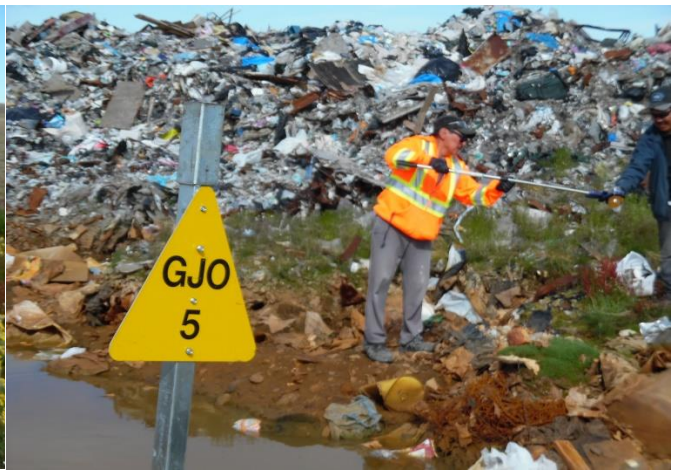
Annual Report-2017

Water Licence: 3BM-GJO1318





Submitted on: March 02, 2018

March 04, 2018

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

Attention: Karen Kharatyan, PhD, Manager of Licensing

RE: Water 3BM-GJO1318- Annual Report 2017, Hamlet of Gjoa Haven, NU

Dear Mr. Karen,

The Hamlet of Gjoa Haven is pleased to submit to the Nunavut Water Board the "Annual Report 2017" of water uses and sewage water and solid waste disposal as required under the compliance of Water Licence, 3BM-GJO1318. Copies of required tests reports are included in Appendices for your reference.

The Licensee has made some effective for waste management during the summer that has led an improvement to solid waste facilities waste management. Monitoring program has been in effect during **June-September** each year as required in the Licence. Samples test result has shown in control on contamination parameters within limit comprising BOD, TSS, E-coli and Toxicity components. Where parameters found exceeding the limiting values, effluents were kept inside the facility point and not discharged until the proper values of parameters achieved – such as GJO-5

We summarize 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.

Best Regards,

David Stockley,
Senor Administrative Officer (SAO),
Hamlet of Gjoa Haven

Cc: Baba Pedersen, Resource management Officer, AANDC

EXECUTIVE SUMMARY:

Hamlet of Gjoa Haven has prepared the Annual Report 2017 to be submitted to the Nunavut Water Board to meet requirements of the Nunavut Water Board Licence 3BM-GJO 1318, Part B General Conditions, through part H conditions to the monitoring program. This report covers the period from January 01st, 2017 to December 31st 2017.

The Licensee has drawn water from the big Swan Lake through twin intake pumps, transformed the reheated intake water by 6 inch HDPE buried line to the Treatment Plant building 3.0 km away where this water has been treated using pressure filters followed by chlorination before truck fill outside by the hamlet trucks and delivered to household tanks for community water needs. Quantity of water uses during this period was about **45,919** m3, within allowable limit 62,000 m3 annually.

Sewage waste collected from household sewage tanks using hamlet operated vacuum trucks, hauled to community sewage lagoon and discharge at the designated dropping point. Raw sewage stayed inside the lagoon during the period Oct through June for almost 9 months freezing where these receive primary treatment naturally. Annual decanting carried during October to reduce quantity inside and make room for new candidate sewage waste. Samples collected from defined designated monitoring stations and tested at Taiga Laboratory Yellowknife.

Batteries, waste oil and waste paint drums replaced inside the seacan placed at Solid waste facility – plan for shipping out from site with certified handler. Non-hazardous waste disposed at the Solid waste facility using hamlet operated truck and pushed down with local cover materials.

Water system upgrade and SCADA monitoring repair:

About 1200m length of the buried water line was replaced in 2015 with HDPE insulated pipes of same diameter, but upgrading of reheat stations and re-sizing of pumps and heat exchanger carried during May-Oct 2017. This replacement was required to continue water supply from intake pump house that has suffered winter freeze-up partly during last 2-3 years. Monitoring of water supply, SCADA upgrading, PLC program and Chlorine measuring device replacement were carried during the summer and fall. With this replacement, water intake and supply efficiency increased but no changes to system, structure or program.

Increased amount of Chlorine in treated water were reported in some occurrences but minimized such escalation of chlorine by controlling the dosing and reducing the amount of extra chlorine addition into overnight trucked water. No other concern was reported in treated water or raw water quality. The licensee has maintained of sending water samples for parameters test to Taiga Lab in Yellowknife and bacteriological test samples to EHO lab in Cambridge Bay.

The amended and additional O&M manual for Free Chlorine measuring system, SCADA sensors and PLC upgrade including the as-built drawings were received and ready to send to Nunavut Water Board separately.

Annual Report-2017

TABLE OF CONTENTS

Part B: General Conditions:

- Tabular Form of Annual water consumption and sewage disposal are filled in NWB Form
- Quantities were measured on daily basis of water distribution and sewage disposal
- New engineered lagoon is in operation and changes the monitoring point to new drop-off and decanting locations.
- No modification to sewage waste wetland or solid waste site during 2017
- No unauthorized discharge or disposal to effluent or waste during this period.
- O&M manuals for sewage and solid waste facilities remains active, except an addition to Chlorine measuring and SCADA system upgrade for Water treatment and supply.
- Monitoring stations locations marked and updated with sign for the new station GJO-2 and GJO-4. Scope signage in standard Official languages of Nunavut not yet completed.
- No device Meter was used for volume measurement, however, truck-fill measurement uses
- Plan of Compliance remained active and implemented as approved by the Board.

Part C: Water Use:

- All water drawn from the Swan Lake for annual demand which was about **45,919** cubic metres and within the allowable annual limit **62,000** cubic metres.
- No erosion at the intake point or close proximity of pumps sucking point. Intake screen inside the lake intake point with clearance from bed and allowance frozen layer on top by 3m plus. No material removed from lake or intake bed near the screen.

Part D: Waste Disposal

- The municipal sewage waste contains both grey and black water; urinal& toilet flush water mix with bath & kitchen water in the same tank. Combined sewage stay inside the house tank for average 3-4 days before collecting by vacuum truck to discharge into the lagoon.
- Amount of sewage generated during this period 01 Jan - 31 Dec is less than 43,000 m3. Quantity of sewage is calculated considering 90-95 % of water supply by truck.
- All sewage and solid waste disposal done to the designated location of sewage lagoon and waste facility using hamlet operated trucks. Sewage and effluent samples were taken from location Station GJO-3A and Final Discharge Point GJO-4, test result 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 are attached including a summary.
- Freeboard at sewage lagoon remained more than1.0 m since it was decanted.
- The existing wetland area and facilities used for effluent treatment and remediation. Test results shown the effluent from Final Discharge Point (GJO-4) within limiting values (BOD: 80; TSS:100; 10,000 CFU/dl; P^H: 6-9) and not acutely toxic to Rainbow Trout or crustacean fish food.

