Operations and Maintenance Manual

Water Reservoir

Municipality of Igloolik, Nunavut

Prepared for:
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Table of Contents

Version History

Date	Details
September 2020	First Submission

1 Introduction

This document is the Operations and Maintenance (O&M) Manual for the water reservoir in the Municipality of Igloolik (Municipality), Nunavut. The document provides procedures and guidance for the normal operations and maintenance of the facilities. The purpose of the O&M Manual is to ensure adherence to approved operating procedures over long periods of time and during changes in operating personnel. The instructions will permit personnel, knowledgeable in reservoir operations to operate the water reservoir at times when regular operating personnel cannot perform their normal duties.

1.1 Purpose and Description of the Project

A water reservoir is used to supply over-winter water storage for consumption and non-consumption uses for the Municipality. A Google image of the water reservoir is shown in Figure 1 in Appendix A. The reservoir near the end of filling is shown in Photo 1. The Water Treatment Plant / Truck Fill Station is located on the north side of the reservoir with inclined pipes leading out into the reservoir where water is withdrawn. Cartridge filtration and chlorination is required for the treatment of the raw water, and treated drinking water is delivered by water trucks to homes and facilities.

The Municipality is the owner of the reservoir, and responsible for its operations and maintenance. The water supply and appurtenances are regulated by the Public Health Act, Water Supply Regulations, which govern approvals, inspections, water sources, water quality, and water treatment. A copy of the Water Supply Regulations is included in Appendix B.

The quantity of the water in the reservoir, which is extracted from the water supply lake is regulated by the Municipality's water licence 3BM-IGL1520 and two amendments approved on February 16, 2016 (Amendment No. 1) and September 1, 2017 (Amendment No. 2), included in Appendix C.

Photo 1: Water reservoir

The reservoir is approximately heart-shaped with approximate dimensions and cross sections as shown in an issued for tender drawing included as Figure 2 in Appendix A. The as-constructed area of the top of the reservoir of 16,105.8 m^2 as shown on the record drawings in Appendix D. The water reservoir details are summarized in Table 1.

Table 1: Water Reservoir Data

Item	Value	Unit
As-constructed area of the top	16,105.8	m^2
Storage capacity (excluding dead zone)	102,800	m^3
Top elevation	51.0 m	m
Freeboard	0.5	m
Freeboard elevation	50.5	m
Active storage bottom elevation	42.0	m
Active storage depth	8.5	m
Estimated volume of 1 m depth of water (based on storage capacity and active storage depth)	12,094	m^3

1.1.1 Reservoir Infrastructure

Infrastructure associated with the reservoir serves two main purposes: filling of the reservoir and withdrawing from the reservoir to the Water Treatment Plant / Truck Fill Station.

Filling of the Reservoir. Filling of the reservoir is accomplished using a permanent water supply line. The outlet of the water supply line reaches the reservoir at its southeast side as shown in Figure 1 in Appendix A. The water supply line rests on the ground as it reaches the reservoir. The pipe outlet is not immersed in water and has no valves. Photo 2 shows filling of the reservoir.

Photo 2: Filling of the water reservoir

Withdrawing from the Reservoir. Permanent withdrawing lines are located on the north side of the reservoir and withdraw the water from the reservoir to the Water Treatment Plant / Truck Fill Station.

A bypass line is located west of the withdrawing lines and leads to a small building west of the plant. The three lines are a part of the Water Treatment Plant / Truck Fill Station and described in detail in the "Operations and Maintenance Manual Water Treatment Plant / Truck Fill Station". The approximate location of the intake is at an elevation of 42.0 m.

Instrumentation. No instrumentation is present at the reservoir during the preparation of this manual.

1.2 Location and Access to the Water Reservoir and Facilities

The water reservoir is located about 2.0 km southwest of the community, 0.5 km southwest of the airport and 1.6 km northeast of South Lake as shown in Figure 3 in Appendix A.

The reservoir is partially fenced. The fence is present along the north, northeast and northwest of the reservoir. Where the filling line reaches the reservoir is not fenced.

1.3 Assignment of Responsibility

The Municipality has the authority over and responsibility for the safety, operations, and maintenance of the water reservoir. The Municipality is accountable for filling the water reservoir annually, withdrawing water from the reservoir for the Municipality use and performing maintenance of the reservoir.

1.4 Attendance and Communication

1.4.1 Attendance

The water reservoir is unattended. The nearest operating personnel are at the Municipality, which is about two kilometers from the reservoir.

1.4.2 Communication

There is no phone or radio communication at the water reservoir. The contact list and their phone numbers are provided in Table 2.

Table 2: Contact List

Title	Email	Phone Number
Interim CAO (Jean-Marie Ipkangnak)	financedirector@igloolik.ca	(867) 934-8830
Public Works Director & Foreman (Donald Ittusardjut)	publicworksdirector@igloolik.ca	(867) 934-8830
Water Plant Operator (Steve Sarpinak & Derek Aqqiaruq)	waterplant@igloolik.ca	(867) 934-8830
Fire Chief (Juluis Kappianaq)	officemanager@igloolik.ca	(867) 934-8888
Chief Administrative Officer (CAO)		(867) 934-8940
Baffin Regional Director		(867) 897-3601
Municipal Planning Engineer (Bhabesh Roy, P.Eng.)	broy@gov.nu.ca	(867) 899-7314
Spill Contact: Emergency Spill Hotline (24-hour line)		(867) 920-8130
Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Inspector		(867) 975-4295
GN Pond Inlet Regional Office		(867) 899-7314
GN Emergency Measures Officer		(888) 624-4043
Igloolik Health Centre		(867) 934-2100
RCMP Igloolik		(867) 934-0123
Environment Canada Emergency Iqaluit		(867) 975-4644
GN Environment Health Office		(867) 473-2676
Canadian North (First Air) Air Cargo		+1 (800) 267-1247

1.5 Public Safety and Health

Safety of the public and all personnel is a primary concern. Only authorized personnel should approach the reservoir. Access to the reservoir needs to be coordinated with the Municipality.

1.6 Restricted Areas

The reservoir is only partially fenced. The access to the reservoir through the non-fenced areas is restricted only to the authorized personnel.

2 Climate and Population Projections

2.1 Project Location

The Municipality is geographically situated on Igloolik Island in the Foxe Basin close to Melville Peninsula, at 69°23' N latitude and 81°46' W longitude. Figure 4 in Appendix A shows the location of Igloolik on a map of Nunavut.

2.2 Climate

The average annual rainfall in Iqloolik is 102.5 mm and the average annual snowfall is 183.1 cm (RWDI, 2008). Temperatures in the summer range between plus 1.6°C and plus 7°C and in winter between minus 19.5°C and minus 30°C. It is generally quite windy with an average wind speed of 14.4 km/h. Igloolik is in the area of continuous permafrost with the depth of seasonal thaw of approximately 1 m below the ground surface. Table 3 summarizes the seasonal climatic conditions as extracted from the Canadian Normals published and posted by Environment Canada.

Table 3: Average Monthly Precipitation and Air Temperatures

Month	Precipitation (mm)	Average Maximum Temperature (°C)	Average Minimum Temperature (°C)
January	12.8	-27.4	-34.3
February	9.7	-27.9	-34.7
March	14.7	-24.1	-31.6
April	16.3	-15.0	-23.2
May	20.5	-4.6	-11.7
June	19.2	4.7	-0.7
July	27.9	11.3	3.8
August	43.0	8.0	2.2
September	31.0	1.8	-1.9
October	32.1	-5.8	-10.7
November	31.1	-15.6	-22.3
December	16.7	-22.3	-29.2

2.3 Population Projections

The Nunavut Bureau of Statistics publishes the Nunavut Population Projections which provide estimates of the population for all the communities within Nunavut to the year 2035.

A projection of population to 2036 has been developed based on an extrapolation of the estimates developed by the Nunavut Bureau of Statistics. A projection of population to 2030 has been provided using the existing estimates. Table 4 summarizes the abovementioned population projections for the

years 2014 through to 2036. The data provided by the Nunavut Bureau of Statistics indicates an annual population growth rate of 1.46%. This leads to a population estimate of 2,761 at a 20-year horizon.

Table 4: Population Projections

Year	Population
2014	2007
2015	2039
2026	2409
2030	2547*
2031	2580
2036	2761

*Note: *estimated based on existing data*

3 Design Summary

3.1 Historical Summary

The water reservoir was originally constructed in the late 1970s at the site of a small lake near the airport. The reservoir was later expanded in 1993 and 1998. The over-winter storage was increased through massive excavation to provide a total depth in part of the lake of approximately 10 m.

The Municipality experienced water shortfall in the water reservoir in June 2015. An emergency response was implemented and included utilizing an alternate water source. EXP was retained in the fall of 2015 to conduct risk assessment for the reservoir. The report concluded that the water reservoir would meet the Municipality's water storage requirements for 2015/2016 over-winter period, but with minimal reserve. The risk assessment also estimated a shortfall of storage for three consumption rates for the year at 2035/2036 as summarized in Table 5. As a result of the risk assessment, EXP was retained to provide engineering services for the design and construction of the reservoir expansion.

Table 5: Risk Assessment Drawdown Analysis Winter 2035/2036

Scenario	Estimated Shortfall in Storage (m^3)
Actual Consumption Rates (75.3 lpcd)	13,000
RWU (90 lpcd)	23,000
MACA RWU (140.3 lpcd)	58,000

3.2 Water Consumption and Storage Requirements

As per the direction of CGS, the Municipal and Community Affairs (MACA) Residential Water Use (RWU) equations were used to generate water consumption rates for planning for additional storage capacity. The calculated per capita daily consumption was compared to the historical water consumption.

3.2.1 Calculated Water Consumption

The General Terms of Reference for Community Water and Sanitation Services Study, as published by the Department of MACA, Government of Northwest Territories (GNWT) has a series of equations based on population, which estimate total water consumption including non-residential usage such as commercial, institutional and industrial activities. The MACA equations are all based on the RWU rates multiplied by a factor tied to the population of the Municipality. The RWU for residents serviced by trucked water delivery and sewage pump out collection is specified as 90 litres per capita per day (lpcd). Table 6 summarizes the consumption rates based on the MACA RWU equations.

Table 6: Water Consumption Rates Calculated Using MACA RWU Equations

Year	Population	Per Capita Daily Consumption (litres)
2015	2039	132
2026	2409	136
2031	2580	138
2036	2761	140

3.2.2 Historical Water Consumption

Annual water consumption reported for the Municipality's water licence together with the populations from the Nunavut Bureau of Statistics provides historical per capita daily consumption as summarized in Table 7 for three years between 2012 and 2014.

Table 7: Historical Water Consumption Rates

Year	Population	Annual Consumption (litres)	Per Capita Daily Consumption (litres)
2012	1906	51,227,919	73.6
2013	1952	53,096,725	74.5
2014	2007	55,085,387	75.2

3.2.3 Over-winter Storage

The over-winter storage is typically defined by the period from the first day after filling is completed to the end of winter. Estimation of the over-winter storage requirements for the reservoir expansion was based on September 7 as the first day after filling and June 30 as the end of winter. Based on the population projections and water consumption rates as per the MACA RWU equations both summarized in the preceding sections, the over-winter storage requirements for a 10-year, 15-year, and 20-year design horizons are summarized in Table 8.

Table 8: Over-winter Storage Requirements

Year	Consumption Rate (lpcd)	Population	Over-winter (m^3)
2026	136	2409	96,977
2031	138	2580	105,388
2036	140	2761	114,416

3.3 Design Methodology

A 3-dimensional model of the reservoir was used for the evaluation of the reservoir expansion. The model was developed as part of the risk assessment and calibrated against actual drawdown of the reservoir that occurred in the 2014/2015.

A dynamic drawdown analysis was used to analyze the reservoir expansion. The dynamic approach was recommended as it better represented the loss of water from the storage both through the ice growth and consumption. The over-winter period is divided into segments, typically months, and the reduction in storage volume lost to ice growth and water consumption is removed from the overall storage volume. A dynamic drawdown analysis requires the estimation of monthly ice thickness over the course of the winter.

3.4 Reservoir Design

A full depth excavation to the limits of the existing waterbody proved not to be enough to meet over-winter storage capacity. Lowering the water intake and reducing freeboard was considered.

A drawdown analysis on an expanded reservoir with maximum elevation of 50.5 m and the bottom of active storage elevation of 42.0 m resulted in an over-winter storage capacity of 102,800 m^3. Table 9 summarizes storage shortfalls / surplus on the expanded reservoir for three design horizons.

Table 9: Storage/Shortfall/Surplus - Expanded Reservoir

Design Horizon	Shortfall/Surplus (m^3)
2026 (10 years)	5,500 Surplus
2031 (15 years)	3,000 Shortfall
2036 (20 years)	11,600 Shortfall

Review of the consumption rates showed that for the design horizon (2036) population of 2761, the maximum over-winter storage capacity of 102,800 m^3 provides a daily consumption rate of 125 lpcd which is 168% of the historical consumption rate of the Municipality.

3.5 Water Supply Pipeline

The design water supply pipeline for filling the water reservoir is a 200 mm diameter HDPE pipeline Sclairpipe® by Infra Pipe Solutions Ltd. (formerly KWH Pipe (Canada) Ltd.) with standard section lengths of 15.24 m (50 ft) (Arktis, 2016).

4 Construction Summary

The construction of the water reservoir involved a massive rock excavation or quarrying operation. The construction was completed in two phases over two construction seasons. Phase 1 was completed in 2016 and involved an expansion to the east of the existing reservoir. Phase 2 was completed in 2017 and involved expansion to the west. The proposed excavation dimensions, volumes and elevations are shown in Figures 5A and 5B in Appendix A.

The main construction activities for Phases 1 and 2 were similar and included:

- Fully draining the water reservoir prior to construction;
- Drilling and blasting of rock material as shown in Photo 3;
- Massive excavation of the rock material and disposal off site as shown in Photo 4;
- Providing temporary water truck filling and water treatment facility during construction;
- Pressure cleaning of the excavation walls as shown in Photo 5; and
- Filling the water reservoir prior to winter.

The expanded reservoir at the end of the 2017 construction season is shown in Photos 6 and 7.

Photo 3: Drilling into the rock material to be blasted

Photo 4: Excavation of the reservoir

Photo 5: Pressure washing the reservoir wall

Photo 6: Reservoir base and walls in 2017

Photo 7: Expanded reservoir in 2017

5 Performance

Filling of the reservoir is undertaken during the summer and typically spans from early July through to early or mid-September, weather permitting.

Provided by the Municipality water consumption records prior to and after the reservoir expansion are summarized in Table 10. As the water consumption was recorded by estimating intake from the reservoir, it likely would have accounted for the dust control and losses.

Table 10: Water Consumption Summary

Year	Water Consumption (litres)
2014	55,085,386.82
2015	53,920,615.31
2016	50,023,000.01
2017	53,083,285.70
2018	51,048,251.80
2019	52,985,694.20
Maximum:	*55,085,386.82 litres*
Minimum:	*50,023,000.01 litres*
Average:	*52,691,038.97 litres*

Source: Municipality of Igloolik

The records suggest that the maximum water volume withdrawn from the water reservoir between 2014 and 2019 was 55,085,386.82 litres in 2014. The design capacity of the water reservoir after the expansion is approximately 102,800,000 litres (excluding dead zone), which is almost double the maximum water consumption recorded between 2014 and 2019.

The design recommends that the water recharge capacity be enough to account for the dead zone, the projected overwinter water consumption of the Municipality, a 300,000 litres fire protection allowance, plus a 20% contingency.

The water consumption of 55,085,386.82 litres plus a 300,000 litres fire protection allowance increased by 20% is 66,462,464.2 litres which is about 65% of the reservoir capacity.

6 Operation Procedures

The operation procedures occur on a regular basis daily, weekly, monthly or yearly to make sure the facility is functioning. Main operation procedures include filling the reservoir and withdrawing from the reservoir to the Water Treatment Plant / Truck Fill Station. Safety and environmental protection should be reviewed prior to carrying any operation procedures.

6.1 Filling Schedule

Filling of the reservoir is undertaken during the summer and typically spans from early July through to early or mid-September, weather permitting. Filling of the reservoir must be completed prior to freeze up.

6.2 Withdrawing Schedule

Withdrawing from the reservoir to the Water Treatment Plant / Truck Fill Station is governed by the Water Treatment Plant / Truck Fill Station operations based on the Municipality needs. Water Treatment Plant / Truck Fill Station operations are described in a separate manual “Operations and Maintenance Manual Water Treatment Plant / Truck Fill Station”.

6.3 Filling Operation

Filling operation recharges the reservoir for over-winter storage. Filling of the reservoir is accomplished using the water supply pipeline described in “Operations and Maintenance Manual Water Supply Pipeline”. Photo 8 shows filling of the water reservoir.

Photo 8: Filling of the water reservoir

Operation procedures for the water supply line are included in a separate manual "Operations and Maintenance Manual Water Supply Line". The window that the reservoir can be filled depends on the weather and typically falls between early July through to early or mid-September. Proper filling of the reservoir is critical in Municipality's over-winter water supply. Filling procedures include:

- Notify water board when they are planning to start filling the reservoir and the anticipated duration of the filling.
- Inspect the infrastructure for filling of the reservoir described in preceding sections prior to starting filling operations.
- Estimate water level in the reservoir prior to starting filling operations.
- Monitor the progress of the filling daily and note anything that is unusual or not expected.
- Read and record water levels in the reservoir daily as the filling progresses.
- Assess the progress of filling operation weekly.
- NOTE – the reservoir does not currently have the means to record the progress of the filling. It is recommended that the Municipality install a metering system, which may consist of elevation markers at one-meter intervals on the side of the reservoir that may be observed to estimate the progress of the filling.

6.4 Withdrawing Operation

Withdrawing of water from the reservoir continues over winter and is undertaken by pumping into the Water Treatment Plant / Truck Fill Station using two submersible pumps. The pump elevation is approximately 42.0 m. An intake screen protects the pipe inlet. Withdrawal operation is part of the Water Treatment Plant / Truck Fill Station operation and is described in the "Operations and Maintenance Manual Water Treatment Plant / Truck Fill Station". The demand in the water treatment facility dictates how the water is withdrawn from the reservoir. The Water Treatment Plant / Truck Fill Station intake profile is shown in Figure 6 in Appendix A.

6.5 Spring Startup Procedure

At the beginning of operations, typically late April to early May, the reservoir and water supply pipeline should be inspected. The inspection should follow the procedures provided in Section 7. Any operational deficiencies should be repaired prior to filling the reservoir.

Operation personnel should review the filling operation plan, this Manual and monitoring requirements.

6.6 Fall Shutdown Procedure

At the end of filling operation, typically September, the reservoir and water supply pipeline should be inspected. The inspection should follow the procedures provided in Section 7. The fall inspection should provide adequate time for completion of repairs prior to the following year.

7 Monitoring and Inspection

Monitoring refers to checking and observing the progress over time of an activity or performance. Monitoring should be conducted mainly during filling of the reservoir.

Inspections refer to checking the condition of the reservoir and the reservoir infrastructure and will be scheduled and completed:

- Bi-annually for routine operation and maintenance inspections prior to filling of the reservoir and when the filling is complete.
- Periodically (not to exceed five years) for comprehensive inspections and an engineering reviews by an engineer registered to practice in the Northwest Territories and Nunavut.
- After critical events such as a slope failure.

7.1 Reservoir Instrumentation Monitoring and Inspection

Reservoir instrumentation, if any, refers to devices installed within, on, or near the reservoir to monitor initial filling and subsequent operation. Instruments provide a means for detecting abnormal conditions which could lead to major problems. The reservoir operator is primarily responsible for collecting and reporting instrumentation readings. Periodic inspections of the instrumentation should be performed by the reservoir operator or the Municipality. The Municipality is responsible to review and file the instrumentation records.

Currently, the reservoir does not have any instrumentation.

7.2 Filling Operation Monitoring

Filling operation should be monitored as often as practicable throughout the course of the filling process. The filling operation should be monitored for:

- Any changes in the amount water being discharged from the water supply pipeline;
- Stability of the ground supporting the water supply pipeline where it enters the reservoir;
- Integrity of the pipe as it enters the reservoir;
- Unusual water level changes in the reservoir;
- Anything unusual in the reservoir, on the sideslopes and around the reservoir perimeter; and
- Any relevant instrumentation readings, if any.

7.3 Withdrawing Operation Monitoring

Withdrawing operation is monitored as part of the Water Treatment Plant / Truck Fill Station operations and described in “Operations and Maintenance Manual Water Treatment Plant / Truck Fill Station”.

7.4 Bi-annual Inspections

As the reservoir owner, the Municipality will assign personnel to conduct bi-annual operation and maintenance inspections. The inspections should be conducted at the spring start up and at the fall

shutdown. Reservoir operator should be notified of any maintenance requirements identified during the inspections within 48 hours. The standard forms should be completed and placed in the project record files. Digital photographic records of project features should be included with the inspection files.

These activities should be accomplished during bi-annual inspections:

- The slopes of the reservoir should be inspected for any signs of sloughing and instability.
- The reservoir near empty should be inspected for the presence of any objects not a part of the reservoir.
- The infrastructure for withdrawing water into the Water Treatment Plant / Truck Fill Station should be inspected as soon as it is exposed to allow for any maintenance and repairs be done prior to it being submerged again for the winter. The items inspected should include the submersible pumps, the elevation of the intake and condition of the intake screen, and condition of the backfill over the withdrawing pipes including the pipe bypassing the Water Treatment Plant / Truck Fill Station.
- The infrastructure for filling the reservoir should be inspected for the integrity of the water supply pipeline, stability of the slope on which the pipe rests as it enters the reservoir and the surrounding area for anything that could interfere with the filling operation.
- Instrumentation, if any, should be inspected and protected for the winter.
- The water supply pipeline should be verified if it is drained for the winter.

