Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

Water Resources Division
Nunavut Regional Office
Iqaluit, NU X0A 0H0

Your file - Votre référence
3AM-PAN----

July 28, 2017

Our file - Notre référence
CIDM#1164720

Richard Dwyer
Licensing Administrator
Nunavut Water Board
Gjoa Haven, NU X0E 1J0

Re: Indigenous and Northern Affairs Canada's (INAC) Review of the Hamlet of Pangnirtung's Type "A" Water Licence Application – #3AM-PAN---- – Municipal Undertaking

Dear Mr. Dwyer,

Thank-you for the email notice received on June 9, 2017 regarding the above mentioned application.

INAC reviewed the application and the results of our review are presented in the enclosed memorandum for the Nunavut Water Board's consideration. Comments have been provided pursuant to the Department's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

Please do not hesitate to contact Lisa Bachellier at 867-975-4568 or Lisa.Bachellier@aandc-aadnc.gc.ca or myself at 867-975-3876 or Sarah.Forte@aandc-aadnc.gc.ca for any additional information.

Regards,

Sarah Forté
Water Management Coordinator

Canada

Technical Review Memorandum

To: Richard Dwyer, Licensing Administrator, NWB

From: Lisa Bachellier, Water Resources Technician, INAC
Sarah Forté, Water Management Coordinator, INAC

Date: July 28, 2017

Re: Application for Renewal and Change to Type 'A' for Water Licence 3BM-PAN1417

Applicant: Hamlet of Pangnirtung
Project: Municipal undertaking
Region: Qikiqtani

A. BACKGROUND

On May 17, 2017, the Nunavut Water Board (NWB or Board) distributed an Application submitted by the Government of Nunavut's Community and Government Services (GN-CGS) on behalf of the Hamlet of Pangnirtung (Licensee or Applicant) for renewal of 3BM-PAN1417 and subsequent change to a Type 'A' Water Licence. This Type 'A' Water Licence is to cover use of water and disposal of waste in the Hamlet, and covers three facilities: Water Supply, Wastewater Treatment and Waste Management.

The Duval River is the water source under 3BM-PAN1417. Since the river does not flow in the winter months, water is pumped from the river to a constructed water storage reservoir during the ice-free months in order to ensure consistent water supply throughout the year. During the last renewal of 3BM-PAN1417 in 2014, it was noted that daily water use might be greater than 300 m^3 per day when filling the water storage reservoir. A three year water licence term (until September 2017) was granted to allow the Licensee time to measure water use during reservoir filling and to confirm whether a Type 'A' Water Licence was required. The Licensee has confirmed, based on reservoir size and time spent to fill the reservoir during the ice-free months that daily water use (extraction) does exceed 300 m^3 per day during reservoir filling (even though water consumption is estimated to be only 138 m^3 per day). As such, the renewal application is for a Type 'A' Water Licence.

In addition to the re-classification of this Water Licence to a Type 'A', the Licensee is requesting a licence term of 10 years (valid until September 2027).

The Application included the following documents available on the NWB's public registry:

- Type 'A' Water Licence Application form and letter confirming change to Type 'A' Water Licence
- Screening Decision Report from the Nunavut Impact Review Board
- Plain language description of Application
- Applicant response to initial completeness review by the NWB
- Management and emergency plans, including:
    - Spill Contingency Plan (dated October 2016)
    - Wastewater Treatment Plan Bypass Contingency Plan (dated October 2016)
    - Fish Process Plant Waste Management Plan (dated April 2017)
    - Solid Waste Operation and Maintenance Plan (dated June 2014)

Indigenous and Northern Affairs Canada (INAC) submitted comments on the completeness of the Application and Information Requests (IRs) to the NWB on June 6, 2017. Further information was provided by the Applicant as shared by the NWB on June 20, 2017, including:

- WWTF Overall Plan Effluent Route to Pang Fjord (dated October 2015)
- 2014- 2016 Caduecon Lab in Ottawa-Wastewater test results of the Hamlet of Pangnirtung (dated May 2016)
- Pang WWTF Effluent Summary 2015 – 2016 (dated December 2016)
- Applicant Response to NWB-Revised on May 11 (dated May 2017)
- WWTP Lab Test Results (dated May 2017)
- Applicant Response to ECCC Comments (dated June 2017)
- Applicant Response to INAC Comments (dated June 2017)
- Applicant Response to Questions (dated June 2017)
- Pangnirtung Environmental facilities under water licence sketches for relative locations (dated June 2017)
- Revised Solidwaste OM Plan (dated June 2017)

The Board requested technical review comments by July 12, 2017. Following our request, the review due date was pushed back to July 28, 2017.

