Annual Report-2019

Water Licence: 3BM-GJO 1828

Submitted: Aug 07, 2020

Gjoa Haven Water Licence: 3BM-GJO 1828 Annual Report 2019

Aug 07, 2020

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

Attention: Richard Dwyer, Manager of Licensing

RE: 3BM-GJO 1828 - Annual Report 2019, Hamlet of Gjoa Haven, NU

Dear Richard,

The Hamlet of Gjoa Haven 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-GJO-1828. 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 Gjoa Haven (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, CIRNAC
SAO, Hamlet of Gjoa Haven, NU

3BM- GJO 1828

Annual Report-2019

TABLE OF CONTENTS

Attachments:

EXECUTIVE SUMMARY:

Hamlet of Gjoa Haven has prepared this Annual Report 2019 to be submitted to the Nunavut Water Board to meet requirements of the Water Licence 3BM-GJO 1828, Part B General Conditions to monitoring. This report covers the period from January 01- December 31, 2019.

water drawn from the big Swan Lake through twin intake pumps, transformed to reheated stations by 6 inch HDPE buried line to 3.2 km away Treatment Plant building, treated water using pressure filters followed by chlorination, truck filled from outside with 2nd chlorination by hamlet trucks and delivered to household tanks for community potable water supply. Quantity of water uses during this period was about **49,573** m3 which is 4.58 % increase compared to previous year (47,400 m3), but within annual allowable limit 62,000 m3. Water uses mainly for residential, institutional, hotels, commercial, health centers, arena and other recreational activities.

Sewage waste collected from household sewage tanks using hamlet operated vacuum trucks, hauled to community sewage lagoon and discharged at the lagoon drop-off location. Raw sewage stays inside the lagoon almost 9 months during the period Oct - Jun where freeze and receives primary treatment naturally. Snow melts water along with melted sewage water decanted outside during Aug - Sep to reduce quantity inside and making room for new candidate raw sewage waste. Samples were collected from the lagoon monitoring station GJO-3A before decanting and tested at Taiga Laboratory Yellowknife. Effluent quality verified with samples results from GJO-2 and GJO-4.

Open area along the north side of the solid waste facility fence was reinstated by the hamlet as directed by the CIRNAC inspector. Solid waste run-off retained inside the facility until sample results from station GJO-5 shown parameters value within allowable limit, but samples not taken when dried. Waste batteries, waste oil and waste paint drums replaced inside C-cans placed at the Solid waste facility. Regular waste piled up at the facility using hamlet operated truck and pushed down to low area and in trench, and covered with sand-gravel materials from nearby area.

Buried water line carries water from intake pumphouse about 3.2 km away and no freeze up issued noticed since some portion of buried line improved with new HDPE insulated pipes and upgrading of reheat stations, re-sizing of pumps and heat exchanger. Improvement to SCADA system, PLC unit and Chlorine measuring devices at the WTP, but the chlorine dosing yet to be fully automated which requires manually OFF/ON sometime when high/low chlorine detected in treated water tank.

Water chemical analysis carried at taiga Laboratory through samples results from raw water, treated supply water and storage tanks. Water quality monitored for E. coli or Coliform through monthly sampling and testing at Taiga Lab. Increased amount of Chlorine in water are reported in some occurrences but still within allowable limits and helpful for bacteriological treatment.

Improvement for solid waste facility is moving with a GN CGS budgeted project incorporating to the Study Report from the consultant. A reasonable location has been identified extending to south-east of current facility, CGS is working with the Hamlet on design and development refining to address the best interest of the community.

General Conditions:

- Tabular Form of Annual water consumption and sewage disposal are filled from the record on daily basis of water distribution and sewage disposal. A Flow Meter available for volume water intake, however, truck-fill measurements considered convenient for records.
- No modification to sewage lagoon, wetland or solid waste facilities during this period
- No unauthorized discharge or disposal to effluent or waste during this period.
- O&M manuals for water intake, treatment, and sewage and solid waste facilities operations remains active since last update and approved in 2017.
- New locations for Monitoring stations GJO-3A identified for sewage sampling at decanting point and updated the GJO-2 and GJO-4 station location for run off and final discharge point.

Water Uses:

- All water drawn from the approved source Swan Lake for community potable water supply of about **49,573** cubic metres which is within the allowable annual limit **62,000** cubic metres, but an increased quantity of about 4.58 % compared to previous year.
- No erosion at the intake point or close proximity of pumps intake screen inside the lake which is cleared from the Lake bed and allowances from frozen layer on top by 3m plus. No materials were removed from lake or intake bed near the screen.