7.5 Periodic Municipality Inspections

Periodic informal Owner inspection should be performed including fall shutdown and spring start- up. The inspection should include a systematic review of the conditions at the reservoir including the filling and withdrawing works and instrumentation, if any. The standard forms should be completed and placed in the project record files. Digital photographic records of project features should be included with the inspection files.

7.6 Periodic Engineer Inspections

Inspections by an engineer registered to practice in the Northwest Territories and Nunavut should be performed if unusual conditions occur or after critical events, such as a slope failure.

7.7 Critical Event Inspections

The reservoir should be inspected during or immediately following the occurrence of critical events, such as a slope failure. Emergency conditions include erosion threatening the integrity of the reservoir or water levels increasing less than usual during filling. Inspection by a qualified engineer should be performed to evaluate the impact of critical events on the reservoir.

8 Maintenance

8.1 Critical Conditions

The following conditions are critical and require immediate repair or maintenance under the direction of a qualified engineer. The critical repairs or maintenance need to address the specific conditions encountered and are not covered in this O&M Manual:

- Erosion, slope failure or other conditions which are endangering the integrity of the reservoir
- Internal erosion of the reservoir walls as evidenced by water level increasing less than usual during filling

8.2 Periodic Maintenance

Maintenance should be conducted at the spring start up and winter shutdown and as a result of items identified during inspections and monitoring. The following items should be noted in the operations log and added to the work schedule whenever they are noted during operation inspections or periodic inspections. The following maintenance items should be completed as soon as possible after identification:

- Repair surface erosion in the vicinity of the reservoir that may cause surface runoff to enter the reservoir.
- Repair damaged reservoir filling point including pipe and pipe supports.
- Maintain riprap or other erosion protection.

Continued maintenance should also be performed for the following items:

- Inspect and maintain instrumentation and gauging equipment.
- Remove debris from reservoir fill area.
- Remove debris from embankment face and from areas around the intake structures.

8.3 Reservoir and Surrounding Area Maintenance

- Maintain positive drainage away from the reservoir. Fill erosion gullies with properly compacted cohesive soil material. Riprap repaired area to stabilize from future erosion.
- Add or repair riprap where displacement or other damage occurs.
- Maintain fences to provide site security.
- Grade the access road to maintain smooth access for water trucks.
- Maintenance tasks should be conducted in a safe and environmentally responsible manner.
- Perform regular inspections as explained in the preceding paragraphs of this section to identify potential maintenance items.

8.4 Filling Pipe Outlet Maintenance

- Repair defective outlet into the reservoir to ensure smooth operation and prevent leakage.

- The water supply line needs to be maintained as per the “Operations and Maintenance Manual Water Supply Line” to function properly during the filling operations.

9 Improvements

The preparation of this O&M Manual revealed that several improvements would enhance the operations and maintenance of the reservoir. These are:

- Install water level markings on the wall of the reservoir; this would allow for developing an actual useful relationship between the water level in the reservoir and the water volume. A reservoir storage curve could then be developed.
- Install water measurement equipment on the water supply line. This would normally be done at the intake pump from the water supply lake and be a part of the "Operations and Maintenance Manual Water Supply Line".

Water level markings could be painted on the wall of the reservoir; however, hiring a contractor for such task could be costly. An alternative could be painting the water level markings on an HDPE roll stock – polyethylene plastic film and unrolling from a secure location the painted roll from the top of the reservoir to reach the bottom. The secure location would include preparation of a flat surface protected by guardrails or a fence with a couple of drilled posts. The painted roll would be arrested on the posts and unrolled for the duration of the filling of the reservoir.

10 Modifications and Construction

The application of appropriate technology for the operations and maintenance of the Municipality's water reservoir system is dependent upon the geology, terrain and climate of the area, as well as the technical and financial capabilities of the Municipality.

These factors limit the pace at which improvements may be undertaken. Improvements to the operation and maintenance of a water reservoir are necessary; however, sometimes these improvements are incremental.

The Municipality may carry out modifications to water reservoir provided that the modifications are reviewed by an engineer registered to practice in the Northwest Territories and Nunavut are consistent with the terms of the water licence and requirements of the water licence Plan of Compliance (NWB, 2020) and are consistent with the Public Health Act, Water Supply Regulations, which govern approvals, inspections, water sources, water quality, and water treatment.

The Water Licence Part E Conditions Applying to Modification and Construction states that the Licensee may, without written approval from the Board, carry out modifications to the Water Supply and Waste Disposal Facilities provided that such modifications are consistent with the terms of the 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. these modifications do not place the Licensee in contravention of the Licence or the Act;

c. 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

d. the Board has not rejected the proposed modifications.

11 References

Arktis Piusitippaa. (2016, October 26). *Improvement of Water System Supply.* Stamped and signed October 26, 2016.

EXP Services Inc. (2016, February). *Design Brief Igloolik Water Reservoir Expansion.* Submitted February 2016.

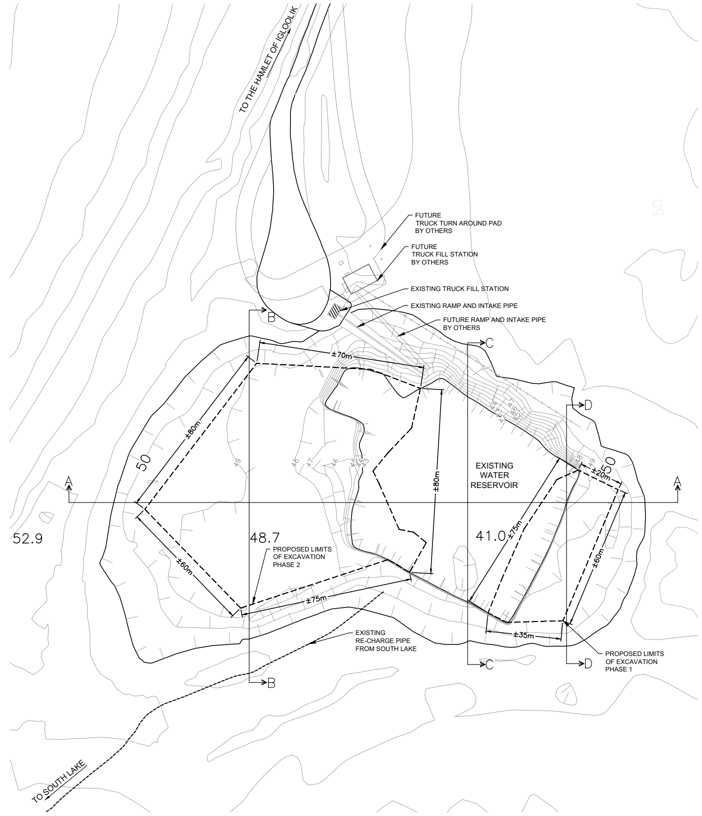
Appendix A – Figures

Figure 1 –
Water Reservoir Google Image

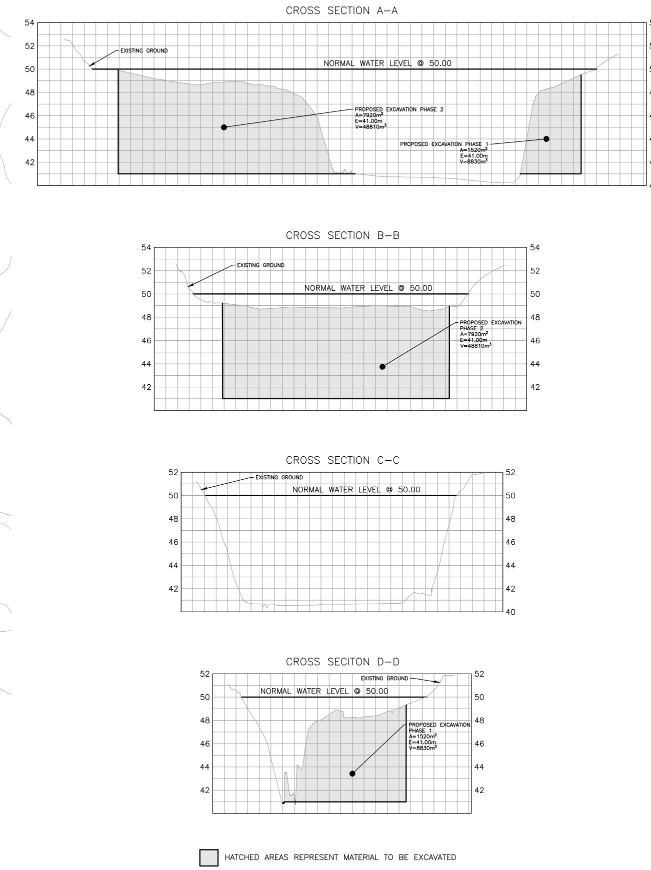
Figure 1: Water Reservoir Google Image

Figure 2 –
Overall Site Plan (Issued for Tender February 19, 2016)

SITE LOCATION PLAN
1:20,000



SITE PLAN
1:1000



CROSS SECTIONS
1:1000

ISSUED FOR TENDER PURPOSES ONLY
DATE: FEBRUARY 19, 2016

PERMIT TO PRACTICE
EXP SERVICES INC.
Signature
Date 2016-02-19
PERMIT NUMBER: P 483
NT/NU Association of Professional Engineers and Geoscientists

NOTES
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PRELIMINARY
NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DATE	BY	APP
2	ISSUED FOR TENDER	2/19/2016	IPC	SLB
1	ISSUED FOR REVIEW	1/29/2016	IPC	SLB

SCALE: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER S. L. BURDEN LICENSEE NWT.

CLIENT: GOVERNMENT OF NUNAVUT DEPARTMENT OF COMMUNITY AND GOVERNMENT SERVICES

exp. exp Services Inc.

BASEPLAN: exp
DESIGN: SLB
CHECKED: SLB
CAD: IPC
PROJECT MANAGER: SLB
APPROVED: SLB

PROJECT: IGLOOIK WATER RESERVOIR EXPANSION
TITLE: OVERALL SITE PLAN
PROJECT No. OTT-00230783-A0
DATE: January 29, 2016
DRAWING No. OSP-1

Figure 2
Overall Site Plan

Figure 3 –
Location of Facilities

Figure 3: Location of Facilities

Figure 4 –
Igloolik on Nunavut Map

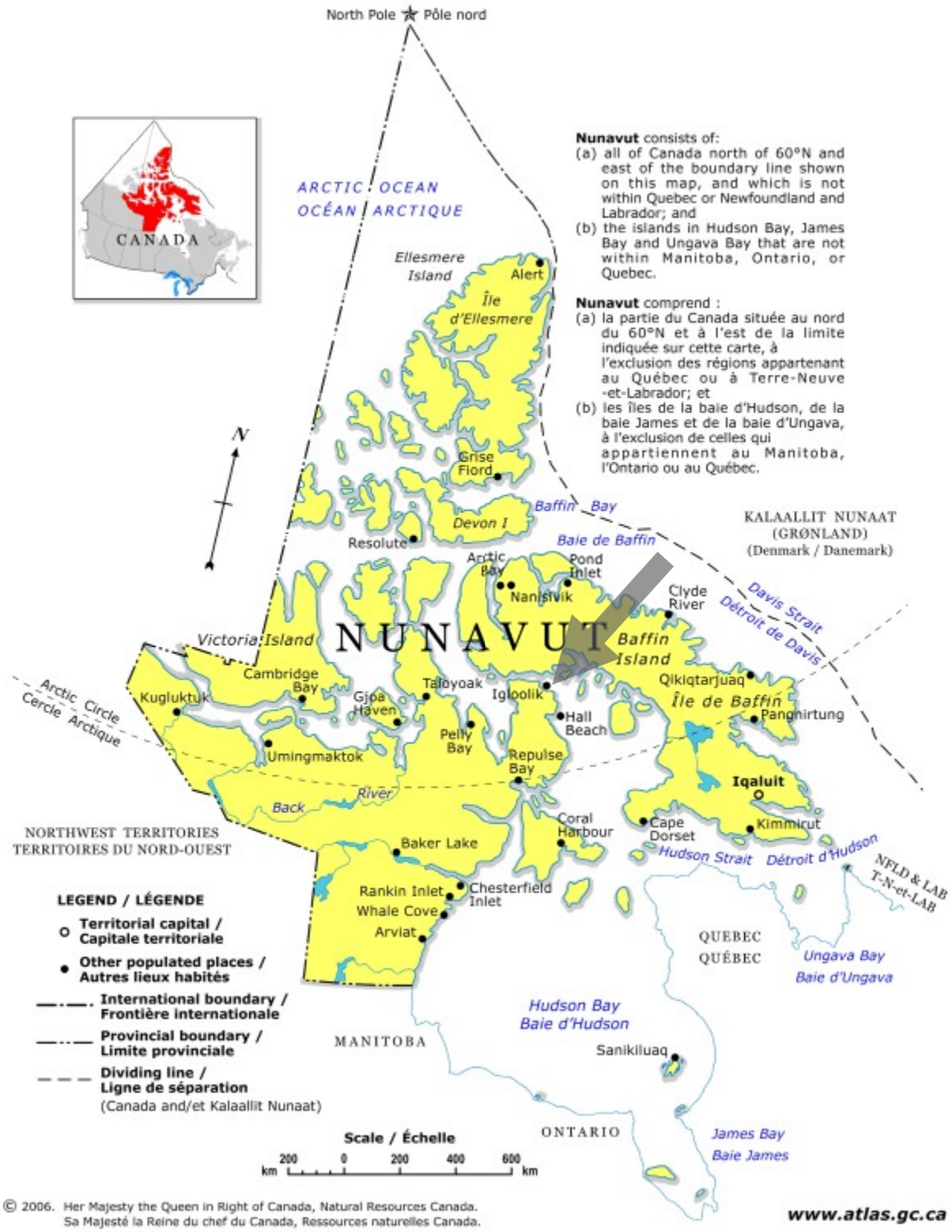


Figure 4: Igloolik on Nunavut Map

Figures 5A and 5B – Proposed Expansion

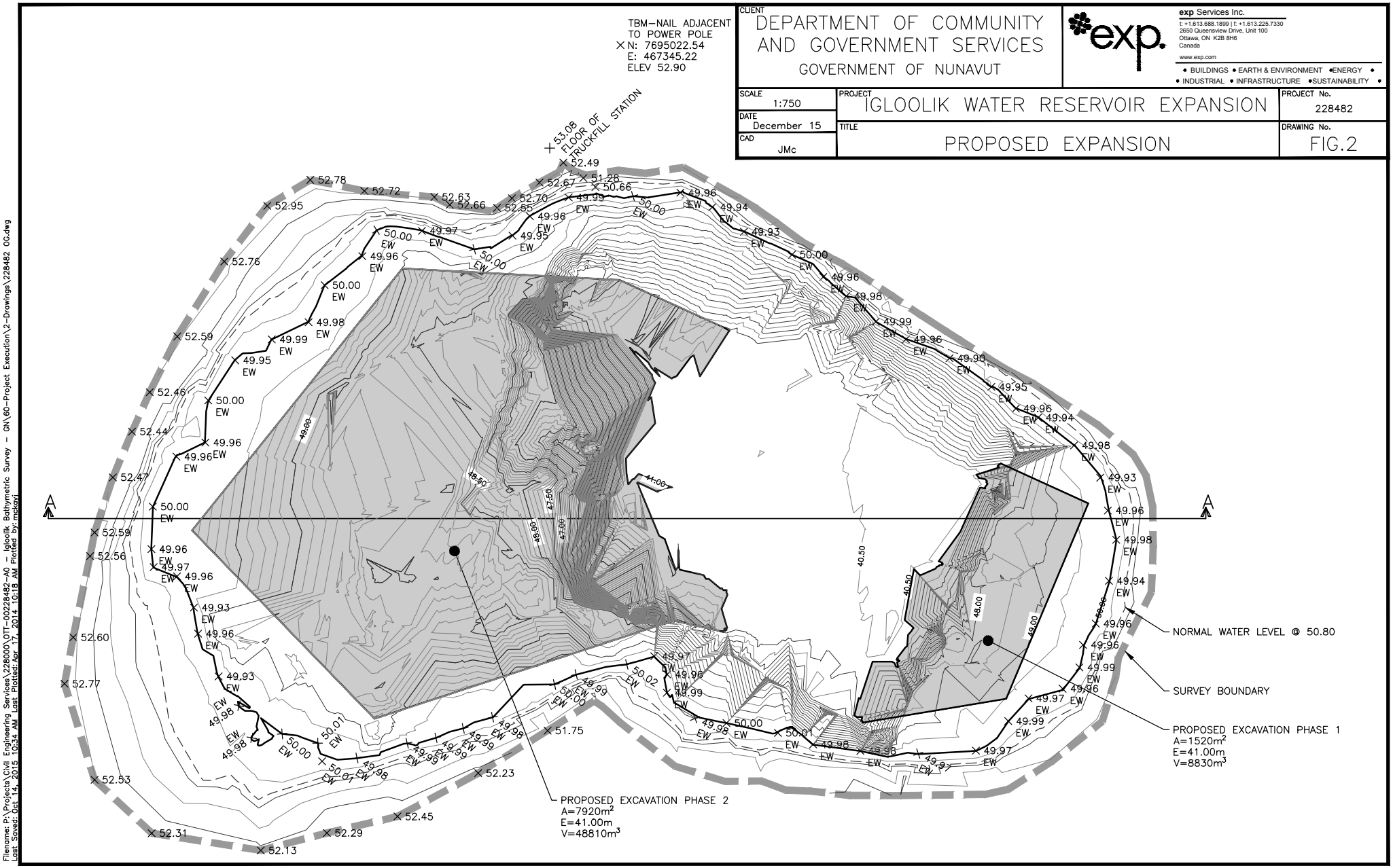
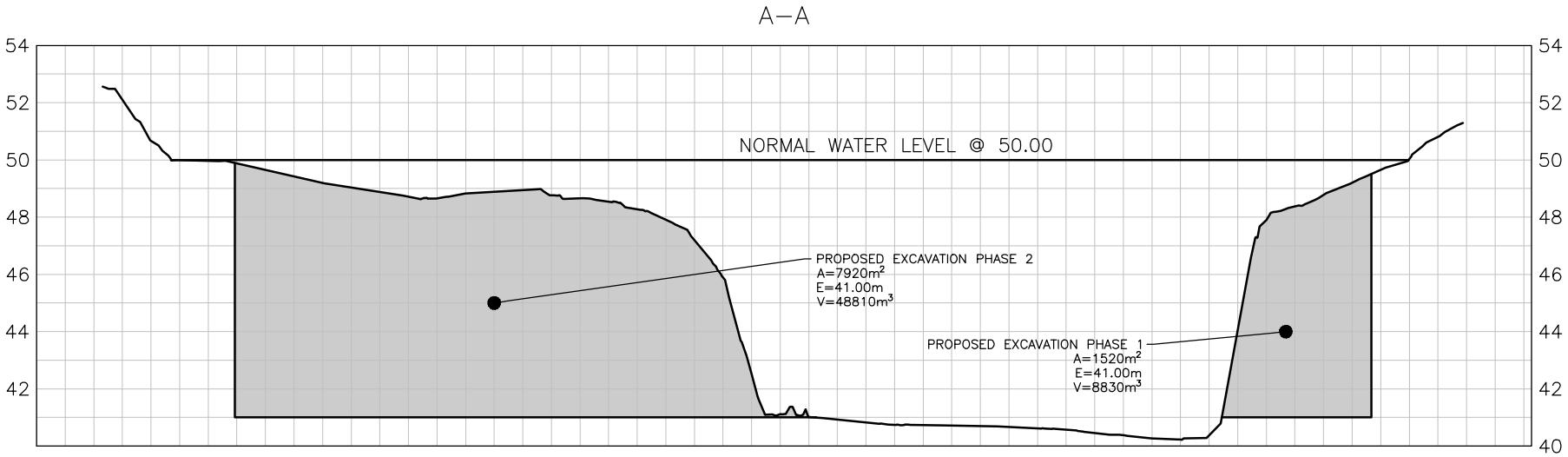


Figure 5A
Igloolik Water Reservoir Expansion
Proposed Expansion



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SCALE: H1:750, V1:150	PROJECT: IGLOOLIK WATER RESERVOIR EXPANSION	PROJECT No.: 228482
DATE: Decemeber 15	TITLE: RESERVOIR SECTIONS	DRAWING No.: FIG.2
CAD: JMc		