Non-hazardous domestic Solid Waste:

- Solid wastes were disposed in the waste facility which is fenced in 3-sides and and leachate run-off at the downstream where sampled and tested at Taiga Lab. It requires some works to segregate hazardous waste from regular waste and secure confined or containment.
- Light materials, paper, paper boards and loose materials segregated and reduced by slow burning inside trench and pushed down burn ashes under the cover materials inside.
- Animal carcass supposed to bury inside sand-pit and cover, but lack proper cell inside the facility has limited the activity and therefore could not be secured. The AANDC inspector has raised this concern during the inspection. The Licensee will prepare some measures in coming summer to deal with animal carcass management.

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

- No modifications to sewage or solid waste facilities and operational plan since developed.
- Upgrading to SCADA control, PLCs system and Free Chlorine measuring devices carried during this period. The operational manual and as-built drawing are ready for submission to the Board.
- No spills occurred during this period. No reclamation to facilities and therefore, no activities related to vegetation growth or seed deposition carried.

Part H: Monitoring Program

- Annual monitoring of sewage and solid waste effluent has been carried during the summer and fall by the Licensee and the consultant at the water treatment system. Annual cleanup to water storage tank was carried and water samples were tested before delivery. Effluent samples were taken from monitoring stations where available as indicated in Part H of the licence, tested at Taiga Laboratory, Yellowknife (CALA approved). Test results are included.

  Station GJO-4 noted as the Final Discharge point from wetland to ocean; therefore, parameters constraints are mostly applicable for sample taken from this station.

  Station GJO-2 has been re-arranged on the wetland where sewage effluent run off merges to solid waste effluent before ending to Final point GJO-4. GPS addresses were established for new location and included in the report.

ANNUAL REPORT

YEAR BEING REPORTED: 2017

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence 3BM-GJO-1318 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 On 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	3,873,733.60	Same
February	3,582,631.00	Same
March	3,940,795.40	Same
April	3,762,316.00	Same
May	3,947,774.58	Same
June	3,510,738.60	Same
July	3,552,010.76	Same
August	4,065,644.30	Same
September	3,732,935.80	Same
October	3,825,366.30	Same
November	3,865,149.70	Same
December	4,259,915.68	Same
ANNUAL TOTAL	45,919,011.72	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;

PLC control system and SCADA upgrading activities for water treatment plant has completed in March 2017 and Chlorine injection system and Free Chlorine measuring devices upgrading completed in Oct 2017 by Stantec consulting Ltd.

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

No reportable unauthorized discharge but only the water from the storage tank clean-up carried on July 05 as part of the Annual operation. Water delivery was suspended for about 8 hours from the treatment plant, but alternative truckfill from intake pumphouse was available. Water delivery resumed from the treatment plant at 9:00 pm on the same day.

Effluent overflows on the wide area of wetland instead of the defined trench-line along GJO-4 when summer freshen and snow melts, but it helps also contaminants parameters polishing in the presence of sunlight, wind and oxygen ingress.

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

Restoration activities carried for Free Chlorine measuring system, PLC communication to HMI units and auto-control on pump selection at the intake pumphouse. Upgrading to reheat station pumps and heating control devices were completed as part of previous year works. Free chlorine reading sensor, temperature reader and tank water level sensor- all re-installed outside the tank and synchronized to the PLC control Board.

Fallen fence components and open area at the north side of solid waste were fixed by hamlet resource during the summer, but no fence or gate at the entrance. Lack of proper equipment, materials and budget are constraints for the Licensee, unless a GN project in coming year.

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;

Annual inspection revealed the necessity for solid waste facility improvement as it has been issues of capacity, unauthorized access through open areas along the perimeter, leaching effluent water overflown outside when summer freshen due to lack of protection berm, and mixing of wastes inside due to lack of identified cells by type. The Board is aware of these issues and limitations from previous years but a GN initiative is expecting under the Capital Fund with standardize improvement activities. A study and assessment project is expecting in coming summer 2018.

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

No specific issues on water uses or waste disposal requested by the Board or the inspector. The inspector has received information water, sewage and waste volume and measurement system.

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

Updated O&M manuals for Model FCL (Free Chlorine measuring system) and PLC control system are ready and will be submitted to the Board separately.
New water and sewage trucks were added with existing fleet and had replaced the older truck.
Water delivery and sewage disposal operations were carried on regular hours and as needed:

- 3-trucks on road and 1-truck standby, for water delivery 7 days a week
- 3-trucks on road and 2 trucks standby for sewage delivery 7 days a week

One out of two truckfill outside of the water treatment plant is currently active, and the other one has some electrical connection seized up. A plan for repair or improvement works for this truckfill will be taken in coming summer 2018; the GN O&M department is acknowledged the issue.
The solid waste facility is running to capacity issues and waste bulks heaping on sides. The licensee has a plan for bulk reduction with the help of GN funding in coming year(s), a project is expecting for waste reduction and improvement in the coming summer by GN CGS.

No changes to Operation plan for water and sewage, and no major maintenance required for water delivery system or sewage disposal operation.

ADDITIONAL INFORMATION THAT THE LICENSEE DEEMS USEFUL:

No additional fire storage water tank in the community and therefore all 3-water trucks are kept full overnight for fire emergency. Free Chlorine level sometimes reduced in overnight storage water and the operator add the difference Chlorine solution to cover the demand before the water delivery to household tank. Regular daily fill also test at least one time per truck; Chlorine Log sheet maintains at the operator office and forward to CGS office weekly.
The treatment plant operator carries Chlorine test on a regular weekly/monthly basis for E. coli and Total Coliform, and water samples also sent to EHO office in Cambridge Bay.

Water chemical tests and sewage water/ effluent tests were carried at Taiga Lab in Yellowknife.

FOLLOW-UP REGARDING INSPECTION/COMPLIANCE CONCERNS:

Some follow up update were carried in regards to concerns by AANDC inspector on July 11, 2017:

- The truckfill turn around area has been kept clean and free of snow accumulation and ponding water cleared through drainage for easy access/exit of water truck. A limitation of space for

two trucks filling at a time keeps one diver waiting until the front truck leaves the spot. The Licensee is working with GN department to facilitate both truckfill to delivery water when a rush hour needs more supply.