Waste Disposal

- The municipal sewage waste contained both grey and black water from urinal, toilet flush mixed with bath and kitchen water in the same tank. Combined sewage stay inside house tanks for average 3-4 days before collecting by vacuum truck and discharge into the lagoon.
- Amount of sewage generated during this period (Jan–Dec, 2019) is less than 45,000 m3. Sewage is calculated considering 90-95 % of water supply by truck.
- Sewage and solid waste discharged to the sewage lagoon and waste facility using hamlet operated trucks. Sewage and effluent samples from station GJO-3A and Final Discharge Point GJO-4 results shown contaminants parameters within allowable limits (FC: 10,000 CFU/dl; BOD_5:80; TSS: 100; P^H: 6-9; Oil & grease: none for station GJO-4). Results attached including a summary.
- Freeboard at sewage lagoon maintained 1.0 m or more measured from berm top. Any water above the Discharge Chute is allowed to free-flow outside which could happened only in early spring freshet when snow melt water increases the water level inside the lagoon.
- The existing wetland tied with the small area of decanting structure from the new lagoon facilities for effluent remediation. Test results shown the effluent from Final Discharge Point (GJO-4) were within limiting values of parameters BOD, TSS, P^H) and not acutely toxic to Rainbow Trout or crustacean fish food.

Non-hazardous domestic Solid Waste:

- Solid wastes collected from community waste bins by hamlet operators, hauled in to waste facility by covered truck and piled up in designated location inside the facility during fall and winter, then pushed those piles down to lower graded area and trenches, packed and covered with sand-gravel using grader and packer.
- Solid waste leachate run-off from the downstream sump at GJO-5, sample tested at Taiga.
- Light materials, paper, paper boards and loose materials reduced by slow burning inside and push down burn ashes under the cover materials.
- The CIRNAC inspector has raised some concern of the bulk metals in the facility and has requested for proper management of the facility and improvement to the solid waste site.

Modification, construction, operation, A&R

- No modifications to water intake, treatment during this year.
- Ripped liner repaired and added new piece on top sewage drop-off pad.
- Operational manual and as-built drawings of SCADA upgrading, PLC system and Chlorine measuring devices submitted to the Board.
- No spills and no reclamation activities related to vegetation growth or seed deposition done during this year.

Monitoring Program:

- Annual monitoring of sewage and solid waste effluent carried Jul-Sep by the hamlet.
- Effluent samples test results from Taiga Laboratory are included in the report.
- Station GJO-4 noted as the Final Discharge point from wetland to ocean, therefore, values of parameters limit are mostly applicable for sample taken from this station.
- Station GJO-5 has moved to the lowest graded sump area near north-east corner.

ANNUAL REPORT

YEAR BEING REPORTED: 2019

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence 3BM GJO-1828 issued to the Hamlet of Gjoa Haven

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 Tap Water Delivery system and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged
January	4,098,841	Same
February	3,713,797	Same
March	4,014,942	Same
April	4,008,113	Same
May	4,061,758	Same
June	3,890,590	Same
July	3,968,668	Same
August	4,383,730	Same
September	4,315,210	Same
October	4,355,123	Same
November	4,370,134	Same
December	4,392,089	Same
ANNUAL TOTAL	**49,572,995**	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;

- No modification or major maintenance carried to water treatment plant or intake pumphouse.
- The chlorine dosing pump is not functioning fully automated but requires manually operation sometime to control chlorine dosing into pressure filtration tank and entry to truckfill hose.
- PLC control panel and SCADA monitoring connection some accessories at the water treatment plant building are open on floor and plan for connection in future. Due to missing connectivity, some information about temperature reading, chlorine dosing, turbidity readings are also missing. Consultant has carried some improvement works in 2017 including SCADA upgrade but might not fully covered to the scope of works.
- Localized ripped spots of HDPE liner at the sewage dropping pad has been repaired by Hamlet operators and added additional piece of liner on top of the affected spots as identified.
- New part of the decanting structure exit valve gate connected by the operators and decanting carried in expected flow rate by the decanting pipe.

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

- No reportable unauthorized discharge of water, sewage waste happened during the period.
- Free flow quantity is unknown from the sewage lagoon and from solid waste facilities when overflow occurs due to snowmelts in spring but might not happened always.
- Effluent overflows sometime on wide area wetland instead of trench-line along GJO-4 when summer freshet, but it helps to contaminant parameters polishing in the presence of sunlight and wind flow.

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

- No abandonment or restoration work carried for water system and no plan for next year.
- Filled up the perimeter berm open spot and reinstated loose fence at solid waste facility
- Metal fence was reinstated at missing location and a temporary gate at the entrance of solid waste facility by the Hamlet operator and locally hired contractor.
- The proposed Solid Waste improvement project is expected in coming FY 2020-21.

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;

- Solid waste facility audit and study project has been carried by exp consultants hired by GN CGS together with Taloyoak solid waste study under one project. The consultant has visited the facility site during late January 2019, audited the status and future uses, constraints, waste diversion possibilities, waste quality and management, facility improvement, upgrading or expansion study in compliance to the regulatory requirements. Schematic design with multiple location option has

been presented to the community and council to recommend the best suited location considering operational and long term uses. A report was prepared and submitted for a Capital plan project.

- Scope of the study include site visit, interview to community operators, people, facility users and sample quantity to waste type measurement, assessment for facility improvement or new facility development with containment by waste types in designated cells.
- GN CGS carried further discussion with consultant and other experts to standardize the waste facility design, development in Territory wide with cost-effective operation. A budget has been determined and plan for design and development in coming years.