Figure 5B
Igloolik Water Reservoir Expansion
Reservoir Sections

Figures 6 –
Truck Fill Intake Profile

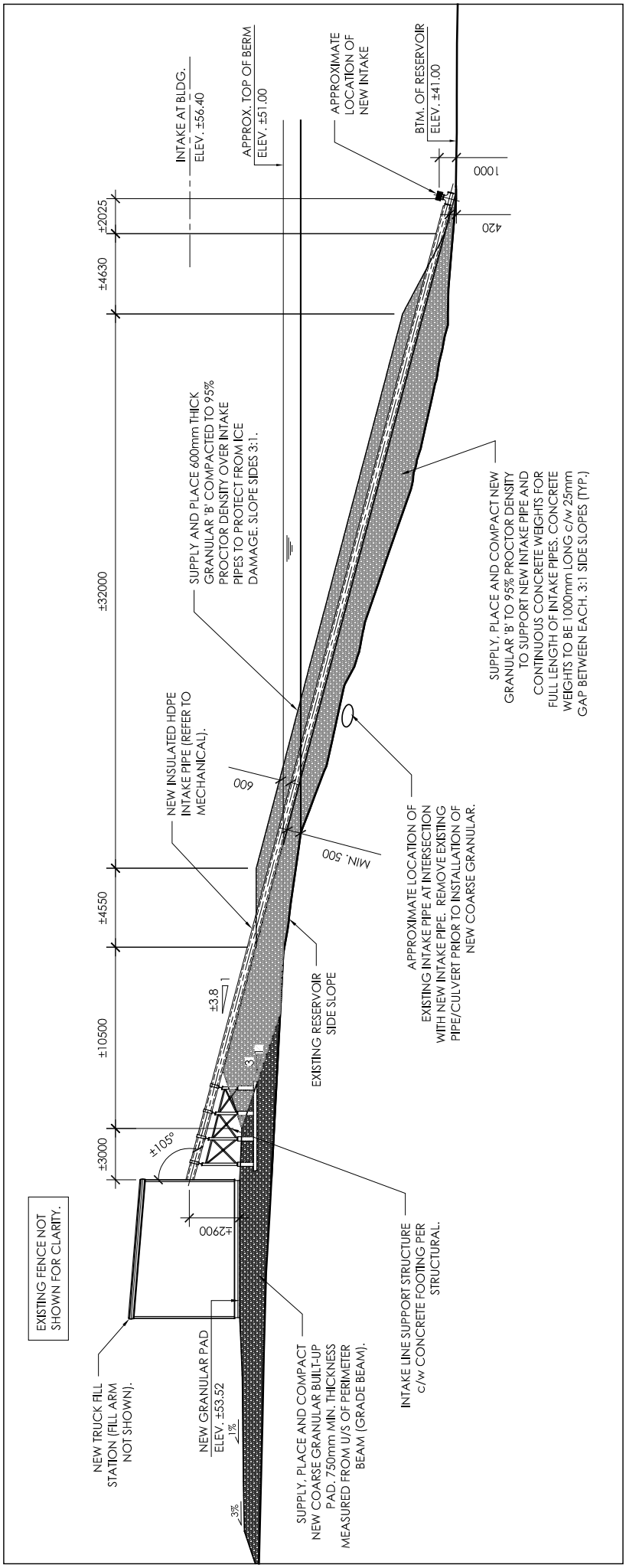

Figure 6
Truck Fill Intake Profile

Appendix B –
Water Supply Regulations

PUBLIC HEALTH ACT

CONSOLIDATION OF PUBLIC WATER SUPPLY REGULATIONS

R.R.N.W.T. 1990,c.P-23

LOI SUR LA SANTÉ PUBLIQUE

CODIFICATION ADMINISTRATIVE DU RÈGLEMENT SUR LE SERVICE D'EAU PUBLIC

R.R.T.N.-O. 1990, ch. P-23

AS AMENDED BY

MODIFIÉ PAR

PUBLIC HEALTH ACT

PUBLIC WATER SUPPLY REGULATIONS

INTERPRETATION

1. In these regulations,

"Act" means the *Public Health Act*; (*Loi*)

"approval" or "approved" means approval or approved in writing by the Chief Medical Health Officer or his or her authorized representative; (*approbation* et *approuvé*)

"finished water" means water that in the opinion of the Chief Medical Health Officer is treated and ready for human consumption; (*eau finie*)

"Health Officer" means a person who is appointed under the Act to act as a Health Officer; (*agent de la santé*)

"Medical Health Officer" means the Medical Health Officer for the area in which the water supply is located; (*médecin-hygiéniste*)

"operator" means the operator or owner of any public water supply; (*exploitant*)

"public water supply" means any water supply system which serves or supplies water, by any means whatsoever, either exclusively or partly for human consumption to more than five customers and includes the plant for the treatment of water; (*service d'eau public*)

"raw water" means untreated water; (*eau brute*)

"surface water source" includes all tributary streams, drainage basins, lakes and reservoirs above a water supply intake which may affect a public water supply; (*source d'eaux de surface*)

"utilidor" means a boxing which contains more than one of the following: water pipes, sewers and hot water or steam heating pipes; (*coffrage d'un réseau de distribution aérien*)

LOI SUR LA SANTÉ PUBLIQUE

RÈGLEMENT SUR LE SERVICE D'EAU PUBLIC

DÉFINITIONS

1. Les définitions qui suivent s'appliquent au présent règlement.

«agent de la santé» La personne nommée à ce titre en vertu de la Loi. (*Health Officer*)

«approbation» Approbation écrite du médecinhygiéniste en chef ou son représentant autorisé. (*approval*)

«approuvé» Approuvé par écrit par le médecin-hygiéniste en chef ou son représentant autorisé. (*approved*)

«citerne de transport d'eau» Citerne montée sur un véhicule et servant au transport et à la livraison d'eau destinée aux besoins domestiques. (*water haulage tank*)

«coffrage d'un réseau de distribution aérien» Coffrage ou compartiment dans lequel sont acheminées au moins deux des conduites suivantes : conduites d'eau, canalisations d'égouts et tuyauteries de chauffage à eau chaude ou à vapeur. (*utilidor*)

«eau brute» Eau non traitée. (*raw water*)

«eau finie» Eau qui a été traitée et qui est propre à la consommation, de l'avis du médecin-hygiéniste en chef. (*finished water*)

«exploitant» L'exploitant ou le propriétaire de tout service d'eau public. (*operator*)

«Loi» La *Loi sur la santé publique*. (*Act*)

«médecin-hygiéniste» La personne nommée à ce titre en vertu de la Loi. (*Medical Health Officer*)

«service d'eau public» Tout système d'aqueduc dont l'eau est destinée exclusivement ou en partie à l'alimentation humaine et qui dessert plus de cinq clients, y compris les installations de traitement de

"water haulage tank" means a tank that is mounted on a vehicle for haulage and delivery of water for domestic purposes. (*citerne de transport d'eau*)

l'eau. (*public water supply*)

«source d'eaux de surface» S'entend notamment de tout tributaire, bassin hydrographique, lac ou réservoir dont le niveau est plus élevé que celui d'une prise d'eau, et qui peut affecter le service d'eau public. (*surface water source*)

PART I

APPLICATION, APPROVAL AND INSPECTION

Application

2. (1) Subject to subsection (2), these regulation apply to every public water supply.

(2) These regulations do not apply to a water supply system that was constructed before the establishment of these regulations, but these regulations apply where

(a) in the opinion of a Medical Health Officer such a system becomes a health hazard; or

(b) changes or repairs are required to such public water supply.

(3) Nothing in these regulations shall be deemed to revoke anything contained in a building code or regulation applicable to a public water supply in any area of the Territories, but where there is a conflict between these regulations and a building code or regulation, these regulations shall apply.

Approval

3. No person shall construct, make a structural alteration or add to a public water supply system unless approval has first been obtained in accordance with these regulations.

Inspection

4. (1) The Medical Health Officer or a Health Officer may, at any reasonable time, enter any premises of a public water supply and examine the premises and anything in the premises that is used in connection with the operation of the public water

PARTIE I

APPLICATION, APPROBATION ET INSPECTION

Application

2. (1) Sous réserve du paragraphe (2), le présent règlement s'applique à tout service d'eau public.

(2) Est soustrait à l'application du présent règlement le système d'aqueduc construit avant l'entrée en vigueur du présent règlement sauf si, selon le cas :

a) de l'avis d'un médecin-hygiéniste, ce système présente un danger pour la santé;

b) des modifications ou des réparations doivent y être apportées.

(3) Le présent règlement n'a pas pour effet de révoquer toute disposition d'un code du bâtiment ou d'un règlement applicable aux services d'eau publics de tout secteur des territoires. Cependant, en cas d'incompatibilité entre le présent règlement et un code du bâtiment ou un autre règlement, le présent règlement a préséance.

Approbation

3. Il est interdit de construire un système d'aqueduc, d'en modifier la structure ou d'en ajouter une partie sans obtenir une approbation préalable en conformité avec le présent règlement.

Inspection

4. (1) Le médecin-hygiéniste ou l'agent de la santé peut, à toute heure raisonnable, pénétrer dans tout local d'un service d'eau public et inspecter le local ainsi que tout objet dans le local servant à l'exploitation du service d'eau public.

supply.

(2) Where, in the opinion of the Medical Health Officer or a Health Officer, any provision of these regulations is not being observed, he or she may make such recommendations or issue such directives to the operator as he or she deems to be necessary in that connection.

(3) Where the operation of a public water supply does not comply with these regulations, the Medical Health Officer or Health Officer shall make a report to the Chief Medical Health Officer and shall furnish a copy of the report to the operator, specifying the violation or violations of these regulations together with recommendations for their correction.

Closure and Appeal

5. (1) Where, in the opinion of the Chief Medical Health Officer, the water is dangerous to the health of the consumers, he or she may order closure of the public water supply.

(2) The operator may appeal in writing to the Commissioner within 48 hours after receiving a closure order under subsection (1) and the Commissioner shall either revoke or confirm the order.

PART II

WATER SOURCES, WATER TREATMENT, CHLORINATION AND FLUORIDATION

Surface Water Sources

6. No surface water source shall be approved for use in a public water supply unless

(a) the quantity of water is sufficient to permit reasonable quality control of the water having regard to the estimate demand that the source is required to fill;

(b) it is practicable to convert the water from the source into finished water having regard to natural and man-made conditions affecting the quality of water.

7. (1) The quantity of water available in a surface

(2) Lorsque, de l'avis du médecin-hygiéniste ou de l'agent de la santé, une disposition du présent règlement n'est pas respectée, il peut faire les recommandations ou donner les directives à l'exploitant qu'il juge nécessaires à cet égard.

(3) Lorsqu'un service d'eau public n'est pas exploité en conformité avec le présent règlement, le médecin-hygiéniste ou l'agent de la santé présente au médecin-hygiéniste en chef un rapport faisant état des infractions relevées et des dispositions correctives recommandées et remet une copie du rapport à l'exploitant.

Fermeture et appel

5. (1) Le médecin-hygiéniste en chef peut ordonner la fermeture d'un service d'eau public s'il estime que l'eau fournie présente un danger pour la santé des consommateurs.

(2) Dans les 48 heures suivant la réception de l'ordre de fermeture visée au paragraphe (1), l'exploitant peut en appeler par écrit devant le commissaire. Celui-ci peut révoquer ou confirmer l'ordre.

PARTIE II

SOURCES D'EAU, TRAITEMENT DE L'EAU, CHLORATION ET FLUORATION

Sources d'eaux de surface

6. L'utilisation d'une source d'eaux de surface dans un service d'eau public n'est approuvée que si :

a) l'eau existe en quantité suffisante pour permettre un contrôle raisonnable de la qualité de l'eau, compte tenu de la demande;

b) il est possible de transformer l'eau de cette source en eau finie, compte tenu des conditions naturelles ou artificielles de la source pouvant affecter la qualité de l'eau.

7. (1) La quantité d'eau disponible dans une source

water source shall be adequate to supply the water demand, including the fire demand, of the community using the surface water source, including a reasonable surplus for anticipated growth.

(2) Where a surface water source is impounded and when it is necessary to estimate the quantity of water to meet the demand of a community, required allowance shall be made for all losses including water released, losses due to evaporation and seepage, loss of capacity due to siltation and ice and unavailable water stored below the bottom intake opening.

8. Where a surface water source is approved for use in a public water supply nothing which may adversely affect the quality of the raw water may be done on the watershed without approval by the Chief Medical Health Officer.

Water Quality
Bacteriological Characteristics

9. Samples of water shall be submitted to a laboratory for bacteriological analysis as directed by the Medical Health Officer. Where practical, it is desirable that there should be a minimum number of samples of treated water a month submitted for bacteriological examination according to the following table:

Population	Number of samples a month
up to 500	1
501 to 2500	2
2501 to 3500	3
3501 to 4000	4
4001 to 4800	5
4801 to 5500	6
5501 to 6500	7

10. (1) Where the multitube fermentation technique is used, the arithmetical mean of the most probable numbers of coliforms for all standard samples examined a month shall not exceed 1 for each 100 ml. When the membrance filter technique is used, the arithmetical mean coliform density of all

d'eaux de surface doit être suffisante pour combler les besoins de la collectivité visée, y compris les besoins en eau d'incendie. Il est également tenu compte d'un surplus raisonnable en prévision de l'accroissement de la population.

(2) Lorsqu'une source d'eaux de surface est retenue et qu'il faut évaluer la quantité d'eau qui répond à la demande de la collectivité, il faut notamment tenir compte des pertes causées par les déversements, l'évaporation, l'infiltration, l'envasement et la formation de glace ainsi que l'eau non disponible qui se situe sous le niveau de l'ouverture de la prise d'eau.

8. Lorsque l'utilisation d'une source d'eaux de surface est approuvée aux fins d'un service d'eau public, toute intervention sur le bassin hydrographique susceptible d'affecter la qualité de l'eau reçoit préalablement l'approbation du médecin-hygiéniste en chef.

Caractéristiques bactériologiques
et qualité de l'eau

9. Selon les directives du médecin-hygiéniste, des échantillons d'eau sont soumis en laboratoire à des analyses bactériologiques. Si cela est pratique, un minimum d'échantillons d'eau traitée est soumis à des analyses bactériologiques à tous les mois, en conformité avec le tableau suivant :

Population	Nombre d'échantillons par mois
jusqu'à 500	1
de 501 à 2500	2
de 2501 à 3500	3
de 3501 à 4000	4
de 4001 à 4800	5
de 4801 à 5500	6
de 5501 à 6500	7

10. (1) Dans le cas où la technique de fermentation en tubes multiples est utilisée, la moyenne arithmétique du nombre le plus probable de coliformes dans tous les échantillons analysés ne peut dépasser un coliforme par 100 ml. Dans le cas où la technique de la membrane filtrante est utilisée, la

standard samples shall not exceed 1 for each 100 ml.

(2) If the most probable number of coliforms when the multitube fermentation technique is used, or the coliform density when the membrance filter technique is used, is nine or greater, then additional samples shall be taken. These should be submitted one after another as soon as reasonably possible in view of the logistics of transportation and the laboratory facilities until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

Physical Characteristics

11. (1) The frequency and manner of sampling shall be determined by the Chief Medical Health Officer. Under normal circumstances, samples should be collected daily by the operator who should record the results.

(2) Drinking water should contain no impurity which would cause offence to the sense of sight, taste or smell. The following limits should not be exceeded:

Turbidity	5 units
Colour	15 units
Threshold odour number	3

Chemical Characteristics

12. (1) The frequency and manner of sampling shall be determined by the Chief Medical Health Officer. Under normal circumstances, analyses for substances listed below need be made no more often than once in two years.

(2) Drinking water shall not contain impurities in concentrations which may be hazardous to the public health. It should not be excessively corrosive to the water supply system. Substances used in its treatment shall not remain in the water in concentrations greater than required by good practice.

moyenne arithmétique des concentrations de coliformes de tous les échantillons ne peut dépasser un coliforme par 100 ml.

(2) Si le nombre le plus probable de coliformes, dans le cas de la technique de fermentation en tubes multiples, ou la concentration de coliformes, dans le cas de la technique de la membrane filtrante, est de neuf ou plus, des échantillons supplémentaires sont prélevés. Ces derniers sont acheminés aux fins d'analyses l'un après l'autre, aussitôt que raisonnablement possible compte tenu des moyens de transport et de la disponibilité des laboratoires, jusqu'à ce que les résultats obtenus sur deux échantillons consécutifs démontrent une qualité d'eau satisfaisante.

Caractéristiques physiques

11. (1) La fréquence et la méthode d'échantillonnage sont fixées par le médecin-hygiéniste en chef. Dans les circonstances normales, les échantillons sont prélevés quotidiennement par l'exploitant et les résultats obtenus sont consignés dans un registre.

(2) L'eau potable ne devrait pas contenir d'impuretés susceptibles d'en troubler la limpidité ou de lui donner un goût ou une odeur désagréable. Les limites suivantes ne devraient pas être dépassées :

turbidité	5 unités
couleur	15 unités
seuil de perception olfactive	3

Caractéristiques chimiques

12. (1) La fréquence et la méthode d'échantillonnage sont fixées par le médecin-hygiéniste en chef. Dans les circonstances normales, les analyses pour mesurer le dosage dans l'eau des substances chimiques mentionnées ci-après ne sont nécessaires qu'une fois tous les deux ans.

(2) L'eau potable ne doit pas contenir d'impuretés en concentrations susceptibles de présenter un danger pour la santé du public. Elle ne devrait pas présenter un risque de corrosion excessive du système d'aqueduc. Les concentrations dans l'eau potable de substances utilisées pour le traitement de celle-ci ne doivent pas être supérieures à celles

(3) Substances which may have deleterious physiological effect, or for which physiological effects are not known, shall not be introduced onto the system in a manner which would permit them to reach the consumer. The following chemical substances should not be present in a water supply in excess of the listed concentrations where, in the judgment of the Chief Medical Health Officer, other more suitable supplies are or can be made available:

Substances	Maximum concentration - mg/l
Alkyl benzene sulfonate (ABS)	0.5
Arsenic (As)	0.05
Chloride (Cl)	250
Copper (Cu)	1
Carbon chloroform extract (CCE)	0.2
Cyanide (CN)	0.01
Fluoride (F)	1.7
Iron (Fe)	0.3
Manganese (Mn)	0.05
Nitrate (NO_3)	45
Phenols	0.001
Sulfate (SO_4)	250
Total dissolved solids	500
Zinc (Zn)	5
Barium (Ba)	1
Cadmium (Cd)	0.01
Chromium (hexovalent) (Cr^6)	0.05
Lead (Pb)	0.05
Selenium (Se)	0.01
Silver (Ag)	0.05.

Radioactive Characteristics

13. (1) The frequency of sampling and analysis for radioactivity shall be determined by the Chief Medical Health Officer in consultation with the Radiation Protection Bureau of the Department of National Health and Welfare, or its successors, after consideration of the likelihood of significant amounts

recommandées en pratique.

(3) Les substances pouvant avoir des effets nocifs sur la santé ou dont les effets sur la santé sont inconnus ne doivent pas être introduits dans le système d'aqueduc de manière à ce qu'elles atteignent le consommateur. Les substances chimiques suivantes ne devraient pas être présentes dans une réserve d'eau en concentrations supérieures à celles indiquées dans le tableau ci-après si, de l'avis du médecin-hygiéniste en chef, d'autres sources d'approvisionnement plus convenables peuvent être disponibles :

Substances	Concentration maximale-mg/l
Alkyl benzène sulfonale (ABS)	0,5
Arsenic (As)	0,05
Chlorures (Cl)	250
Cuivre (Cu)	1
Produit d'une extraction chloroformique sur charbon (ECC)	0,2
Cyanures (CN)	0,01
Fluorures (F)	1,7
Fer (Fe)	0,3
Manganèse (Mn)	0,05
Nitrate (NO_3)	45
Phénols	0,001
Sulfate (SO_4)	250
Matières totales dissoutes	500
Zinc (Zn)	5
Barym (Ba)	1
Cadmium (Cd)	0,01
Chrome (hexavalent)(Cr^6)	0,05
Plomb (Pb)	0,05
Sélénium (Se)	0,01
Argent (Ag)	0,05.

Radioactivité

13. (1) La fréquence de l'échantillonnage et des analyses aux fins de déterminer le taux de radioactivité est fixée par le médecin-hygéniste en chef après avoir consulté le Bureau de la radioprotection du ministère de la Santé nationale et du Bien-être social, ou le service qui lui aura

being present.

(2) The effects of human radiation exposure are viewed as harmful and any unnecessary exposure to ionizing radiation should be avoided. Approval of water supplies containing radioactive materials shall be based upon the judgment that the radioactivity intake from such water supplies when added to that from all other sources is not likely to result in an intake greater than the radiation protection guidance recommended by the Radiation Protection Division of the Department of National Health and Welfare, or its successors.

Water Treatment Plants

14. (1) The design of water treatment plants shall be adequate to provide the treatment of the raw water which is required to produce finished water.

(2) Filters shall be of the gravity type unless otherwise approved by the Chief Medical Health Officer.

(3) Heating facilities of a safe type should be provided in buildings which will be occupied by personnel, and should be adequate for comfort, as well as for protection of the equipment.

(4) The buildings shall be well-ventilated by means of windows and doors, roof ventilators or other means. All rooms, compartments, pits and other enclosures below the grade floor, which must be entered and in which an unsafe atmosphere may develop, or where excessive heat may be built up by equipment, shall have adequate forced ventilation. The equipment should be capable of producing at least six complete turnovers of air an hour. Rooms containing equipment or piping should be adequately heated, ventilated and, if necessary, dehumidified to prevent injurious condensation. Where practicable, ventilation should be supplemented by insulation of the building, equipment and piping. Switches which control the forced ventilation shall be located in order to be conveniently manipulated from outside such compartments.

succédé, après avoir considéré les probabilités d'une irradiation importante de l'eau.

(2) Les effets dus à l'irradiation des personnes sont considérés comme nocifs et toute exposition inutile à un rayonnement ionisant devrait être évitée. L'approbation d'une réserve d'eau contenant des substances radioactives est basée sur la radio-concentration de l'eau qui, une fois ajoutée à celle des autres sources d'eau, ne doit pas atteindre un total supérieur à la norme établie par la Division de la radioprotection du ministère de la Santé nationale et du Bien-être social, ou le service qui lui aura succédé.

Installations de traitement de l'eau

14. (1) Les installations de traitement de l'eau sont conçues de façon à pouvoir fournir à l'eau brute le traitement nécessaire pour la transformer en eau finie.

(2) Les filtres utilisés sont des filtres à gravité sauf si le médecin-hygiéniste en chef approuve un autre genre de filtre.

(3) Dans les bâtiments abritant du personnel, des installations de chauffage sécuritaires devraient être fournies afin d'assurer le confort des occupants et la protection de l'équipement.