B. RESULTS OF REVIEW

Comments and recommendations are provided for the Board's consideration. This section is divided into four sub-sections. The first three sub-sections group comments related to the different facilities; water supply, wastewater treatment, and waste management. The last sub-section has general comments applying to the whole licence.

1 WATER SUPPLY

The water supply for the municipality of Pangnirtung is the Duval River. During open water season, water from the river is pumped to a 120 000 m^3 reservoir to ensure water availability year round. A new water treatment plant/truck fill station was completed in 2016 and is currently undergoing calibration. Trucks are used to deliver water to homes and institutions.

1.1 Quantity of water requested

Reference:

- Application for Type B Water Licence # 3BM-PAN1417 Renewal to Type A of the Municipality of Pangnirtung, GN-CGS, March 20, 2017
- Applicant's response to INAC comments, GN-CGS, June 7, 2017
- Water licence 3BM-PAN1417, Nunavut Water Board, September 16, 2014

Comment:

The present water licence authorizes the Licensee to extract 74 000 m^3/year or a maximum of 299 m^3/day from the Duval River.

The quantity of water requested in the new licence is unclear. In the application, the quantity of water to be used is "*138.02 m^3/day (Note: This is equivalent to the consumption volume only. The actual extraction volume will be higher)*". The extraction volume is not specified. Further in the application, the quantity of water to be used is said to be the same as in the existing licence (203 m^3/day). Yet further, under the section for quantities to be used for different purposes, the value is given as "*232.85 m^3/day (84,989 cubic meters annually) in 2027 based on the designed consumption 129litres/capita/day for the 1805 population.*"

In their response to our information request #3, the Licensee explained the lined reservoir was "*drained and cleaned at every 4 to 5 years interval.*" Filling the reservoir those years which it is emptied would presumably require its full capacity, 120 000 m^3.

Recommendation:

We recommend an authorized water use of 120 000 m^3/year to allow the Licensee to fill its reservoir to capacity the years it is drained.

1.2 Water pumping capacity

Reference:

- Re: Application for the Renewal of the Water Licence # 3BM-PAN 1417, TYPE-B of the Municipality of Pangnirtung to TYPE A, Letter to the NWB, GN-CGS, March 20, 2017
- Applicant's response to INAC comments, GN-CGS, June 7, 2017

Comment:

The Duval River serves as the community's water source. Every summer, water is pumped from the river to fill the reservoir. The Licensee has provided conflicting information regarding how this is done.

In the March 20, 2017 letter, pumping is done "*Using a Gorman and Rupp diesel driving pump with 200mm intake line for a capacity of 75 litres/second as per design, total time to fill the Reservoir of the capacity of 120,000cubic meters takes 444.45 hours or 56 days at 8hrs of daily operation.*"

In their reply to our information request #3, on June 7, 2017 the Licensee wrote "*A diesel pump of capacity 114,000L/hr. is used to extract water from Duval River to the Water storage Reservoir normally in September each year. To fill the empty reservoir takes roughly 120 hours.*"

Data presented on June 7 is not coherent. A pumping rate of 114 000 L/hr can be converted to a rate of 2 736 m^3/day. Our calculations indicate it would take over 1000 hours to fill the 120 000 m^3 reservoir, or 132 days at 8 hours of daily operation. This does not match the information provided by the Licensee, as they stated filling the reservoir takes 120 hours, and leads to questions as to how it is possible to fill the reservoir during open water season.

The Hamlet's pumping capacity needs to be adequate so the reservoir can be filled during the open water season which is of limited duration.

Recommendation:
We recommend requiring the Licensee provide detailed and accurate information about their pumping capacity. If the capacity is insufficient to adequately fill the reservoir in a timely manner, they should also provide plans on how they will increase their capacity, with an implementation schedule.

