Annual Report -2019

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU



Date: Aug 06, 2020

Submitted to:

Nunavut Water Board

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

Kugluktuk Water Licence: 3BM-KUG 1520 Annual Report 2019

Aug 06, 2020

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

Attention: Richard Dwyer, Manager of Licensing

RE: 3BM-KUG 1520 - Annual Report 2019, Hamlet of Kugluktuk

Dear Richard,

The Hamlet of Kugluktuk is pleased to submit the "**Annual Report 2019**" of water uses and sewage solid waste disposal as required and directed under the compliance of Water Licence 3BM-KUG-1520. 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 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 Water Licence for water, sewage and solid waste facilities.

CGS is submitting this report on behalf of the Hamlet of Kugluktuk (the Licensee).

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 2019 for the Hamlet of Kugluktuk is prepared to meet requirements of the Nunavut Water Board Licence 3BM-KUG 1520, Part B General Conditions, through part H to the monitoring program, with information covering period from 01 January to 31 December 2019.

Potable water intakes from Coppermine river through intake pump of the new IPH and treated at the treatment plant through coagulation, sedimentation, filtration, UV and disinfected by chlorination before truck-fill by hamlet operated water trucks to community residence tanks. Water intake could be carried using old pumphouse which is determined as alternate when high salinity in water at the main pumphouse location. The alternate water intake system mobile shack for ice water intake put on the riverbank but was not used for this duration. The old IPH was not used during this period since the heat trace burnt by an unknown fire in Nov 2018. The temporary water storage reservoir has been in use with sedimentation and re-intake to treatment plant when high turbidity & salinity in water source alarmed. Quantity of water drawn from all sources during this period was nearly **65,209 m3** which is about 84 % of the allowable limit **77,000** annually determined in the Licence.

Wastewater combines with raw sewage and grey water were collected from household sewage tanks using hamlet operated vacuum trucks and hauled and discharged at the sewage lagoon using the sewage dropping pad. Raw sewage stayed frozen inside the lagoon during Sep – June, almost 10 months where they received primary treatment naturally and settled sludge layers on lagoon floor. Frozen wastewater starts melting during spring through summer and flows inside the lagoon with air and gravity and sludge materials deposits on lagoon floor which forms a layer of sludge blanket and slowly remediate anaerobically. Sewage water decanting was carried during July-Sep which has reduced water volume inside, but no sludge removal required during this period. Sewage water samples were collected from decanting point KUG-3A before the decanting operation and tested at Taiga Laboratory Yellowknife for parameters compliances. Test results were reviewed by CIRNAC inspector before approved for decanting.

Water samples were tested at Taiga Laboratory for EC and FC on monthly basis and as necessitated during the high turbidity issues in source water during the spring but no issues or concern during this period. Feed water storage tank was cleaned, and sludge was removed from the tank floor by using wastewater trucks.

Municipal waste comprises residential and commercial were collected from household waste bins by hamlet operators and hauled in dump trucks to municipal solid waste facility where it disposed at designated location and cells. Loose wastes were reduced by slow burning inside and burn ashes pushed and compacted down by grader and covered with sand-gravels when was possible.

The lagoon leak is continuous across the berm and earthen buttress toe which is a concern for berm structure and non-compliance to regulation. Air bubbles inside the lagoon liner are concerns to the sewage containment and capacity until annual decanting of sewage water. The licensee has been in discussion with GN CGS for an effective remediation of these issues which needed funding source to support the repair works.

Part B: General Conditions

- Annual water consumptions are recorded daily basis and sewage quantity estimated from daily sewage disposal in the lagoon. No device Meter was used for volume measurement but only estimated by truck amount; however, this estimate is considered precise for the water, sewage and round up for solid waste quantities.
- The new water treatment plant is fully in operation, water treatment process included sedimentation, coagulation flocculation (as needed), sand filtration, UV and chlorination.
- Water intake from the Coppermine River by using twin intake pumps (one at a time) and mobile ice shack as needed when salt intrusion in water and high turbidity. Intake screen set up underwater with clearance to river bottom and at least 2.5m below the river water surface for assumed ice thickness in winter. One intake line was pulled out due to missing the intake screen and plan to re-instate with new screen structure.
- Water reservoir uses for temporary sedimentation of turbidity and salinity in water (when needed) and redirect to water treatment plant for regular treatment process.
- 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 point. Raw sewage stayed inside the lagoon almost 9 months frozen and received the primary treatment naturally and allowing sludge built up at lagoon bottom and sewage water on top.
- Sewage water decanted from the lagoon to wetland (KUG-3A) using a mechanical pump during late July-early Sep 2019 and emptied about 85 % of sewage water from lagoon.
- O&M manuals for sewage and waste approved and updated with compliance. O&M manual for sewage lagoon has not changed since 2009, but revised version submitted to the Board as requested.
- As-built drawing for water system construction and documents has been submitted to the Board.
- Water and sewage effluent sampling carried during June – Sep as available for sampling as described in the compliance plan. Samples were tested at Taiga lab, Yellowknife.
- No erosion, slumping or adverse sign of salt and high turbidity noticed for water intake during this period and not required the mobile shack or reservoir uses.

Part C: Water Use:

- Water drawn from the Coppermine River using one of the twin pumps alternate and switching from new pump house to old pump house as needed. The annual quantity of about 65,209 cubic metres within allowable limit of 77,000 cubic metres.
- Water intake through net screen secured under water with clearance to river bed and about 2.5 m below the top water surface to avoid freezing layer and free from fish and debris ingress; thus protect intake from any larger particles bringing with water.

Part D: Waste Disposal

- Raw sewage collected from household sewage tank by hamlet operated vacuum trucks 7 days a week and discharged raw sewage into the lagoon at designated location. Raw sewage stayed inside about 9 months frozen until decanting using a mechanical pump.
- Decanting took place over 6 week during the period of July 03 – September 15 with some days off in between to facilitate the wetland polishing up decanted water.
- Samples of effluent water collected during the period July - August and tested at Taiga laboratory, Yellowknife. Samples results are attached with this report for information.

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

- Modification for water intake mobile shack completed and placed on the riverbank near the old IPH which will be used with the delivery line of old IPH to WTP when needed.
- Berm slumping and cracks monitoring continued but no reportable crack or slumping but leak continued across the earthen buttress at berm toe.
- Sludge removal can be carried together with the leak repair plan - normally sludge removal plan only when sludge thickness comes to a minimum 2 feet on lagoon bed.