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

Information of sewage lagoon, effluent discharge location, wetland flow trench, monitoring stations, final merging point to water body, location of solid waste and metal dump related infrastructure were updated with the Board as these has been requested in the new Licence 3BM-GJO 1828, and addendum to the Sewage Lagoon O&M manual, addressing the freeboard limit of sewage disposal, existing wetland details.

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

- No changes to the approved O&M manual of water treatment plant (WTP), process, sensors, flow meter, FCL and PLC control system during this period, but a plan for future improvement some of the components and control system.
- Plan for improving the solid waste and metal dump facilities with the proposed new project by CGS which will include cleaning sediment layer of effluent on wetland trench for smooth flow and reduce deposition that may cause slow remediation and polishing of effluent moving down.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

- Current water treatment plant and process is focused mostly filtration and bacteriological remediation matters as other type of parameters were not found in remarkable numbers. During spring freshet, sometime increase numbers of turbidity and dissolved metals found in the source water but temporary and inconsistence. Recommendations for upgrading or additional process is under review and discussion including some standardization in future.
- Although some improvement to SCADA system and accessories water level sensor, flow meter, chlorine analyser, UPS, auto dialler and HMI comfort panel carried in 2017, monitoring of these components and inspection for performance confirmation is recommended.
- Lagoon decanting is annually to ensure capacity and containment of raw sewage inside at least 9 months a year, but sludge removal only recommended at every 5-10 years as needed.
- Chlorine tests for water from each truck at least once a day by the hamlet operators before delivery to household tanks and at least once per day by the plant operator at the WTP
- Water test for E. coli and Total Coliform on weekly basis by the plant operator.
- Water analysis and sewage effluent quality tests were carried at Taiga Lab in Yellowknife.

ANNUAL REPORT

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

- Monitoring station GJO-3A determined at the decanting location for sewage waste sampling.
- Monitoring stations GJO-2 determined on wetland (sewage effluent and solid waste run-off mix area and GJO-4 at N 68^0 36′ 59.8″and W 95^0 49′ 48.1 determined as Final Discharge point onto waterbody Ocean flow.
- Lagoon water decanted using the decanting structure after replacing the valve gate which was breakdown two years back.
- Open areas at the solid waste berm was repaired as reported and a temporary gate uses at the solid waste entrance.
- Slow burning of loose materials helps in reduction of waste, but only can be carried based on the weather and airflow direction. A mechanical incinerator would be helpful.
- The Licensee has plan for waste diversion program through collecting recycles, but a funding is needed to manage its sustainability, and therefore, not yet moved to full process.
- Spills and contaminated soil remediation remain a concern since no specific facility or cell included to the current License but would be beneficial.
- A sludge removal and sludge drying pad would be required in future.

Gjoa Haven Water Licence: 3BM-GJO-1318

Monitoring Stations of sewage and solid waste sample collection

Sampling Station	GPS Location		Description	Frequency	Comments
	Latitude	Longitude			
GJO-1	N 68^0 39′ 22.9″	W 95^0 55′ 06.5″	Raw Water source at Swan Lake	Volume of water (Monthly)	No change
GJO-2	N 68^0 37′ 05″	W 95^0 50′ 42″	Solid Waste leachate discharge location		
GJO-2 (new)	N 68^0 37′ 13.7″	W 95^0 50′ 23.2″	Sewage discharge on wetland location	Outside the berm monthly (May-Aug)	**Changed**
GJO-3	N 68^0 37′ 28.8″	W 95^0 50′ 21.9″	Sewage truck offload point	From lagoon when decanting	**At new Lagoon decanting point**
GJO-4	N 68^0 37′ 23″	W 95^0 50′ 39″	Sewage effluent Final discharge on wetland		
GJO-4 (new)	N 68^0 36′ 59.6″	W 95^0 49′ 48.0″	Sewage effluent Final discharge point	On wetland Monthly (May-Aug)	**Change location**
GJO-5	N 68^0 37′ 05″	W 95^0 50′ 44″	Solid Waste Leachate retention sump pit.	only when decanting requires	No change

Notes:

- Suggested location of GJO-4 (new) is based on the trend of sewage effluent flow on wetland
- Old GJO-3 is moved from previous location to new truck off-load point at the new lagoon.
- Station GJO-5 is inside the Solid waste facility secured by berm. Sampling from GJO-5 is carried when requires decanting of effluent-water, mostly happened in mid-summer.
- changes of GJO-2 location by sequence location

