500-NH3:G	
Biochemical Oxygen Demand	20	2	mg/L	04-Sep-20	SM5210:B	
CBOD	21	2	mg/L	04-Sep-20	SM5210:B	
Organic Carbon, Total	34.6	0.5	mg/L	09-Sep-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	168	0.4	mg/L	04-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	550	0.4	µS/cm	04-Sep-20	SM2510:B	
pH	7.87		pH units	04-Sep-20	SM4500-H:B	
Solids, Total Suspended	72	3	mg/L	08-Sep-20	SM2540:D	
Major Ions						
Chloride	43.2	0.7	mg/L	04-Sep-20	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.27	0.01	mg/L	04-Sep-20	SM4110:B	
Sulphate	16	1	mg/L	04-Sep-20	SM4110:B	
Microbiology						
Coliforms, Fecal	55000	1000	CFU/100mL	04-Sep-20	SM9222:D	88
Organics						

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-3 Leak **Taiga Sample ID:** 003

Oil and Grease, visible	Non-visible			08-Sep-20	Visual Exam
Subcontracted Inorganics					
Calcium	11.5	0.05	mg/L	15-Sep-20	EPA200.2
Hardness	48.7	0.13	mg/L	15-Sep-20	EPA200.2
Magnesium	4.82	0.005	mg/L	15-Sep-20	EPA200.2
Potassium	17.4	0.05	mg/L	15-Sep-20	EPA200.2
Sodium	41.9	0.05	mg/L	15-Sep-20	EPA200.2
Subcontracted Organics					
Phenols, Total	< 0.0010	0.001	mg/L	14-Sep-20	AB ENV.06537
Trace Metals, Total					
Arsenic	0.6	0.2	µg/L	11-Sep-20	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8
Chromium	0.4	0.1	µg/L	11-Sep-20	EPA200.8
Copper	17.1	0.2	µg/L	11-Sep-20	EPA200.8
Iron	225	5	µg/L	11-Sep-20	EPA200.8
Lead	0.2	0.1	µg/L	11-Sep-20	EPA200.8
Mercury	0.02	0.01	µg/L	11-Sep-20	EPA200.8
Nickel	1.8	0.1	µg/L	11-Sep-20	EPA200.8
Zinc	18.5	5	µg/L	11-Sep-20	EPA200.8

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID:** 004

Client Project: Kugluktuk Sewage Waste
Sample Type: Metal Dump Run
Received Date: 04-Sep-20
Sampling Date: 02-Sep-20
Sampling Time: 9:20
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.102	0.005	mg/L	08-Sep-20	SM4500-NH3:G	
Biochemical Oxygen Demand	3	2	mg/L	04-Sep-20	SM5210:B	
CBOD	3	2	mg/L	04-Sep-20	SM5210:B	
Organic Carbon, Total	14.6	0.5	mg/L	09-Sep-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	246	0.4	mg/L	04-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	1490	0.4	µS/cm	04-Sep-20	SM2510:B	
pH	8.19		pH units	04-Sep-20	SM4500-H:B	
Solids, Total Suspended	8	3	mg/L	08-Sep-20	SM2540:D	
Major Ions						
Chloride	309	0.7	mg/L	04-Sep-20	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.30	0.01	mg/L	04-Sep-20	SM4110:B	
Sulphate	44	1	mg/L	04-Sep-20	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL	04-Sep-20	SM9222:D	88
Subcontracted Inorganics						

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-2 **Taiga Sample ID:** 004

Calcium	77.5	0.05	mg/L	15-Sep-20	EPA200.2
Hardness	426	0.13	mg/L	15-Sep-20	EPA200.2
Magnesium	56.6	0.005	mg/L	15-Sep-20	EPA200.2
Potassium	3.89	0.05	mg/L	15-Sep-20	EPA200.2
Sodium	131	0.05	mg/L	15-Sep-20	EPA200.2
Subcontracted Organics					
Phenols, Total	< 0.0010	0.001	mg/L	14-Sep-20	AB ENV.06537
Trace Metals, Total					
Aluminum	282	5	µg/L	11-Sep-20	EPA200.8
Arsenic	1.0	0.2	µg/L	11-Sep-20	EPA200.8
Cadmium	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8
Chromium	0.6	0.1	µg/L	11-Sep-20	EPA200.8
Copper	7.1	0.2	µg/L	11-Sep-20	EPA200.8
Iron	462	5	µg/L	11-Sep-20	EPA200.8
Lead	0.7	0.1	µg/L	11-Sep-20	EPA200.8
Manganese	58.8	0.1	µg/L	11-Sep-20	EPA200.8
Mercury	0.02	0.01	µg/L	11-Sep-20	EPA200.8
Nickel	1.8	0.1	µg/L	11-Sep-20	EPA200.8
Silver	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8
Zinc	97.3	5	µg/L	11-Sep-20	EPA200.8