(4) Les bâtiments sont largement ventilés au moyen de fenêtres, de portes, de ventilateurs de toit ou autrement. Les locaux, compartiments, fosses et autres enceintes accessibles situés sous le niveau du rez-de-chaussée et où une atmosphère malsaine peut se former ou encore où une quantité excessive de chaleur produite par l'équipement peut s'accumuler doivent être desservis par un système adéquat de ventilation par air pulsé. L'équipement devrait pouvoir effectuer au moins six renouvellements d'air complets par heure. Les locaux abritant de l'équipement ou de la tuyauterie devraient être chauffés, aérés et, au besoin, déshumidifiés pour empêcher la condensation nuisible. Si possible, la ventilation devrait être complétée par l'isolation du bâtiment, de l'équipement et de la tuyauterie. Les interrupteurs de commande du système de ventilation par air pulsé sont placés de manière à pouvoir être facilement manœuvrés depuis l'extérieur des compartiments desservis.

(5) Buildings shall be adequately lighted throughout by means of natural light or by artificial lighting facilities, or both. Control switches, where needed, shall be conveniently placed at the entrance to each room or compartment. All electric wiring and equipment shall be of a type listed by the Canadian Standards Association Testing Laboratories and installed in accordance with the CSA Standard C22.1 - 1986 Canadian Electrical Code - Part I - *Safety Standard for Electrical Installation* and those of the Government of the Northwest Territories and local government authorities.

(6) Where lavatory and toilet facilities are provided at the water treatment plant, wastes shall be safely disposed of, without danger of contaminating the water and preferably they shall be discharged directly into an approved sewer.

Chlorination

15. (1) Drinking water shall be chlorinated or receive other bactericidal treatment as approved by the Chief Medical Health Officer in all cases when the supply is obtained from a surface source, and in the case of a groundwater source if the water may be subject to contamination in the well or in storage reservoirs or mains. Additional chlorination may be required if there is reasonable possibility for contamination subsequent to the original disinfection.

(2) Chlorination equipment shall have a maximum feed capacity at least 50% greater than the highest dosage required to provide a free chlorine residual.

(3) Dependable feed equipment, either of the gas feed or positive displacement solution feed type, shall be used for adding chlorine. Automatic proportioning of the chlorine dosage to the rate of flow of the water treated shall be provided at all treatment plants where the rate of flow varies without manual adjustment of pumping rates. In the selection and design of equipment, care should be taken to ensure that there is sufficient dilution of chlorine in

(5) Les bâtiments sont adéquatement et complètement éclairés au moyen d'un éclairage naturel, d'installations d'éclairage artificiel, ou des deux. Les interrupteurs de commande nécessaires sont placés à un endroit pratique, à l'entrée de chaque local ou compartiment. Le câblage et l'équipement électriques doivent être d'un genre approuvé par les laboratoires d'essai de l'Association canadienne de normalisation et installés en conformité avec la norme de l'ACNOR numéro C22.1, Code canadien de l'électricité 1986, partie I, *Norme de sécurité relative aux installations électriques* et les normes fixées par le gouvernement des Territoires du Nord-Ouest ou les administrations locales.

(6) Lorsque des installations sanitaires sont aménagées dans une station de traitement de l'eau, les eaux usées sont évacuées d'une manière ne présentant aucun danger de contamination de l'eau et, de préférence, elles sont évacuées directement dans un égout approuvé.

Chloration

15. (1) Lorsque l'approvisionnement provient d'une source d'eaux de surface, l'eau potable est chlorée ou autrement traitée avec des substances bactéricides suite à l'approbation du médecin-hygiéniste en chef. Dans le cas d'une source d'eau souterraine, ces traitements sont requis si l'eau est susceptible d'être contaminée dans les puits, les réservoirs de retenue ou dans les conduites d'amenée. S'il existe une possibilité raisonnable que l'eau soit contaminée après une première désinfection, il peut être nécessaire de procéder à une seconde chloration.

(2) L'équipement de chloration a une capacité maximale d'alimentation au moins 50 % supérieure à la dose maximale requise pour obtenir un résidu de chlore libre.

(3) Des appareils fiables, soit du type à alimentation du chlore à l'état gazeux ou du type à alimentation du chlore en solution à l'aide de pompes volumétriques, sont utilisés pour l'ajout du chlore. Dans le cas des installations de traitement dont le débit d'eau varie sans que le taux de pompage ne puisse être réglé manuellement, des appareils permettant le dosage automatique proportionnel au débit d'eau sont utilisés. Lorsque l'eau chlorée doit

the water whenever there is contact with piping, valves or fittings which are corrodible.

(4) All chlorination equipment should be installed in duplicate, in order to provide standby units for ensuring uninterrupted operation. In addition, spare parts consisting of at least the commonly expendable parts such as glassware, rubber fittings, hose clamps, and gaskets should be provided for effecting emergency repairs. In some cases, satisfactory emergency chlorinators may consist of discontinued equipment if it is operable and adequately sized.

(5) Where gas feed chlorinators are employed, a scale shall be provided for weighing the chlorine cylinders serving each operating chlorinator. Preferably, weigh scales for 68 kg cylinders should be recessed in the floor, and the recess provided with a drain.

(6) Where a powdered hypochlorite is used, solutions should be prepared in a separate tank. The clear liquid should be siphoned to the solution storage tank from which it is drawn by the hypochlorinator. A second tank is not required when chlorine is supplied as a solution.

(7) Where gas chlorine is used, there shall be a canister-type respirator with a full face mask in a location handy to the operator. The canister shall be specifically designed to protect against chlorine and a new one should be obtained each time one is used.

(8) Safety chains should be used to retain 68 kg cylinders of chlorine gas, either in storage or on weigh scales, in a safe upright position.

(9) Gas chlorine equipment, including chlorinators, weigh scales and chlorine cylinders, shall be located in an isolated building, room or rooms. In larger installations, the storage and scale facilities should be in a room separated from the chlorinators. The construction of the room or rooms should be of fire resistant material and have concrete

entrer en contact avec des tuyaux, des soupapes ou des raccords susceptibles de se corroder, les appareils choisis ou conçus devraient permettre une dilution suffisante du chlore dans l'eau.

(4) Tout équipement de chloration devrait être installé en double de façon à ce que des installations de secours puissent assurer un fonctionnement ininterrompu. De plus, des pièces de rechange pour les pièces généralement non réutilisables tels la verrerie, les raccords en caoutchouc, les colliers de serrage et les joints d'étanchéité statiques devraient être prévues pour les réparations d'urgence. Dans certains cas, des chlorateurs désuets, mais en bon état et de taille appropriée peuvent être utilisés comme appareils de secours.

(5) Lorsque des chloronomes sont utilisés, une balance permet de peser les bouteilles de chlore reliées à chaque chloronome. Les balances pour bouteilles de 68 kg sont de préférence encastrées dans le plancher et les cavités sont munies d'un tuyau d'écoulement.

(6) Lorsque de l'hypochlorite en poudre est utilisé, la solution devrait être préparée dans un réservoir distinct. La solution devrait être siphonnée à un réservoir de stockage et ensuite aspirée par le chlorateur. Un second réservoir n'est pas requis lorsque le chlore est fourni sous forme de solution.

(7) Lorsque du chlore à l'état gazeaux est utilisé, un respirateur à boîte filtrante muni d'un masque complet est placé à la portée de l'opérateur. La boîte filtrante est spécialement conçue pour assurer une protection contre le chlore et devrait être remplacée après chaque utilisation.

(8) Des chaînes de sécurité devraient être utilisées pour retenir les bouteilles de chlore de 68 kg en position verticale, tant en entrepôt que sur les balances.

(9) L'équipement de chloration au chlore gazeux, y compris les chloronomes, les balances et les bouteilles de chlore, est situé dans un bâtiment isolé ou dans un ou plusieurs locaux détachés, de préférence construits en matériaux qui résistent au feu et dotés d'un plancher en béton. Dans les installations plus importantes, l'entrepôt et les

floors.

(10) Areas containing chlorine or chlorinator equipment shall be clearly marked "DANGER! CHLORINE STORAGE" or "DANGER! CHLORINE FEED EQUIPMENT" as applicable.

(11) There should be two or more exits if the distance of travel to the nearest exit exceeds 4.5 m.

(12) There should be continuous mechanical ventilation at the rate of three air changes an hour. Alternatively there should be screened openings to the outdoors with a size of 0.02% of the floor area

(a) within 150 mm of the floor, and

(b) near the ceiling.

(13) In addition, there should be emergency mechanical ventilation sufficient to produce 30 air changes an hour taking suction at floor level. The switch for the emergency fan should be located outside the chlorinator room. It should be posted with a sign warning that 10 minutes should elapse after starting the fan before entering the room.

(14) The temperature in the storage and scale room should never be higher and preferably slightly lower than that in the chlorinator room. The gas lines between the scales, chlorinators and injectors should not be located on an outside wall or in a location where low temperatures may be encountered.

16. (1) The application of chlorine shall be sufficient to provide 0.2 mg/l of residual free chlorine after a thorough mixing of the chlorine and water and 20 minutes of contact time after the mixing. Notwithstanding the foregoing, the Chief Medical Health Officer may decide on another chlorine residual for particular local circumstances.

balances devraient se situer dans un local séparé des chloronomes.

(10) Dans les aires renfermant du chlore ou de l'équipement de chloration, sont visiblement affichés les messages suivants : «DANGER! ENTREPOSAGE DE CHLORE» ou «DANGER! ÉQUIPEMENT DE CHLORATION».

(11) Il devrait y avoir deux sorties ou plus afin que la distance à franchir pour se rendre jusqu'à la sortie la plus rapprochée ne soit jamais supérieur à 4,5 m.

(12) Il devrait y avoir un système de ventilation mécanique assurant trois renouvellements d'air par heure. À défaut d'une telle installation, il devrait y avoir des ouvertures grillagées donnant à l'extérieur, d'une superficie correspondant à 0,02 % de celle du plancher, et situées aux endroits suivants :

a) à au plus 150 mm du plancher;

b) près du plafond.

(13) Il devrait également y avoir un système de ventilation mécanique de secours, à aspiration au niveau du plancher, capable d'assurer 30 renouvellements d'air par heure. L'interrupteur de commande du ventilateur de secours devrait être situé à l'extérieur du local des chlorateurs et être surmonté d'un avis indiquant d'attendre 10 minutes après la mise en marche du ventilateur avant d'entrer dans le local.

(14) La température dans la salle d'entreposage et des balances ne devrait jamais être supérieure à celle qui prévaut dans la salle des chlorinateurs; elle devrait, de préférence, être légèrement inférieure à cette dernière. Les conduites de gaz entre les balances, les chlorinateurs et les injecteurs ne devraient pas être acheminées le long d'un mur extérieur ou à un endroit où règne une basse température.

16. (1) La quantité de chlore à ajouter dans l'eau doit être suffisante pour que la concentration de résidu de chlore libre, après un parfait mélange du chlore et de l'eau et un temps de contact de 20 minutes suivant ce mélange, soit de 0,2 mg/l. Malgré ce qui précède, le médecin-hygiéniste en chef peut modifier cette exigence en cas de circonstances locales particulières.

(2) The chlorine residual test is performed on a sample of the plant or pipeline effluent, after it has been held for 20 minutes, unless it is certain that there has already been a chlorine contact time of 20 minutes.

(3) Where bacterial counts in the distribution system are high, the minimum requirements for chlorine residual should be increased.

(4) Where possible, a chlorine residual should be maintained in all active parts of the distribution system.

(5) There shall be a minimum total chlorine contact period of 20 minutes in the pipeline and reservoirs, before the first consumption by any person of the treated water.

(6) There shall be a permanent standard chlorine residual comparator test kit at each water plant where chlorination is undertaken.

(7) Whenever it is necessary to pump unchlorinated water which might not be potable into the distribution system the Chief Medical Health Officer or in his or her absence a responsible Health Officer, shall be notified immediately. After the emergency, the water mains and service lines shall be disinfected as stated in section 22.

Fluoridation

17. (1) Fluoridation is recommended for community water supplies. Before the equipment is ordered, the fluorides concentration in the raw water shall be checked to be sure of the need for fluorides.

(2) The fluorides feed rate shall be proportioned to the water flow rate. Where a pump supplies water at approximately a constant rate, a suitable fluoridator is a type which operates simultaneously with the pump. The pumping variation should be less than 10% from the mean.

(2) La détermination du taux de chlore résiduel est effectuée sur un échantillon d'un effluent de la station de traitement ou d'une canalisation après une période d'attente de 20 minutes, à moins qu'il ne soit établi qu'il y ait déjà eu un temps de contact de 20 minutes.

(3) Lorsque la numération bactérienne dans le réseau de distribution est élevée, la concentration de chlore résiduel minimale devrait être augmentée.

(4) Si possible, une certaine concentration de chlore résiduel devrait être maintenue dans toutes les parties actives du réseau de distribution.

(5) Il doit y avoir un temps de contact total de chlore de 20 minutes dans les canalisations et les réservoirs avant que toute personne puisse consommer l'eau traitée.

(6) Toute station de traitement de d'eau qui effectue la chloration est dotée en permanence d'une trousse standard du type comparateur pour effectuer les dosages de chlore résiduel.

(7) Lorsqu'il est nécessaire d'acheminer dans un réseau de distribution de l'eau non chlorée et possiblement non potable, le médecin-hygiéniste en chef ou, en son absence, un agent de la santé compétent, en est immédiatement avisé. Une fois l'urgence satisfaite, les conduites principales et les conduites de branchement sont désinfectées de la manière prévue à l'article 22.

Fluoruration

17. (1) Il est recommandé de procéder à la fluoruration des réserves d'eau d'une collectivité. Avant de commander l'équipement, une vérification de la concentration de fluorures dans l'eau est effectuée pour s'assurer de la nécessité de la fluoruration.

(2) Le taux d'alimentation en fluorures est proportionnel au débit d'eau. Lorsque le débit d'eau fourni par la pompe est à peu près constant, le fluorateur idéal est celui qui agit selon le fonctionnement de la pompe. Le débit d'eau fourni par la pompe ne devrait pas s'écarter de plus de 10 % de la moyenne.

(3) The sampling point should be a tap located on a line before the point where interfering substances (alum, chlorine, polyphosphates and other such substances) are added. The application point for the fluorides should be far enough ahead of this to ensure thorough mixing. Usually a distance equivalent to 10 pipe diameters would be sufficient for this purpose.

(4) If such an arrangement is not practical in view of the existing plant layout, then accurate tests may be made following neutralization in the case of chlorine and removal by distillation in the case of aluminum (from alum) and phosphates. The operator should make appropriate adjustments in the readings of his or her tests.

(5) The concentration of fluorides in the finished water shall be within the range of 1.2 and 1.6 mg/l. The optimum proportion is 1.4 mg/l.

(6) The following control procedures are required and all results should be recorded:

(a) the operator should make daily tests to determine the fluorides concentration in the treated water. In some installations there will be instantaneous variations in the fluorides concentration at the sampling tap due to the briefly intermittent discharge characteristics of some fluorides feeders. To compensate for these variations a large bottle of water should be drawn as the source of samples for testing;

(b) on a weekly basis duplicate samples of the water to be tested should be submitted to a laboratory designated by the Chief Medical Health Officer. The laboratory analyses will establish the accuracy of the plant operator's field tests and his or her ability to properly control the treatment. When this criteria has been attained, duplicate samples should be submitted on a monthly basis only;

(c) as a daily routine, the chemical dosage should be calculated based on the consumption of fluorides and volume of

(3) Le point d'échantillonnage devrait se trouver en amont de l'endroit où sont ajoutées certaines substances (alum, chlore, phosphates et autres substances du genre) venant modifier la composition de l'eau. Le point d'introduction des fluorures dans le réseau devrait être encore plus en amont pour que les fluorures puissent être parfaitement dispersés dans l'eau. À cette fin, une distance équivalant à 10 diamètres de conduite est habituellement suffisante.

(4) Si un tel aménagement n'est pas pratique en raison de la disposition actuelle des lieux, des essais précis peuvent être menés après neutralisation du chlore et enlèvement par distillation de l'alum et des phosphates. Les ajustements nécessaires devraient alors être apportés à la lumière des résultats de tels essais.

(5) La concentration de fluorures dans l'eau finie se situe entre 1,2 et 1,6 mg/l, la concentration optimale étant de 1,4 mg/l.

(6) Les mécanismes de contrôle ci-après décrits sont obligatoires et les résultats devraient être consignés dans un registre :

a) des essais quotidiens sont faits pour déterminer la concentration de fluorures dans l'eau traitée. Dans certaines installations, des variations instantanées dans la concentration de fluorures peuvent être décelées à la prise d'échantillon, en raison des brèves interruptions de débit des fluorateurs à fonctionnement intermittent. Pour éviter que les résultats de l'essai ne soient faussés, une grosse bouteille d'eau devrait être prélevée comme échantillon;

b) chaque semaine, un double de chaque échantillon d'eau prélevé aux fins d'analyses devrait être soumis à un laboratoire désigné par le médecin-hygiéniste en chef pour que puissent être vérifiées la précision des essais faits à la station et l'aptitude de l'exploitant à contrôler adéquatement le traitement de l'eau. Une fois cette précision et cette aptitude établies, le double des échantillons ne devrait être soumis qu'une fois par mois;

water treated.

(7) Protection to the skin and lungs of the operator handling the fluoride chemical shall be maintained as follows:

(a) if the equipment is not of a type which prevents the dust entering the air when the fluorides chemical is being replaced, then the equipment should be in a separate room with suitable exhaust venting from the floor level to the outside atmosphere. A vacuum cleaner in which disposable bags are used would be a suitable alternative, and it could also be used in cleaning the room. The bags should be either buried at the nuisance grounds or washed out in the sewer;

(b) respirator, cloth cap, rubber gloves, rubber apron and goggles should be used at all times when handling the dry chemical, and these should be stored outside the fluoridation room;

(c) the operator should not smoke while handling the dry powder;

(d) instructions should be posted instructing the staff to observe the points contained in this section.

c) tous les jours, le dosage de fluorures est calculé sur la base de la quantité de fluorures utilisée par rapport au volume d'eau traitée.

(7) La protection de la peau et des poumons de la personne qui manipule les fluorures est assurée par le respect des directives suivantes :

a) si l'équipement ne permet pas d'empêcher la dispersion des particules chimiques dans l'air au moment de la remise en place des fluorures, l'équipement devrait être installé dans une salle distincte desservie par un ventilateur d'extraction convenable, aspirant l'air au niveau du sol et l'évacuant à l'extérieur. Une bonne solution de rechange serait un aspirateur avec sacs jetables, lequel pourrait également être utilisé pour l'entretien de la salle. Les sacs usés devraient être enfouis à un endroit prévu à cette fin ou leur contenu chassé dans l'égout;

b) lors de la manipulation de la poudre chimique, le respirateur, la casquette de toile, les gants, le tablier de caoutchouc ainsi que les lunettes de sécurité devraient être utilisés en tout temps et devraient être entreposés à l'extérieur de la salle de fluoration;

c) la personne qui manipule la poudre sèche ne devrait pas fumer;

d) des directives portant sur les points traités au présent article devraient être affichées.

PART III

PUMPING STATIONS, RESERVOIRS AND DISTRIBUTION SYSTEMS

Pumping Stations

18. (1) The design of pumping stations shall be based on the provision to ensure maintenance of the sanitary quality of the water pumped through it, and to facilitate cleanliness, continuity and ease of operation. Subsurface pits, subterranean piping and connections and inaccessible installations should be avoided.

PARTIE III

STATIONS DE POMPAGE, RÉSERVOIRS ET RÉSEAUX DE DISTRIBUTION

Stations de pompage

18. (1) Les stations de pompage sont conçues de manière à préserver la qualité de l'eau qui y est pompée et à favoriser l'entretient ainsi que la simplicité et la continuité de son fonctionnement. Elle devrait comporter le moins possible de fosses et de canalisations souterraines ainsi que d'installations inaccessibles.

(2) The location should be chosen so that there will be adequate control over every external factor (such as usage of surrounding areas) which might contribute to the impairment of the sanitary quality of the water.

(3) The wet wells and pump reservoirs which are part of pumping stations shall conform with section 19.

Equalizing Reservoirs, Elevated Tanks, Standpipes and Pressure Tanks for Finished Water

19. (1) The most up-to-date standards should be followed where applicable in the design of reservoirs and other tanks.

(2) The locations, size and type of reservoir, tank or standpipe should be integrated with the distribution system, ground elevations and effective pressures, type and capacity of supply, economics of pumping and construction, consumer use and terrain. The design to be desired should give uniform pressures during the day with no pressure drop below 140 kPa.

(3) Reservoirs shall have watertight covers or roofs which exclude birds, animals, insects and excessive dust.

(4) There shall be locks on access manholes, fencing and other precautions in order to prevent trespassing, vandalism or sabotage.

(5) Steps should be taken to prevent an excessive build-up of ice which would damage the reservoir.

(6) There shall be consideration of public health safety in the location of ground level reservoirs. The bottom should be above the groundwater table and preferably above any possible flooding.

(7) Where the bottom of a reservoir is below the

(2) L'emplacement devrait être choisi en fonction de la possibilité de contrôler convenablement les facteurs externes (telle l'utilisation faite des secteurs attenants) pouvant contribuer à la dégradation de la qualité de l'eau.

(3) Les bâches d'aspiration et les réservoirs qui font partie intégrante des stations de pompage sont conformes à l'article 19.

Réservoirs d'équilibre, châteaux d'eau, réservoirs au sol et réservoirs sous pression pour l'eau finie

19. (1) Les normes applicables les plus récentes sont respectées dans la conception des réservoirs et des citernes.

(2) L'emplacement, la dimension et la sorte de réservoir, de citerne ou de réservoir au sol devraient être déterminés en fonction de l'utilisation de l'eau, du réseau de distribution, des accidents de terrain, de la contrainte effective, du type et de la capacité de la réserve d'eau, de la rentabilité d'une installation de pompage et sa construction ainsi que du genre de terrain. Les réservoirs devraient être conçus pour permettre de maintenir des pressions constantes durant la journée, sans chutes sous les 140 kPa.