1.3 Duval River as water source

Reference:

- Re: Application for the Renewal of the Water Licence # 3BM-PAN 1417, TYPE-B of the Municipality of Pangnirtung to TYPE A, Letter to the NWB, GN-CGS, March 20, 2017
- Water Resources Development for High Arctic Communities, Master's Thesis, Ralph Suk, McMaster University, August 1975
- HYDAT database, station 10UF001, Water Survey of Canada
- Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada, Fisheries and Oceans Canada, May 2013

Comment:
The community's water source is the Duval River and every summer, water is pumped from the river to fill the 120 000 m^3 reservoir. When extracting water from a river, it is important to consider how much water will be left in the river.

Fisheries and Oceans Canada (FOC) provides a framework with recommendations for ecological flow requirements that may be appropriate in this case because no

information has been presented regarding this topic and some limited hydrological flow data is available. The framework states:

> *The probability of degradation to ecosystems sustaining fisheries increases with increasing alteration to the natural flow conditions. Thus, the assessment of alterations to the flow regime should be considered in a cumulative sense, and not only on a project-by-project basis.*
>
> *o Cumulative flow alterations <10% in amplitude of the actual (instantaneous) flow in the river relative to a "natural flow regime" have a low probability of detectable impacts to ecosystems that support commercial, recreational or Aboriginal fisheries. Such projects can be assessed with "desktop" methodologies.*
>
> *o Cumulative flow alterations that result in instantaneous flows < 30% of the mean annual discharge (MAD) have a heightened risk of impacts to fisheries.*

Information reported by Ralph Suk indicates that in 1974 flow estimates for the Duval River near Pangnirtung ranged from 2 to 24 m^3/s (72 to 850 cfs).

Information is available from a hydrometric station that was operated by Water Survey Canada on the Duval River near Pangnirtung (10UF001, 66°43'3" N 65°41'10") from 1973 to 1983. The data records are not all complete and have the following characteristics for the 11 years of data available:

maximum measured daily discharge	22.8 m^3/s	minimum measured daily discharge	0.02 m^3/s
earliest measured flow start date	June 11	latest measured flow start date	July 8
earliest measured flow end date	August 24	latest measured flow end date	September 30
mean annual discharge	5.2 m^3/s	mean monthly discharge – July	7.3 m^3/s
mean monthly discharge – August	3.7 m^3/s	mean monthly discharge – September	1.7 m^3/s
minimum daily discharge, averaged over July	3.1 m^3/s	minimum daily discharge, averaged over August	1.7 m^3/s
minimum daily discharge, averaged over September	0.4 m^3/s		

Although the FOC documents recommends a minimum of 20 years of flow data to establish the natural flow regime, the 11 years of data available can be compared to the pumping rate. As discussed in comment 1.2, the pumping rate provided by the Licensee unclear. Using the higher pumping rate of 0.075 m^3/s (75 L/s), we conclude that there is no risk of flow alterations that result in instantaneous flows <30% of the mean annual discharge. The mean annual discharge is 5.2 m^3/s, and 30% of this is 1.6 m^3/s.

However, during low flow periods, there is a risk of alterations >10% in amplitude of the instantaneous flow in the river. For the 0.075 m^3/s pumping rate to remain below 10% of the river flow, the discharge must be above 0.75 m^3/s. The daily discharge in the month of September is frequently below this value.

These simple comparisons were done with incomplete information that was gathered 35 years ago because it is the only information available. In their application, the GN-CGS has committed to undertake a hydrology study by December 2018. The main components of the study are to be: "*discharge volume, velocity, erosion and sedimentation, hydraulics, hydrology, water quality and thermo erosion.*" It will be important for this study to characterize the variability of discharge.

Recommendation:
INAC recommends that until further information is available, water extraction from the Duval River be limited to the months of July and August unless the Licensee monitors river discharge to ensure they are not extracting more than 10% of its flow.

We also recommend that the hydrology study committed to by GN-CGS be included as a condition in the licence, should it be renewed.

1.4 Surface water management around reservoir

Reference:

- Water Licence Inspection Report: Date July 27, 2016

  Water Use and relate structures: Item # 3

Comment:
The Berm wall around the reservoir has a depression near the northeast corner. This was likely caused from upstream surface water run-off. The depression is likely allowing surface water from the surrounding environment to flow into the reservoir during heavy rainfall events only. This should be addressed to maintain the designed integrity of the structure.

Water is infiltrating around the reservoir due to spring melt and heavy rains creating a pond around the reservoir.

Recommendation:
INAC recommends that the Licensee re-enforce this berm wall around the reservoir, failing to do so may cause future problems.