- Ponding snow piles outside the building made ingress of water inside the building and caused flooding under the tank. The licensee used temporary measures to overcome the situation of snow pile, but no permanent scope as the WTP building plinth is almost same level of truckfill driveway.
- The fuel tank outside the intake pumphouse is double shelled and the inner layer hold the fuel, any potential leaked fuel still will be within the containment by the outer shell. The bank of intake pumphouse and fuel tank is covered and protected by gravels. No other permanent berm along the shore line or outside of the intake pumphouse is in plan.
- The chipped door panel at the intake pumphouse entry has been repaired, which alarmed the proper closing and thus loosing heat energy from inside.
- Monitoring stations re-arranged with GPS system:
  - GJO-2 moves down to sewage lagoon from previous location down of solid waste facility with GPS address: N 68^0 37′ 13.7″ and W 95^0 50′ 23.2″
  - GJO-4 (Final Discharge point) at: N 68^0 36′ 59.6″ and W 95^0 49′ 48.0″

Community: Gjoa Haven **Water Analysis 2017**

Parameters		GCDWQ			April 18, 2017			July 11, 2017		
	Units	**Guideline**	**MAC**	**AO**	**Raw**	**Truckfill**	**WTP**	**Raw**	**Truckfill**	**WTP**
Colour	TCU	2005		<=15				8	<5	5
pH		2015		7.0-10.5	7.64	7.81	7.64	8.04	8.04	7.94
Turbidity	NTU		1	<=5	0.25	0.39	0.23	0.53	0.49	0.4
TDS	mg/L	1991						219	228	209
TSS	mg/L				<3	3	<3	<3	<3	<3
Alkalinity	mg/L				154	154	153	99.7	98.5	98.8
Conductivity	µS/cm				718	713	716	480	491	487
Dissolve C	mg/L		45		4.9	4.9	4.7	3.8	3.8	3.4
Total C	mg/L				4.9	4.8	4.8	3.8	3.5	3.5
P, Total	mg/L									
Cyanide	mg/L	1991	0.2		<0.001	<0.001	<0.001			
THMs	mg/L	2006	0.1			0.005	0.116			
Phenol, Totl	mg/L				<0.001	0.001	<0.001			
Bromo-CH4	mg/L					0.005	0.05			
Nitrate N	mg/L				0.06	0.06	0.06	0.32	0.17	0.17
Hardness	mg/L				190	196	190	122	123	123
Chloride	mg/L			<=250	129	136	130	82.1	85.7	84.6
Fluoride	mg/L				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	mg/L	1979		<=200	69.8	73	69.9	44.5	47.8	46.8
Sulphate	mg/L	1994		<=500	15	16	16	11	11	11
Magnesium	mg/L				26.4	27.3	26.4	17.1	17.1	17.2
Calcium	mg/L				32.6	33.6	32.7	20.9	21	21.1
Potasium	mg/L				3.5	3.7	3.5	2.3	2.3	2.3
Total Coli	CFU	2012	none		<1.0	<1.0	<1.0		<1	<1
E. Coli	CFU	2012	none		<1.0	<1.0	<1.0			
Aluminium	µg/L	1998	ND	<100	1.2	2.8	0.6	3.2	9.7	0.8
Arsenic	µg/L	2006	100	5	0.5	0.5	0.5	0.3	0.3	0.3
Barium	µg/L	1990	1000		<0.1	<0.1	<0.1	4.5	4.2	4.3
Cadmium	µg/L	2005	5		<0.05	<0.05	<0.05	<0.04	<0.04	0.04
Chromium	µg/L	1986	50		<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Copper	µg/L	1992	ND	<=1000	71.1	37.9	36.5	<0.2	18.9	72.3
Iron	µg/L	2005	ND	<=300	20	43	20	12	69	47
Lead	µg/L	1992	10		1.1	0.5	0.3	<0.1	0.4	0.4
Manganese	µg/L	1987	ND	<=50	1.3	3	2.4	5.7	4.7	3.2
Selenium	µg/L	2014	50		<0.3	<0.3		<0.3	<0.3	<03
Uranium	µg/L	1999	20							
Zinc	µg/L	2005	ND	<=5000	171	154	149	<0.4	99.1	88.7
Mercury	µg/L	1986	1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	µg/L				0.4	0.3	0.3	<0.1	0.2	0.3

GCDWQ=Guidelines for Canadian Drinking Water Quality
IMAC=Interim maximum acceptable concentration
MAC=Maximum acceptable concentration, ND=Not defined
AO=Aesthetic Objectives,

Table

Effluent samples results 2017: Hamlet of Gjoa Haven, NU

Parameters	MAC Limit	units	July 11, 2017	July 11, 2017	July 11, 2017			
			GJO-3A	**GJO-5**	**GJO-4**			
Alkalinity		mg/L	341	349	189			
Conductivity		µS/cm	1180	2980	657			
P^H	6-9		7.49	7.54	7.71			
TSS	100	mg/L	48		4			
BOD	80	mg/L	39	51	25			
CBOD	200	mg/L	133					
Organic C, Dissolve	80	mg/L	68.2	74	14.1			
Organic C, Total	100	mg/L	107	105	14.9			
Phosphorus, Total		mg/L	8.15	0.421	0.082			
Nitrate as N2		mg/L	0.35	0.33	3.44			
Nitrite as N2		mg/L	2.42	0.14	0.11			
Calcium		mg/L	20.8	413	35.1			
Chloride	250	mg/L	127	158	62.7			
Hardness ($CaCO_3$)	500	mg/L	124	1360	182			
Magnesium		mg/L	17.6	80.1	23			
Potassium		mg/L	22.6	51.9	6.3			
Sodium	200	mg/L	87.7	165	62.2			
Sulphate	500	mg/L	12	1100	33			
Fecal Coliform	10^4	CFU/100mL	124	<1	<1			
Oil and Grease	5000	µg/L	None	None	None			
Aluminium	1000	µg/L	80.5	104	10.8			
Arsenic	1000	µg/L	0.8	7.3	1.4			
Cadmium	100	µg/L	<0.1	1.8	<0.04			
Chromium	100	µg/L	0.6	2.0	0.2			
Cobalt	50	µg/L	0.4	8.9	1.0			
Copper	200	µg/L	73.6	412	5.9			
Iron	1000	µg/L	315	23900	68			
Lead	50	µg/L	0.7	48.3	0.1			
Manganese	50	µg/L	24.5	1500	13.2			
Nickel	200	µg/L	1.8	30.6	4.8			
Zinc	500	µg/L	84.6	954	4.5			
Mercury (Hg)	0.6	µg/L	<0.01	0.28	<0.01			

Parameters MAC value for **sewage effluent** identified in the Water Licence.

- Red fonts shows higher parameter values that requires more holding time before decanting/ discharge
- blue fonts shows values within allowable limit and ready for discharge the effluent water

Note: GJO-4 is Final Discharge point (end-of-pipe), and GJO-5 inside the Solid waste facility where effluent dries naturally, no decanting or discharge required. GJO-3A is at sewage Lagoon.

