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Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble
ᓄᓇᕗᑦ Nunavut

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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 Respond to Comments

November 17, 2020

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

Attention: Richard Dwyer, Manager of Licensing, and Karen Kharatyan, Director of Technical Services

RE: Respond to comments on 3BM-KUG 1520 by ECCC and CIRNAC letters dated October 30, 2020

Dear Richard and Karen,

We refer to the request by the Board, along with clarification of comments from ECCC and CIRNAC on Sewage Lagoon leaks resulted to effluent water pooling in ditch referenced in Annual Report 2019.

Please find enclosed responds to Items requested in their letter dated October 30, 2020

1. Report detailing options and timeline for repairing the leaking lagoon: request by ECCC

GN CGS has hired consultants in different times and continued monitoring of lagoon leak effluents. A site inspection in July 2015 and review of the existing structure confirmed that only a segment of the east berm had subsided approximately 40 centimetres resulted a slumping and seepage in the same section of the berm.

Options were developed for remedial work on the lagoon, which included (i)addition of a buttress to the existing berm, (ii) new berm reconstruction, (iii) removal and replacement of the existing liner, and (iv) repair of the existing liner. The capital costs for these options ranged from $400,000 to $4.6 million. The buttress addition would not provide complete containment of the sewage, and therefore could require a relaxation of the operating criteria of the facility. It was recommended that remedial work be completed to provide a facility that fully contains sewage water; however, it is recognized that the possibility exists for a relaxation of the operating criteria. This relaxation would allow leaking to be continued and let to accommodate addition of a buttress structure to the existing berm to provide long term stability. The buttress structure was completed, and the remedial work was undertaken in 2016. Ongoing monitoring of the remedial work is to determine if the buttress is an appropriate long-term solution.

P.O. Bag 200, Helen Maksagak Centre
Cambridge Bay, Nunavut X0B 0C0

(867) 973 4156
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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Current workplan for repairing the lagoon:

Hire a consultant under SAO agreement to complete a planning study for long-term options of the repair works and determine the scope of works – which is supposed to start during the fall 2020 and activities to be carried during summer 2021 (as seen in attached email copy). GN CGS is still in this plan for expert hiring and options analysis which will provide a class D estimate of the work. Based on such plan, it is anticipated to complete the repair works by 2022 with funding arrangement. Meanwhile, the leak monitoring and samples quality assurance be continued except for any urgent needs.

2. SNP monitoring location for leak effluent quality assurance: by ECCC

The attached test results of samples taken on August 11 and Sep 03, 2020 are revealing the quality matters and comparison remediated sewage water inside the lagoon (KUG3A), leak sewage (Leak) and at final discharge point (KUG-4). The lagoon is leaking, but not in state of or alarm to devastating failure, but failing the containment requirement inside for expected duration, rather is continuously losing wastewater volume from inside, and keeping sewage sludge sediments inside. Also, leak rate goes slower as water level inside the lagoon reduces – which is acting as ex-filtration lagoon system.

The Licensee will continue such monitoring of effluent until an effective repair works carried.

3. Estimated volume of effluent leaking: request by ECCC

The lagoon capacity is about 126,000 m3, but annual wastewater generation less then 74,000 m3, with additional temporary volume of snow melted water. Overflow pipe allows free flow of extra water (mostly rain or snow melted in spring) outside. Because of continuous leaking, an increase in water level inside the lagoon is not determinable specifically during late summer and fall- which compromises with decanting volume and time duration, but still decanting requires and control the remediation requirement inside the lagoon. Samples test results reveal remediation time & pattern

The licensee is acknowledging the compliance requirements of these along with other mandatory items, but nature of works , funding availability and keeping existing facility in operation are limiting scope of a quick repair plan of the berm or full lagoon structure. As stated above for another time assessment and compliance, the Licensee is expecting the repair works be completed by 2022.

4. Seepage issue may have potential impact the environment: request by CIRNAC

GN CGS project has repaired all 3 sides (east, south, and west) cracks, slumping and ponding at berm toe along with the buttress development option at affected location. Seasonal localized ponding is part of annual maintenance works that the licensee carries every year and will do as requested.

We request that Nunavut Water Board will find this letter of respond and explanation useful to support the amendment process of water Licence 3BM-KUG 1520.

On behalf of the Hamlet of Kugluktuk, GN-CGS will provide any necessary information to the Board upon request.

Best Regards,

Shah Alam, P. Eng. E.P, CAMP
Municipal Planning Engineer,
Government of Nunavut
Community and Government Services

From:	Browne, David
To:	Alam, Shah
Subject:	Kugluktuk Lagoon
Date:	August 25, 2020 3:05:43 PM

Hi Shah,

I am looking to retain a consultant (Ken Johnson with Exp) to complete a planning study for long-term options to repair the Kugluktuk lagoon. I have spoken to him briefly, and am aiming to send the formal request under our SOA agreement within the next day or two. As per your previous recommendation, I am also reaching out to the SAO to get his input on the preferred scope of work.

I listed what I have so far below. Please advise if you have any comments or other items you think should be added to the scope.