(3) Les réservoirs doivent être munis d'un couvercle ou d'un toit étanche qui empêche les oiseaux, les animaux, les insectes et la poussière de pénétrer à l'intérieur.

(4) Des serrures sont installées sur les trous d'homme d'accès, ainsi que sur les clôtures et d'autres mesures sont prises pour décourager les intrusions, ainsi que les actes de vandalisme et de sabotage.

(5) Des mesures devraient être prises pour empêcher l'accumulation excessive de glace pouvant endommager les réservoirs.

(6) L'emplacement des réservoirs au niveau du sol est déterminé en tenant compte de la santé et de la sécurité du public. Le fond des réservoirs devrait se situer au-dessus de la nappe phréatique et, de préférence, au dessus de tout niveau possible de crue.

(7) Les réservoirs dont le fond se trouve au-

normal ground surface, separation from possible sources of contamination shall be provided as follows:

(a) 46 m from any septic tank, sewage lift station, sewage disposal point, sewage disposal field or other similar source of contamination;

(b) 8 m from any sewer pipe and preferably 30 m;

(c) for all other sources of contamination as far as appears to be reasonable in view of local conditions and the type of construction.

dessus du niveau normal du sol doivent être installés à une certaine distance de toute source de contamination possible, à savoir, selon le cas :

a) à une distance de 46 m d'une fosse septique, d'une station de relevage des eaux usées, d'un point de rejet des eaux usées, d'un champ d'épuration ou de toute autre source de contamination similaire;

b) à une distance de 8 m et de préférence 30 m de toute conduite d'égout;

c) à une distance raisonnable de toute autre source de contamination, compte tenu des conditions locales et du type de construction.

(8) Tops of ground level reservoirs shall be not less than 600 mm above the normal ground surface, and shall be a minimum of 1.2 m above any possible flood level.

(8) Le dessus des réservoirs au niveau du sol est situé à au moins 600 mm au-dessus du niveau normal du sol et à au moins 1,2 m au-dessus de tout niveau de crue possible.

(9) The area surrounding ground level reservoirs shall be graded to prevent surface water from standing against the structure.

(9) Autour des réservoirs au niveau du sol, le terrain est régalé en pente pour empêcher que les eaux de surface ne stagnent contre les réservoirs.

(10) There shall be footing drains around the reservoir, which should be drained by gravity if possible. There should be a means of observing the volume of flow from the footing drains.

(10) Des drains de semelle, si possible à écoulement par gravité, sont posés autour des réservoirs. Un dispositif devrait être prévu pour observer le débit d'eau dans les drains.

(11) The maximum variation of working levels in storage reservoirs which float on a distribution system should not exceed 9 m.

(11) La variation maximale du niveau utile des réservoirs de stockage incorporés à un réseau de distribution ne devrait pas être supérieure à 9 m.

(12) Water level controls or telemetering equipment should be provided in reservoirs on the distribution system where there is an appreciable variation in level.

(12) Lorsque la variation du niveau est importante, les réservoirs devraient être munis de régulateurs de niveau d'eau ou d'équipement de télémesure.

(13) Water level control switches or telemetering equipment should be provided, with warning or alarms in appropriate places about the community, so that high and low water levels may be immediately reported.

(13) Des interrupteurs reliés aux régulateurs de niveau ou d'équipement de télémesure sont prévus, avec avertisseurs ou signaux d'alarme placés à des endroits stratégiques de la collectivité, afin que les niveaux d'eau trop hauts ou trop bas soient signalés immédiatement.

(14) Overflows on structures shall have free fall discharges that are in plain view, and should be designed so that they will not freeze.

(14) Les déversoirs des réservoirs sont du type à déversement libre et sont à l'épreuve du gel.

(15) A manhole on a reservoir or tank shall be framed so that there is a raised lip around the edge. The lip shall be at least 100 mm high, and preferably 150 mm, and the join between the lip and the roof shall be watertight. It shall be fitted with a watertight cover which overlaps the lip of the manhole and extends down around the frame at least 50 mm. The cover shall be hinged at one side and shall be provided with a locking device.

(15) Le contour des trous d'homme sur les réservoirs ou les citernes est muni d'un collet. Le collet mesure 100 mm et de préférence 150 mm de haut, et le joint entre le collet et le toit est étanche. Un couvercle étanche recouvre complètement le collet et est muni d'un rebord d'au moins 50 mm qui tombe sur les parois du réservoir.

(16) The roof of the structure should be well drained. The downspout pipes of the roof drain shall not enter the reservoir or connect to the overflow from the reservoir. There shall be no parapets or construction which will tend to pool the water or snow on the roof.

(16) Le toit des réservoirs devrait être muni des éléments nécessaires à l'écoulement des eaux de pluie. Les tuyaux de descente reliés à l'avaloir ne sont pas acheminés à l'intérieur des réservoirs ni raccordés au déversoir. Le toit ne doit pas être muni de parapets ou d'autres constructions pouvant causer l'accumulation de l'eau ou de la neige.

(17) Valve stems or similar projections through the roof shall be designed with a wall sleeve, elevated at least 100 mm above the roof top, set in a curbed opening, or welded to the cover plate. The opening must be covered by an overlapping, turned-down hood, welded to the valve stem.

(17) Les tiges de soupape ou les autre éléments faisant sailli sur le toit des réservoirs sont protégés par un manchon s'élevant à une hauteur d'au moins 100 mm au-dessus du toit. Les manchons sont soudés au couvercle ou passent par une ouverture à collet. Les ouvertures sont recouvertes d'un capuchon rabattu qui chevauche la tige en saillie et qui est soudé à celle-ci.

(18) Vents, overflows, finial decorations and warning lights shall be so constructed as to exclude dust, birds, animals and insects. There shall be no direct connection between an overflow and any drain or sewer. A ground level vent must terminate in an inverted U construction, the opening of which is at least 600 mm above the ground surface.

(18) Les évents, les déversoirs, les éléments décoratifs et les feux avertisseurs sont construits de manière à empêcher l'introduction de la poussière, des oiseaux, des animaux et des insectes. Les déversoirs ne sont pas directement raccordés aux drains ou aux canalisations d'égout. Tout évent situé près du sol doit se terminer en forme de U renversé, l'ouverture placée à une hauteur d'au moins 600 mm au-dessus du niveau du sol.

(19) Unsafe water shall not be stored adjacent to a finished water compartment when only a single wall separates the two.

(19) L'eau de mauvaise qualité ne doit pas être stockée dans un compartiment voisin d'un compartiment d'eau finie lorsqu'une seule paroi sépare les deux compartiments.

(20) Reservoirs should be drainable to the ground surface in such a manner as to preclude contamination by surface water and access by animals. There shall be no direct connection to a sewer or storm. Alternatively, a reservoir should be drained by pumping from a sump at a lower level than the bottom. A manhole should be located directly above the sump, to permit servicing of the

(20) Le contenu des réservoirs devraient être évacué à la surface du sol sans qu'il y ait risque d'intrusion d'animaux ou risque de contamination par des eaux de surface. Les réservoirs ne sont pas directement raccordés à un égout sanitaire ou pluvial. À défaut, ils devraient être vidés au moyen d'une pompe installée dans un puisard situé à un niveau inférieur à celui du fond du réservoir. Le puisard

pump intake and to allow dewatering with a portable pump.

devrait être muni d'un trou d'homme pour permettre l'entretien de la prise et l'assèchement du puissard au moyen d'une pompe portative.

(21) Interior surfaces of all steel reservoirs shall be protected by paints or other protective coatings or cathodic protection according to practices recommended by the American Water Works Association or the Canadian Standards Association.

(21) Les parois intérieures des réservoirs en acier sont protégées par une peinture ou d'autres revêtements de protection ou encore une protection cathodique en conformité avec les pratiques recommandées par l'American Water Works Association ou l'Association canadienne de normalisation.

(22) There should be periodical disinfection in order to ensure a continued source of finished water.

(22) Afin que l'alimentation en eau finie soit continue, les réservoirs devraient être désinfectés périodiquement.

Water Mains

Conduites d'eau principales

20. (1) Pipes and pipe packing and jointing materials shall have been manufactured in conformity with the latest standard specifications issued by the American Water Works Association or the Canadian Standards Association. Plastic pipe shall be approved by and bear the seal of the Canadian Standards Association. Selection of the pipe material and design shall be made after giving consideration to the possible deleterious action of the soils and water which will be surrounding the pipe, the water to be distributed and possible electrolytic action on the metal parts.

20. (1) Les tuyaux ainsi que les matériaux de jointement et d'obturation utilisés doivent être fabriqués en conformité avec les normes récentes prescrites par l'American Water Works Association ou l'Association canadienne de normalisation. Les tuyaux en plastique sont approuvés par l'Association canadienne de normalisation et en portent l'étiquette. La conception et les matériaux de fabrication des tuyaux sont choisis en tenant compte de l'effet possiblement nuisible du sol et de l'eau qui entoureront le tuyau, de l'eau qui est distribuée et de la possibilité d'une réaction électrolytique avec les pièces métalliques.

(2) Steps should be taken to prevent freezing, which could damage the mains.

(2) Les conduites d'eau principales devraient être protégées contre le gel.

(3) The minimum working pressure during the flow in outlying parts of the distribution system should be 140 kPa.

(3) La pression de service minimale dans les parties périphériques du réseau de distribution devrait être de 140 kPa.

(4) If water hydrants are installed, the supply of water shall be adequate to provide water for the fire pumps and regular use, and at the same time maintain adequate positive pressure in all parts of the system.

(4) Si le réseau de distribution comporte des prises d'eau, la réserve d'eau est suffisante pour répondre à la demande régulière et à une demande ponctuelle en eau d'incendie, et pour maintenir une pression positive adéquate dans toutes les parties du réseau.

(5) The dead-end of a main should have a fire hydrant or blow-off connected for flushing purposes. No flushing device shall be connected directly to any sewer.

(5) L'impasse d'une conduite principale devrait être raccordée à un poteau d'incendie ou à un robinet d'évacuation aux fins de rinçage. Aucun dispositif de rinçage n'est raccordé directement à un égout.

(6) Water mains shall be laid a minimum of 3 m from sewers which run in the same direction. Where it is clearly very difficult to comply with this regulation, then

(a) the bottom of the water main shall be at least 450 mm higher than the top of the sewer, and

(b) the water main shall rest on undisturbed soil.

(6) Les conduites d'eau principales sont installées à une distance d'au moins 3 m de toute canalisation d'égout parrallèle. S'il est trop difficile de se conformer à cette règle, les règles suivantes s'appliquent :

a) la partie inférieure d'une conduite d'eau principale doit se situer à au moins 450 mm de la partie supérieure d'une canalisation d'égout située au-dessous;

b) la conduite d'eau principale repose sur un sol non remanié.

(7) When a water main must cross a sewer, the bottom of the water main shall be laid at least 450 mm above the top of the sewer. The vertical separation shall be maintained for that portion of the water main located within 3 m of the sewer, the 3 m to be measured as the normal distance from the water main to the sewer.

(7) Lorsqu'une conduite d'eau principale croise une canalisation d'égout, la partie inférieure de la conduite d'eau doit se situer à au moins 450 mm de la partie supérieure de la canalisation d'égout qui se situe au-dessous. Cette distance s'applique pour toute partie de la conduite d'eau comprise dans un rayon de 3 m de la canalisation d'égout, cette distance de 3 m étant la distance normale entre la conduite d'eau et la canalisation d'égout.

(8) When it is impossible to achieve the condition as stated in subsections (6) and (7) then both the water main and the sewer shall be constructed of Class 150 pressure-type pipes. There shall be adequate support on each side of the crossing for both pipes so that there will be no stresses in either pipe caused by one pipe settling on the other. Pipe sections shall be centred at the crossing so that there is a maximum distance from the crossing to all joints. Both pipes shall be pressure tested to assure that there are no leaks.

(8) S'il est impossible de respecter les dispositions des paragraphes (6) et (7), alors la conduite d'eau principale et la canalisation d'égout sont fabriquées de tuyaux sous pression de catégorie 150. Chacune des deux canalisations est soutenue de part et d'autre du croisement afin qu'aucune des deux n'exerce une pression sur l'autre. Les sections des tuyaux sont centrées de manière à ce que les joints de chacune des canalisations se situent à égale distance de part et d'autre du point d'intersection entre les deux canalisations. L'étanchéité des canalisations est vérifiée au moyen d'un essai sous pression.

(9) Where water and sewer pipes are contained in a utilidor, there shall be adequate provision for drainage in order to prevent contamination of the water supply during repairs and breakdowns.

(9) Lorsque des canalisations d'eau et d'égout sont acheminées dans le coffrage d'un réseau de distribution aérien, des dispositions sont prises pour l'évacuation du coffrage afin d'éviter les risques de contamination des réserves d'eau lors d'un bris ou d'une réparation.

(10) Water mains which run below the surface of a stream or other surface water body shall be of special construction with flexible watertight joints. Valves shall be provided at both ends of the water crossing so that the section can be isolated for test or repair. The valves shall be easily accessible and not subject to flooding. Taps shall be made for testing

(10) Les conduites d'eau principales qui passent sous un ruisseau ou tout cours d'eau de surface sont de construction particulière et munies de joints flexibles et étanches. Des robinets sont installés aux deux extrémités du tronçon qui se retrouve sous le cours d'eau afin qu'il soit possible d'isoler ce dernier aux fins d'essai ou de réparation. Les robinets sont

and locating leaks.

(11) Water mains which cross under railways shall conform to the standards and requirements of those regulations established by the National Transportation Agency cited as *Pipe Crossings Under Railways Regulations*.

(12) Drains from hydrant barrels shall not be connected to sanitary sewers or storm drains. Where practicable hydrant barrels should be drained to the ground surface, or to dry wells provided exclusively for that purpose and a means provided for pumping out.

(13) There shall be no physical connections between the distribution system and any pipes, pumps or tanks which are connected to a sewer system or storm drain or are supplied from any source that is not approved.

Water Haulage Tanks

21. (1) Water haulage tanks should be constructed so as to exclude birds, animals, insects and dust.

(2) There shall be a manhole cover on a tank, conveniently located for entering for purposes of cleaning the interior. The opening shall be made so that there is a water-tight raised lip around the edge, a minimum of 50 mm high. It shall be fitted with a water-tight cover.

(3) There shall be a drain opening in the bottom of a tank so that the tank may be drained completely and flushed easily.

(4) Each tank shall be provided with convenient clean storage space for the hoses, and the ends of the hoses shall be protected from contamination.

Disinfection of New or Repaired Works

22. (1) Before disinfection is attempted, all surfaces should be thoroughly cleaned. Pipelines should be

faciles d'accès et ne sont pas susceptibles d'être submergés. Des prises d'essai sont prévues pour la détection des fuites.

(11) Les conduites d'eau principales qui passent sous un chemin de fer sont conformes aux normes et exigences du *Règlement sur le passage de conduits sous les chemins de fer* de l'Office nationale des transports.

(12) Les tuyaux d'écoulement des poteaux d'incendie ne sont pas raccordés directement à un égout sanitaire ou à un collecteur d'eaux pluviales. Si possible, les poteaux d'incendie devraient être évacués à la surface du sol ou dans un puits sec prévu à cette seule fin muni d'un dispositif de pompage.

(13) Les conduites, les pompes et les réservoirs raccordés à un réseau d'égouts ou à un collecteur d'eaux pluviales ou alimentés à partir d'une source non approuvée ne sont raccordés d'aucune manière au réseau de distribution.

Citernes de transport d'eau

21. (1) Les citernes de transport d'eau sont construites de manière à empêcher l'introduction des oiseaux, des animaux, des insectes et de la poussière.

(2) Les citernes sont munies d'un trou d'homme avec couvercle étanche, placé de manière à faciliter l'accès à l'intérieur aux fins de nettoyage. L'étanchéité est assurée par un collet d'au moins 50 mm de hauteur sur le contour du trou d'homme.

(3) Un trou d'évacuation est pratiqué au fond des citernes afin qu'elles puissent être vidées complètement et rincées facilement.

(4) Chaque citerne comporte un espace de rangement pour tuyaux souples qui est propre et convenable. Les extrémités des tuyaux souples qui y sont rangées sont protégées contre toute contamination.

Désinfection des ouvrages neufs ou remis en état

22. (1) La désinfection devrait être précédée d'un nettoyage à fond de toutes les surfaces des ouvrages

flushed with potable water until turbidity-free water is obtained at all ends. Reservoirs should be flushed with water and brushed if necessary to obtain clean surfaces.

(2) New, repaired or altered waterworks and pipelines shall be disinfected according to the American Water Works Association Standards, or as follows:

(a) all surfaces should be in contact with chlorine solution with a final strength of 10 or 50 mg/l of available chlorine after a contact period of 24 or two hours respectively. The higher value may be tested using chlorine testing papers;

(b) if it is necessary to conserve water and chemical, reservoirs may be disinfected by spraying all surfaces with a chlorine solution having a starting strength of 250 mg/l available chlorine. Special protective clothing and self contained or air-supplied type respirators should be used by personnel performing the spray procedure; or

(c) when surface conditions are not ideal, such as may be encountered in used works, special disinfection procedures will be required. This could include the maintenance of a chlorine residual for an extended period of time.

visés. Les canalisations devraient être rincées avec de l'eau potable jusqu'à ce que de l'eau parfaitement limpide en ressorte aux extrémités. Les réservoirs devraient être rincés avec de l'eau et leurs surfaces brossées au besoin.

(2) Les canalisations et autres ouvrages d'adduction et de distribution d'eau, nouveaux, modifiés, ou remis en état, sont désinfectés en conformité avec les normes de l'American Water Works Association ou les exigences suivantes :

a) toutes les surfaces devraient être mises en contact avec une solution de chlore présentant une concentration finale de chlore actif de 10 ou 50 mg/l pour une période de 24 ou de 2 heures, respectivement. La valeur la plus élevée peut être vérifiée au moyen d'un papier détecteur de chlore;

b) s'il est nécessaire d'économiser l'eau et les produits chimiques, les réservoirs peuvent être désinfectés en pulvérisant sur toutes ses surfaces une solution de chlore présentant une concentration initiale de chlore actif de 250 mg/l. Le personnel responsable de ces travaux devrait porter des vêtements de protection particuliers ainsi que des respirateurs à adduction d'air ou à alimentation en air autonome;

c) lorsque l'état des surfaces n'est pas idéal, comme dans le cas des ouvrages usagés, des méthodes de désinfection particulières sont nécessaires. Ainsi, il pourrait être nécessaire de maintenir, pour une période prolongée, un résidu de chlore dans l'eau.

Records

23. (1) Accurate records shall be maintained of raw water quality, finished water quality and amounts of chemicals used.

(2) As-built construction plans shall be maintained and shall be amended to include additions, extensions and renovations.

Registres

23. (1) Les données concernant la qualité de l'eau brute, la qualité de l'eau finie et les quantités de produits chimiques utilisés sont consignées de façon précise dans des registres.

(2) Les ajouts, prolongements et rénovations sont indiqués au fur et à mesure sur les dessins d'exécution des installations en place.

Appendix C –
Water Licence (with Amendments)

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: 3BM-IGL1520/Renewal

March 31, 2015

Brian Flemming
Senior Administrative Officer
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Igloolik, NU XOA 0A0

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Government of Nunavut
Dept. Community and Government Services
P.O Box 379, Pond Inlet, NU X0A 0S0

E-mail: broy@gov.nu.ca

RE: NWB Renewal Licence No. 3BM-IGL1520

Dear Mr. Flemming and Mr. Roy;

Please find attached Licence No. **3BM-IGL1520** issued to Hamlet of Igloolik by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (*Nunavut Land Claims Agreement or NLCA*). The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then water use and waste disposal must cease, or the Licensee may be in contravention of the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the licence. The NWB recommends that an application for the renewal of this Licence be filed at least three (3) months prior to the Licence expiry date.

If the Licensee contemplates or requires an amendment to this licence, the NWB may decide, in the public's interest, to hold a public hearing. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment; however, a minimum of sixty (60) days is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been received and are

acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received by interested persons on issues identified. This information is attached for your consideration.[1]

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/ce/ri

Enclosure: Licence No. **3BM-IGL1520**
Comments – AANDC

Cc: Qikiqtani Distribution List

[1] Aboriginal Affairs and Northern Development Canada (AANDC), September 11, 2014;

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DECISION

LICENCE NUMBER: 3BM-IGL1520

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence renewal received on March 13, 2014, made by:

HAMLET OF IGLOOLIK

to allow for the use of water and deposit of waste during municipal activities by the Hamlet of Igloolik, located within the Qikiqtani Region of Nunavut at geographical coordinates as follows:

Latitude: 69°23'N and Longitude: 81°46'W

DECISION

After having been satisfied that the application was for a location that falls outside of an area with an approved Land Use Plan[2] as determined by the Nunavut Planning Commission (NPC) and exempt from the requirement for screening as described within Schedule 12-1 by the Nunavut Impact Review Board[3] in accordance with Article 12 of the *Nunavut Land Claims Agreement* (*NLCA*), the NWB decided that the application could proceed through the regulatory process. In accordance with S.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*Act*) and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the Applicant and considering the representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *Act*, waived the requirement to hold a public hearing, and determined that:

Licence No. 3BM-IGL0911 be renewed as Licence No. 3BM-IGL1520 subject to the terms and conditions contained therein. (Motion #: 2014-B1-045)

Signed this 31st day of March, 2015 at Gjoa Haven, NU.