Part H: Monitoring Program

- Annual sampling of sewage & waste effluent carried from station KUG-2, KUG-3A, KUG-4 and KUG-5 during July – August and results attached with this report.
- Monitoring of water, sewage and sold waste facilities mostly required during spring through fall, other times visual observation and protection of facilities required.
- Sampling from specified location, samples storage, shipping and testing requirements are part of the monitoring program carried by the operators. Location for station KUG-2 has been adjusted based on best representation of samples collection. Monitoring locations were marked with signs and recorded by GPS locator.

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 point of run-off effluent from Solid Waste facility.	Monitoring station, outside of solid waste facility
KUG-3A	Discharge point of sewage disposal from the lagoon to wetland	Sampling point at sewage lagoon inside
KUG-3	Raw Sewage disposal location from truck to lagoon	To estimate volume of sewage
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

NWB Form - Annual Report 2019

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

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YEAR BEING REPORTED: 2019

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	5,616,188.60	same
February	5,117,726.40	same
March	5,502,469.70	same
April	5,456,099.90	same
May	5,627,564.60	same
June	5,244,863.10	same
July	5,474,985.40	same
August	5,750,202.60	same
September	5,324,571.40	same
October	5,410,974.90	same
November	5,208,694.80	same
December	5,546,301.50	same
ANNUAL TOTAL	**65,208,642.90**	same

iv. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;

Water Supply:

- The UV process added to the recirculation line of treated water storage tanks TW1/ TW2 of the old water treatment building. Water from the last tank is connected to the delivery tank TW3 that deliver water to the new twin truckfill.
- A bypass line connected towards the raw water storage tank of the WTP instead of using the existing charge tank. The new plant has been in operation since Dec 31, 2017
- New mobile shack for ice water intake has been moved to a location along the river bank suitable to ice intake from river surface area when high salt wedge in river bed water alarm mostly during Nov-May before the ice breaks up. The shack water intake will be delivered to the new WTP through the insulated pipe line of old intake pump house- which requires heat-trace replacement as part of the line has been burn out due to a unknown fire in 2017.
- Intake screen was missing to one of the twin intake lines of new IPH and the insulated line has been pulled out of water to river bank in 2018 while the other intake screen was raised to about 200-300 mm from existing position of river bed to reduce salinity ingress into the water intake pipe. Plan to reinstate this intake line into river water with new funding by GN CGS projects.

The new WTP has been in operation since Dec 31, 2017 with processes inclusion of Roughing Sand filtration (RSF), Slow Sand filtration (SSF) and coagulation, flocculation, sedimentation (CFD) by adding alum and PAC as needed when turbidity is high in raw water to refine the turbidity followed by chlorination before the truckfill.

Sewage and Solid waste:

- Continued the leak monitoring of the berm of the lagoon which was strengthen by adding a buttress at the toe of the berm section, but no other activities carried during this period.
- Some of liner bubbles has reduced the size automatically while lagoon decanting and the entrapped sludge water flowed down naturally, but liner bubbles were not eliminated as entrapped air still remains inside of the bubble.
- Some top layers of the soils and sands were removed from the land farm cell and uses as solid waste cover materials.
- Ditch area at the solid waste facility entrance was filled and trenched for run-off drainage and new location determined for KUG-2 for effluent sampling with best available run-off --

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

- Sewage lagoon berm is still leaking at a location to the right of sewage drop-off point but the leak flows near to the toe at a reduced rate. Leaked sewage water temporarily stores on a shallow ditch area outside of old sewage facility (which was decommissioned) and later it moves on wetland and finally towards the discharge point KUG-4 at river bank.
- No other unauthorised discharged of water, sewage effluent or solid waste in this period.

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

- The old IPH remains idle since the water delivery line was damaged due to a fire sparked from heat trace on Nov 10, 2018. The old IPH is an alternate water intake system and is not for decommissioning. To bring the water by the old IPH, the repair works of damaged portion would include heat trace, insulation, conduits and electrical connection system.
- The new mobile shack was placed along the river bank for ice water intake (an alternate) if a salt intrusion occurs in river water. This added facility is for water intake into the WTP but will not reduce or decommissioned any existing facilities.
- A proposal has been submitted to CGS for lagoon leak repair and a liner cell for sludge drying (whenever needed), but no project yet initiated as funding not confirmed.

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**;

- Inspector has a concerned of continuous sewage leak while no effective steps yet to ensure full containment of sewage water inside but the mechanical decanting only in summer fall
- The licensee is proposing for the wetland facility study to analyze the continuous ability of wetland since a continuous leak effluent is now storing on wetland. Such study can be considered with funding arrangement by GN CGS or a 3rd party interested – such as research works under Federal source.
- The land farm facility is over borne than its capacity and needs to be emptied for new candidate soils and spills.
- The solid waste facility is old, getting in full capacity and close proximity to public road side. It should be planned either expansion or addition of new cells, securement and water drainage towards the wetland (share with sewage effluent) and odor control. Kugluktuk community is acknowledging warmer weather compare to previous years, increase growth of plants, vegetation and it attracts animals towards the solid waste facility for their foods. Thus the facility would require a full containment with fence and gate control.

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

- The Board has requested to update the sewage leak remediation plan but not a specific time schedule.
- The Board requires lagoon containment assurance and plan to control bubbles.

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

O&M manuals for Water Treatment Plant (WTP) completed and submitted. The two existing treated water storage tanks connected with the new WTP which follows the old O&M manual.

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ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- Plan to reinstate the missing intake line at new IPH which may include a replacement of intake screen at a raised location on river bed to intake less turbid water and better flow.
- Plan for repair of the fire burnt damaged water delivery line of the old IPH and inclusion of the Mobile Ice Shack when needed.
- Water Operators Training provided to a group of 3 operators to get certification and operation.
- Plan for cleaning the water treatment process media (sand filtration) in coming summer.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- The new Water treatment plant acknowledges high turbidity in source water sometime (mostly in spring freshet which adds some concerns and challenge to filtration system.
- Boil water advisory happened in last year due to increased turbidity in raw water and put the water treatment in challenges, but it stays very short duration. During this year, such threats wasn't seen