Sewage Effluent Results: Gjoa Haven 2019

Test type	Parameters	Units	MAC Limits GJO-4	July 29th 2019			
				Solid Waste GJO-2	Sewage Lagoon GJO-3A	Final Discharge GJO-4	Solid Waste Runoff GJO-5
Physicals	Alkalinity	mg/L		181	239	224	
	Conductivity	µS/cm		750	832	730	
	P^h	p^h	6-9	8.26	7.28	8.33	
	TSS	mg/L	100		48	424	
Nutrients	Ammonia as N_2	mg/L				4	
	BOD_5	mg/L	80	12	197	6	
	CBOD	mg/L				18.8	
	Dissolved, C	mg/L		23.3	71	21	
	Total, C	mg/L		27.9	107		
Major Ions	Nitrate as N_2	mg/L	45	3.97	0.26	2.12	
	Nitrite as N_2	mg/L	3				
	Calcium	mg/L	32	34.1	14.5	39.6	
	Chloride	mg/L	100	92.2	92	86.8	
	Hardness	mg/L	500	188	87.4	214	
	Magnesium	mg/L		24.9	12.4	27.9	
	Potassium	mg/L		12.9	15	9.8	
	Sodium	mg/L	200	66.9	57.7	58.3	
	Sulphate	mg/L	500	50	13	26	
Microbiolo	Fecal Coliform	CFU/100mL	$1x10^6$	2	1030000	100	
Organics	Total Coliform	MPN/100mL		> 2419.6	> 2419.6	86.5	
	Escherichia Coli	MPN/100mL		8.1	> 2419.6	15	
Metals(T)	Oil & Grease, Visible	Visibility			Non Visible	Non-visible	Non-Visible
	Total Phenols	mg/L		0.0024	0.31	0.0018	
	Aluminium	µg/L	200	24.1	226	21.1	
	Arsenic	µg/L	25	7.4	0.9	4.4	
	Barium	µg/L	50	12.5	4	12.9	
	Copper	µg/L	200	3.3	78.3	2.7	
	Iron	µg/L	500	2010	287	1490	
	Lead	µg/L	10	0.6	0.9	0.4	
	Mercury	µg/L		< 0.01	< 0.01	< 0.01	
	Nickel	µg/L		4.3	1.4	3.8	
	Silver	µg/L		< 0.1	0.1	< 0.1	
	Zinc	µg/L	500	< 5	90.5	< 5	

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Hamlet of Gjoa Haven	Ed Deveroux
Licence No. / Expiry	**Representative's Title**
3BM-GJO1828	Senior Administrative Officer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
2019 July 5	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	1 & 2	Storage	U	7
Flow Measure. Device	A	8	Culverts / Bridges			Spills	C	6
Source:			Drainage			Spill Plan		
Water Use:	A		Erosion / Sediment					
Recirculation (y /n)			Mitigation Measures	C	3 & 4	**Administrative**		
			Reclamation Activities			Records	A	
			Materials Storage			Reports	A	
Waste Disposal			Signage	C	9	Plans		
Waste Water	A					Notifications	A	
Solid Waste	C	5	**Monitoring**			**Other**		
Hazardous Waste	U	7	Sample Collection / Analysis	A				

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

Samples taken by Inspector:	Location(s): Samples were taken by the Hamlet and GN
☐ Yes ☒ No	

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

On July 5, 2019 I Inspected the Hamlet of Gjoa Haven's Municipal Water License 3BM-GJO1828. I was accompanied by Anthony Anguttitauruq and Jacob Keanik from the Hamlet of Gjoa Haven as well as Shah Alam from the GN CGS.

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

At the Sewage Lagoon we saw 1. Holes in the Liner (Photo 1) at the Truck Dumping Station, 2. Floating Debris (Photo 2) within the Lagoon, 3. Lagoon levels at Capacity (Photo 3) at the Emergency Runoff area, 4. Damaged Perimeter Fencing (Photo 4), 5. The Garbage Dump (Photo 5), 6. Noticeable Leaking under the Berm of the Garbage Dump (Photo 6), 7. The Battery Storage Area (Photos 7 & 8), 8. The Flow Meter (Photo 9) inside the Raw Water Pump Station, and 9. Signage at Sample Station GJO-1 (Photo 10).

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

1. The Tears/Holes in the Sewage Lagoon Liner Must be repaired after the Decant when the levels are lower. 2. All Debris floating within the Lagoon Must be removed. 3. Samples must be taken and then Decanting of the Lagoon must be done in order to bring the internal level down to a manageable amount. 4. The Perimeter Fencing on the East and North Sides must be Repaired. 5. The Garbage Dump needs better Sorting/Segregation as well as routine controlled Burning to avoid a possible future uncontrolled Burn. 6. The Hamlet and the GN CGS need to look at the Berm Leakage and come up with a Mitigation Plan to Control/Stop the Leak. 7. All used Batteries must be stored in Wooden Crates Lined with Plastic Poly. 8. This is a very nice Flow Meter that keeps accurate readings, thank you for that. 9. The Signage for Sample Station GJO-1 needs to be Repaired or Replaced.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	2019 Nov 28

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

cc. CIRNAC, Director of Lands, Iqaluit, erik.allain@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 5	Sony DSC-HX50V	Baba Pedersen	3BM-GJO1828

Photo Log # DSC05113 **Location – Sewage Lagoon**

Photo 1

Description: Tear in Lagoon Liner requires Repair after Decant Program is complete

Photo Log # DSC05123 **Location – Sewage Lagoon**

Photo 2

Description: Floating Debris within Sewage Lagoon requires Removal

Photo Log # DSC05130	Location – Sewage Lagoon

Photo 3

Description: No Freeboard at Emergency Runoff, Lagoon requires Decant

Photo Log # DSC05136	Location – Sewage lagoon

Photo 4

Description: Fencing Requires Repair on both the East and North Sides

Photo Log # DSC05148	Location – Garbage Dump

Photo 5

Description: Dump needs better Sorting/Segregation and Routine Controlled Burning