Thomas Kabloona
Nunavut Water Board, Chair

TK/ce/ri

[2] Nunavut Planning Commission (NPC) Conformity Determination, August 13, 2014.
[3] Nunavut Impact Review Board (NIRB) Screen Exemption from Screening Decision, August 20, 2014

I. BACKGROUND

The Hamlet of Igloolik (Hamlet or Igloolik) is located on Igloolik Island in the northwest region of the Foxe Basin within the Qikiqtani Region of Nunavut, at the following coordinates: Latitude: 69°23'N and Longitude: 81°46'W. Igloolik is located within a zone of continuous permafrost and the island is composed of dolomitic conglomerates, with sandstone, dolostone and siltstone. The island is at a very low elevation with numerous ponds and an extensive tidal foreshore.

In 2014, the Hamlet of Igloolik has an estimated population of approximately 1,780. Existing Water Use and Waste Disposal Facilities include a freshwater intake pump, reservoir, truck fill station, a three cell sewage exfiltration lagoon system with a wetland, an older fourth sewage cell constructed prior to the three cell lagoon system, domestic landfill, and metallic waste landfill.

The Water Supply, Waste Water treatment by lagoon process and Waste Management systems within this Water Licence are at different stages with system upgrades and design/construction activities. The following is an update provided by the Licensee for each system:

Water Supply: This system consists of a Water Truck Fill Station, Water Storage Reservoir and an intake pipe from South Lake to the Water Storage Reservoir. The Licensee has indicated that the design and construction plans to expand the Water Storage Reservoir are currently on hold, pending capital fund approvals. The Board advises that an amendment application with construction drawings shall be submitted prior to the commencement of construction for the Water Supply system.

Wastewater Treatment by Lagoon: A three cell exfiltration lagoon is used to treat the entire wastewater produced annually in the Community. The older cell constructed prior to these three cells is still there and sometimes is used in case of emergency. The design for rehabilitation and improvement of the sewage lagoons is complete. The Licensee has expressed that the project is on hold. The Board advises that an amendment application with construction drawings shall be submitted prior to the commencement of construction for the Wastewater Treatment Facility.

Solid Waste Management: The solid waste management for the Hamlet is comprised of a domestic waste site and a metal waste site. The Licensee has expressed that the rehabilitation plans for the Waste Management Facilities is currently on hold due to funding. The Board advises that an amendment application with construction drawings shall be submitted prior to the commencement of construction or upgrades for the new Waste Management System.

II. FILE HISTORY

Information contained on the NWB's FTP site indicates that the Nunavut Water Board (NWB) has issued two licences to the Hamlet of Igloolik in past years.

Licences issued by the NWB to the Hamlet of Igloolik are the followings:

- ***Licence NWB3IGL0308***
  This licence was issued on February 5, 2003 with an expiry date of August 31, 2008. The licence allowed for the use of 70,000 cubic metres of water annually and deposit of waste in support of a Municipal undertaking.

- ***Licence 3BM-IGL0911***
  This licence was issued on July 10, 2009 with an expiry date of July 31, 2011. The licence allowed for the use of 70,000 cubic metres of water annually and deposit of waste in support of a Municipal undertaking.

III. PROCEDUAL HISTORY

The NWB received from the Government of Nunavut – Community Government Services (GN-CGS), on behalf of the Hamlet of Igloolik, the following application documents (Application) for the ten (10) year renewal of Licence 3BM-IGL0911, from March 13, 2014 to May 16, 2014:

- Hamlet Annual Reports 2009, 2010, 2011, 2012 and 2013
- Renewal Application Cover Letter, May 16 2014
- Hazardous Materials Spill Database, Baffin Spills in 2013
- Igloolik Bathymetic Survey, Arktis Solutions Incorporated, August 2011
- Igloolik Cover Letter to NWB Application March 2014
- Igloolik Water Licence Application March 2014
- Location of South Lake 2014
- Hamlet of Igloolik, Plan for Compliance Igloolik
- Technical Summary of Environmental Facilities under the Water License # 3BM-IGL 0911 (Part B:1.a) of the Hamlet of Igloolik, Baffin Region, Nunavut (in English & Inuktitut) March 2014
- Igloolik Water Supply Design Development ARKTIS March 2014
- CGS Letter to NWB for Igloolik May 2014
- Department of Community and Government Services Letter to NWB, May 16, 2014
- Igloolik Chemical Analysis of raw water 2008
- Igloolik Lab Final Report, Taiga Environmental Laboratory, September 04 2008
- Igloolik Operations and Maintenance Manual Water Truck Fill Station, 1980 (Chapter 1- 10)
- Design Development Report – Improvement of Water Supply System, Igloolik, Nunavut, 15 October2011

Following receipt and an internal review, NWB distributed the Application for a thirty (30)-day comment period on August 12, 2014. On September 11, 2014, submission was received from Aboriginal Affairs and Northern Development Canada (AANDC).

The NWB has placed in its Public Registry copies of the Application and all comments received from interveners. This information can be accessed on the NWB's File Transfer Protocol (FTP) site using the following link (Username: **public**; Password: **registr***y*):

ftp://ftp.nwb-oen.ca/1%20PRUC%20PUBLIC%20REGISTRY/3%20MUNICIPAL/3B/3BM%20-%20Municipality/3BM-IGL0911/

Based upon the results of the detailed assessment, including consideration of any potential accidents, malfunctions, or impacts to water that the overall project might have in the area, the Board approved the application and has renewed the Licence 3BM-IGL0911 as Licence 3BM-IGL1520.

IV. ISSUES

The following sections provide background information relevant to the terms and conditions included in this Licence, in the context of submissions received and/or the Board's rationale. Where appropriate, the Board has removed or modified terms and conditions associated with the previous licence, which are no longer applicable under this renewal Licence.

Term of the Licence

In accordance with s. 45 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA or the Act), the NWB may issue a licence for a term not exceeding twenty-five (25) years. In determining an appropriate term for a renewal licence, the Board generally takes into consideration several factors including intervener's comments, the Licensee's compliance history, as well as the rationale contained in the Application.

The Licensee requested in its Application a ten (10) year term for the licence. The intervening party, AANDC, in their submissions recommended a renewal term of not more than five (5) years. The Board in examining the compliance history of the Licensee and the comments received from AANDC has granted a term of five (5) years to the Licence. In so doing, the Board believes and expects that the five-year terms will provide the Licensee with significant opportunities to prove that it can consistently abide by the terms and conditions in the licence overtime.

Moreover, it is noted that the Hamlet's actual daily water use may be higher than 300 cubic metres per day when filling the Water Storage Reservoir which could trigger a change of the Licence Type "B" to Type 'A". The five (5) year term shall allow the Licensee to measure the daily water use during two (2) full years and help the Board to accurately determine the Type of Licence for the future renewal

Annual Report

Under the reporting section of the Licence, Part B, Item 1, the Licensee is required to submit, on an annual basis, a report pertaining to water use and waste deposit activities. Although the 2011-2013 reports submitted include useful information, the AANDC noted that the reporting requirements specified in Part B, Item 1 of the Licence were not being fully satisfied. The NWB concurs with AANDC's recommendations and requests that the Licensee supplement the standard NWB reporting forms with additional documentation in order to ensure that all monitoring requirements are satisfied. The Licensee is encouraged to develop its own annual reporting template. This template should include tabular summaries of monitoring data pursuant of Part B, Item 1 (a) of the Licence. The Licensee is encouraged to contact AANDC, the NWB, or the GN-CGS to discuss its licensed monitoring program. This reporting information will be kept in the NWB's public registry

and made available to interested persons upon request. Further, the NWB maintains annual reporting information on its FTP site, which can be accessed using the following link (username: **public** and password: **registry**): ftp://ftp.nwb-oen.ca/1%20PRUC%20PUBLIC%20REGISTRY/.

Water Supply Facilities

The Hamlet of Igloolik currently obtains its potable water from South Lake to annually supply an existing reservoir with a capacity of 65,000 cubic metres. The Licensee has indicated that the Hamlet's plans to expand the existing reservoir are currently on hold, pending capital fund approvals. Water is currently withdrawn during the months of August and September with a maximum authorized water use quantity of 70,000 cubic metres annually.

No concerns were raised by the parties in their written submissions as to the amount of water required by the Hamlet, the manner in which it is obtained or in the manner in which this water will be used.

In review of the application, the NWB relied on the new Nunavut Waters Regulations (Regulations) issued on April 18, 2013 and the definition of "Use" provided by the Act. All water taken from the South Lake, main water source to fill the reservoir would qualify under the definition as "use of water". Therefore, having given due consideration to the information presented during the review, the NWB has determined that water extracted from the source water supply, for any purposes, is considered as a Use of water and that the Licensee is requested to daily measure directly, on the source at the Freshwater Intake Pump, all freshwater used for all purposes. The Licensee shall also measure and on a daily, monthly and annual basis all freshwater used for all purposes at the Truck-fill Station.

The Licensee is also advised that according to the Schedule 2 of Regulations any use of 300 cubic metres or more per day and any use of waters related to the storage of 60,000 cubic metres or more water would require a Type "A" Water Licence. The Board has, therefore, set the maximum water usage for all purposes specified in this Licence at 81,208 cubic metres per year or up to 299 cubic metres per day for filling of the reservoir. Lastly, please note that the NWB has renewed the terms and conditions associated with water use by the Hamlet accordingly.

Sewage Disposal Facilities

The Hamlet of Igloolik currently provides trucked sewage services for the Community residents, businesses and institutions. No concerns were raised by the parties in their written submissions as to the manner in which the sewage is treated and disposed of. The NWB has renewed the terms and conditions associated with Sewage Disposal Facility accordingly. The NWB requests that the Licensee install flow-meters on the waste discharge pipelines by May 31, 2015 in order to accurately measure the sewage disposal volumes (of the year following the calendar year being reported) and comply with Part B, Item 1 and 4 of the current Licence. The NWB has also added a requirement that all inspection of engineered facilities related to the management of water and waste shall be carried by an Engineer (Civil, Municipal or Geotechnical) annually, in order to comply with Part F, item 3, the Licensee must ensure that it will provide annual Engineer reports within 60 days of inspections, including a cover letter outlining an implementation plan

addressing each of the Engineer's recommendations. The Board acknowledges that though no reports or cover letters have been provided to date, the Licensee has set forth, in the Igloolik Compliance Plan, a plan to comply with this condition in the future.

Finally, as part of the Sewage Disposal Facility Operation and Maintenance (O&M) Plan, the NWB requires that the Licensee include procedures and frequencies of inspections to be carried out to verify whether or not/when there is flow from the Sewage Disposal Facility. Visual inspections to verify flow from the Sewage Disposal Facility are required to ensure that the monitoring program under Part D, Item 2 of the Licence is initiated at the appropriate time and that the Inspector is notified upon its commencement.

Solid Waste Disposal Facilities

In the recently submitted *Technical Summary of the Environmental Facilities* document, the Hamlet expressed plans in 2014 to segregate hazardous wastes like batteries etc. The Board requests that the Hamlet submit an Operation and Maintenance (O&M) Plan for the Solid Waste Disposal Facilities that include procedures for the segregation, storage and eventual removal/disposal of hazardous wastes, including waste oil, and runoff management. The Licensee should note that a condition has been included in the licence for the submission of O &M Plan for the Solid Waste Disposal Facilities within ninety (90) days of issuance of this Licence under Part F, Item 1.

Operation & Maintenance Plans

In accordance with Part F, Item 1, of the expired licence, the Licensee was required to submit a Sewage Disposal Facility Operation and Maintenance (O&M) Plan (including the Sewage Sludge Management Plan, a Solid Waste Disposal Facility Operation and Maintenance (O&M) Plan, and a Spill Contingency Plan. These Plans need to be developed to the satisfaction of the NWB for the operation and maintenance of the facilities, the protection of the environment with regard to potential spills through day-to-day operations, and abandonment and restoration of various sites.

The Licensee has submitted a document entitled: Igloolik Operations and Maintenance Plan Water Truck Fill Station that needs to be updated to include an Abandonment & Restoration Planning, and Spill Contingency Planning. The renewed Licence has therefore continued to include the requirement to provide separate updated O&M Manuals for Water Supply and Waste Disposal Facilities, to the NWB within a set timeframe of issuance of the Licence. The NWB reviewed and deemed the short-term goals of the submitted Compliance Plan dated March 13 2014, as satisfactory. The NWB also reviewed the Department of Community and Government Services' Letter to NWB, dated May 16 2014, clarifying and answering the questions put forward by the Board on the submitted Compliance Plan by the Licensee.

The only comments received from interested parties were from the AANDC. AANDC indicated that the NWB should either require the Licensee to submit any outstanding Operational Plans before renewing the licence, or require the submissions within 90 days of renewing the licence. This includes plans for Operation and Maintenance of the Solid Waste Management and Sewage Disposal Areas, Abandonment and Restoration and Spill Contingency.

Taking into account the review of the application and comments received, the O&M

Manuals to be submitted are as follows, in accordance with Part F, Item 1 of the Licence:

a. *Updates to the Water Storage and Distribution Facility Operation and Maintenance (O&M) Plan*; *Amendments required include:*
    i. *An improved description of the technology and process;*
    ii. *A detailed breakdown of maintenance work and schedule of work required for the system equipment (including the submersible pumps, intake screens, and valves);*
    iii. *Revisions to the faded Intake Screen and Reservoir Fill Line Drawings (Drawing No. 78-IB7-101 to 106); and*
    iv. *Submitted O &M details 1979 Service Contracts for the operating pumps, if these Service Contracts are still required please renew and update the submitted information.*
b. *Sewage Disposal Facility Operation and Maintenance (O&M) Plan* (including the *Sewage Sludge Management Plan)*;
c. *Solid Waste Disposal Facility Operation and Maintenance (O&M) Plan*; and
d. *Spill Contingency Plan;*

The purpose of the O&M Manuals noted above is to assist Hamlet staff in carrying out the procedures relating to their water distribution and waste disposal facilities. The O&M Manuals should demonstrate to the NWB that the Hamlet is capable of operating and maintaining the infrastructure related to water use and waste disposal to meet the requirements of the Licence. The O&M Manuals should be based, at a minimum on the various guidelines available (i.e. *Guidelines for the Preparation of an Operations and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories,* Duong and Kent, 1996) acceptable by NWB, and other regulatory guidelines as deemed appropriate.

Abandonment and Restoration Plan

General terms and conditions under Part G, Item 1 in the licence require the Licensee to submit an Abandonment and Restoration (A&R) Plan at least six (6) months prior to abandoning any facility under the scope of this renewal Licence. It should be noted that the Board is aware that the Licensee is contemplating abandoning the old water intake structure and pump house associated with the potable water treatment facilities. The Board expects that an appropriate A&R plan will be submitted in accordance with the terms and conditions in this licence.

Monitoring Plan

Although the 2011-2013 reports submitted include some of the required information, however, the reporting requirements specified in Part B, Item 1 of the Licence are not being fully satisfied. The Licensee needs to submit a relevant Monitoring and Quality Assurance / Quality Control (QA/QC) Plan for its operations, more detailed requirements for the QA/QC Plan are included in Part H, Item 9 and 10 of this Licence.

Engineered Drawings and Designs

The Licensee has stated that it will construct a new sewage lagoon, waste disposal facility, and expand its water reservoir once it secures the necessary capital funding. The Licensee shall refer to Part E of this Licence for the conditions applying to modifications and construction of the facilities included in this Licence. Part E Item 1 states that the Licensee

shall submit to the Board for approval in writing, for construction design drawings stamped by a qualified Engineer, sixty (60) days prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes. Part E, Item 4 of this Licence requires the Licensee to provide to the Board, for review, as-built plans and drawings, for facilities included under the scope of that licence, within ninety (90) days of completion of construction or, if already constructed, within ninety (90) days of issuance of the Licence.

NUNAVUT WATER BOARD
WATER LICENCE RENEWAL

Licence No. 3BM-IGL1520

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

HAMLET OF IGLOOLIK

(Licensee)

P.O. BOX 30 IGLOOLIK NUNAVUT X0A 0L0

(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence renewal:

Licence Number/Type:	3BM-IGL1520 TYPE "B"
Water Management Area:	KINGORA WATERSHED - 20
Location:	HAMLET OF IGLOOLIK QIKIQTANI REGION, NUNAVUT
Classification:	MUNICIPAL UNDERTAKING
Purpose:	DIRECT WATER USE AND DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	81,208 CUBIC METRES *PER* ANNUM OR MAXIMUM OF 299 CUBIC METRES *PER* DAY
Date of Licence Issuance:	MARCH 31, 2015
Expiry of Licence:	MARCH 30, 2020

This Licence renewal, issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

Thomas Kabloona,
Nunavut Water Board, Chair

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Scope

This Licence allows for the use of water and the deposit of waste for a Municipal undertakings at the Hamlet of Igloolik, located within the Qikiqtani Region, Nunavut(Latitude: 69°23'N and Longitude: 81°46'W).

a. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing *Regulations* are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

b. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

"**Act**" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Addendum**" means the supplemental text that is added to a full plan or report usually included at the end of the document and is not intended to require a full resubmission of the revised report;

"**Amendment**" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"**Appurtenant Undertaking**" means an undertaking in relation to which a use of water or a deposit of waste is permitted by a licence issued by the Board;

"**Board**" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Effluent**" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond, landfarm or a treatment plant;

"**Engineer**" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2*

and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"**Existing Sewage Disposal Facilities**" refers to the pre-upgraded Sewage Disposal Facilities under Licence 3BM-IGL1520 that comprised numerous ponds as identified in the Technical Summary Environmental Facilities Report March 2014;

"**Existing Solid Waste Disposal Facilities**" refers to the pre-upgraded Solid Waste Disposal Facilities under Licence 3BM-IGL1520 designated for the disposal of solid waste, as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Final Discharge Point**" in respect of an effluent means an identifiable discharge point of a facility beyond which the operator of the facility no longer exercises control over the quality of the effluent;

"**Freeboard**" means the vertical distance between water line and the designed maximum operating height on the crest of a dam or dyke's upstream slope;

"**Geotechnical Engineer**" means a professional engineer registered with the Association of Professional Engineers, Geologist and Geophysicists of Nunavut and whose principal field of specialization with the engineering properties of earth materials in dealing with man-made structures and earthworks that will be built on a site. These can include shallow and deep foundations, retaining walls, dams, and embankments;

"**Grab Sample**" means an undiluted single water or wastewater sample, collected at a particular time and place that may be representative of the total substance being sampled, at the time and place it was collected.

"**Greywater**" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"**High Water Mark**" means the usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land (ref. Department of Fisheries and Oceans Canada, Operational Statement: Mineral Exploration Activities);

"**Inspector**" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"**Licensee**" means the holder of this Licence;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Modified Sewage Disposal Facility**" refers to the upgrade Sewage Disposal Facilities that comprises the Primary Sewage Lagoon and Retention Sewage Lagoon as identified on Drawing No. C-O1, C-02 and C-04, Government of Nunavut Igloolik Waste Facilities, October 3, 2008, also as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Modified Solid Waste Disposal Facilities**" referred to the up-graded Solid Waste Disposal Facilities designated for the disposal of solid waste, as identified on Drawing No. C-O1, C-02 and C-04, Government of Nunavut Igloolik Waste Facilities, October 3, 2008 and modified as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Monitoring Program**" means a monitoring program established to collect data on surface water and groundwater quality, to assess impacts of an appurtenant undertaking to the freshwater aquatic environment.

"**Nunavut Land Claims Agreement *(NLCA)***" means the "*Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*", including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"**Regulations**" means the *Nunavut Waters Regulations* SOR/2013-69 18th April, 2013;

"**Retention Sewage Lagoon**" is the secondary cell of the Modified Sewage Disposal Facilities and is identified within the drawings submission dated October 3, 2008, "Igloolik Sewage and Solid Waste Facilities", specifically on Drawing No. C-01, Process Summary and drawing C-04, Sewage Lagoon Improvement Plan as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Sewage**" means all toilet wastes and greywater;

"**Sewage Wetland**" compromises of the 'Sewage Wetland' Area Drawing No. C-O1, 'Wetland' Drawing No. C-02 and 'Proposed Wetland' Drawing No.C-04, Government of Nunavut Igloolik Waste Facilities, October 3, 2008 as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Spill Contingency Plan**" means a Plan developed to deal with unforeseen petroleum and hazardous materials events that may occur during the operations conducted under the Licence;

"**Sump or Sumps**" A structure or depression that collects, controls, and filters liquid waste before it is released to the environment. This structure should be designed to prevent erosion while allowing percolation of liquid waste;

"**Toilet Wastes**" means all human excreta and associated products, but does not include greywater;

"**Waste**" means, as defined in S.4 of the *Act*, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means.

"**Waste Disposal Facilities**" consist of the Modified Sewage Disposal Facilities and the Modified Solid Waste Disposal Facilities as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Water Supply Facilities**" comprises the area and associated intake infrastructure at Water Lake, the Intake Pump House and back-up truck fill station, the Water Treatment Plant, the Storage Tanks adjacent to the Water Treatment Plant and the Water Supply Pipe as described in the renewal application dated March 13, 2014 and supplementary documents submitted with the application;

"**Water" or "Waters**" means waters as defined in section 4 of the Act.

3. Enforcement

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

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 31 of the year following the calendar year being reported, containing the following information:

   a. an executive summary as required by Part B, Item 8;
   b. tabular summaries of all data generated under the "Monitoring Program";
   c. the daily, monthly and annual quantities in cubic metres of fresh water obtained at the Water Supply Facilities;
   d. the daily, monthly and annual quantities in cubic metres of all waste discharged;
   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. any Addendum with updates or revisions for manuals and plans (i.e., *Operations and Maintenance Manuals/Plans*) as required by changes in operation and/or technology;
i. a summary of any studies or reports requested by the Board that relate to water use and waste disposal or restoration, and a brief description of any future studies planned; and
j. any other details on water use or waste disposal requested by the Board by November 1 of the year being reported;

2. 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.