ReportDate: Wednesday, September 16, 2020
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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 005

Client Project: Kugluktuk Sewage Waste
Sample Type: Solid Waste Run
Received Date: 04-Sep-20
Sampling Date: 02-Sep-20
Sampling Time: 9:20
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	0.126	0.005	mg/L	08-Sep-20	SM4500-NH3:G	
Biochemical Oxygen Demand	5	2	mg/L	04-Sep-20	SM5210:B	
CBOD	5	2	mg/L	04-Sep-20	SM5210:B	
Organic Carbon, Total	20.9	0.5	mg/L	09-Sep-20	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	280	0.4	mg/L	04-Sep-20	SM2320:B	
Conductivity, Specific (@25C)	2930	0.4	µS/cm	04-Sep-20	SM2510:B	
pH	7.30		pH units	04-Sep-20	SM4500-H:B	
Solids, Total Suspended	20	3	mg/L	08-Sep-20	SM2540:D	
Major Ions						
Chloride	434	0.7	mg/L	04-Sep-20	SM4110:B	
Nitrate+Nitrite as Nitrogen	< 0.01	0.01	mg/L	04-Sep-20	SM4110:B	
Sulphate	630	1	mg/L	04-Sep-20	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL	04-Sep-20	SM9222:D	88
Organics						

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 005

Benzene		0.002	mg/L		EPA8260B	16
Ethylbenzene		0.002	mg/L		EPA8260B	16
F2: C10-C16		0.2	mg/L		EPA8015B	16
F3: C16-C34		0.2	mg/L		EPA8015B	16
F4: C34-C50		0.2	mg/L		EPA8015B	16
Hydrocarbons, Total Extractable		0.2	mg/L		EPA8015B	16
Hydrocarbons, Total Purgeable		0.3	mg/L		EPA8015	16
Oil and Grease, visible	Non-visible			08-Sep-20	Visual Exam	
Toluene		0.002	mg/L		EPA8260B	16
Xylenes		0.002	mg/L		EPA8260B	16
Subcontracted Inorganics						
Calcium	214	0.05	mg/L	15-Sep-20	EPA200.2	
Hardness	867	0.13	mg/L	15-Sep-20	EPA200.2	
Magnesium	80.6	0.005	mg/L	15-Sep-20	EPA200.2	
Potassium	36.0	0.05	mg/L	15-Sep-20	EPA200.2	
Sodium	291	0.05	mg/L	15-Sep-20	EPA200.2	
Subcontracted Organics						
Phenols, Total	< 0.0010	0.001	mg/L	14-Sep-20	AB ENV.06537	
Trace Metals, Total						
Aluminum	90.4	5	µg/L	11-Sep-20	EPA200.8	
Arsenic	2.4	0.2	µg/L	11-Sep-20	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8	
Chromium	0.7	0.1	µg/L	11-Sep-20	EPA200.8	
Copper	0.9	0.2	µg/L	11-Sep-20	EPA200.8	
Iron	3680	5	µg/L	11-Sep-20	EPA200.8	

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 005

Lead	0.2	0.1	µg/L	11-Sep-20	EPA200.8
Manganese	640	0.1	µg/L	11-Sep-20	EPA200.8
Mercury	0.01	0.01	µg/L	11-Sep-20	EPA200.8
Nickel	4.7	0.1	µg/L	11-Sep-20	EPA200.8
Silver	< 0.1	0.1	µg/L	11-Sep-20	EPA200.8
Zinc	< 5.0	5	µg/L	11-Sep-20	EPA200.8

ReportDate: Wednesday, September 16, 2020
Print Date: *Wednesday, September 16, 2020*

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Taiga Batch No.: 200709

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 005

- DATA QUALIFERS -

Data Qualifier Descriptions:

111 *Vial contained air bubble, analysis not possible*

16 *Test requested but no sample bottle received*

88 *Samples analysed past holding time, as per client request.*

*** 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

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