Sewage Effluent Results Summary

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

Kugluktuk Sewage Lagoon Sampling 2019

Parameters	Units	MAC Limits	July 03 2019		
			Sewage Disposal KUG-3	Sewage Outfall Wetland KUG-4	Comments
Alkalinity	mg/L		295	68.9	
Conductivity	µS/cm		830	532	
P^h	p^h	6-9	7.7	7.59	Water License
TSS	mg/L	180	40	106	Water License
Ammonia as N_2	mg/L		58.9	0.0702	
BOD_5	mg/L	120	171	4	Water License
CBOD	mg/L		174	3	
Nitrate as N_2	mg/L	45	0.08	0.60	
Nitrite as N_2	mg/L	3	< 0.01	< 0.01	
Calcium	mg/L	32	10	14.1	
Chloride	mg/L	100	43.7	114	
Hardness	mg/L	500	44.9	87.3	
Magnesium	mg/L		4.8	12.7	
Potassium	mg/L		19.5	3.1	
Sodium	mg/L	200	41.5	66.2	
Sulphate	mg/L	500	14	12	
Fecal Coliform	CFU/100mL	$1x10^6$	$.0242x10^6$	291	Water License
Oil Grease visible	Visibility		Non-Visible	Non-Visible	Water License
Aluminium	µg/L	200	104	223	
Arsenic	µg/L	25	1	1.5	
Cadmium	µg/L	5	< 0.1	< 0.1	
Chromium	µg/L	50	0.7	0.7	
Cobalt	µg/L	50	0.6	0.5	
Copper	µg/L	200	39.9	2.6	
Iron	µg/L	500	490	3400	
Lead	µg/L	10	0.6	0.3	
Manganese	µg/L	50	39.0	146.0	
Nickel	µg/L	200	2.4	1.7	
Zinc	µg/L	500	34.5	< 5.0	

CIRNAC Inspection Report 2019

Water Licence: 3BM-KUG 1520

Hamlet of Kugluktuk, NU

WATER LICENCE INSPECTION FORM

☒ **Original**
☐ **Follow-Up Report**

Licensee	**Licensee Representative**
Hamlet of Kugluktuk	Don Leblanc
Licence No. / Expiry	**Representative's Title**
3BM-KUG1520	Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
2019 July 30	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	C	4&5	Storage	U	7
Flow Measure. Device	A		Culverts / Bridges			Spills		
Source:			Drainage			Spill Plan		
Water Use:			Erosion / Sediment					
Recirculation (y /n)			Mitigation Measures	C	6	**Administrative**		
			Reclamation Activities			Records	A	
			Materials Storage			Reports	A	
Waste Disposal			Signage	C	1,2&3	Plans		
Waste Water	C	4&5				Notifications		
Solid Waste	A		**Monitoring**			**Other**		
Hazardous Waste	C	8	Sample Collection / Analysis	A		Authorization Display	C	9

**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 30, 2019 I Inspected the Hamlet of Kugluktuk's Municipal Water License 3BM-KUG1520. I was accompanied by Isa Kalluk from the Hamlet of Kugluktuk and Shah Alam from the GN CGS.

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

We saw 1. Signage for Sample Station KUG-1A (Photo 1), 2. The indoor Sample Station KUG-1C (Photo 2), 3. The Emergency Water Intake Pump Shack (Photo 3), at the Sewage Lagoon we saw 4. The ongoing Leak under the Buttress (Photo 4), 5. The extremely Low Level within the Lagoon (Photo 5), 6. Floating Debris and Wood inside the Lagoon (Photos 6 & 7), 7. The Contaminated Soil Land Farm Area (Photo 8), 8. The used Battery Pile in the Land Farm Area (also Photo 8), and 9. I asked to see a copy of this Water License 3BM-KUG1520.

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

1. The Signage for Sample Station KUG-1A must be moved to a more visible location closer to the actual Sample Point. 2. The Signage for Sample Station KUG-1C must be Permanent and easily readable that identifies exactly where the Sample Point is. 3. Signage to Identify the Sample Station KUG-1D must be attached to the outside of the green Emergency Water Intake Pump Shack. If/when this is ever used, the exact GPS Coordinates must be provided to the Inspector as to where it was located during use. 4. The Hamlet and the GN must work together to come up with a permanent solution to the ongoing leak in the lined Berm under the Buttress area on the North Side. 5. The very low level of fluid within the Lagoon BEFORE any Decant has taken place is an ongoing concern related to the Leakage. 6. The 2 piles of floating Debris and Wood Beams must be removed from the Lagoon to prevent damage to the Liner. 7. The Contaminated Soil Land Farm Area must be cleaned out of all items that should not be there. This area is ONLY for Contaminated Soil and nothing else. This has brought to the attention of the Hamlet by the Inspector numerous times and MUST be dealt with before the summer of 2020 Inspection or the Inspector will have no choice but to pursue further Enforcement Action. 8. All used Batteries are to be stored in Wooden Crates lined with Plastic Poly for safe keeping until they are able to be shipped south for proper disposal. 9. Hard Copies of Water License 3BM-KUG1520 MUST be available to the key people responsible for ensuring all Terms and Conditions of this License are being met. Namely, the SAO, the Foreman and the Water Plant Operators MUST be able to show a copy to the Inspector on request.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	2019 Nov 29

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

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

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

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

PHOTO LOG

Date	Camera	Inspector	Authorization
2019 July 30	Sony DSC-HX50V	Baba Pedersen	3BM-KUG1520