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

4. Meters, devices or other such methods as approved by the Board in writing, used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee.

5. The Licensee shall, within ninety (90) days following the first visit by the Inspector, following issuance of this Licence, post the necessary signs to identify the stations of the "Monitoring Program," in the Official Languages of Nunavut.

6. The Licensee shall immediately report to the 24-Hour Spill Report Line (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.

7. The Licensee shall ensure a copy of this Licence is maintained at the Municipal Office at all times. Any communication with respect to this Licence and any notice provided to an Inspector, 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@nwb-oen.ca

(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

8. 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.

9. The Licensee shall ensure that all document(s) and correspondence submitted by the Licensee to the Board are received and acknowledged by the Manager of Licensing.

10. 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 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.

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

12. 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 condition 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.

13. This Licence is not assignable except as provided in Section 44 of the Act.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from South Lake using the Water Supply Facilities, to be stored in the Hamlet Reservoir, or as otherwise approved by the Board in writing.

2. The annual quantity of water used for all purposes shall not exceed 81,208 cubic metres annually or a daily quantity of water for all purposes shall not exceed 299 cubic metres.

3. The Licensee shall equip all water intake hoses with a screen of an 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.

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

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

6. Sediment and erosion control measures shall be implemented prior to and maintained during the operation to prevent entry of sediment into water.

7. The Licensee shall submit to the Board for approval in writing, at least thirty (30) days prior to the use of water in sufficient volume that the source water body may be drawn down, the following information: volume required, hydrological overview of the water body, details of impacts, and proposed mitigation measures.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Modified Sewage Disposal Facilities included under the scope of this licence.

2. The Licensee shall provide a minimum of ten (10) days' notice annually to an Inspector of the intent to discharge effluent from either the Modified Sewage Disposal Facilities.

3. All Effluent discharged from the Sewage Disposal Facility at Monitoring Program Station IGL-4, and IGL-5 shall meet the following Effluent quality standards:

Parameter	**Maximum Concentration of Any Grab Sample**
BOD_5	100 mg/L
Total Suspended Solids	120 mg/L
Fecal Coliforms	1×10^6 CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

4. The Licensee shall maintain at all times, a freeboard of at least 1.0 metre, or as recommended by a qualified engineer and as approved by the Board in writing, for all dams, dykes or other structures intended to contain, withhold, divert or retain water or wastes.

5. The Modified Sewage Disposal Facilities 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 Modified Solid Waste Disposal Facilities, or as otherwise approved by the Board in writing.

7. The Licensee shall segregate and store all hazardous materials and/or hazardous waste within the Modified Solid Waste Disposal Facilities in such a manner as to prevent the

deposit of deleterious substances into any water, until such a time that the materials have been removed for proper disposal at an approved facility.

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

1. The Licensee shall submit to the Board for approval in writing, for construction design drawings stamped by a qualified Engineer, 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 approval from the Board, carry out modifications to the Water Supply 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. these modifications do not place the Licensee in contravention of the Licence or the Act;
   c. 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
   d. the Board has not rejected the proposed modifications.

3. Modifications for which all of the conditions referred to in Part E, Item 2, have not been met may be carried out only with written approval from the Board. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

4. The Licensee shall provide to the NWB for review, as-built plans and drawings, stamped and signed by an Engineer, within ninety (90) days of completion of construction.

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 sediment and erosion control measures prior to and during activities carried out under this Part, to prevent the release of sediment and minimize erosion.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall submit to the Board for approval, within ninety (90) days of issuance of the Licence, Operations and Maintenance Manuals prepared where

appropriate, in accordance with the "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories; 1996". The following Manuals and Plans shall take into consideration the comments received during the application review process:

a. Sewage Disposal Facility Operation and Maintenance (O&M) Plan (including the Sewage Sludge Management Plan;
b. Solid Waste Disposal Facility Operation and Maintenance (O&M) Plan; and
c. Spill Contingency Plan;

2. The Licensee shall review the Water Distribution Facility Operation and Maintenance (O&M) Plan. Changes in operation and technology should be modified accordingly. Revisions are to be submitted in the form of an Addendum to be included with the Annual Report. Additionally, the following specific amendments are required for the O&M:
    a. An improved description of the technology and process;
    b. A detailed breakdown of maintenance work and schedule of work required for the system equipment (including the submersible pumps, intake screens, and valves);
    c. Revisions to the faded Intake Screen and Reservoir Fill Line Drawings (Drawing No. 78-IB7-101 to 106); and
    d. Submitted O &M details 1979 Service Contracts for the operating pumps, if these Service Contracts are still required please renew and update the submitted information.

3. An inspection of all engineered facilities related to the management of water and waste shall be conducted by an Engineer (Civil, Municipal or Geotechnical) annually and before commissioning any facility. The Engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a Cover Letter from the Licensee outlining an implementation plan addressing each of the Engineer's recommendations.

4. The Licensee shall perform more frequent inspections of the engineered facilities at the request of an Inspector.

5. 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 contingency measures as approved under the Operation and Maintenance Manuals for the Hamlet of Igloolik;
    b. report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130 and to the Inspector 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 preventative measures to be implemented.

PART G: CONDITIONS APPLYING TO ABANDONMENT, RESTORATION AND CLOSURE

1. The Licensee shall submit to the Board for approval an *Abandonment, Restoration and Closure Plan* at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for 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. petroleum and chemical storage areas;
   d. any site affected by waste spills;
   e. leachate prevention;
   f. an implementation schedule;
   g. maps delineating all disturbed areas, and site facilities;
   h. consideration of altered drainage patterns;
   i. type and source of cover materials;
   j. future area use;
   k. hazardous wastes; and
   l. proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

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

3. All disturbed areas shall be stabilized and re-vegetated as required, upon completion of work, and restored as practically as possible to a pre-disturbed state.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

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

Monitoring Program Station Number	Description	Status
IGL-1	Raw water supply intake at South Lake	Active (Volume)
IGL-2	Runoff from Solid Waste Disposal Facility	Active (Water Quality)
IGL-3	Raw Sewage at Discharge point into the Sewage Disposal Facility	**Not** Active
IGL-4	Final control point from Sewage Disposal Facility	Active (Water Quality)
IGL-5	Final Effluent Discharge Point prior entering Foxe Basin	New (Water Quality)

2. The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of water pumped at Monitoring Program Station IGL-1, for all purposes.

3. The Licensee shall sample at Monitoring Program Stations IGL-4 and IGL-5, monthly during periods of observed flow. Samples shall be analyzed for the following parameters:

Biochemical Oxygen Demand (BOD_5)	Fecal Coliforms
Total Suspended Solids	pH
Conductivity	Nitrate-Nitrite
Oil and Grease (visual)	Total Phenols
Magnesium	Calcium
Sodium	Potassium
Chloride	Sulphate
Total Hardness	Total Alkalinity
Ammonia Nitrogen	Total Zinc
Total Cadmium	Total Iron
Total Cobalt	Total Manganese
Total Chromium	Total Nickel
Total Copper	Total Lead
Total Aluminum	Total Arsenic
Total Mercury	Total Organic Carbon (TOC)
Carbonaceous Biochemical Oxygen Demand (cBOD5)	

4. The Licensee shall sample at Monitoring Program Station IGL-2 once at the beginning, middle and near the end of discharge/run-off observed. . Samples shall be analyzed for the parameters under Part H, Item 3.

   The Licensee shall measure and record the annual quantities of sewage solids removed from the Waste Water Treatment Plant along with the treatment/storage/disposal provided.

5. If additional Final Discharge Points are identified during the term of this Licence, the Licensee shall submit, along with the Annual Report, the following information:

   a. Plans, specifications, geographic coordinates and a general description of each Final Discharge Point; and
   b. A description of how each Final Discharge Point is designed and maintained, if required.

6. 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.

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

8. The Licensee shall submit to the Board for review, within ninety (90) days of issuance of the Licence, a Quality Assurance/Quality Control Plan that conforms to the guidance document *Quality Assurance (QA) and Quality Control (QC) Guidelines For Use by Class "B" Licensees in Collecting Representative Water Samples in the Field*

and for Submission of a QAQC Plan INAC (1996). The Plan shall be acceptable to an accredited laboratory and include a covering letter from the accredited laboratory confirming acceptance of the Plan for analyses to be performed under the Licence.

9. The Licensee shall annually review the Quality Assurance/Quality Control Plan as required in Part H, Item 8 and modify the Plan as necessary. Proposed modifications shall be submitted to the accredited laboratory for approval.

10. Additional monitoring stations, sampling and analyses may be requested by an Inspector.

11. 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 requested by an Inspector.

12. Modifications to the Monitoring Program may be made only upon written approval from the Board. Requests for changes to the Monitoring Program should be forwarded to the NWB in writing, and should include the justification and appropriate evidence to support the change.

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: 3BM-IGL1520/Amendment No. 1

February 16, 2016

Brian Flemming
Senior Administrative Officer
Hamlet of Igloolik
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Igloolik, NU XOA 0A0

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Bhabesh Roy, P. Eng.
Municipal Planning Engineer, Baffin Region
Government of Nunavut
Dept. Community and Government Services
P.O Box 379, Pond Inlet, NU X0A 0S0

E-mail: broy@gov.nu.ca

RE: Licence No. 3BM-IGL1520, Type "B" – Amendment No. 1 – Expansion and Rehabilitation of the Sewage Lagoon Facility

Dear Mr. Flemming and Mr. Roy:

Please find attached, Amendment No. 1 to Licence No. **3BM-IGL1520** issued to Hamlet of Igloolik by the Nunavut Water Board (NWB) under Motion 2015-27-56, pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (*Nunavut Land Claims Agreement or NLCA*). The terms and conditions of the original Licence related to the use of Water and the deposit of Waste remain an integral part of this approval.

The Licensee is advised that this Amendment is for an undertaking that falls outside of an area with an approved Land Use Plan[1] as determined by the Nunavut Planning Commission (NPC) and subject to a 12.4.4(a) Screening Decision as described within Schedule 12-1 by the Nunavut Impact Review Board[2] in accordance with Article 12 of the *Nunavut Land Claims Agreement* (NLCA).

The NWB strongly recommends that the Licensee consult the comments received by interested persons on issues identified. This information is attached for your consideration.[3, 4]

[1] Nunavut Planning Commission (NPC) Conformity Determination, June 9, 2015.
[2] Nunavut Impact Review Board (NIRB), Screening Decision, dated December 8, 2015.
[3] Aboriginal Affairs and Northern Development Canada (AANDC), June 26, 2015;
[4] Fisheries and Oceans Canada (DFO), May 28, 2015;

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/ce/kk

Enclosure: **Licence No. 3BM-IGL1520 – Amendment No. 1**
Comments – AANDC, DFO

Cc: Qikiqtani Distribution List

LICENCE AMENDMENT No. 1

Licensee:	**Hamlet of Igloolik**
Licence No:	**3BM-IGL1520 – Type "B"**
Licence Issued:	**March 31, 2015**
Expiry Date:	**March 30, 2020**
Effective Date:	**February 16, 2016**

DECISION

Licence No. 3BM-IGL1520, issued on March 31, 2015 and set to expire on March 30, 2020, shall be amended to allow for the construction of a new lagoon cell and the rehabilitation of the Modified Sewage Lagoon Facility, as described in the Application received by the Board on April 20, 2015, for use as required in the deposit and management of Sewage Waste, operated by the Hamlet of Igloolik (the Hamlet or the Licensee), which is located within the Qikiqtani Region of Nunavut.

The NWB received from the Government of Nunavut – Community Government Services (GN-CGS), on behalf of the Hamlet of Igloolik, from March 16, 2015 to December 14, 2015, the following application documents (Application) for the amendment of Licence 3BM-IGL1520:

Water Licence Amendment Application, April 20, 2015

- Completed Amendment Application form and Cover Letter, April 20, 2015
- Hamlet Authorization letter by SAO, April 20, 2015
- Technical Summary of the Wastewater Treatment Facility, in English and Inuktitut, April 20, 2015
- Wastewater Treatment Facility, Hamlet of Igloolik (IGL-1 to IGL-8), dated March 27, 2015, April 20, 2015
- Operation and Maintenance Plan, Wastewater Treatment Plant, originally developed in 1979, April 20, 2015
- Operation and Maintenance Plan, additional amendments for the Wastewater Treatment Plant, August 17, 2015
- Preliminary Spill Contingency Plan, August 17, 2015
- Hamlet Annual Report 2014, March 16, 2015
- Design Brief, Optimization of the Wastewater Facility, Igloolik, Nunavut developed by exp Services Inc., dated November 2014, submitted April 20, 2015
- Vegetated Filterstrip Wetland Assessment for the Treatment of Pre-treated Sewage, Hamlet of Igloolik (Final), MTE, October 8, 2014. Prepared for the Government of Nunavut, CGS,
- Specifications Document, Government of Nunavut, Igloolik Sewage Lagoon (OTCD-00019838A); Stamped and Signed by exp Services Inc., November 13, 2015
- Stamped and Signed Tender Drawings, Rev.5, issued for NWB review, drawings IGL1 through IGL8
- Additional Geotechnical Investigation, developed by exp Services Inc., dated September 29, 2014, April 20, 2015

- Additional Geotechnical Investigation Results, developed by exp Services Inc., dated October and November, 2009, April 20, 2015
- Geothermal Analysis of Proposed Sewage Lagoon, developed by Naviq Consulting Inc, dated June 2010, April 20, 2015
- Geotechnical Investigation-attached results, developed by exp Services Inc., dated March 16, 2010, April 20, 2015
- Sewage Lagoon Upgrade Project Schedule, dated November, 2014, April 20, 2015
- Environmental Assessment Screening (Draft), Construction of New Sewage Lagoon and Rehabilitation of Existing Lagoons, developed by Global Tox, dated November, 2009, April 20, 2015
- Geotechnical Investigation, developed by Trow Associates Inc., dated March 16, 2010, July 30, 2015
- Geotechnical Report Letter, by exp Services Inc., dated November 5, 2014, December 14, 2015
- Email Correspondence for Amendment Application, July 20, 2015, August 5, 2015, and December 14, 2015

Following receipt and an internal preliminary review, NWB distributed the Application for a thirty (30)-day comment period on May 26, 2014. On May 28, 2015 a submission was received from Fisheries and Oceans Canada (DFO). On June 26, 2015, a submission was received from Aboriginal Affairs and Northern Development Canada (AANDC).

In their submission, the DFO requested clarification on whether any planned dewatering activities that are required for the new pipe installation, would have any impact on fish or fish habitat. Clarification was provided that areas of dewatering involved surface runoff areas that had no record of fish habitation.

AANDC, in their submission, requested additional information on the handling and storage of sewage sludge and confirmation that the storage of sludge has been considered in the design of the new and rehabilitated sewage lagoons. In addition, a description on how the Licensee planned to store excavated sludge during the rehabilitation of the existing sewage lagoon cells was requested.

Following the receipt of the comments, the applicant confirmed in its email correspondence of December 15, 2015 the use of the older cell for sludge storage and emergency use. It was also confirmed that the new construction would include design for 0.5m depth for sludge accumulation and that there are no plans to dispose of any sludge in a landfill.

Other concerns noted in AANDC's submission were the references to documents not submitted with the Application and the absence during the review. These supporting documents were either located in the NWB files or provided by the Applicant and subsequently placed in the Public Registry for future reference.

With respect to operational plans, AANDC submitted that all outstanding plans should be provided, including those for the Operation and Maintenance of the Solid Waste Management and Sewage Disposal Areas, Abandonment and Restoration and the Spill Contingency Plan.

Although the Licensee, with this amendment application, submitted two additional O&M documents[5,6] with respect to plans, further updates are required and have been addressed through the amendment of Part F, Item 1 of this amendment.

In addition to the intervener's comments received, the NWB received pre-licensing requirements in the form of the Nunavut Planning Commission's (NPC) Land Use Conformity Determination for the file, on June 9, 2015 and the Nunavut Impact Review Board's (NIRB) Screening Report on December 8, 2015.

The NWB has placed in its Public Registry copies of the Application documents, including all comments received from interveners. This information is maintained in the NWB's public registry and is available to interested persons upon request. In addition, the NWB maintains reporting information on its FTP site, which can be accessed using the following link: ftp.nwb-oen.ca

The NWB, having considered the information provided in support of the Application and the comments received from parties during the review process, and pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* and the *Nunavut Waters* and the *Nunavut Surface Rights Tribunal Act*, hereby grants Amendment No.1 to Licence No. 3BM-IGL1520. The amendment is subject to the following terms and conditions that are based on the comments received, and standard conditions imposed by the NWB for similar undertakings:

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Definitions

Insert

> **"Upgraded Sewage Disposal Facilty"** consists of the new and rehabilitated Modified Sewage Disposal Facility, used for treating the waste water collected by the Hamlet of Igloolik, as described in the amendment application dated April 20, 2015 and supplementary documents submitted with the Application;
>
> **"Vegetative Filter Strip Wetland"** means the combination of treatment wetlands and vegetated filter strip areas and process as described in the document '*Vegetated Filter Strip Assessment for the Treatment of Pre-treated Sewage, Hamlet of Igloolik'*, prepared for the Government of Nunavut, CGS by MTE, dated October 8, 2014 (through exp Services Inc.);
>
> "**Waste Disposal Facilities**" consists of the Modified Solid Waste Disposal Facilities and the Modified Sewage Disposal Facilities (or upon completion, the Upgraded

[5]Operation and Maintenance Plan, additional amendments for the Wastewater Treatment Plant, August 17, 2015;
[6]Supplemental Spill Contingency information, August 17, 2015

Sewage Disposal Facility) as described in the renewal application dated March 13, 2014 and the amendment application dated April 20, 2015, as well as the supplementary documents associated with each application.

PART B: GENERAL CONDITIONS

Insert Item 1(k)

Provide an updated/revised Plan for Compliance, taking into account works achieved during the year, noting areas of (new) compliance and the anticipated goals and timelines for the next and future years.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

Amend Item 1

The Licensee shall direct all Sewage to the Modified Sewage Disposal Facility, or upon commissioning, to the Upgraded Sewage Disposal Facility, or as otherwise approved by the Board in writing.

Amend Item 2

The Licensee shall provide a minimum of ten (10) days' notice to an Inspector, of the intent to discharge Effluent from the Modified Sewage Disposal Facility, or upon commissioning, the Upgraded Sewage Disposal Facility.

Amend Item 3

All Effluent discharged from the Modified Sewage Disposal Facility, or upon commissioning, the Upgraded Sewage Disposal Facility, at Monitoring Program Stations IGL-4, and IGL-5 shall not exceed the following Effluent quality limits: (See Licence table).

Amend Item 5

The Modified Sewage Disposal Facilities, or upon commissioning, the Upgraded Sewage Disposal Facility, shall be maintained and operated in such a manner as to prevent structural failure.

Insert Item 8

The Licensee shall locate areas designated for waste disposal at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body such that the quality, quantity or flow of Water is not impaired, unless otherwise approved by the Board in writing.

Insert Item 9

The Licensee shall dispose of and permanently contain all solid wastes at the Waste Disposal Facilities, or as otherwise approved by the Board in writing.

Insert Item 10

The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood to prevent the deposition of Waste materials of incomplete combustion and/or leachate from contaminated ash residual,

from impacting any surrounding waters, unless otherwise approved by the Board in writing.

Insert Item 11

The Licensee shall segregate and store all hazardous materials and hazardous Waste including waste oil, within the Waste Disposal Facilities in a manner to prevent the deposit of deleterious substances into any Water, until such a time that the materials are to be removed for proper disposal at licensed facility.

Insert Item 12

The Licensee shall implement measures to ensure leachate from the Waste Disposal Facilities do not enter Water.

Insert Item 13

The Licensee shall remove and treat hydrocarbon contaminated soils on site or transport them to an approved disposal site for treatment.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

Amend Item 1(a)(i), (ii) and (iii)

a. Sewage Disposal Facility Operation and Maintenance (O&M) Plan (including the Sewage Sludge Management Plan), to include the following information:
   i. a summary of how the sludge management lagoon will be rehabilitated (e.g., re-enforced berms, lining, etc.);
   ii. how Effluent that accumulates within the sludge management lagoon will be managed;
   iii. design drawings of the sludge management lagoon including drawings that reference the sludge management cell relative to the planned new sewage lagoon and rehabilitated sewage lagoons;
   iv. the testing requirements that will be applied to sewage sludge and the criteria required prior to any plans for landfill disposal;
   v. a description of how sludge will be disposed in the landfill.

Insert Item 6

The Licensee shall conduct any equipment maintenance and servicing in designated areas and shall implement special procedures (such as the use of drip pans and liners) to manage motor fluids and other waste and contain potential spills.

Insert Item 7

The Licensee shall maintain appropriate spill response equipment and clean-up materials (e.g., shovels, pumps, barrels, drip pans, and absorbents) and be readily available during any transfer of fuel or hazardous substances.

PART H: CONDITIONS APPLYING TO MONITORING

Amend Item 1

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

Monitoring Program Station Number	Description	Status
IGL-1	Raw Water supply intake at South Lake	Active (Volume)
IGL-2	Runoff from Modified Solid Waste Disposal Facilities	Active (Water Quality)
IGL-3	Raw Sewage at Discharge point into the Modified Sewage Disposal Facility	**Not** Active
IGL-4	Final control point from the Modified Sewage Disposal Facility or upon commissioning, the Upgraded Sewage Disposal Facility	Active (Water Quality)
IGL-5	Final Effluent discharge point prior entering Foxe Basin	New (Water Quality)

Amend Item 4

Delete second paragraph "The Licensee shall measure and record…"

All remaining terms and conditions of Licence No. 3BM-IGL1520, Type 'B", issued March 31, 2015, are still applicable.