Photo Log # DSC05160	Location – Garbage Dump

Photo 6

Description: Noticeable Leakage under Garbage Dump Berm

Photo Log # DSC05198	Location – Battery Storage Area beside Garage

Photo 7

Description: Battery Storage Outside Shed on bear ground with No Secondary Containment

Photo Log # DSC05200	Location – Battery Storage Area beside Garage

Photo 8

Description: Battery Storage Inside Shed with No Secondary Containment

Photo Log # DSC05202	Location – Swan Lake Water Intake Pump House

Photo 9

Description: Raw Water Flow Meter inside Swan Lake Pump House – Very Nice

Photo Log # DSC05211	Location – Swan Lake Water Intake

Photo 10

Description: Sample Station GJO-1 Signage requires Repair

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

Taiga Batch No.: 190523

- FINAL REPORT -

Prepared For: Hamlet of Gjoa Haven

Address: P.O. Box 200
Gjoa Haven,NU
X0B 1J0

Attn: **Ed Devereaux** **Facsimile: (867(360-6309**

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: ***Friday, August 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.: 190523

- CERTIFICATE OF ANALYSIS -

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

Client Project: Gjoa Haven Water System
Sample Type: Raw Water
Received Date: 16-Jul-19
Sampling Date: 15-Jul-19
Sampling Time: 10:00
Location: Source Water and delivery water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.2	0.5	mg/L	18-Jul-19	SM5310:B	
Organic Carbon, Total	4.2	0.5	mg/L	19-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	105	0.4	mg/L	16-Jul-19	SM2320:B	
Colour, Apparent	6	5	CU	16-Jul-19	SM2120:B	
Conductivity, Specific (@25C)	466	0.4	µS/cm	16-Jul-19	SM2510:B	
pH	8.09		pH units	16-Jul-19	SM4500-H:B	
Solids, Total Dissolved	248	10	mg/L	22-Jul-19	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	22-Jul-19	SM2540:D	
Major Ions						
Calcium	21.1	0.1	mg/L	16-Jul-19	SM4110:B	
Chloride	82.7	0.7	mg/L	16-Jul-19	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	16-Jul-19	SM4110:B	
Hardness	123	0.7	mg/L	16-Jul-19	SM4110:B	

ReportDate: Friday, August 16, 2019
Print Date: ***Friday, August 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.: 190523

- CERTIFICATE OF ANALYSIS -

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

Magnesium	17.0	0.1	mg/L	16-Jul-19	SM4110:B
Nitrate as Nitrogen	0.34	0.01	mg/L	16-Jul-19	SM4110:B
Nitrate+Nitrite as Nitrogen	0.34	0.01	mg/L	16-Jul-19	SM4110:B
Nitrite as Nitrogen	< 0.01	0.01	mg/L	16-Jul-19	SM4110:B
Potassium	2.3	0.1	mg/L	16-Jul-19	SM4110:B
Sodium	45.0	0.1	mg/L	16-Jul-19	SM4110:B
Sulphate	10	1	mg/L	16-Jul-19	SM4110:B
Microbiology					
Coliforms, Total	7.5	1.0	MPN/100ml	16-Jul-19	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jul-19	SM9223:B
Subcontracted Inorganics					
Sulphide	< 0.0180	0.018	mg/L	22-Jul-19	APHA4500-S2
Subcontracted Organics					
Cyanide, Total	< 0.0050	0.005	mg/L	29-Jul-19	APHA4500-CN
Phenols, Total	< 0.0010	0.001	mg/L	22-Jul-19	AB ENV.06537
Trace Metals, Total					
Aluminum	5.3	0.6	µg/L	22-Jul-19	EPA200.8
Arsenic	0.4	0.2	µg/L	22-Jul-19	EPA200.8
Barium	4.1	0.1	µg/L	22-Jul-19	EPA200.8
Beryllium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Cadmium	< 0.04	0.04	µg/L	22-Jul-19	EPA200.8
Chromium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Copper	0.4	0.2	µg/L	22-Jul-19	EPA200.8
Iron	7	5	ug/L	22-Jul-19	EPA200.8
Lead	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8

ReportDate: Friday, August 16, 2019
Print Date: *Friday, August 16, 2019*

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

Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Manganese	4.2	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	22-Jul-19	EPA200.8
Silver	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	0.5	0.4	µg/L	22-Jul-19	EPA200.8