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

Station GJO-2: Sewage Effluent discharge onto wetland

GJO-4 (old): Effluent Final Discharge on natural wetland before moving onto Ocean

GJO-5: Solid Waste Leachate retention inside the berm

Appendix: A

Water Samples Results- 2017

Water Licence: 3BM-GJO 1318

Hamlet of Gjoa Haven, NU

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

Taiga Batch No.: 170083

- FINAL REPORT -

Prepared For: Hamlet of Gjoa Haven

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

Attn: **Jacob Keanik** **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: Tuesday, March 07, 2017
Print Date: ***Tuesday, March 07, 2017***

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Delivery **Taiga Sample ID:** 001

Client Project: GH Water Supply
Sample Type: Potabel Water
Received Date: 24-Feb-17
Sampling Date: 23-Feb-17
Sampling Time: 10:00
Location: Hamlet of Gjoa Haven
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.9	0.5	mg/L	01-Mar-17	SM5310:B	
Organic Carbon, Total	4.8	0.5	mg/L	01-Mar-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	154	0.4	mg/L	24-Feb-17	SM2320:B	
Conductivity, Specific (@25C)	713	0.4	µS/cm	24-Feb-17	SM2510:B	
pH	7.81		pH units	24-Feb-17	SM4500-H:B	
Solids, Total Suspended	3	3	mg/L	01-Mar-17	SM2540:D	
Turbidity	0.39	0.05	NTU	24-Feb-17	SM2130:B	
Major Ions						
Calcium	33.6	0.1	mg/L	24-Feb-17	SM4110:B	
Chloride	136	0.7	mg/L	24-Feb-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	24-Feb-17	SM4110:B	
Hardness	196	0.7	mg/L	24-Feb-17	SM4110:B	
Magnesium	27.3	0.1	mg/L	24-Feb-17	SM4110:B	

ReportDate: Tuesday, March 07, 2017
Print Date: ***Tuesday, March 07, 2017***

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Delivery **Taiga Sample ID:** 001

Nitrate as Nitrogen	0.06	0.01	mg/L	24-Feb-17	SM4110:B	
Potassium	3.7	0.1	mg/L	24-Feb-17	SM4110:B	
Sodium	73.0	0.1	mg/L	24-Feb-17	SM4110:B	
Sulphate	16	1	mg/L	24-Feb-17	SM4110:B	
Microbiology						
Coliforms, Total	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B	
Escherichia coli	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B	
Organics						
Bromodichloromethane		0.005	mg/L		EPA8260B	85
Bromoform		0.005	mg/L		EPA8260B	85
Chloroform		0.005	mg/L		EPA8260B	85
Dibromochloromethane		0.005	mg/L		EPA8260B	85
Trihalomethanes, Total		0.005	mg/L		EPA8260B	85
Subcontracted Organics						
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Mar-17	APHA4500-CN	
Phenols, Total	0.0011	0.001	mg/L	02-Mar-17	AB ENV.06537	
Trace Metals, Total						
Aluminum	2.8	0.6	µg/L	24-Feb-17	EPA200.8	
Arsenic	0.5	0.2	µg/L	24-Feb-17	EPA200.8	
Beryllium	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8	
Cadmium	< 0.05	0.05	µg/L	24-Feb-17	EPA200.8	
Chromium	0.1	0.1	µg/L	24-Feb-17	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8	
Copper	37.9	0.2	µg/L	24-Feb-17	EPA200.8	
Iron	43	5	µg/L	24-Feb-17	EPA200.8	

ReportDate: Tuesday, March 07, 2017
Print Date: *Tuesday, March 07, 2017*

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Delivery **Taiga Sample ID:** 001

Lead	0.5	0.1	µg/L	24-Feb-17	EPA200.8
Manganese	3.0	0.1	µg/L	24-Feb-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Feb-17	EPA200.8
Nickel	0.3	0.1	µg/L	24-Feb-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	24-Feb-17	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Zinc	154	0.4	µg/L	24-Feb-17	EPA200.8

ReportDate: Tuesday, March 07, 2017
Print Date: *Tuesday, March 07, 2017*

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Treatment Plant (WTP) **Taiga Sample ID:** 002

Client Project: GH Water Supply
Sample Type: Potabel Water
Received Date: 24-Feb-17
Sampling Date: 23-Feb-17
Sampling Time: 10:15
Location: Hamlet of Gjoa Haven
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.7	0.5	mg/L	01-Mar-17	SM5310:B	
Organic Carbon, Total	4.8	0.5	mg/L	01-Mar-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	153	0.4	mg/L	24-Feb-17	SM2320:B	
Conductivity, Specific (@25C)	716	0.4	µS/cm	24-Feb-17	SM2510:B	
pH	7.64		pH units	24-Feb-17	SM4500-H:B	
Solids, Total Suspended	< 3	3	mg/L	01-Mar-17	SM2540:D	
Turbidity	0.23	0.05	NTU	24-Feb-17	SM2130:B	
Major Ions						
Calcium	32.7	0.1	mg/L	24-Feb-17	SM4110:B	
Chloride	130	0.7	mg/L	24-Feb-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	24-Feb-17	SM4110:B	
Hardness	190	0.7	mg/L	24-Feb-17	SM4110:B	
Magnesium	26.4	0.1	mg/L	24-Feb-17	SM4110:B	
Nitrate as Nitrogen	0.06	0.01	mg/L	24-Feb-17	SM4110:B	
Potassium	3.5	0.1	mg/L	24-Feb-17	SM4110:B	

ReportDate: Tuesday, March 07, 2017
Print Date: ***Tuesday, March 07, 2017***

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Treatment Plant (WTP) **Taiga Sample ID:** 002

Sodium	69.9	0.1	mg/L	24-Feb-17	SM4110:B
Sulphate	16	1	mg/L	24-Feb-17	SM4110:B
Microbiology					
Coliforms, Total	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B
Organics					
Bromodichloromethane	0.019	0.005	mg/L	27-Feb-17	EPA8260B
Bromoform	0.045	0.005	mg/L	27-Feb-17	EPA8260B
Chloroform	< 0.005	0.005	mg/L	27-Feb-17	EPA8260B
Dibromochloromethane	0.050	0.005	mg/L	27-Feb-17	EPA8260B
Trihalomethanes, Total	0.116	0.005	mg/L	27-Feb-17	EPA8260B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Mar-17	APHA4500-CN
Phenols, Total	< 0.0010	0.001	mg/L	02-Mar-17	AB ENV.06537
Trace Metals, Total					
Aluminum	0.6	0.6	µg/L	24-Feb-17	EPA200.8
Arsenic	0.5	0.2	µg/L	24-Feb-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Cadmium	< 0.05	0.05	µg/L	24-Feb-17	EPA200.8
Chromium	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Cobalt	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Copper	36.5	0.2	µg/L	24-Feb-17	EPA200.8
Iron	20	5	µg/L	24-Feb-17	EPA200.8
Lead	0.3	0.1	µg/L	24-Feb-17	EPA200.8
Manganese	2.4	0.1	µg/L	24-Feb-17	EPA200.8