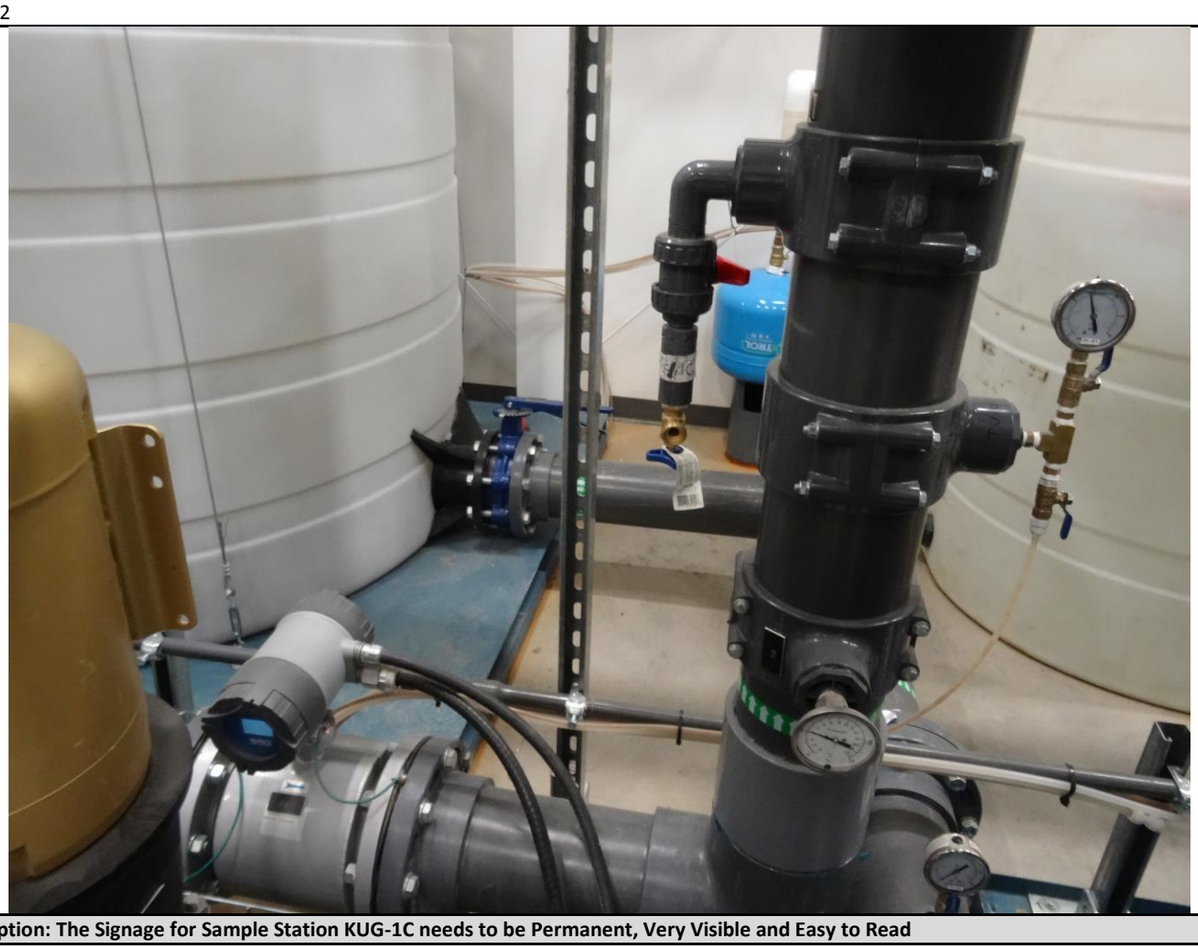
Photo Log # DSC05264 **Location – New Water Intake**

Photo 1

Description: The Signage for Sample Station KUG-1A needs to be Moved to a more Visible Location

Photo Log # DSC05274 **Location – Water Treatment Plant**

Photo 2



Description: The Signage for Sample Station KUG-1C needs to be Permanent, Very Visible and Easy to Read

Photo Log # DSC05280	Location – Emergency Water Intake Pump Shack

Photo 3

Description: Signage for Sample Station KUG-1D needs to be attached to the outside of the Green Emergency Water Intake Pump Shack

Photo Log # DSC05283	Location – Sewage Lagoon

Photo 4

Description: Leakage through the Sewage Lagoon Buttress on the North side of the Berm

Photo Log # DSC05305	Location – Sewage Lagoon

Photo 5

Description: Extremely Low Levels within the Lagoon BEFORE Decant Program showing large volume of continuous Leakage

Photo Log # DSC05315	Location – Sewage Lagoon

Photo 6

Description: Debris Pile #1 and Wood Beam in South East Corner needs to be Removed from Lagoon

Photo Log # DSC05316	Location – Sewage Lagoon

Photo 7

Description: Debris Pile #2 and Wood Beam in South East Corner needs to be Removed from Lagoon

Photo Log # DSC05339	Location – Land Farm area in Garbage Dump

Photo 8

Description: Remove everything, only Contaminated Soil to be in this Land Farm. All Batteries are to be stored in Lined Wood Crates

Appendix: A

Water Test Results 2019

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.: 190332

- FINAL 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:

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: Tuesday, June 25, 2019
Print Date: *Tuesday, June 25, 2019*

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

Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Client Project: Kugluktuk Water System
Sample Type: Raw Water
Received Date: 11-Jun-19
Sampling Date: 10-Jun-19
Sampling Time:
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	8.4	0.5	mg/L	17-Jun-19	SM5310:B	
Organic Carbon, Total	8.4	0.5	mg/L	18-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	44.9	0.4	mg/L	11-Jun-19	SM2320:B	
Colour, Apparent	219	5	CU	11-Jun-19	SM2120:B	
Conductivity, Specific (@25C)	87.0	0.4	µS/cm	11-Jun-19	SM2510:B	
pH	7.72		pH units	11-Jun-19	SM4500-H:B	
Solids, Total Dissolved	94	10	mg/L	13-Jun-19	SM2540:C	
Solids, Total Suspended	172	3	mg/L	13-Jun-19	SM2540:D	
Major Ions						
Calcium	9.4	0.1	mg/L	11-Jun-19	SM4110:B	
Chloride	< 0.7	0.7	mg/L	11-Jun-19	SM4110:B	
Fluoride	0.3	0.1	mg/L	11-Jun-19	SM4110:B	
Hardness	41.9	0.7	mg/L	11-Jun-19	SM4110:B	

ReportDate: Tuesday, June 25, 2019
Print Date: ***Tuesday, June 25, 2019***

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

Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Magnesium	4.5	0.1	mg/L	11-Jun-19	SM4110:B
Nitrate+Nitrite as Nitrogen	0.16	0.01	mg/L	11-Jun-19	SM4110:B
Potassium	0.7	0.1	mg/L	11-Jun-19	SM4110:B
Sodium	0.7	0.1	mg/L	11-Jun-19	SM4110:B
Sulphate	3	1	mg/L	11-Jun-19	SM4110:B
Microbiology					
Coliforms, Total	148	1.0	MPN/100ml	11-Jun-19	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	11-Jun-19	SM9223:B
Subcontracted Organics					
Cyanide, Total	< 0.0050	0.005	mg/L	17-Jun-19	APHA4500-CN
Phenols, Total	< 0.0010	0.001	mg/L	20-Jun-19	AB ENV.06537
Trace Metals, Total					
Aluminum	1770	5	µg/L	24-Jun-19	EPA200.8
Arsenic	0.7	0.2	µg/L	24-Jun-19	EPA200.8
Barium	38.2	0.1	µg/L	24-Jun-19	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Cesium	0.3	0.1	µg/L	24-Jun-19	EPA200.8
Chromium	3.3	0.1	µg/L	24-Jun-19	EPA200.8
Copper	7.4	0.2	µg/L	24-Jun-19	EPA200.8
Iron	2040	5	µg/L	24-Jun-19	EPA200.8
Lead	1.3	0.1	µg/L	24-Jun-19	EPA200.8
Manganese	55.7	0.1	µg/L	24-Jun-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	3.7	0.1	µg/L	24-Jun-19	EPA200.8