1.5 Reclamation of old truck fill station

Reference:

- Applicant's response to NWBs correspondence, GN-CGS, May 10, 2017

Comment:
The Licensee wrote that they intend to decommission the old truck fill station on or before 2019, after keeping it as a back-up for the new truck fill station for approximately a year.

It is important to reclaim water management facilities no longer in use and INAC will review any decommissioning plans as they become available.

Recommendation:

INAC recommends that the old truck fill station remain in a renewed licence and that a condition for its decommissioning be included.

1.6 Operation and Maintenance manuals for water supply

Reference:

- Application for the Renewal of the Water Licence # 3BM-PAN 1417, TYPE-B of the Municipality of Pangnitung to TYPE A, Letter to the NWB, GN-CGS, March 20, 2017
- Applicant's response to NWBs correspondence, GN-CGS, May 10, 2017
- Completeness Assessment of Application for Renewal and Change to Type 'A' Water Licence No.3BM-PAN1417, INAC, June 6, 2017
- Applicant's response to INAC comments, GN-CGS, June 7, 2017

Comment:

At the completeness review stage of this water licensing process, INAC requested a revised Operation and Maintenance manual for the Pangnirtung truck fill station, written to allow a clear understanding of how the station will be operated to meet water licence requirements.

The Licensee's response to the NWB on the same topic was that a revised manual would be completed within 3 months of May 4, 2017. In their response to our request, the Licensee has written that the manual will be updated and submitted to the NWB on or before December 2017.

INAC also requested an Operation and Maintenance Plan for the process of filling the reservoir. A description of the activities was included in the Licensee's response on June 7, 2017. This is helpful in understanding the procedure, but does not match the description included in the application cover letter, dated March 20, 2017. Neither the reply not the letter can be used as a reference for operators filling the reservoir. Therefore an Operation and Maintenance plan should be produced with coherent information as well as procedures required to meet water licence requirements.

Recommendation:

INAC recommends that a renewed licence include a condition capturing the Licensee's commitment to provide a revised Operation and Maintenance manual for the Pangnirtung truck fill station by December 2017.

INAC also recommends that the Licensee be required to provide and Operation and Maintenance manual for the process of filling the reservoir, either as a stand-alone document, or a section in the truck fill station manual, which would then become a broader manual on water supply.

2 WASTEWATER TREATMENT

Wastewater collected from homes and institutions by truck is treated at a wastewater treatment plant commissioned in 2015. The plant uses filters and membrane bioreactor (MBR) technology to treat water before discharging at an outfall covered with rip-rap that is approximately 140 m from the ocean. There is a sewage lagoon that was used for fish plant wastewater and occasionally municipal wastewater, but it is no longer in use.

2.1 Wastewater treatment plant bypass contingency plan

Reference:

- WWTP Bypass Contingency Plan, Hamlet of Pangnirtung, Pangnirtung, Nunavut, exp Services Inc., October 31, 2016

Comment:

The WWTP Bypass Contingency Plan describes in detail 8 possible types of bypasses that can be utilized when there are difficulties with the equipment in the wastewater treatment plant. Two deficiencies were noted in the plan:

- Table 4-2 on page 4 does not include INAC in the agencies that have a vested interest in the event of a bypass event.
- Section 6 on bypass recording and reporting does not include reporting events where untreated or partially treated sewage are discharged to the NT-NU 24-hour spill report line.

Recommendation:

INAC recommends that the Licensee include these additions in an updated version of the Plan.

2.2 Sewage lagoon

Reference:

- Applicant's response to NWBs correspondence, GN-CGS, May 10, 2017
- Pangnirtung Fish Waste Lagoon Decommissioning Plan, exp Services Inc., May 23, 2013
- Completeness Assessment of Application for Renewal and Change to Type 'A' Water Licence No.3BM-PAN1417, INAC, June 6, 2017
- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017

Comment:

This comment repeats comment #2 of INAC's completeness review.

> "*The Applicant has indicated that the old sewage lagoon is no longer in use due to the commissioning of the Wastewater Treatment Plant. However, this facility has not been decommissioned and decommissioning will not be completed for another 1-2 years depending on the performance of the Wastewater Treatment Plant.*"

The Licensee had indicated that a decommissioning design was provided for the old sewage lagoon facility. After clarification, we understand that the sewage lagoon is the

same as the fish waste lagoon. The plan provided for the decommissioning of the fish waste lagoon is a recommended sampling program, and the actual plan will depend on the results.