ReportDate: Friday, August 16, 2019
Print Date: *Friday, August 16, 2019*

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Client Project: Gjoa Haven Water System
Sample Type: Treated Water
Received Date: 16-Jul-19
Sampling Date: 15-Jul-19
Sampling Time: 10:00
Location: Source Water and delivery water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.3	0.5	mg/L	18-Jul-19	SM5310:B	
Organic Carbon, Total	4.2	0.5	mg/L	19-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	106	0.4	mg/L	16-Jul-19	SM2320:B	
Colour, Apparent	< 5	5	CU	16-Jul-19	SM2120:B	
Conductivity, Specific (@25C)	493	0.4	µS/cm	16-Jul-19	SM2510:B	
pH	8.03		pH units	16-Jul-19	SM4500-H:B	
Solids, Total Dissolved	242	10	mg/L	22-Jul-19	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	22-Jul-19	SM2540:D	
Major Ions						
Calcium	21.7	0.1	mg/L	16-Jul-19	SM4110:B	
Chloride	88.3	0.7	mg/L	16-Jul-19	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	16-Jul-19	SM4110:B	
Hardness	126	0.7	mg/L	16-Jul-19	SM4110:B	
Magnesium	17.4	0.1	mg/L	16-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.17	0.01	mg/L	16-Jul-19	SM4110:B	

ReportDate: Friday, August 16, 2019
Print Date: ***Friday, August 16, 2019***

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Nitrate+Nitrite as Nitrogen	0.17	0.01	mg/L	16-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	16-Jul-19	SM4110:B	
Potassium	2.3	0.1	mg/L	16-Jul-19	SM4110:B	
Sodium	48.9	0.1	mg/L	16-Jul-19	SM4110:B	
Sulphate	10	1	mg/L	16-Jul-19	SM4110:B	
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	16-Jul-19	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jul-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 Inorganics						
Sulphide	< 0.0180	0.018	mg/L	22-Jul-19	APHA4500-S2	
Subcontracted Organics						
Cyanide, Total	< 0.0050	0.005	mg/L	29-Jul-19	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	22-Jul-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	3.6	0.6	µg/L	22-Jul-19	EPA200.8	
Arsenic	0.4	0.2	µg/L	22-Jul-19	EPA200.8	
Barium	3.8	0.1	µg/L	22-Jul-19	EPA200.8	
Beryllium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	22-Jul-19	EPA200.8	

ReportDate: Friday, August 16, 2019
Print Date: *Friday, August 16, 2019*

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Chromium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Copper	30.6	0.2	µg/L	22-Jul-19	EPA200.8
Iron	52	5	ug/L	22-Jul-19	EPA200.8
Lead	0.1	0.1	µg/L	22-Jul-19	EPA200.8
Manganese	3.8	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	0.1	0.1	µg/L	22-Jul-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	22-Jul-19	EPA200.8
Silver	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	66.7	0.4	µg/L	22-Jul-19	EPA200.8

ReportDate: Friday, August 16, 2019
Print Date: *Friday, August 16, 2019*

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Client Project: Gjoa Haven Water System
Sample Type: Treated Water
Received Date: 16-Jul-19
Sampling Date: 15-Jul-19
Sampling Time: 10:00
Location: Source Water and delivery water
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.1	0.5	mg/L	18-Jul-19	SM5310:B	
Organic Carbon, Total	4.2	0.5	mg/L	19-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	107	0.4	mg/L	16-Jul-19	SM2320:B	
Colour, Apparent	< 5	5	CU	16-Jul-19	SM2120:B	
Conductivity, Specific (@25C)	490	0.4	µS/cm	16-Jul-19	SM2510:B	
pH	8.04		pH units	16-Jul-19	SM4500-H:B	
Solids, Total Dissolved	245	10	mg/L	22-Jul-19	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	22-Jul-19	SM2540:D	
Major Ions						
Calcium	21.8	0.1	mg/L	16-Jul-19	SM4110:B	
Chloride	88.2	0.7	mg/L	16-Jul-19	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	16-Jul-19	SM4110:B	
Hardness	126	0.7	mg/L	16-Jul-19	SM4110:B	
Magnesium	17.4	0.1	mg/L	16-Jul-19	SM4110:B	
Nitrate as Nitrogen	0.17	0.01	mg/L	16-Jul-19	SM4110:B	

ReportDate: Friday, August 16, 2019
Print Date: ***Friday, August 16, 2019***

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Nitrate+Nitrite as Nitrogen	0.17	0.01	mg/L	16-Jul-19	SM4110:B	
Nitrite as Nitrogen	< 0.01	0.01	mg/L	16-Jul-19	SM4110:B	
Potassium	2.3	0.1	mg/L	16-Jul-19	SM4110:B	
Sodium	48.8	0.1	mg/L	16-Jul-19	SM4110:B	
Sulphate	10	1	mg/L	16-Jul-19	SM4110:B	
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	16-Jul-19	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	16-Jul-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 Inorganics						
Sulphide	< 0.0180	0.018	mg/L	22-Jul-19	APHA4500-S2	
Subcontracted Organics						
Cyanide, Total	< 0.0050	0.005	mg/L	29-Jul-19	APHA4500-CN	
Phenols, Total	< 0.0010	0.001	mg/L	22-Jul-19	AB ENV.06537	
Trace Metals, Total						
Aluminum	8.8	0.6	µg/L	22-Jul-19	EPA200.8	
Arsenic	0.4	0.2	µg/L	22-Jul-19	EPA200.8	
Barium	3.8	0.1	µg/L	22-Jul-19	EPA200.8	
Beryllium	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	22-Jul-19	EPA200.8	