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

Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Selenium	< 0.5	0.5	µg/L	24-Jun-19	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Zinc	27.7	5	µg/L	24-Jun-19	EPA200.8

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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

Client Sample ID: WTP **Taiga Sample ID:** 002

Client Project: Kugluktuk Water System
Sample Type: Treated Water
Received Date: 11-Jun-19
Sampling Date: 10-Jun-19
Sampling Time:
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	3.6	0.5	mg/L	17-Jun-19	SM5310:B	
Organic Carbon, Total	3.6	0.5	mg/L	18-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	37.5	0.4	mg/L	11-Jun-19	SM2320:B	
Colour, Apparent	11	5	CU	11-Jun-19	SM2120:B	
Conductivity, Specific (@25C)	89.9	0.4	µS/cm	11-Jun-19	SM2510:B	
pH	7.83		pH units	11-Jun-19	SM4500-H:B	
Solids, Total Dissolved	62	10	mg/L	13-Jun-19	SM2540:C	
Solids, Total Suspended	4	3	mg/L	13-Jun-19	SM2540:D	
Major Ions						
Calcium	9.3	0.1	mg/L	11-Jun-19	SM4110:B	
Chloride	4.4	0.7	mg/L	11-Jun-19	SM4110:B	
Fluoride	0.3	0.1	mg/L	11-Jun-19	SM4110:B	
Hardness	36.0	0.7	mg/L	11-Jun-19	SM4110:B	
Magnesium	3.1	0.1	mg/L	11-Jun-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.12	0.01	mg/L	11-Jun-19	SM4110:B	

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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

Client Sample ID: WTP **Taiga Sample ID:** 002

Potassium	0.6	0.1	mg/L	11-Jun-19	SM4110:B
Sodium	3.4	0.1	mg/L	11-Jun-19	SM4110:B
Sulphate	3	1	mg/L	11-Jun-19	SM4110:B
Microbiology					
Coliforms, Total	< 1.0	1.0	MPN/100ml	11-Jun-19	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	11-Jun-19	SM9223:B
Organics					
Bromodichloromethane	< 0.005	0.005	mg/L	18-Jun-19	EPA8260B
Bromoform	< 0.005	0.005	mg/L	18-Jun-19	EPA8260B
Chloroform	0.036	0.005	mg/L	18-Jun-19	EPA8260B
Dibromochloromethane	< 0.005	0.005	mg/L	18-Jun-19	EPA8260B
Trihalomethanes, Total	0.039	0.005	mg/L	18-Jun-19	EPA8260B
Subcontracted Organics					
Cyanide, Total	< 0.0050	0.005	mg/L	17-Jun-19	APHA4500-CN
Phenols, Total	< 0.0010	0.001	mg/L	20-Jun-19	AB ENV.06537
Trace Metals, Total					
Aluminum	62.0	0.6	µg/L	24-Jun-19	EPA200.8
Arsenic	0.2	0.2	µg/L	24-Jun-19	EPA200.8
Barium	8.5	0.1	µg/L	24-Jun-19	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Cadmium	< 0.04	0.04	µg/L	24-Jun-19	EPA200.8
Cesium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Chromium	0.1	0.1	µg/L	24-Jun-19	EPA200.8
Copper	50.4	0.2	µg/L	24-Jun-19	EPA200.8
Iron	27	5	ug/L	24-Jun-19	EPA200.8

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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

Client Sample ID: WTP **Taiga Sample ID:** 002

Lead	1.1	0.1	µg/L	24-Jun-19	EPA200.8
Manganese	0.3	0.1	µg/L	24-Jun-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	1.3	0.1	µg/L	24-Jun-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	24-Jun-19	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Zinc	12.1	0.4	µg/L	24-Jun-19	EPA200.8

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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Client Project: Kugluktuk Water System
Sample Type: Treated Water
Received Date: 11-Jun-19
Sampling Date: 10-Jun-19
Sampling Time:
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	6.5	0.5	mg/L	17-Jun-19	SM5310:B	
Organic Carbon, Total	6.5	0.5	mg/L	18-Jun-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	43.4	0.4	mg/L	11-Jun-19	SM2320:B	
Colour, Apparent	35	5	CU	11-Jun-19	SM2120:B	
Conductivity, Specific (@25C)	95.7	0.4	µS/cm	11-Jun-19	SM2510:B	
pH	7.85		pH units	11-Jun-19	SM4500-H:B	
Solids, Total Dissolved	58	10	mg/L	13-Jun-19	SM2540:C	
Solids, Total Suspended	4	3	mg/L	13-Jun-19	SM2540:D	
Major Ions						
Calcium	10.6	0.1	mg/L	11-Jun-19	SM4110:B	
Chloride	3.4	0.7	mg/L	11-Jun-19	SM4110:B	
Fluoride	0.3	0.1	mg/L	11-Jun-19	SM4110:B	
Hardness	42.7	0.7	mg/L	11-Jun-19	SM4110:B	
Magnesium	3.9	0.1	mg/L	11-Jun-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.05	0.01	mg/L	11-Jun-19	SM4110:B	

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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Potassium	0.7	0.1	mg/L	11-Jun-19	SM4110:B	
Sodium	2.3	0.1	mg/L	11-Jun-19	SM4110:B	
Sulphate	3	1	mg/L	11-Jun-19	SM4110:B	
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	11-Jun-19	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	11-Jun-19	SM9223:B	
Organics						
Bromodichloromethane		0.005	mg/L		EPA8260B	111
Bromoform		0.005	mg/L		EPA8260B	111
Chloroform		0.005	mg/L		EPA8260B	111
Dibromochloromethane		0.005	mg/L		EPA8260B	111
Trihalomethanes, Total		0.005	mg/L		EPA8260B	111
Subcontracted Organics						
Cyanide, Total	< 0.0050	0.005	mg/L	17-Jun-19	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	20-Jun-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	171	0.6	µg/L	24-Jun-19	EPA200.8	
Arsenic	0.2	0.2	µg/L	24-Jun-19	EPA200.8	
Barium	11.6	0.1	µg/L	24-Jun-19	EPA200.8	
Beryllium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	24-Jun-19	EPA200.8	
Cesium	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8	
Chromium	0.2	0.1	µg/L	24-Jun-19	EPA200.8	
Copper	9.2	0.2	µg/L	24-Jun-19	EPA200.8	
Iron	81	5	ug/L	24-Jun-19	EPA200.8	