The O&M Plan refers to a "sewage treatment wetland" which receives the runoff from the bulk metal/hazardous waste storage area. It is not clear if this is the same as the sewage lagoon to be decommissioned, but the Inspector believes they might be distinct.

Recommendation:
This comment repeats recommendation #1 of INAC's completeness review.
INAC recommends that the old sewage lagoon remain under a renewed licence until such time as it is decommissioned. We also recommend that the Licensee clarify if the sewage lagoon to be decommissioned is distinct from the sewage treatment wetland receiving leachate from the metal dump. If they are in fact the same, it may have an important impact of the reclamation effort required.

3 WASTE MANAGEMENT

Waste is deposited in two facilities, the landfill site and the metal waste site. The landfill site is divided into an area for domestic waste and another for sludge by a culvert placed on the ground surface. Both facilities are unlined and only the landfill is surrounded by a fence.

3.1 Fish solid waste management

Reference:

- Fish Process Plant Waste Management Plan, Hamlet of Pangnirtung, Pangnirtung, Nunavut, exp, April 2017
- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017

Comment:
Pangnirtung has a fish processing plant and management of waste generated at this facility has historically been a concern.

The Fish Process Plant Waste Management Plan describes how two species are processed in different seasons. During the 3-4 month turbot season in winter "*solid waste generally consists of waste packing materials and any material generated during clean-up (paper towels, etc.). These solids wastes are to be transported to the solid waste landfill site for disposal.*" During the 4 week arctic char season in summer "*the solid waste generated from Char processing could range from 0-10,000 kg (potentially up to approximately 400 kg/d over a 4-week period).*"

In the O&M Plan for the Solid Waste Facilities, Table 2 quantifies the fish processing offal from the fish processing plant at approximately 230 m^3/year. This is contradicted in Section 2.2.2 of the Plan that states "*no fish waste disposal has been dumped at the landfill since 2010.*" However two sentences later we read that fish plant waste is included in the total solid waste accumulation calculations.

Information request:
We would like the Licensee to clarify if arctic char solid waste is being disposed of at the landfill.

Recommendation:
INAC recommends that the Licensee correct the O&M Plan so that it is coherent with regards to fish waste and correct the contradiction between the Fish Process Plant Waste Management Plan and the O&M Plan.

3.2 Surface water management at metal dump

Reference:

- Nunavut Waters and Nunavut Surface Rights Tribunal Act Inspector's Direction, Aboriginal Affairs and Northern Development Canada (AANDC), August 10, 2015
- Water Licence Inspection Form, AANDC, July 22, 2015
- Water Licence Inspection Form, INAC, July 27, 2016

Comment:
During the summer 2015 visit, the Water Resources Inspector noted breaches in the berm to the southeast of the metal dump designed to divert runoff from the mountains around the metal dump. This resulted in an Inspector's Direction and the breaches in the berm were filled with hardened cement and soil, as seen by the Inspector during his summer 2016 visit. Water was accumulating behind the newly fixed sections and filtering into the metal dump.

It is critical that surface water be properly managed at the metal dump because it is not lined and it is also used to store hazardous waste. Any water flowing through the dump will pick up contaminant loads, so all water from outside the dump footprint needs to be diverted around it. It is understood that there are important runoff volumes coming from the mountains behind the dump and the channel flows are not always consistent between years.

The present water management structure consisting of a berm on the mountain side of the dump is insufficient, as water is ponding behind the berm and filtering through. Further efforts are required. A ditch diverting the water around the dump might be considered.

Recommendation:
INAC recommends that the Licensee be required to present a plan for managing surface water at the metal dump as well as a timetable for its implementation.

3.3 Runoff/leachate from landfill and metal waste sites

Reference:

- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017
- Annual Report for the Hamlet of Pangnirtung – 2014, GN-CGS, March 31, 2015
- Annual Report for the Hamlet of Pangnirtung – 2013, GN-CGS, January 21, 2014

- Annual Report for the Hamlet of Pangnirtung – 2012, GN-CGS, February 12, 2013
- Water Licence Inspection Form, AANDC, July 22, 2015
- Water Quality Guidelines for the Protection of Aquatic Life, Canadian Council of Ministers of the Environment (CCME), 2015

Comment:
The landfill, also referred to as the municipal solid waste (MSW) disposal area, is not an engineered facility. The description of operations in the O&M manual is:

> "*The MSW disposal area at Pangnirtung is used as a natural attenuation landfill. This means that the landfill is not lined and small amounts of contaminants can enter the surrounding environment to be naturally broken down. In this type of landfill, the rate that contaminants enter the environment is expected to occur at a rate such that contaminants can easily be broken down and the surrounding environment is not overwhelmed. Natural attenuation landfills also rely on permafrost aggrading into the covered waste cells of the landfill and eventually freezing them. However, as contaminants are able to freely enter the environment in this type of landfill, proper waste segregation is important to ensure harmful contaminants are kept out of the landfill.*"

A similar strategy described in the O&M manual for the metal waste site:

> "*The bulk metal/hazardous waste storage area is currently used to store hazardous wastes from the community. This area is filled but not bermed or lined and runoff from the facility presently flows into the sewage treatment wetland. If use of this area is to continue for storage of hazardous wastes, it is recommended that an engineered berm and liner system be installed as this will limit the amount of potentially hazardous leachate entering the surrounding environment.*"

The natural attenuation strategy is echoed in the water licence, and further precisions are given:

> "*To ensure that site runoff is properly managed so there is no impact to the natural environment in terms of contamination the Board has again included within the Monitoring Program Stations sampling of Monitoring Program Stations for the Landfill leachate/run-off from domestic waste dumping area (PAN-4) and from Sludge dumping area (PAN-5). The Board has also included an additional Monitoring Program Station (PAN-6) for the run-off from metal/vehicle dump area.*"

INAC agrees with the NWB that monitoring the leachate/run-off is important for ensuring there is no impact to the environment. The Licensee has not reported results that can be identified as either stations PAN-4, PAN-5 or PAN-6. In the last seven annual reports, two samples were identified as "leachate" (September 3, 2014 and September 20, 2013), and one as "effluent dump site" (September 12, 2012). According to the 2015 inspection report, leachate at the MSW facility was sampled at the time of the inspection, but the results were not included in the annual report, nor was the Inspector

able to find them. The Inspector believes the leachate results reported are likely from the MSW facility and not the metal dump.

We are concerned that contaminants are potentially entering the environment from the landfill at a rate greater than what can be attenuated or broken down. In particular, the metal contaminants which cannot be broken down, but can potentially become absorbed to the medium they flow through or be precipitated out of the leachate through chemical reactions. There is little information available, but in the two leachate samples for which metals were analyzed, concentrations of arsenic, cadmium, copper, iron, mercury and zinc were above CCME guidelines for the protection of aquatic life in the freshwater environment. The landfill's proximity to the ocean means that CCME guidelines for the protection of marine life may be applicable, and the samples have cadmium and mercury concentrations above these.

The high mercury concentration in one of the two samples (4.8 µg/L) is of particular concern. It is 30 times above the CCME guideline for the protection of marine life (0.016 µg/L). If this sample is from the metal dump, or if similar leachate is produced at the metal dump, there is even further cause for concern because the runoff flows into a "sewage treatment wetland", and there is the potential for bacteria in the wetland environment to transform the mercury into methylmercury, a toxin that bio-accumulates in fish.

Recommendation:
INAC recommends that the Licensee collect, analyze and report the leachate/runoff samples at the monitoring stations specified in the water licence to form a clearer picture of the environmental threat caused by the landfill and metal dump.

We recommend the Licensee submit a modified waste management strategy that limits the spread of contaminants in the environment from the landfill and metal dump leachate/runoff, unless results indicate action is not necessary. Actions may include executing the suggestion of the O&M manual for the metal dump, making it a lined facility. If the sewage treatment wetland is to be part of the attenuation strategy, samples need to be taken downstream of the wetland to demonstrate that the receiving environment is not being impacted.

3.4 Hazardous waste storage area

Reference:

- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017
- Environmental Guideline for the General Management of Hazardous Waste, GN Department of Environment, October 2010

Comment:
Section 6.2 of the O&M Plan states that the hazardous waste storage area should be fenced and have appropriate signage. INAC agrees and adds that entire metal dump should be fenced to control access.

The fencing measures are required for general public health and safety reasons, as written in the O&M Plan, but also as an environmental protection measure. Improper disposal of hazardous wastes and metal objects such as fridges and cars which could leak contaminants greatly increases the risk of releasing unacceptable contaminants to the environment.