ReportDate: Tuesday, March 07, 2017
Print Date: *Tuesday, March 07, 2017*

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Water Treatment Plant (WTP) **Taiga Sample ID:** 002

Mercury	< 0.01	0.01	µg/L	24-Feb-17	EPA200.8
Nickel	0.3	0.1	µg/L	24-Feb-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	24-Feb-17	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Zinc	149	0.4	µg/L	24-Feb-17	EPA200.8

ReportDate: Tuesday, March 07, 2017
Print Date: *Tuesday, March 07, 2017*

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: At Pumphouse **Taiga Sample ID:** 003

Client Project: GH Water Supply
Sample Type: Intake Water
Received Date: 24-Feb-17
Sampling Date: 23-Feb-17
Sampling Time: 10:30
Location: Hamlet of Gjoa Haven
Report Status: **Final**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Organic Carbon, Dissolved	4.9	0.5	mg/L	01-Mar-17	SM5310:B	
Organic Carbon, Total	4.9	0.5	mg/L	01-Mar-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	154	0.4	mg/L	24-Feb-17	SM2320:B	
Conductivity, Specific (@25C)	718	0.4	µS/cm	24-Feb-17	SM2510:B	
pH	7.64		pH units	24-Feb-17	SM4500-H:B	
Solids, Total Suspended	< 3	3	mg/L	01-Mar-17	SM2540:D	
Turbidity	0.25	0.05	NTU	24-Feb-17	SM2130:B	
Major Ions						
Calcium	32.6	0.1	mg/L	24-Feb-17	SM4110:B	
Chloride	129	0.7	mg/L	24-Feb-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	24-Feb-17	SM4110:B	
Hardness	190	0.7	mg/L	24-Feb-17	SM4110:B	
Magnesium	26.4	0.1	mg/L	24-Feb-17	SM4110:B	
Nitrate as Nitrogen	0.06	0.01	mg/L	24-Feb-17	SM4110:B	
Potassium	3.5	0.1	mg/L	24-Feb-17	SM4110:B	

ReportDate: Tuesday, March 07, 2017
Print Date: ***Tuesday, March 07, 2017***

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: At Pumphouse **Taiga Sample ID:** 003

Sodium	69.8	0.1	mg/L	24-Feb-17	SM4110:B
Sulphate	15	1	mg/L	24-Feb-17	SM4110:B
Microbiology					
Coliforms, Total	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B
Escherichia coli	< 1.0	1.0	MPN/100ml	24-Feb-17	SM9223:B
Subcontracted Organics					
Cyanide, Weak Acid Dissociable	< 0.0010	0.001	mg/L	01-Mar-17	APHA4500-CN
Phenols, Total	< 0.0010	0.001	mg/L	02-Mar-17	AB ENV.06537
Trace Metals, Total					
Aluminum	1.2	0.6	µg/L	24-Feb-17	EPA200.8
Arsenic	0.5	0.2	µg/L	24-Feb-17	EPA200.8
Beryllium	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Cadmium	< 0.05	0.05	µg/L	24-Feb-17	EPA200.8
Chromium	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Cobalt	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Copper	71.1	0.2	µg/L	24-Feb-17	EPA200.8
Iron	20	5	µg/L	24-Feb-17	EPA200.8
Lead	1.1	0.1	µg/L	24-Feb-17	EPA200.8
Manganese	1.3	0.1	µg/L	24-Feb-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	24-Feb-17	EPA200.8
Nickel	0.4	0.1	µg/L	24-Feb-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	24-Feb-17	EPA200.8
Silver	< 0.1	0.1	µg/L	24-Feb-17	EPA200.8
Zinc	171	0.4	µg/L	24-Feb-17	EPA200.8

ReportDate: Tuesday, March 07, 2017
Print Date: *Tuesday, March 07, 2017*

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

Taiga Batch No.: 170083

- CERTIFICATE OF ANALYSIS -

Client Sample ID: At Pumphouse **Taiga Sample ID:** 003

- DATA QUALIFERS -

Data Qualifier Descriptions:

85 *Equipment/supply failure, insufficient sample to repeat measurement.*

*** 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

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

Taiga Batch No.: 170515

- PRELIMINARY REPORT -

Prepared For: Hamlet of Gjoa Haven

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

Attn: **Jacob Keanik** **Facsimile: (867(360-6309**

Final report has been reviewed and approved by:

Judy Mah
Client Service Officer

NOTES:

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

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Raw Water
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 10:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	< 2	2	mg/L	13-Jul-17	SM5210:B	
Nitrogen, Total	0.32	0.06	mg/L	14-Jul-17	ISO/TR 11905:1997(E)	
Organic Carbon, Dissolved	3.8	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	3.8	0.5	mg/L	19-Jul-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	99.7	0.4	mg/L	12-Jul-17	SM2320:B	
Colour, Apparent	8	5	CU	12-Jul-17	SM2120:B	
Conductivity, Specific (@25C)	480	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	8.04		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Dissolved	219	10	mg/L	15-Jul-17	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	15-Jul-17	SM2540:D	
Turbidity	0.53	0.05	NTU	12-Jul-17	SM2130:B	
Major Ions						
Calcium	20.9	0.1	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Chloride	82.1	0.7	mg/L	12-Jul-17	SM4110:B
Fluoride	< 0.1	0.1	mg/L	12-Jul-17	SM4110:B
Hardness	122	0.7	mg/L	12-Jul-17	SM4110:B
Magnesium	17.1	0.1	mg/L	12-Jul-17	SM4110:B
Nitrate+Nitrite as Nitrogen	0.20	0.01	mg/L	12-Jul-17	SM4110:B
Potassium	2.3	0.1	mg/L	12-Jul-17	SM4110:B
Sodium	44.5	0.1	mg/L	12-Jul-17	SM4110:B
Sulphate	11	1	mg/L	12-Jul-17	SM4110:B
Microbiology					
Coliforms, Fecal	< 1	1	CFU/100mL		SM9222:D
Subcontracted Organics					
Cyanide, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	3.2	0.6	µg/L	19-Jul-17	EPA200.8
Arsenic	0.3	0.2	µg/L	19-Jul-17	EPA200.8
Barium	4.5	0.1	µg/L	19-Jul-17	EPA200.8
Cadmium	< 0.04	0.04	µg/L	19-Jul-17	EPA200.8
Chromium	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Cobalt	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Copper	< 0.2	0.2	µg/L	19-Jul-17	EPA200.8
Iron	12	5	µg/L	19-Jul-17	EPA200.8
Lead	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	5.7	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Nickel	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	19-Jul-17	EPA200.8
Silver	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	< 0.4	0.4	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Treated Water
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 10:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L	13-Jul-17	SM5210:B	97
Nitrogen, Total	0.27	0.06	mg/L	14-Jul-17	ISO/TR 11905:1997(E)	
Organic Carbon, Dissolved	3.4	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	3.5	0.5	mg/L	19-Jul-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	98.8	0.4	mg/L	12-Jul-17	SM2320:B	
Colour, Apparent	5	5	CU	12-Jul-17	SM2120:B	
Conductivity, Specific (@25C)	487	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	7.94		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Dissolved	209	10	mg/L	15-Jul-17	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	15-Jul-17	SM2540:D	
Turbidity	0.40	0.05	NTU	12-Jul-17	SM2130:B	
Major Ions						
Calcium	21.1	0.1	mg/L	12-Jul-17	SM4110:B	
Chloride	84.6	0.7	mg/L	12-Jul-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Hardness	123	0.7	mg/L	12-Jul-17	SM4110:B	
Magnesium	17.2	0.1	mg/L	12-Jul-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.17	0.01	mg/L	12-Jul-17	SM4110:B	
Potassium	2.3	0.1	mg/L	12-Jul-17	SM4110:B	
Sodium	46.8	0.1	mg/L	12-Jul-17	SM4110:B	
Sulphate	11	1	mg/L	12-Jul-17	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL		SM9222:D	
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, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN	
Phenols, Total		0.001	mg/L		AB ENV.06537	
Trace Metals, Total						
Aluminum	0.8	0.6	µg/L	19-Jul-17	EPA200.8	
Arsenic	0.3	0.2	µg/L	19-Jul-17	EPA200.8	
Barium	4.3	0.1	µg/L	19-Jul-17	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	19-Jul-17	EPA200.8	
Chromium	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8	
Copper	72.3	0.2	µg/L	19-Jul-17	EPA200.8	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Iron	47	5	µg/L	19-Jul-17	EPA200.8
Lead	0.4	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	3.2	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	19-Jul-17	EPA200.8
Nickel	0.3	0.1	µg/L	19-Jul-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	19-Jul-17	EPA200.8
Silver	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	88.7	0.4	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Fill Supply **Taiga Sample ID:** 003

Client Project:
Sample Type: Treated Water
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 10:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand		2	mg/L	13-Jul-17	SM5210:B	97
Nitrogen, Total	0.23	0.06	mg/L	14-Jul-17	ISO/TR 11905:1997(E)	
Organic Carbon, Dissolved	3.8	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	3.5	0.5	mg/L	19-Jul-17	SM5310:B	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	98.5	0.4	mg/L	12-Jul-17	SM2320:B	
Colour, Apparent	< 5	5	CU	12-Jul-17	SM2120:B	
Conductivity, Specific (@25C)	491	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	8.04		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Dissolved	228	10	mg/L	15-Jul-17	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	15-Jul-17	SM2540:D	
Turbidity	0.49	0.05	NTU	12-Jul-17	SM2130:B	
Major Ions						
Calcium	21.0	0.1	mg/L	12-Jul-17	SM4110:B	
Chloride	85.7	0.7	mg/L	12-Jul-17	SM4110:B	
Fluoride	< 0.1	0.1	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Fill Supply **Taiga Sample ID:** 003

Hardness	123	0.7	mg/L	12-Jul-17	SM4110:B	
Magnesium	17.1	0.1	mg/L	12-Jul-17	SM4110:B	
Nitrate+Nitrite as Nitrogen	0.17	0.01	mg/L	12-Jul-17	SM4110:B	
Potassium	2.3	0.1	mg/L	12-Jul-17	SM4110:B	
Sodium	47.8	0.1	mg/L	12-Jul-17	SM4110:B	
Sulphate	11	1	mg/L	12-Jul-17	SM4110:B	
Microbiology						
Coliforms, Fecal	< 1	1	CFU/100mL		SM9222:D	
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, Weak Acid Dissociable		0.005	mg/L		APHA4500-CN	
Phenols, Total		0.001	mg/L		AB ENV.06537	
Trace Metals, Total						
Aluminum	9.7	0.6	µg/L	19-Jul-17	EPA200.8	
Arsenic	0.3	0.2	µg/L	19-Jul-17	EPA200.8	
Barium	4.2	0.1	µg/L	19-Jul-17	EPA200.8	
Cadmium	< 0.04	0.04	µg/L	19-Jul-17	EPA200.8	
Chromium	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8	
Cobalt	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8	
Copper	18.9	0.2	µg/L	19-Jul-17	EPA200.8	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Truck Fill Supply **Taiga Sample ID:** 003

Iron	69	5	µg/L	19-Jul-17	EPA200.8
Lead	0.4	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	4.7	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	19-Jul-17	EPA200.8
Nickel	0.2	0.1	µg/L	19-Jul-17	EPA200.8
Selenium	< 0.3	0.3	µg/L	19-Jul-17	EPA200.8
Silver	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	99.1	0.4	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

Appendix: B

Effluent Samples Results- 2017

Water Licence: 3BM-GJO 1318

Hamlet of Gjoa Haven, NU

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-3A **Taiga Sample ID:** 004

Client Project:
Sample Type: Sewage Lagoon
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 13:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	39	2	mg/L	13-Jul-17	SM5210:B	81
CBOD	133	2	mg/L	13-Jul-17	SM5210:B	
Organic Carbon, Dissolved	68.2	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	107	0.5	mg/L	19-Jul-17	SM5310:B	
Phosphorous, Total	8.15	0.002	mg/L	21-Jul-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	341	0.4	mg/L	12-Jul-17	SM2320:B	
Conductivity, Specific (@25C)	1180	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	7.49		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Suspended	48	3	mg/L	15-Jul-17	SM2540:D	
Major Ions						
Calcium	20.8	0.1	mg/L	12-Jul-17	SM4110:B	
Chloride	127	0.7	mg/L	12-Jul-17	SM4110:B	
Hardness	124	0.7	mg/L	12-Jul-17	SM4110:B	
Magnesium	17.6	0.1	mg/L	12-Jul-17	SM4110:B	
Nitrate as Nitrogen	0.35	0.01	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-3A **Taiga Sample ID:** 004