ReportDate: Tuesday, June 25, 2019
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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

Lead	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Manganese	1.0	0.1	µg/L	24-Jun-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Jun-19	EPA200.8
Nickel	0.5	0.1	µg/L	24-Jun-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	24-Jun-19	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Jun-19	EPA200.8
Zinc	0.6	0.4	µg/L	24-Jun-19	EPA200.8

ReportDate: Tuesday, June 25, 2019
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Taiga Batch No.: 190332

- CERTIFICATE OF ANALYSIS -

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

- 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: Tuesday, June 25, 2019

Print Date: ***Tuesday, June 25, 2019***

Appendix: B

Effluent Waste Test Results 2019

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.: 190448

- FINAL 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:

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: Tuesday, July 16, 2019
Print Date: ***Tuesday, July 16, 2019***

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

Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Solid Waste
Received Date: 04-Jul-19
Sampling Date: 03-Jul-19
Sampling Time: 9:30
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	26	2	mg/L	04-Jul-19	SM5210:B	55
CBOD	26	2	mg/L	04-Jul-19	SM5210:B	55
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	172	0.4	mg/L	04-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	1540	0.4	µS/cm	04-Jul-19	SM2510:B	
pH	7.90		pH units	04-Jul-19	SM4500-H:B	
Solids, Total Suspended	20	3	mg/L	09-Jul-19	SM2540:D	
Major Ions						
Calcium	65.4	0.1	mg/L	05-Jul-19	SM4110:B	
Chloride	334	0.7	mg/L	05-Jul-19	SM4110:B	
Hardness	389	0.7	mg/L	05-Jul-19	SM4110:B	
Magnesium	54.8	0.1	mg/L	05-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.34	0.01	mg/L	05-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	05-Jul-19	SM4110:B	

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Potassium	4.4	0.1	mg/L	05-Jul-19	SM4110:B
Sodium	148	0.1	mg/L	05-Jul-19	SM4110:B
Sulphate	81	1	mg/L	05-Jul-19	SM4110:B
Organics					
Oil and Grease, visible	Non-visible			04-Jul-19	Visual Exam
Subcontracted Inorganics					
Sulphide	< 0.0015	0.0015	mg/L	06-Jul-19	APHA4500-S2
Subcontracted Microbiology					
Coliforms, Fecal	< 1	1	MPN/100ml	04-Jul-19	APHA9223B
Subcontracted Nutrients					
Ammonia as Nitrogen	< 0.0050	0.005	mg/L	07-Jul-19	SM4500 NH3
Trace Metals, Total					
Aluminum	460	5	µg/L	10-Jul-19	EPA200.8
Arsenic	4.3	0.2	µg/L	10-Jul-19	EPA200.8
Cadmium	0.2	0.1	µg/L	10-Jul-19	EPA200.8
Chromium	1.1	0.1	µg/L	10-Jul-19	EPA200.8
Cobalt	0.9	0.1	µg/L	10-Jul-19	EPA200.8
Copper	10.5	0.2	µg/L	10-Jul-19	EPA200.8
Iron	782	5	µg/L	10-Jul-19	EPA200.8
Lead	1.8	0.1	µg/L	10-Jul-19	EPA200.8
Manganese	396	0.1	µg/L	10-Jul-19	EPA200.8
Nickel	2.6	0.1	µg/L	10-Jul-19	EPA200.8
Zinc	140	5	µg/L	10-Jul-19	EPA200.8

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

Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Sewage Disposal
Received Date: 04-Jul-19
Sampling Date: 03-Jul-19
Sampling Time: 9:30
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	171	2	mg/L	04-Jul-19	SM5210:B	
CBOD	174	2	mg/L	04-Jul-19	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	295	0.4	mg/L	04-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	830	0.4	µS/cm	04-Jul-19	SM2510:B	
pH	7.70		pH units	04-Jul-19	SM4500-H:B	
Solids, Total Suspended	40	3	mg/L	09-Jul-19	SM2540:D	
Major Ions						
Calcium	10.0	0.1	mg/L	05-Jul-19	SM4110:B	
Chloride	43.7	0.7	mg/L	05-Jul-19	SM4110:B	
Hardness	44.9	0.7	mg/L	05-Jul-19	SM4110:B	
Magnesium	4.8	0.1	mg/L	05-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.08	0.01	mg/L	05-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	05-Jul-19	SM4110:B	
Potassium	19.5	0.1	mg/L	05-Jul-19	SM4110:B	
Sodium	41.5	0.1	mg/L	05-Jul-19	SM4110:B	

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Sulphate	14	1	mg/L	05-Jul-19	SM4110:B	
Organics						
Oil and Grease, visible	Non-visible			04-Jul-19	Visual Exam	
Subcontracted Inorganics						
Sulphide	0.0385	0.0015	mg/L	06-Jul-19	APHA4500-S2	
Subcontracted Microbiology						
Coliforms, Fecal	24200	10	MPN/100ml	04-Jul-19	APHA9223B	210
Subcontracted Nutrients						
Ammonia as Nitrogen	58.90	1.3	mg/L	07-Jul-19	SM4500 NH3	
Trace Metals, Total						
Aluminum	104	5	µg/L	10-Jul-19	EPA200.8	
Arsenic	1.0	0.2	µg/L	10-Jul-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	10-Jul-19	EPA200.8	
Chromium	0.7	0.1	µg/L	10-Jul-19	EPA200.8	
Cobalt	0.6	0.1	µg/L	10-Jul-19	EPA200.8	
Copper	39.9	0.2	µg/L	10-Jul-19	EPA200.8	
Iron	490	5	µg/L	10-Jul-19	EPA200.8	
Lead	0.6	0.1	µg/L	10-Jul-19	EPA200.8	
Manganese	39.0	0.1	µg/L	10-Jul-19	EPA200.8	
Nickel	2.4	0.1	µg/L	10-Jul-19	EPA200.8	
Zinc	34.5	5	µg/L	10-Jul-19	EPA200.8	