ReportDate: Friday, August 16, 2019
Print Date: *Friday, August 16, 2019*

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Taiga Batch No.: 190523

- CERTIFICATE OF ANALYSIS -

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

Chromium	0.1	0.1	µg/L	22-Jul-19	EPA200.8
Copper	31.2	0.2	µg/L	22-Jul-19	EPA200.8
Iron	62	5	ug/L	22-Jul-19	EPA200.8
Lead	0.3	0.1	µg/L	22-Jul-19	EPA200.8
Manganese	4.0	0.1	µg/L	22-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	22-Jul-19	EPA200.8
Nickel	0.2	0.1	µg/L	22-Jul-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	22-Jul-19	EPA200.8
Silver	< 0.1	0.1	µg/L	22-Jul-19	EPA200.8
Zinc	69.1	0.4	µg/L	22-Jul-19	EPA200.8

ReportDate: Friday, August 16, 2019
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190523

- 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: Friday, August 16, 2019

Print Date: ***Friday, August 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.: 190478

- FINAL REPORT -

Prepared For: Hamlet of Gjoa Haven

Address: P.O. Box 200
Gjoa Haven,NU
X0B 1J0

Attn: **Anthony Anguttitauruq** **Facsimile: (867(360-6309**

Final report has been reviewed and approved by:

Glen Hudy
Quality Assurance Officer

NOTES:

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

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

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

Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

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

Client Project: Gjoa Haven Sewage and Solid Waste
Sample Type: Sewage Lagoon Water
Received Date: 09-Jul-19
Sampling Date: 08-Jul-19
Sampling Time: 10:00
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	197	2	mg/L	08-Jul-19	SM5210:B	
Organic Carbon, Dissolved	71.0	0.5	mg/L	12-Jul-19	SM5310:B	
Organic Carbon, Total	107	0.5	mg/L	13-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	239	0.4	mg/L	09-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	832	0.4	µS/cm	09-Jul-19	SM2510:B	
pH	7.28		pH units	09-Jul-19	SM4500-H:B	
Solids, Total Dissolved	322	10	mg/L	12-Jul-19	SM2540:C	
Solids, Total Suspended	48	3	mg/L	12-Jul-19	SM2540:D	
Major Ions						
Calcium	14.5	0.1	mg/L	09-Jul-19	SM4110:B	
Chloride	92.0	0.7	mg/L	09-Jul-19	SM4110:B	
Hardness	87.4	0.7	mg/L	09-Jul-19	SM4110:B	
Magnesium	12.4	0.1	mg/L	09-Jul-19	SM4110:B	

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

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Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

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

Nitrate+Nitrite as Nitrogen	0.26	0.01	mg/L	09-Jul-19	SM4110:B	
Potassium	15.0	0.1	mg/L	09-Jul-19	SM4110:B	
Sodium	57.7	0.1	mg/L	09-Jul-19	SM4110:B	
Sulphate	13	1	mg/L	09-Jul-19	SM4110:B	
Microbiology						
Coliforms, Fecal	1030000	10000	CFU/100mL	09-Jul-19	SM9222:D	
Coliforms, Total	>2419.6	1.0	MPN/100ml	09-Jul-19	SM9223:B	
Escherichia coli	>2419.6	1.0	MPN/100ml	09-Jul-19	SM9223:B	
Subcontracted Organics						
Phenols, Total	0.3100	0.005	mg/L	17-Jul-19	AB ENV.06537	224
Trace Metals, Total						
Aluminum	226	5	µg/L	17-Jul-19	EPA200.8	
Arsenic	0.9	0.2	µg/L	17-Jul-19	EPA200.8	
Barium	4.0	0.1	µg/L	17-Jul-19	EPA200.8	
Copper	78.3	0.2	µg/L	17-Jul-19	EPA200.8	
Iron	287	5	µg/L	17-Jul-19	EPA200.8	
Lead	0.9	0.1	µg/L	17-Jul-19	EPA200.8	
Mercury	< 0.01	0.01	µg/L	17-Jul-19	EPA200.8	
Nickel	1.4	0.1	µg/L	17-Jul-19	EPA200.8	
Silver	0.1	0.1	µg/L	17-Jul-19	EPA200.8	
Zinc	90.5	5	µg/L	17-Jul-19	EPA200.8	

ReportDate: Monday, July 29, 2019
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Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-2 **Taiga Sample ID:** 002