Nitrite as Nitrogen	2.42	0.01	mg/L	12-Jul-17	SM4110:B
Potassium	22.6	0.1	mg/L	12-Jul-17	SM4110:B
Sodium	87.7	0.1	mg/L	12-Jul-17	SM4110:B
Sulphate	12	1	mg/L	12-Jul-17	SM4110:B
Microbiology					
Coliforms, Fecal	124	1	CFU/100mL		SM9222:D
Organics					
Oil and Grease, visible	Non-visible			13-Jul-17	Visual Exam
Subcontracted Organics					
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	80.5	5	µg/L	19-Jul-17	EPA200.8
Arsenic	0.8	0.2	µg/L	19-Jul-17	EPA200.8
Cadmium	< 0.1	0.1	µg/L	19-Jul-17	EPA200.8
Chromium	0.6	0.1	µg/L	19-Jul-17	EPA200.8
Cobalt	0.4	0.1	µg/L	19-Jul-17	EPA200.8
Copper	73.6	0.2	µg/L	19-Jul-17	EPA200.8
Iron	315	5	µg/L	19-Jul-17	EPA200.8
Lead	0.7	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	24.5	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	19-Jul-17	EPA200.8
Nickel	1.8	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	84.6	5	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Client Project:
Sample Type: Solid Waste
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 13:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	51	2	mg/L	13-Jul-17	SM5210:B	81
Organic Carbon, Dissolved	74.0	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	105	0.5	mg/L	19-Jul-17	SM5310:B	
Phosphorous, Total	0.421	0.002	mg/L	21-Jul-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	349	0.4	mg/L	12-Jul-17	SM2320:B	
Conductivity, Specific (@25C)	2980	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	7.54		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Suspended	97	3	mg/L	15-Jul-17	SM2540:D	
Major Ions						
Calcium	413	0.1	mg/L	12-Jul-17	SM4110:B	
Chloride	158	0.7	mg/L	12-Jul-17	SM4110:B	
Hardness	1360	0.7	mg/L	12-Jul-17	SM4110:B	
Magnesium	80.1	0.1	mg/L	12-Jul-17	SM4110:B	
Nitrate as Nitrogen	0.33	0.01	mg/L	12-Jul-17	SM4110:B	
Nitrite as Nitrogen	0.14	0.01	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

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

Potassium	51.9	0.1	mg/L	12-Jul-17	SM4110:B
Sodium	165	0.1	mg/L	12-Jul-17	SM4110:B
Sulphate	1100	1	mg/L	12-Jul-17	SM4110:B
Microbiology					
Coliforms, Fecal	< 1	1	CFU/100mL		SM9222:D
Organics					
Oil and Grease, visible	Non-visible			13-Jul-17	Visual Exam
Subcontracted Organics					
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	104	5	µg/L	19-Jul-17	EPA200.8
Arsenic	7.3	0.2	µg/L	19-Jul-17	EPA200.8
Cadmium	1.8	0.1	µg/L	19-Jul-17	EPA200.8
Chromium	2.0	0.1	µg/L	19-Jul-17	EPA200.8
Cobalt	8.9	0.1	µg/L	19-Jul-17	EPA200.8
Copper	412	0.2	µg/L	19-Jul-17	EPA200.8
Iron	23900	5	µg/L	19-Jul-17	EPA200.8
Lead	48.3	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	1500	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	0.28	0.01	µg/L	19-Jul-17	EPA200.8
Nickel	30.6	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	954	5	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-4 **Taiga Sample ID:** 006

Client Project:
Sample Type: Final Discharge
Received Date: 12-Jul-17
Sampling Date: 11-Jul-17
Sampling Time: 13:00
Location: Water System, Gjoa Haven
Report Status: **Preliminary**

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Biochemical Oxygen Demand	25	2	mg/L	13-Jul-17	SM5210:B	55
Organic Carbon, Dissolved	14.1	0.5	mg/L	18-Jul-17	SM5310:B	
Organic Carbon, Total	14.9	0.5	mg/L	19-Jul-17	SM5310:B	
Phosphorous, Total	0.082	0.002	mg/L	21-Jul-17	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	189	0.4	mg/L	12-Jul-17	SM2320:B	
Conductivity, Specific (@25C)	657	0.4	µS/cm	12-Jul-17	SM2510:B	
pH	7.71		pH units	12-Jul-17	SM4500-H:B	
Solids, Total Suspended	4	3	mg/L	15-Jul-17	SM2540:D	
Major Ions						
Calcium	35.1	0.1	mg/L	12-Jul-17	SM4110:B	
Chloride	62.7	0.7	mg/L	12-Jul-17	SM4110:B	
Hardness	182	0.7	mg/L	12-Jul-17	SM4110:B	
Magnesium	23.0	0.1	mg/L	12-Jul-17	SM4110:B	
Nitrate as Nitrogen	3.44	0.01	mg/L	12-Jul-17	SM4110:B	
Nitrite as Nitrogen	0.11	0.01	mg/L	12-Jul-17	SM4110:B	

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-4 **Taiga Sample ID:** 006

Potassium	6.3	0.1	mg/L	12-Jul-17	SM4110:B
Sodium	62.2	0.1	mg/L	12-Jul-17	SM4110:B
Sulphate	33	1	mg/L	12-Jul-17	SM4110:B
Microbiology					
Coliforms, Fecal	< 1	1	CFU/100mL		SM9222:D
Organics					
Oil and Grease, visible	Non-visible			13-Jul-17	Visual Exam
Subcontracted Organics					
Phenols, Total		0.001	mg/L		AB ENV.06537
Trace Metals, Total					
Aluminum	10.8	0.6	µg/L	19-Jul-17	EPA200.8
Arsenic	1.4	0.2	µg/L	19-Jul-17	EPA200.8
Cadmium	< 0.04	0.04	µg/L	19-Jul-17	EPA200.8
Chromium	0.2	0.1	µg/L	19-Jul-17	EPA200.8
Cobalt	1.0	0.1	µg/L	19-Jul-17	EPA200.8
Copper	5.9	0.2	µg/L	19-Jul-17	EPA200.8
Iron	68	5	µg/L	19-Jul-17	EPA200.8
Lead	0.1	0.1	µg/L	19-Jul-17	EPA200.8
Manganese	13.2	0.1	µg/L	19-Jul-17	EPA200.8
Mercury	< 0.01	0.01	µg/L	19-Jul-17	EPA200.8
Nickel	4.8	0.1	µg/L	19-Jul-17	EPA200.8
Zinc	4.5	0.4	µg/L	19-Jul-17	EPA200.8

ReportDate:
Print Date: *Wednesday, July 26, 2017*

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

Taiga Batch No.: 170515

- CERTIFICATE OF ANALYSIS -

Client Sample ID: GJO-4 **Taiga Sample ID:** 006

- DATA QUALIFERS -

Data Qualifier Descriptions:

111	*Vial contained air bubble, analysis not possible*
55	*BOD result is inconclusive; residual DO was less than 1 mg/L. For evaluation purposes only.*
81	*Results are inconclusive due to insufficient depletion of sample, minimum 2 mg/L required over 5 days.*
97	*Analyst error, analysis was not completed.*