The GN guideline for hazardous wastes states that storage facilities should be secure and that "*drainage into and from the storage facility site should be controlled to prevent spills or leaks from leaving the site and to prevent run-off from entering the site.*" This guideline is relevant to water protection measures because it will prevent contaminants from entering the environment. It is acknowledged in the O&M Plan which recommends that an engineered berm and liner system be installed at the bulk metal/hazardous waste storage area.

Recommendation:
INAC recommends that Licensee act on the recommendation it makes in the O&M Plan regarding lining the hazardous waste storage area and provide the NWB with an implementation schedule.

3.5 Solid waste O&M manual

Reference:

- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017

Comment:
Section 5.1 on the operations of the municipal solid waste disposal area is written as suggestions. It list activities and procedures that "should" be done, rather than what will or must be done. Such non-committal wording in the O&M Manual is not conducive to rigorous execution of the activities described.

Recommendation:
We recommend that a future version of the plan re-word the operations section to be more affirmative.

4 GENERAL

4.1 Station PAN-01 – raw water supply intake

Reference:

- Nunavut Water Board licence: 3BM-PAN1417

Comment:
Part B Item 5 of the licence states "*The Licensee shall, install flow meters or other such devices or implement suitable methods required for the measuring of water volumes as required under Part H, Item 2.*"

No extraction volumes are found in the annual report, so we assume this licence condition has not been met.

Recommendation:
INAC recommends the Licensee install a gauge or flow meter to have an exact amount of water used on a daily, monthly and annual basis. It would also be acceptable to estimate the extraction volumes by multiplying the pumping rate by the duration of pumping operations. The measurements should be recorded in the annual reports, fulfilling the obligation required under the licence.

4.2 Reporting of water quality results

Reference:

- Nunavut Water board Licence -3BM-PAN1417
  Part H: Conditions Applying to the Monitoring Program
- Operation & Maintenance Plan for solid waste Facilities dated May 2017

Comment:
Part H Item 1 of the licence states: *The Licensee shall maintain Monitoring Program stations of the following locations:*

Monitoring Program Station Number	Description	Status
PAN-1	Raw Water supply intake at the Duval River	Active (Volume)
PAN-2	Raw Sewage from pump-out truck	New (Volume)
PAN-3	Effluent from Waste Water Treatment Facility	Active (Quality)
PAN-4	Run-off from Sludge Disposal Area	Active (Quality)
PAN-5	Run-off from the Solid Waste Disposal Facility	Active (Quality)
PAN-6	Run-off from Metals Storage Area	New (Quality)

Part H Item 5 of the issued water licence states: "*The Licensee shall sample at Monitoring Program Stations PAN-4, PAN-5 and PAN-6 once at the beginning, middle and near the end of discharge/run-off observed. Samples shall be analyzed for the parameters listed in Part H, Item 4:*"

The Operation & Maintenance Plan for solid waste Facilities dated May 2017 has similar information found in Section 8.0 Quality Control and Quality Assurance (QA/QC): Monitoring and Sampling, Sub-section 8.1 Monitoring Requirement: Table 7: Monitoring Station

Monitoring Station	Description	Frequency
PAN-3	First point of pipe effluent discharge from the WWTP	Monthly
PAN-4	Leachate sampling from sludge dumping area of the land fill site	Three times: at the beginning, at the middle and near the end of the season when flow is observed.
PAN-5	Leachate sampling from domestic waste dumping area	- Do--

INAC notes that PAN-6 has not been included in the monitoring station table of the O&M Plan. We also note that the only water quality data included in the annual reports is for effluent from the wastewater treatment facility.

Recommendation:
INAC recommends the Licensee:

- correct their O&M Plan to include all four water quality stations
- comply with the issued water licence Part H Item 5
- identify the sample results submitted by monitoring station names, so they can be identified
- report in future annual reports all samples taken for QA/QC sampling and monitoring

4.3 Wastewater treatment plan information

Reference:

- Nunavut Water board issued Licence -3BM-PAN1417

Part H: Conditions applying to the Monitoring Program Item # 13

Comment:
Part H Item 13 of the issued water licence states "*The Licensee shall submit to the Board for review and approval, within six (6) months of the issuance of this licence, a report identifying any additional Final Discharge Point from the Waste Water Treatment Plant. The report shall include at a minimum:*
a. Plans, specifications, geographic coordinates and a general description of each Final Discharge Point and direction of flow;
b. A description of how each Final Discharge Point is designed and maintained, if required; and
c. A description of the receiving environment."