This Licence Amendment issued and recorded at Gjoa Haven, NU on February 16, 2016.

Approved by,

Thomas Kabloona
Nunavut Water Board, Chair

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File: 3BM-IGL1520 / Amendment No. 2

September 1, 2016

Shawn Stuckey
Senior Administrative Officer
Hamlet of Igloolik
P.O. Box 30
Igloolik, NU XOA 0L0

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Bhabesh Roy, P. Eng.
Municipal Planning Engineer, Baffin Region
GN -Community and Government Services
P. O. Box 379
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RE: Licence No. 3BM-IGL1520, Type "B" – Amendment No. 2

Dear Mr. Stuckey and Mr. Roy:

Please find attached **Amendment No. 2** to Type "B" Water **Licence No. 3BM-IGL1520**, issued to the Hamlet of Igloolik by the Nunavut Water Board (NWB) under **Motion 2016-B1-011** pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. The terms and conditions of the original Licence as they related to Waste deposit and Water use, remain an integral part of this approval.

The Licensee is advised that this Amendment is for an undertaking that falls outside of an area with an approved Land Use Plan as determined by the Nunavut Planning Commission (NPC)[1] and does not require a review pursuant to section 92(1)(a) of the Nunavut Planning and Project Assessment Act (NuPPAA) as indicated in the Nunavut Impact Review Board's (NIRB) Screening Decision Report.[2]

The NWB strongly recommends that the Licensee consult the comments and/or recommendations provided by intervener(s). This information is attached for your consideration.[3]

[1] Nunavut Planning Commission (NPC) Determination, March 1, 2016.
[2] Nunavut Impact Review Board (NIRB) Screening Decision Report, May 13, 20.16.
[3] Indigenous and Northern Affairs Canada (INAC) Comment Submission, August 22, 2016.

Sincerely,

Thomas Kabloona
Nunavut Water Board, Chair

TK/sj/vk

Enclosure: **Licence No. 3BM-IGL1520 – <u>Amendment No. 2</u>**
Comments – INAC

Cc: Qikiqtani Distribution List

Background

On June 2, 2016, the Government of Nunavut – Community and Government Services (the "GN-CGS"), on behalf of the Hamlet of Igloolik, submitted to the Nunavut Water Board ("NWB" or "Board") for consideration, an application and supporting information (the "Application") to amend Type "B" Water Licence No. 3BM – IGL1520 (the "Existing Licence") to allow for the expansion of an existing potable water supply reservoir, replacement of an intake line that transmits water from the South Lake source to the Hamlet's water supply reservoir, the construction of a new truck-fill station, and the inclusion of Fish Lake as an alternative water source to the scope of the Existing Licence.

Details included in the Application to amend the Existing Licence indicate that in 2015 the Hamlet experienced a shortage in the reservoir's over-winter water storage due to anoxic conditions at the South Lake water source. To protect the public's safety, the Government of Nunavut – Department of Health (GN-DOH) advised that use of the South Lake water source should be temporarily discontinued. The Hamlet accepted the GN-DOH advise, and it decided to use Fish Lake as its water supply source until the integrity of the South Lake source was restored.

The Hamlet indicated in its Application that to minimize the possibility of similar shortages in the future, it is proposing, as stated above, to expand the reservoir's annual over-winter storage capacity from 79,000 m^3 to 102,800 m^3 as well as upgrade some of the other structures/equipment associated with the Water Supply Facilities.

The Application submitted to amend Licence No. 3BM-IGL1520 included the following documents:

- Igloolik Approval Letter
- Reservoir Expansion Letter
- Amendment 2 Letter
- 012500 Special Provisions rev April 11, 2016
- Certificate of Analysis B1515523 R
- February 2, 2016 Final Design Brief
- Iglolik Amendment 2 Letter
- Igloolik Bathymetric Survey ARKTIS
- Igloolik Fish Lake Hydrology study August 12, 2015
- Igloolik Reservoir Expansion Sketch
- Igloolik Water Supply Design Development ARKTIS
- Inspectors Direction
- May 27, 2016 INAC Letter to Igloolik Reservoir Expansion Request
- NIRB Project Proposal of Igloolik Water Reservoir Expansion Project, February 18, 2016
- NIRB Project Proposal of Igloolik Water Reservoir Expansion Project, March 3, 2016
- October 27, 2015 Risk Assessment Report Final
- Signature Water Licence Amendment 2 Application
- Water Licence Amendment 2 Application

Following an internal preliminary review and receipt of additional information as well as confirmation from the respective regulators regarding pre-licensing issues related to the Application, the NWB distributed the Application on July 22, 2016 for a thirty (30) day comment and review period with the deadline for submissions set for August 22, 2016. Before

the deadline for comments elapsed, a submission was received from Indigenous and Northern Affairs Canada (INAC) in which INAC provided several comments and recommendations, which are summarized below:

- The Operation and Maintenance Plan associated with the undertaking should be updated to included the water supply system's two pump houses. The updated plan should be submitted to the NWB for review and approval;
- A spill contingency plan should be submitted to the NWB for review and approval;
- Spill involving fuel or hazardous material that occur adjacent to or into a water body regardless of quantity or size should be reported immediately to the NWT, 24-hour spill report line and to INAC's Manager of Field Operations; and
- In accordance with the *Consolidation of Spill Contingency Planning and Reporting Regulations* (R-068-93), any person storing contaminants in an above-ground storage facility, with capacity equal to or greater than 20,000 litres/kilograms, is required to file a spill contingency plan.

With respect to pre-licensing matters, the Nunavut Planning Commission (NPC) issued its determination[4] for the Application on March 1, 2016, stating that the project falls outside of the area in which an approved Land Use Plan is in place and that the proposal was forwarded to the Nunavut Impact Review Board (NIRB) for screening as it did not belong to the class of exempt works or activities. On May 13, 2016, the NIRB issue its Screening Determination[5] for the project.

Issues Considered by the Board

The following sections provide an overview of some of the main issues that the Board considered in its decision on whether or not to grant Amendment No. 2 to Licence No. 3BM-IGL1520:

Inspector's Direction

On June 2, 2016, Indigenous and Northern Affairs Canada (INAC) issued an Inspector's Direction[6] regarding the shortage of over-winter water storage for the Hamlet of Igloolik. The Inspector directed that the issue(s) that created the shortage be addressed immediately to prevent any potential threat to public health and safety. Further, the Inspector requested that a plan be provided prior to any work occurring, including the timelines and details of work required to address public health and safety concerns pertaining to the water shortage and that a final summary of work completed be provided on or prior to October 31, 2016.

In keeping with the Inspector's Direction and as part of the Licensee's strategy to prevent future shortages, the Licensee, as mentioned above, is proposing to expand the water storage facility and associated infrastructure. Written letters of support[7] for the proposed expansion were provided by the Nunavut's Deputy Chief Medical Officer of Health and the Mayor of the Hamlet of Igloolik.

Water Use/Type of Licence

[4] Nunavut Planning Commission (NPC), Land Use Determination, March 1, 2016.
[5] Nunavut Impact Review Board (NIRB) Screening Decision, May 13, 2016.
[6] J. Hack, Water Resource Officer, INAC, to D. Flynn, Assistant Deputy Minister, Local Government – GN-CGS; CC'd: E. Allain, INAC, Licensing, NWB; T. Toonoo, CGS; Dr. K. Barker and M. LeBlanc Havard, Department of Health; SAO, Hamlet of Igloolik; Re: Nunavut Waters and Nunavut Surface Rights Tribunal Act Inspector's Direction, June 2, 2116.
[7] Letter from P. Ivalu, Mayor, Municipality of Igloolik, to B. Roy, Municipal Planning Engineer, Re: Igloolik Water Reservoir Expansion, February 26, 2016; and letter from, M. Kaikie, Deputy Chief Medical Officer of Health, to M. Heath, Director of Community Infrastructure Division, GN- CGS, Re: Igloolik Water Reservoir Expansion, February 25. 20165.

Details included in the Application to amend the Licence indicate that while the Licensee is proposing to increase the storage capacity of the reservoir from 79,000 m^3 to 102,800 m^3, the actual water consumption rate for the Hamlet in the short-term will remain at the current volume allowed in Existing Licence. The Existing Licence authorizes the use of up to 81,208 cubic metres of water annually not exceeding 299 cubic metres per day directly from the water source authorized under the Existing Licence; however, the Licensee's 2013, 2014, and 2015 Annual Reports suggest that the Hamlet's annual water usage was on average 54,000 cubic metres during the aforementioned periods and that the rate of usage is unlikely to change in the short-term.

It should be noted that in the decision section of the Existing Licence, which was issued on March 31, 2015, it was mentioned that Schedule 2 of the *Nunavut Waters Regulations* (the "Regulations"), which came into effect on April 18, 2013, states that a Type "A" water licence is required for activities involving the storage of more than 60,000 cubic metres of water and/or the used of at least 300 cubic metres of water per day. It should be noted that the Board did not apply this requirement at the time the Existing Licence was issued due to a number of factors including the nature of the storage facility involved (the Regulations are based on storage utilizing dams or dikes – Column 2, Item 3 of Schedule 2) and the fact that the Hamlet's direct water usage from the source or its reservoir did not exceed the threshold outlined in Schedule 2 of the Regulations. The Licensee is advised, however, that if there is any proposed increase in direct source water use related to the Existing Licence in future, the associated renewal or amendment application for this potential increase in use may potentially be treated as a Type "A" application and processed in accordance with the relevant thresholds established in the Regulations.

Water Sources

Conditions included in the Existing Licence allow for the use of South Lake as the Hamlet's primary and only source of water supply. However, due to the over-winter shortage experienced in 2015 as a result of poor water quality that temporarily effected the South Lake source, the Hamlet was obliged to use Fish Lake as an alternative water source during that period. As part of its Application (Amendment No. 2 Application), the Licensee requested the inclusion of Fish Lake as a secondary water supply source. The memorandum entitled *Fish Lake Hydrology Study: Igloolik*, included as part of the Application, the yield to Fish Lake is estimated at 302,000 cubic metres, excluding evaporation and some other factors, while the annual community demand is expected reach approximately 165,000 cubic metres by the year 2045. Although the assessment did not examine the suitability of Fish Lake as an over-winter source, based on the information presented, Fish Lake may be considered capable of meeting the Hamlet's water supply needs as a secondary source, to some extent.

A bathymetric survey conducted by Arktis Solutions Incorporated for the South Lake water supply source estimates its volume at 491,956 cubic metres, suggesting, with the consideration of other factors, that the Hamlet's current and future water demand (20-year projection) could continue to be met by this source assuming that its integrity and yield are maintained over time.

The Board has considered the Licensee's request in the context of previous and potential risk(s) that may be inherent in using the South Lake water source as well as the potential implications for the Hamlet should such risk come to fruition, in deciding to grant the Licensee's request under Part C, Item 1 of this Amendment. The Licensee should note that in granting the use of Fish Lake as an alternative water source, the Board included requirements to inform the NWB

and the Inspector at least ten (10) days prior to withdrawing water from Fish Lake for any purpose under the Licence.

Management Plans
In accordance with the terms and conditions included in the Existing Licence, the Licensee is required to submit to the Board for review and/or approval, the following management plans:

a. An Operation and Maintenance Manual for the Sewage and Solid Waste Disposal Facilities, within ninety (90) days of issuance of the Existing Licence (Part F, Item 1). The Licensee submitted on August 17, 2015, a one-page document entitled *Operation and Maintenance Procedure of Wastewater Treatment by Lagoons of the Hamlet of Igloolik*, which the Board determined as being insufficient for meeting the requirements in the Licence. Therefore, the Licensee should note that the conditions in the Existing Licence as well as any added requirements imposed by Amendment No. 1 to the Existing Licence remain applicable and in effect.

   The Licensee should also be advised that the requirements under Part F, Item 1, which include the submission of a Spill Contingency Plan (SCP), remain outstanding. INAC in its submission related to this Application, requested that a SCP be submitted to the Board for approval, which the Board is in agreement with. As there is no SCP currently approved under the Existing Licence or submitted for approval at the time of the Application, the Board has included the condition under Part E, Item 8 of this Amendment for the submission of a separate spill contingency plan for the proposed construction activities.

b. Changes to the Operation and Maintenance Manual for the Water Distribution Facility, as an addendum within the annual report submitted for the Existing Licence (Part F, Item 2). The Licensee submitted on August 8, 2015 a document to satisfy this requirement; however, the Board determined shortly following submission that the document needed to be revised as it was inadequate. Consequently, this requirement remains outstanding and must be addressed as stipulated in the Exiting Licence and/or Amendment No. 1 to the Existing Licence.

   Apart from the aforementioned item, the Board has included terms and condition under Part F, Item 8 of this Amendment for the submission, within sixty (60) days of completion of the Water Supply Facilities expansion, an O&M manual that captures the upgraded facilities authorized under this amendment (Amendment No. 2). The Licensee should note that the requirement in the Existing Licence for submission of an O&M Manual for the current Water Supply Facilities remains in effect and outstanding. However, condition has been added to this Amendment for the submission of an O&M manual for the expanded facility once completed and commissioned that should take into consideration INAC's relevant comments and recommendations.

c. Submission of a Quality Assurance/Quality Control (QA/QC) Plan, within ninety (90) days of issuance of the Existing Licence (Part H, Item 8). The Licensee has indicated that it intends to submit a QA/QC Plan within ninety (90) days of issuance of Amendment No. 2. No changes have been made to this requirement in this Amendment or in Amendment No. 1; therefore, the requirement as included in the Existing Licence remains in effect and outstanding.

Closure and Reclamation

As the pertinent requirements in the Existing Licence are quite general and adequate enough to address closure and reclamation procedures for the current Water Supply Facilities once construction of the expanded facilities is completed and the facility is commissioned, the Board has not included any additional conditions regarding closure and reclamation activities. Licensee should note that the Water Supply Facilities and infrastructure that are no longer in use will require closure and reclamation in accordance with Part G, Item 1 of the Existing Licence.

Compliance

As mentioned above, the Board notes that some of the management plans associated with the Existing Licence remain outstanding and that an Inspector's direction, dated June 2, 2016, has been issued and remains in effect. Further, the Board notes that the Plan for Compliance required under Part B, Item 1(k) of Amendment No. 1 to the Existing Licence remains outstanding. The Board advises that it is the obligation of the Licensee to ensure that all requirements associated with its Existing Licence and related Amendment(s) are accordingly addressed.

Design Drawings

As part of the Application to amend the Existing Licence, the Licensee submitted a report prepared by exp Services Inc. that contained design parameters and drawings pertaining to the reservoir expansion, Figures 1 and 2. Further, a design development report for the water supply system improvement, prepared by Arktis Piusitippaa Inc., contained in addition to relevant design parameters, design drawings for the truck-fill station and pump house, Figures 5-12. The Licensee should note that as the drawings provided in both documents were not signed and stamped by an engineer, and it is inconclusive as to whether they are for-construction or for tendering purposes. Conditions have been included under Part E, Item 9 in this Amendment, requiring the submission of for-construction drawings for the Board's review at least two (2) weeks prior to the commencement of construction activities.

Project Execution

Based on details included in the Application, the proposed expansion of the reservoir will be undertaken in two phases:

- Phase 1 – Mobilization, dewatering of existing reservoir, drill and blasting, excavation, temporary water truck filling facility, and recharging of reservoir. Phase 1 is schedule to commence September 30, 2016 or prior to the freeze-up period.
- Phase 2 – Mobilization, dewatering of existing reservoir, drill and blasting excavation, temporary water truck filling facility, and recharging of reservoir. Phase 2 is schedule to commence September 30, 2017 or prior to the freeze-up period.

Decision

Considering that above-mentioned issues and the Licensee proposed investment in infrastructure improvements to enhance its ability to adequately address the community's potable water supply needs, the Board has decided to approve the issuance of Amendment No. 2 to Licence No. 3BM-IGL1520.

LICENCE AMENDMENT No. 2

Licensee:	**Hamlet of Igloolik**
Licence No:	**3BM-IGL1520, Type "B"**
Licence Issued:	**March 31, 2015**
Amendment No.1	**February 16, 2016**
Amendment Effective Date:	**September 1, 2016**
Expiry Date:	**March 30, 2020**

Pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* and the *Nunavut Waters and the Nunavut Surface Rights Tribunal Act*, with respect to the Application for Amendment No. 2 to Licence No. 3BM-IGL1520, dated April 29, 2016, made by the Government of Nunavut – Community and Government Services (GN-CGS) on behalf of the Hamlet of Igloolik, the Nunavut Water Board hereby grants the following Licence Amendment.

The Licence issued on March 31, 2015 with an expiry date of March 30, 2020, shall be further amended to include the following terms and conditions, with respect to the use of Water and the deposit of Waste for a Municipal undertaking within the boundaries of the Hamlet of Igloolik, in the Qikiqtani Region, Nunavut, at the following geographical coordinates: Latitude: 69º 23' N and Longitude 81º 46' W.

The Licence shall be amended as follows:

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

Item 1 – Scope

Amended to read:

> This Licence allows for the deposit of Waste use and use of Water, including the expansion of the Hamlet's water supply reservoir, construction of a new truck-fill station, replacement of the transmission main that supplies water from the South Lake water source, and the use of Fish Lake as an alternative water source; for a Municipal undertaking at the Hamlet of Igloolik, located within the Qikiqtani Region, Nunavut (Latitude: 69°23'N and Longitude: 81°46'W).

Item 2 –Definitions

Amended to read

> "**Water Supply Facilities**" – Consists of pre-expanded and/or expanded facilities and associated infrastructure including the South Lake water source, intake infrastructure, and transmission line to the Hamlet's water supply reservoir and the reservoir, as well as the

Fish Lake Water source, a secondary and alternative source, as described in the Application dated March 13, 2015 and/or Amendment No. 2 Application dated June 2, 2016.

PART C: CONDITIONS APPLYING TO WATER USE

Item 1 Amended to read:

The Licensee is authorized to withdraw freshwater using the Water Supply Facilities for the purposes allowed under the Licence and associated amendments, from either South Lake, as a primary source, or Fish Lake, as a secondary source.

Insert Item 8

The Licensee shall provide to the Board and an Inspector, at least (10) days written notice, prior to withdrawing and using fresh water from Fish Lake, the secondary water source authorized under this Amendment.

PART E: CONDITIONS APPLYING TO MODIFICTAION AND CONSTRUCTION

Insert Item 7

The Licensee shall, within ninety (90) days of completion of construction of the reservoir expansion and related infrastructure, submit to the Board for review a Construction Summary Report that includes stamped, as-built plans and drawings, explanations for deviations from the construction specifications and drawings, and consideration of construction and field decisions and their effects on the performance of engineered facilities.

Insert Item 8

The Licensee shall submit to the Board for Approval, within thirty (30) days prior to commencing construction activities, a Spill Contingency Plan to assist the Licensee in preventing and/or minimizing spills during construction works and activities.

Insert Item 9

The Licensee shall submit to the Board for review, at least two (2) weeks prior to commencing construction activities, for-construction drawings and plans, signed and stamped by Engineer.

Insert Item 10

The Licensee shall ensure that surface runoff or discharges impacted by construction activities associated with the undertaking, not exceed the following Effluent Quality Limits, where flow may directly or indirectly enter Water:

Parameter	**Maximum Average Concentration**	**Maximum Concentration of Any Grab Sample (mg/L)**
Total Suspended Solids	50	100
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

Insert Item 8

The Licensee shall submit, to the Board for approval, an Operation and Maintenance Manual for the updated or expanded Water Supply Facilities authorized under the scope of Amendment No. 2, at least sixty (60) days prior to commissioning the facility.

PART H: CONDITIONS APPLYING TO MONITORING PROGRAM

Item 1 Amended to read:

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

Monitoring Station ID	**Description**	**Status**
IGL-1	Raw Water Supply Intake at South Lake	Active (Volume)
IGL-1a (New)	Raw Water Supply Intake at Fish Lake	Active (Volume)
IGL-2	Runoff from the Modified Solid Waste Disposal Facility	Active (Water Quality)
IGL-3	Raw Sewage at Discharge point into the Modified Sewage Disposal Facility	Not Active
IGL-4	Final control point from the Modified Sewage Disposal Facility or upon commissioning, the Upgraded Sewage Disposal Facility	Active (Water Quality)
IGL-5	Final Effluent Discharge Point prior entering Foxe Basin	Active (Water Quality)

Item 2 Amended to read:

The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of water pumped at Monitoring Program Stations IGL-1, and IGL-1a for all purposes under the Existing Licence associated Amendments.

All remaining terms and conditions of Licence No. 3BM-IGL1520, Type 'B", dated March 31, 2015, and Amendment No.1 dated February 16, 2016 still apply.

This Amendment, Amendment No. 2 to Licence No. 3BM-IGL1520, is issued and recorded at Gjoa Haven, NU on September 1, 2016.

Approved by,

Thomas Kabloona
Nunavut Water Board, Chair

Appendix D –
Record Drawings

CLIENT
DEPARTMENT OF COMMUNITY AND GOVERNMENT SERVICES
GOVERNMENT OF NUNAVUT

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SCALE 1:750	PROJECT IGLOOLIK WATER RESERVOIR EXPANSION	PROJECT No. 230783
DATE OCT 2017	TITLE AS CONSTRUCTED RESERVOIR	DRAWING No. FIG.2–AC
CAD SAB		

FUEL TANK

EXISTING BUILDING

RAMP

TOP OF RESERVOIR
AS CONSTRUCTED
16,105.8m²

0 5m 10m 30m
HORIZONTAL 1:750

N

Plotted by: PLOTTEDBY
Last Plotted: LASTPLOTTED
Filename: FILENAME
Last Saved: LASTSAVED