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Outfall Wetland
Received Date: 04-Jul-19
Sampling Date: 03-Jul-19
Sampling Time: 9:30
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	4	2	mg/L	04-Jul-19	SM5210:B	
CBOD	3	2	mg/L	04-Jul-19	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	68.9	0.4	mg/L	04-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	532	0.4	µS/cm	04-Jul-19	SM2510:B	
pH	7.59		pH units	04-Jul-19	SM4500-H:B	
Solids, Total Suspended	106	3	mg/L	09-Jul-19	SM2540:D	
Major Ions						
Calcium	14.1	0.1	mg/L	05-Jul-19	SM4110:B	
Chloride	114	0.7	mg/L	05-Jul-19	SM4110:B	
Hardness	87.3	0.7	mg/L	05-Jul-19	SM4110:B	
Magnesium	12.7	0.1	mg/L	05-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.60	0.01	mg/L	05-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	05-Jul-19	SM4110:B	
Potassium	3.1	0.1	mg/L	05-Jul-19	SM4110:B	
Sodium	66.2	0.1	mg/L	05-Jul-19	SM4110:B	

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

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

Sulphate	12	1	mg/L	05-Jul-19	SM4110:B
Organics					
Oil and Grease, visible	Non-visible			04-Jul-19	Visual Exam
Subcontracted Inorganics					
Sulphide	< 0.0015	0.0015	mg/L	06-Jul-19	APHA4500-S2
Subcontracted Microbiology					
Coliforms, Fecal	291	1	MPN/100ml	04-Jul-19	APHA9223B
Subcontracted Nutrients					
Ammonia as Nitrogen	0.0702	0.005	mg/L	07-Jul-19	SM4500 NH3
Trace Metals, Total					
Aluminum	223	5	µg/L	10-Jul-19	EPA200.8
Arsenic	1.5	0.2	µg/L	10-Jul-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	10-Jul-19	EPA200.8
Chromium	0.7	0.1	µg/L	10-Jul-19	EPA200.8
Cobalt	0.5	0.1	µg/L	10-Jul-19	EPA200.8
Copper	2.6	0.2	µg/L	10-Jul-19	EPA200.8
Iron	3400	5	µg/L	10-Jul-19	EPA200.8
Lead	0.3	0.1	µg/L	10-Jul-19	EPA200.8
Manganese	146	0.1	µg/L	10-Jul-19	EPA200.8
Nickel	1.7	0.1	µg/L	10-Jul-19	EPA200.8
Zinc	< 5.0	5	µg/L	10-Jul-19	EPA200.8

ReportDate: Tuesday, July 16, 2019
Print Date: *Tuesday, July 16, 2019*

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

Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 004

Client Project:
Sample Type: Landfarm
Received Date: 04-Jul-19
Sampling Date: 03-Jul-19
Sampling Time: 9:30
Location: Kugluktuk, NU
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Physicals						
pH	7.87		pH units	04-Jul-19	SM4500-H:B	
Organics						
Benzene	< 0.002	0.002	mg/L	15-Jul-19	EPA8260B	
Ethylbenzene	< 0.002	0.002	mg/L	15-Jul-19	EPA8260B	
Hexane Extractable Material		2.0	mg/L		EPA1664A	16
Toluene	< 0.002	0.002	mg/L	15-Jul-19	EPA8260B	
Xylenes	< 0.002	0.002	mg/L	15-Jul-19	EPA8260B	
Subcontracted Organics						
Phenols, Total	< 0.0010	0.001	mg/L	05-Jul-19	AB ENV.06537	
Polychlorinated Biphenyls	< 0.00100	0.001	mg/L	08-Jul-19	EPA3510	
Trace Metals, Dissolved						
Cadmium	< 0.04	0.04	µg/L	10-Jul-19	EPA200.8	
Chromium	0.2	0.1	µg/L	10-Jul-19	EPA200.8	
Cobalt	0.3	0.1	µg/L	10-Jul-19	EPA200.8	
Copper	0.8	0.2	µg/L	10-Jul-19	EPA200.8	
Lead	< 0.1	0.1	µg/L	10-Jul-19	EPA200.8	

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 004

Nickel	3.3	0.1	µg/L	10-Jul-19	EPA200.8
Trace Metals, Total					
Arsenic	1.6	0.2	µg/L	10-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	10-Jul-19	EPA200.8

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Taiga Batch No.: 190448

- CERTIFICATE OF ANALYSIS -

Client Sample ID: KUG-5 **Taiga Sample ID:** 004

- DATA QUALIFERS -

Data Qualifier Descriptions:

16	*Test requested but no sample bottle received*
210	*Detection limit adjusted for required dilution.*
55	*BOD result is inconclusive; residual DO was less than 1 mg/L. For evaluation purposes only.*

*** 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: Tuesday, July 16, 2019
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190626

- FINAL 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:

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, August 16, 2019
Print Date: ***Monday, August 19, 2019***

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

Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

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

Client Project: Kugluktuk Sewage System
Sample Type: Sewage Water
Received Date: 31-Jul-19
Sampling Date: 31-Jul-19
Sampling Time: 10:30
Location: Sewage Lagoon + Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	65	2	mg/L	01-Aug-19	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	268	0.4	mg/L	01-Aug-19	SM2320:B	
Conductivity, Specific (@25C)	733	0.4	µS/cm	01-Aug-19	SM2510:B	
pH	7.88		pH units	01-Aug-19	SM4500-H:B	
Solids, Total Suspended	108	3	mg/L	06-Aug-19	SM2540:D	
Major Ions						
Calcium	10.2	0.1	mg/L	07-Aug-19	SM4110:B	
Chloride	42.7	0.7	mg/L	07-Aug-19	SM4110:B	
Magnesium	4.7	0.1	mg/L	07-Aug-19	SM4110:B	
Nitrate as Nitrogen	0.34	0.01	mg/L	07-Aug-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	07-Aug-19	SM4110:B	
Potassium	19.6	0.1	mg/L	07-Aug-19	SM4110:B	
Sodium	42.6	0.1	mg/L	07-Aug-19	SM4110:B	