Client Project: Gjoa Haven Sewage and Solid Waste
Sample Type: Wetland Flow
Received Date: 09-Jul-19
Sampling Date: 08-Jul-19
Sampling Time: 10:15
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	12	2	mg/L	08-Jul-19	SM5210:B	
Organic Carbon, Dissolved	23.3	0.5	mg/L	12-Jul-19	SM5310:B	
Organic Carbon, Total	27.9	0.5	mg/L	13-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	181	0.4	mg/L	09-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	750	0.4	µS/cm	09-Jul-19	SM2510:B	
pH	8.26		pH units	09-Jul-19	SM4500-H:B	
Solids, Total Dissolved	440	10	mg/L	12-Jul-19	SM2540:C	
Solids, Total Suspended	26	3	mg/L	12-Jul-19	SM2540:D	
Major Ions						
Calcium	34.1	0.1	mg/L	09-Jul-19	SM4110:B	
Chloride	92.2	0.7	mg/L	09-Jul-19	SM4110:B	
Hardness	188	0.7	mg/L	09-Jul-19	SM4110:B	
Magnesium	24.9	0.1	mg/L	09-Jul-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	3.97	0.01	mg/L	09-Jul-19	SM4110:B	
Potassium	12.9	0.1	mg/L	09-Jul-19	SM4110:B	

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

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Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-2 **Taiga Sample ID:** 002

Sodium	66.9	0.1	mg/L	09-Jul-19	SM4110:B
Sulphate	50	1	mg/L	09-Jul-19	SM4110:B
Microbiology					
Coliforms, Fecal	2	1	CFU/100mL	09-Jul-19	SM9222:D
Coliforms, Total	>2419.6	1.0	MPN/100ml	09-Jul-19	SM9223:B
Escherichia coli	8.1	1.0	MPN/100ml	09-Jul-19	SM9223:B
Subcontracted Organics					
Phenols, Total	0.0024	0.001	mg/L	17-Jul-19	AB ENV.06537
Trace Metals, Total					
Aluminum	24.1	5	µg/L	17-Jul-19	EPA200.8
Arsenic	7.4	0.2	µg/L	17-Jul-19	EPA200.8
Barium	12.5	0.1	µg/L	17-Jul-19	EPA200.8
Copper	3.3	0.2	µg/L	17-Jul-19	EPA200.8
Iron	2010	5	µg/L	17-Jul-19	EPA200.8
Lead	0.6	0.1	µg/L	17-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	17-Jul-19	EPA200.8
Nickel	4.3	0.1	µg/L	17-Jul-19	EPA200.8
Silver	< 0.1	0.1	µg/L	17-Jul-19	EPA200.8
Zinc	< 5.0	5	µg/L	17-Jul-19	EPA200.8

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

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

Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

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

Client Project: Gjoa Haven Sewage and Solid Waste
Sample Type: Final Discharge
Received Date: 09-Jul-19
Sampling Date: 08-Jul-19
Sampling Time: 10:30
Location:
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	6	2	mg/L	08-Jul-19	SM5210:B	
Organic Carbon, Dissolved	18.8	0.5	mg/L	13-Jul-19	SM5310:B	
Organic Carbon, Total	21.0	0.5	mg/L	13-Jul-19	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	224	0.4	mg/L	09-Jul-19	SM2320:B	
Conductivity, Specific (@25C)	730	0.4	µS/cm	09-Jul-19	SM2510:B	
pH	8.33		pH units	09-Jul-19	SM4500-H:B	
Solids, Total Dissolved	424	10	mg/L	12-Jul-19	SM2540:C	
Solids, Total Suspended	4	3	mg/L	12-Jul-19	SM2540:D	
Major Ions						
Calcium	39.6	0.1	mg/L	09-Jul-19	SM4110:B	
Chloride	86.8	0.7	mg/L	09-Jul-19	SM4110:B	
Hardness	214	0.7	mg/L	09-Jul-19	SM4110:B	
Magnesium	27.9	0.1	mg/L	09-Jul-19	SM4110:B	
Nitrate+Nitrite as Nitrogen	2.12	0.01	mg/L	09-Jul-19	SM4110:B	
Potassium	9.8	0.1	mg/L	09-Jul-19	SM4110:B	

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

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

Taiga Batch No.: 190478

- CERTIFICATE OF ANALYSIS -

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

Sodium	58.3	0.1	mg/L	09-Jul-19	SM4110:B
Sulphate	26	1	mg/L	09-Jul-19	SM4110:B
Microbiology					
Coliforms, Fecal	100	100	CFU/100mL	09-Jul-19	SM9222:D
Coliforms, Total	86.5	1.0	MPN/100ml	09-Jul-19	SM9223:B
Escherichia coli	15.0	1.0	MPN/100ml	09-Jul-19	SM9223:B
Subcontracted Organics					
Phenols, Total	0.0018	0.001	mg/L	17-Jul-19	AB ENV.06537
Trace Metals, Total					
Aluminum	21.1	5	µg/L	17-Jul-19	EPA200.8
Arsenic	4.4	0.2	µg/L	17-Jul-19	EPA200.8
Barium	12.9	0.1	µg/L	17-Jul-19	EPA200.8
Copper	2.7	0.2	µg/L	17-Jul-19	EPA200.8
Iron	1490	5	µg/L	17-Jul-19	EPA200.8
Lead	0.4	0.1	µg/L	17-Jul-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	17-Jul-19	EPA200.8
Nickel	3.8	0.1	µg/L	17-Jul-19	EPA200.8
Silver	< 0.1	0.1	µg/L	17-Jul-19	EPA200.8
Zinc	< 5.0	5	µg/L	17-Jul-19	EPA200.8

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- 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