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

SM - Standard Methods for the Examination of Water and Wastewater

EPA - United States Environmental Protection Agency

ReportDate:

Print Date: *Wednesday, July 26, 2017*

Appendix: C

Pages from Water Licence part B-H

Water Licence: 3BM-GJO 1318

Hamlet of Gjoa Haven, NU

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

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

PART B: GENERAL CONDITIONS

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

   a. tabular summaries of all data generated under the "Monitoring Program";
   b. summary of modifications to the "Monitoring Program" in accordance with Part H, Item 12;
   c. the daily, monthly and annual quantities in cubic metres of freshwater obtained from all sources;
   d. the daily, monthly and annual quantities in cubic metres of each and all waste discharged; including the hazardous and non-hazardous waste accepted at the Solid Waste Facilities;
   e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
   f. a list of unauthorized discharges and summary of follow-up action taken;
   g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
   h. a summary of any studies, reports and plans (e.g., Operation and Maintenance, Abandonment and Restoration, QA/QC) requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;
   i. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.

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

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

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

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

6. The Licensee shall, post the necessary signs, where possible, to identify the stations of the "Monitoring Program". All signage postings shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector.

7. The Licensee shall immediately report to the 24-Hour Spill Report Line at (867) 920-8130, any spills of Waste, which are reported to, or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.

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

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

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

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

12. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

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

(b) Inspector Contact:
Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100

Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

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

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

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

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all freshwater processed by the Water Supply Facilities and/or used for municipal purposes from Swan Lake or as otherwise approved by the Board in writing.

2. The annual quantity of water use for all purposes under this Licence shall not exceed sixty-two thousand (62,000) cubic metres per year or one hundred seventy (170) cubic metres per day.

3. Where the use of water is of a sufficient volume that the source Water body may be drawn down, the Licensee shall submit to the Board for approval in writing the following: the volume required a hydrological overview of the water body, details of impacts, and proposed mitigation measures.

4. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

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

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

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

8. Sediment and erosion control measures shall be implemented prior to and maintained as required during Hamlet operations, to prevent entry of sediment into water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

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

2. All Effluent discharged from the Sewage Disposal Facilities at Monitoring Program Station GJO-4 shall meet the following effluent quality standards:

Parameter	Maximum Concentration of any Grab
Faecal Coliforms	1×10^4 CFU/dl
BOD_5	80 mg/L
Total Suspended Solids	100 mg/L
Oil and grease	No visible sheen
PH	Between 6 and 9

3. A Freeboard limit of at least 1.0 metre, or as recommended by a qualified geotechnical Engineer and as approved by the Board in writing, shall be maintained at all dams, dykes, or structures intended to contain, withhold, divert or retain water or wastes.

4. The Licensee shall provide at least ten (10) days notification to an Inspector, prior to initiating any decant of the Sewage Lagoon.

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

6. The Licensee shall dispose of and permanently contain all Solid Wastes at the Solid Waste Disposal Facility or as otherwise approved by the Board in writing.

7. The Licensee shall implement measures to prevent hazardous materials and/or leachate from the Solid Waste Disposal Facility from entering water.

8. Licensee shall submit, within 30 days after the discharge point is identified and at least 60 days prior to discharging Effluent, the following information for any new Final Discharge Points or changes made to existing Final Discharge Points during the term of the licence:

    a. Plans, specifications and a general description of each Final Discharge Point together with its specific geo-referenced location;
    b. A description of how the additional Final Discharge Point is designed and maintained.

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

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

1. The Licensee shall submit to the Board for approval, for construction drawings stamped and signed by a qualified engineer registered in Nunavut, sixty (60) days prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes.

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

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

3. The Modifications for which all of the conditions referred to in Part E, Item 2(a) through (d), have not been met, may only be carried out upon written approval from the Board.

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

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

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

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

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Board has approved the Plan entitled "Hamlet of Gjoa Haven Sewage Treatment Facility Operation and Maintenance (O&M) Plan" dated August 15, 2013 that was submitted as additional information with the Application.

2. The Board has approved the Plan entitled "Hamlet of Gjoa Haven, Nunavut Solid Waste Treatment Facility Operation and Maintenance (O&M) Plan" dated August 15, 2013 that was submitted as additional information with the Application.

3. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

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

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval, an Abandonment and Restoration Plan at least three (3) months prior to abandoning any facilities or the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

    a. water intake facilities;
    b. the water treatment and waste disposal sites and facilities;
    c. abandoned water and waste facilities;
    d. petroleum and chemical storage areas;
    e. any site affected by waste spills;
    f. leachate prevention;
    g. an implementation schedule;
    h. maps delineating all disturbed areas, and site facilities;
    i. consideration of altered drainage patterns;
    j. type and source of cover materials;
    k. future area use;
    l. hazardous wastes; and

m. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

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

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

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

5. Areas that have been contaminated by hydrocarbons shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, January 2002. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Board has approved the Plan entitled "Environmental Monitoring Program – Sample Collection Training Program" dated August 13, 2013 that was submitted as additional information with the Application.

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

Monitoring Program Station Number	Description	Frequency	Status
GJO-1	Raw Water Supply at Swan Lake	Monthly	Active (Volume)
GJO-2	Effluent Final Discharge Point from Solid Waste Disposal Facility	Monthly (May to August)	Active (Quality)
GJO-3	Raw Sewage at truck offload point	Monthly	Active (Volume)
GJO-4	Effluent Final Discharge Point from Sewage Disposal Facility	Monthly (May to August)	Active (Quality)
GJO-5	Solid Waste leachate retention inside berm	Sample collected when decanting requires	Active (Quality)

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

4. The Licensee shall sample monthly at Monitoring Station GJO-2 and GJO-4 during the months of May to August, inclusive. Sample shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate-Nitrite	Oil and Grease (visual)
Total Phenols	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	

5. The Licensee shall measure and record in cubic metres the daily, monthly and annual quantities of raw sewage offloaded from trucks at Monitoring Station GJO-3 for all purposes.

6. The Licensee shall provide the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) of all locations where sources of water are utilized for all purposes.

7. The Licensee shall sample before decanting at Monitoring Station GJO-5. Samples shall be analyzed for the parameters stated in Part H, Item 4.

8. Additional sampling and analysis may be requested by an Inspector.

9. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board in writing.

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

11. The Licensee shall annually review the QA/QC Plan and modify it as necessary. Revised QA/QC Plans shall be submitted to the Board with a current approval letter from an accredited lab and shall meet the standards set out in Part H, Item 9 and Part H, Item 10 of the Licence.

12. The Licensee shall include all of the data and information required by the Monitoring Program in the Licensee's Annual Report, as required per Part B, Item 1 or as otherwise requested by an Inspector.

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