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

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

Sulphate	16	1	mg/L	07-Aug-19	SM4110:B
Microbiology					
Coliforms, Fecal	30000	10000	CFU/100mL	01-Aug-19	SM9222:D
Organics					
Hexane Extractable Material	2.1	2.0	mg/L	06-Aug-19	EPA1664A
Oil and Grease, visible	Non-visible			31-Jul-19	Visual Exam
Subcontracted Organics					
Phenols, Total	0.0017	0.001	mg/L	07-Aug-19	AB ENV.06537
Trace Metals, Total					
Aluminum	63.7	5	µg/L	13-Aug-19	EPA200.8
Arsenic	1.1	0.2	µg/L	13-Aug-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	13-Aug-19	EPA200.8
Chromium	0.5	0.1	µg/L	13-Aug-19	EPA200.8
Cobalt	0.6	0.1	µg/L	13-Aug-19	EPA200.8
Copper	40.2	0.2	µg/L	13-Aug-19	EPA200.8
Iron	431	5	µg/L	13-Aug-19	EPA200.8
Lead	0.5	0.1	µg/L	13-Aug-19	EPA200.8
Manganese	49.4	0.1	µg/L	13-Aug-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	13-Aug-19	EPA200.8
Nickel	1.8	0.1	µg/L	13-Aug-19	EPA200.8
Zinc	31.2	5	µg/L	13-Aug-19	EPA200.8

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

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

Client Project: Kugluktuk Sewage System
Sample Type: Effluent discharge final
Received Date: 31-Jul-19
Sampling Date: 31-Jul-19
Sampling Time: 10:30
Location: Sewage Lagoon + Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	4	2	mg/L	01-Aug-19	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	90.8	0.4	mg/L	01-Aug-19	SM2320:B	
Conductivity, Specific (@25C)	716	0.4	µS/cm	01-Aug-19	SM2510:B	
pH	7.69		pH units	01-Aug-19	SM4500-H:B	
Solids, Total Suspended	4	3	mg/L	06-Aug-19	SM2540:D	
Major Ions						
Calcium	17.5	0.1	mg/L	07-Aug-19	SM4110:B	
Chloride	154	0.7	mg/L	07-Aug-19	SM4110:B	
Magnesium	17.7	0.1	mg/L	07-Aug-19	SM4110:B	
Nitrate as Nitrogen	0.73	0.01	mg/L	07-Aug-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	07-Aug-19	SM4110:B	
Potassium	4.5	0.1	mg/L	07-Aug-19	SM4110:B	
Sodium	93.7	0.1	mg/L	07-Aug-19	SM4110:B	
Sulphate	19	1	mg/L	07-Aug-19	SM4110:B	
Microbiology						

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

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

Coliforms, Fecal	23	1	CFU/100mL	01-Aug-19	SM9222:D
Organics					
Hexane Extractable Material	< 2.0	2.0	mg/L	06-Aug-19	EPA1664A
Oil and Grease, visible	Non-visible			31-Jul-19	Visual Exam
Subcontracted Organics					
Phenols, Total	< 0.0010	0.001	mg/L	07-Aug-19	AB ENV.06537
Trace Metals, Total					
Aluminum	54.6	5	µg/L	13-Aug-19	EPA200.8
Arsenic	0.8	0.2	µg/L	13-Aug-19	EPA200.8
Cadmium	< 0.1	0.1	µg/L	13-Aug-19	EPA200.8
Chromium	0.3	0.1	µg/L	13-Aug-19	EPA200.8
Cobalt	0.3	0.1	µg/L	13-Aug-19	EPA200.8
Copper	1.9	0.2	µg/L	13-Aug-19	EPA200.8
Iron	1070	5	µg/L	13-Aug-19	EPA200.8
Lead	< 0.1	0.1	µg/L	13-Aug-19	EPA200.8
Manganese	149	0.1	µg/L	13-Aug-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	13-Aug-19	EPA200.8
Nickel	1.7	0.1	µg/L	13-Aug-19	EPA200.8
Zinc	< 5.0	5	µg/L	13-Aug-19	EPA200.8

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Leak **Taiga Sample ID:** 003

Client Project: Kugluktuk Sewage System
Sample Type: Leaked Sewage
Received Date: 31-Jul-19
Sampling Date: 31-Jul-19
Sampling Time: 10:30
Location: Sewage Lagoon + Wetland
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	69	2	mg/L	01-Aug-19	SM5210:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	608	0.4	mg/L	01-Aug-19	SM2320:B	
Conductivity, Specific (@25C)	2200	0.4	µS/cm	01-Aug-19	SM2510:B	
pH	6.94		pH units	01-Aug-19	SM4500-H:B	
Solids, Total Suspended	145	3	mg/L	06-Aug-19	SM2540:D	
Major Ions						
Calcium	56.8	0.1	mg/L	07-Aug-19	SM4110:B	
Chloride	334	0.7	mg/L	07-Aug-19	SM4110:B	
Magnesium	50.9	0.1	mg/L	07-Aug-19	SM4110:B	
Nitrate as Nitrogen	0.06	0.01	mg/L	07-Aug-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	07-Aug-19	SM4110:B	
Potassium	25.9	0.1	mg/L	07-Aug-19	SM4110:B	
Sodium	222	0.1	mg/L	07-Aug-19	SM4110:B	
Sulphate	32	1	mg/L	07-Aug-19	SM4110:B	
Microbiology						

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Leak **Taiga Sample ID:** 003

Coliforms, Fecal	160	10	CFU/100mL	01-Aug-19	SM9222:D	
Organics						
Hexane Extractable Material	< 2.0	2.0	mg/L	06-Aug-19	EPA1664A	
Oil and Grease, visible	Non-visible			31-Jul-19	Visual Exam	
Subcontracted Organics						
Phenols, Total	0.1340	0.003	mg/L	07-Aug-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	515	5	µg/L	13-Aug-19	EPA200.8	
Arsenic	13.6	0.2	µg/L	13-Aug-19	EPA200.8	
Cadmium	< 0.1	0.1	µg/L	13-Aug-19	EPA200.8	
Chromium	3.8	0.1	µg/L	13-Aug-19	EPA200.8	
Cobalt	7.3	0.1	µg/L	13-Aug-19	EPA200.8	
Copper	17.5	0.2	µg/L	13-Aug-19	EPA200.8	
Iron	30000	5	µg/L	13-Aug-19	EPA200.8	
Lead	2.0	0.1	µg/L	13-Aug-19	EPA200.8	
Manganese	4180	0.1	µg/L	13-Aug-19	EPA200.8	
Mercury	< 0.01	0.01	µg/L	13-Aug-19	EPA200.8	
Nickel	25.0	0.1	µg/L	13-Aug-19	EPA200.8	
Zinc	< 5.0	5	µg/L	13-Aug-19	EPA200.8	

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Taiga Batch No.: 190626

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Leak **Taiga Sample ID:** 003

- DATA QUALIFERS -

Data Qualifier Descriptions:

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

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

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

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