The consultant is to prepare a business case that includes the following:

- Background review of all work done to date
- Two field assessments to visually assess the condition of the lagoon.
  - One may occur in the summer or fall of 2020 by an Exp employee currently in the Northwest Territories or Nunavut.
  - The other field assessment is to take place during a period (likely during the 2021 spring freshet) when there is active shallow subsurface or surface water flow in the vicinity of the lagoon to further investigate the possible presence of the subsurface stream that was identified in previous studies. Exp is to recommend techniques for assessing the shallow subsurface flow which are subject to approval by CGS.
- Following these two field assessments, a memo is to be submitted to CGS that summarizes each problem with the lagoon and provides possible solutions.
- Three schematic design alternatives (drawings) for the long-term repairs to the lagoon.
- Ranking of the three options using SWOT or Pairwise analysis (or an alternative method as recommended by the consultant and approved by CGS)
  - Note that this will include Class D estimates that will be conducted by a PQS retained directly by CGS.
- A recommended option (subject to approval by CGS)

All the best.

David

David Browne, M.A.Sc., P.Eng.

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Senior Municipal Planning Officer
Government of Nunavut
Department of Gov't and Community Services
Community Infrastructure Division

Angiyuhiq Nunalaaniitukharni Pangnaiyaliqiyuq Havakti
Nunavut Kavamanga
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Nunalaaniituni Tunngavikhaliqiyunut Havakviat

Agente principale de la planification municipale
Gouvernement du Nunavut
Ministère des Services communautaires et gouvernementaux
Division de l'infrastructure communautaire

☎ 867-975-5462
✉ dbrowne@gov.nu.ca
Box 1000, Station 700 (4th Floor, Brown Building) Iqaluit, NU X0A 0H0

Environmental Protection Operations Directorate
Prairie & Northern Region
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

ECCC File: 6200 000 013/006
NWB File: 3BM-KUG1520

October 30, 2020

via email at: licensing@nwb-oen.ca

Karén Kharatyan
Director of Technical Services
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Karén Kharatyan:

RE: 3BM-KUG1520 – Kitikmeot Region – Hamlet of Kugluktuk – Water License Renewal Application

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-noted Water License Renewal Application. We appreciate the opportunity to submit these comments to the registry. You will find our comments below.

ECCC's specialist advice is based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

ECCC provides the following comments:

1. Leaking from Sewage Lagoon

Reference(s)

- Executive Summary, 2019 Inspection Report

Comment

The application references to an ongoing leaking issue from the berms of the sewage lagoon. The application suggests that the leak is not a threat to capacity or containment, however, the most recent 2019 inspection report noted very low levels in the lagoon before the decant had occurred and attributed this to the leak. The Executive Summary indicates that the Government of Nunavut (GN) hired a consultant to investigate the issues and a report has been prepared of options to repair the leaking berm. ECCC notes that the reference report has not been provided as part of the renewal review and no timeline for

potential repair of the lagoon has been proposed. As per the 2019 inspection report, it appears that there is the potential for large volumes of sewage effluent to be leaking from the compromised lagoon berm. Based on photographs provided, it appears that some effluent is pooling in a ditch but no discussion is provided on the quantity or quality of the seepage, nor the flow path of the leaking sewage effluent.

ECCC Recommendation(s)

ECCC Recommends:

- Provide the report detailing options for repairs to the leaking lagoon
- Provide a timeline for completion of repairs to the lagoon
- Establish a temporary SNP monitoring location to monitor the quality of the effluent leaking from the lagoon
- Provide the estimated volume of effluent that has leaked from the lagoon, and the flow path within the environment.

If you need more information, please contact Anna Graham at Anna.Graham2@Canada.ca.

Sincerely,

Anna Graham
Environmental Assessment Coordinator

cc: Brian Asher, Acting Head, Environmental Assessment North (NT and NU)
Anne Wilson, Team Lead, Expert Support – Water Quality

Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
3BM-KUG1520
Our file - Notre référence
CIDM#1290594

October 30, 2020

Mr. Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada Comments on Hamlet of Kugluktuk Water Licence Renewal Application for Type "B" Water Licence No. 3BM-KUG1520

Dear Ms. Ikkutisluk,

Thank you for your October 9, 2020 email invitation for review and comment on the above-referenced water licence renewal application, submitted by GN-CGS on behalf of the Hamlet of Kugluktuk. Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*, reviewed the renewal application documents and would like to provide the following comment to the Nunavut Water Board for consideration.

CIRNAC site inspections and the 2019 Annual Report of 3BM-KUG1520 have reported seepages across the berm and buttress toe of the Sewage Lagoon. These seepages may indicate a potential risk to structural stability which could consequently impact the environment. CIRNAC recommends that the licencee provide its plan to appropriately mitigate this seepage issue and implement the plan as early as practically possible.

CIRNAC appreciates the opportunity to participate in this review. If there are any questions or concerns, please contact me at (867) 975-4555 or david.zhong@canada.ca or Bridget Campbell at (867) 975-4282 or bridget.campbell@canada.ca.

Sincerely,

David Zhong
Regulatory and Science Advisor

Canada

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***

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
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
Print Date: ***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	

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-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

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-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						

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

- 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

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-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						

ReportDate: 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-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

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-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						

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

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
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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

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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
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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

ReportDate: Wednesday, September 16, 2020

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