INAC was unable to find the requested documents, which should have been submitted in 2015.

Recommendation:
INAC recommends the Licensee provide the information requested in Part H Item # 13, including geographic coordinates, a general description of samples taken of wastewater effluent, and a better description of where the discharge samples are being taken.

4.4 Annual reports

Reference:

- Hamlet of Pangnirtung Annual Reports, 1996 to 1998, 2002, 2003, 2010, 2011, 2012, 2013, 2014, 2015,2016

Comment:

As required under issued licence 3BM-PAN1417, *"The Licensee is required to submit all monitoring data with appropriate station identification to the NWB as a requirement of the Annual Report in Part B Item 1 of the licence. The Annual Report shall include all Monitoring Program results as per requirements included within Part H (Conditions applying to the Monitoring Program) of the Licence. The Licensee shall provide, with Annual Reports, all tabular summaries for monitoring program stations in addition to laboratory results. As stated by AANDC these summaries should reference licensed monitoring program stations (e.g., PAN-X), effluent quality limits, and any exceedances"*

Several Annual Reports (2002, 2003, 2010, 2011, 2012, 2013, 2014, 2015) that have been provided are incomplete, lacking monitoring data and information. INAC has noted an improvement in the quality of the Monitoring Reports over the years. The 2014 Annual Monitoring Report was thorough and the Master Analytical Summary Table provided was helpful.

Recommendation:

INAC recommends keeping the requirement in the Licence and encourages the Licensee to provide water quality monitoring data in a tabular format that identifies the station sampled and any criteria exceedance.

4.5 Spill contingency plan

Reference:

- Spill Contingency Plan, Hamlet of Pangnirtung, Pangnirtung, Nunavut, exp, October 31, 2016
- Operation and Maintenance Plan for Solid Waste Facilities, GN-CGS, June 2017

Comment:

The Licensee has provided a stand-alone Spill Contingency Plan and Section 10 of the O&M Plan for the Solid Waste Facilities covers the same topics.

Three deficiencies were noted in the Spill Contingency Plan:

- In Section 5, the list of potential contaminants anticipated to be at public facilities and infrastructure sites does not include calcium hypochlorite, which is used at the water treatment plant/truck fill station.
- Step #7 of the three different spill contingency procedures in Section 7 is to contact the facility supervisor. This job title is not found in Table 4-1, listing contacts and phone numbers, so it is not clear whom should be contacted.
- Section 8.3 suggests the Hamlet should have several spill kits stored at the municipal garage, and that these kits should be brought to different sites before

maintenance work commences. Spills can occur during regular operations as well, so there should be a spill kit at each location where important quantities of potential contaminants are stored. This could include not only the municipal garage, but also the tank farm and gas bar, the truck fill station, wastewater treatment plant, and waste storage areas. Section 10.9 of the O&M Plan for the solid waste facility states "*At least one spill kit should be clearly marked and present at the solid waste disposal facility (within the facility). One spill kit should also be present within the water distribution facility, located at the pump house.*"

Recommendation:
We recommend that the Licensee correct the deficiencies noted above in a revised version of the Spill Contingency Plan to be submitted with next year's annual report.

4.6 Licence term

Reference:

- Application for Type B Water Licence # 3BM-PAN1417 Renewal to Type A of the Municipality of Pangnirtung, GN-CGS, March 20, 2017
- Applicant's response to INAC comments, GN-CGS, June 7, 2017

Comment:
The licensee has requested a ten year licence renewal term.

Substantial changes are planned to the solid waste management in the Hamlet. Upgrades have been approved and a Capital Project is scheduled for 2020-2021. More specifically, "*design will happen in 2019-20. Construction then to take place from 2021-23.*" According to the information presented, upgraded landfill, metal waste and hazardous waste facilities are sorely needed. A water licence amendment will be necessary to incorporate the new waste facilities, once the design has been completed.

Information available on the water source, the Duval River, is incomplete. Pangnirtung is planning to have a hydrological study completed by 2018. It will provide more information on the water source, which should be incorporated into the water licence as soon as possible.

Several deficiencies were noted in the annual reports as discussed in points 4.1, 4.2 and 4.4. We expect that the Licensee will work to fulfil the conditions of their licence.

Recommendation:
INAC recommends that the license should be renewed for 10 years.