Aboriginal Affairs and Northern Development Canada
Affaires autochtones et Développement du Nord Canada

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

Your file - Votre référence
3AM-IQA0612

July 10, 2015

Our file - Notre référence
IQALUIT #924423

Robin Ikkutisluk
Licensing Administrator Assistant
Nunavut Water Board
Gjoa Haven, NU X0E 1J0

Re: Aboriginal Affairs and Northern Development Canada's (AANDC) Review of the City of Iqaluit's Type "A" Amendment and Renewal Water Licence Application – #3AM-IQA0612 – Municipal Undertaking

Dear Ms. Ikkutisluk,

Thank-you for the email notice received on May 28, 2015 regarding the above mentioned application.

AANDC reviewed the application and the results of our review are provided 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 me at 867-975-3876 or Sarah.Forte@aandc-aadnc.gc.ca for any additional information.

Regards,

Sarah Forté
Water Management Coordinator

c.c.: Karen Costello, Director of Resource Management, AANDC Nunavut
Andrew Keim, Acting Manager of Water Resources, AANDC Nunavut
Erik Allain, Manager of Field Operations, AANDC Nunavut

Canada

Technical Review Memorandum

To: Robin Ikkutisluk, Licensing Administrator Assistant, NWB

From: Amjad Tariq, Regulatory and Science Advisor, Water Resource Division, AANDC
Sarah Forté, Water Management Coordinator, Water Resource Division, AANDC

Date: July 10, 2015

Re: Water Licence Renewal and Amendment Application, #3AM-IQA0612

Applicant: City of Iqaluit
Project: Municipal undertaking
Region: Qikiqtani

A. BACKGROUND

On May 28, 2015, the Nunavut Water Board (NWB or Board) provided notification of the City of Iqaluit's (the "Licensee" or the City) application to renew and amend its Type 'A' Water Licence, # 3AM-IQA0611 (the licence), that allows the use of water and deposit of waste for municipal undertakings.

During the period between November 2012 and March 2015, the Board received from the Licensee several submissions in support of the application to renew and amend the Licence, which was issued to the City on May 15, 2006 and expired, following an extension to the Licence term, on July 15, 2012.

Interested parties were asked to review the application and provide the comment by July 05, 2015. The Board had also requested to provide comments on the type of Technical Meeting and Pre-hearing Conference (TM/PHE) that may be held in accordance with the NWB's Rules.

The total scope of the present renewal and amendment application includes the original scope, the addition to the original scope and new requests to the original scope.

Original Scope (2012)

- Upgrade, operation and the eventual decommissioning of the Water Treatment Plant and other associated systems that supply water extracted from Lake

Geraldine for municipal use with a maximum withdrawal of 1,100,000 cubic meters annually.
- Upgrade, operation and the eventual decommissioning of the infrastructure for managing wastewater at the existing West 40 Wastewater Treatment Plant and backup Sewage Lagoon.
- Operation and eventual decommissioning of the solid waste management facility at the existing West 40 Landfill and associated infrastructure.

Additions to the Original Scope (2014)

- Construction, operation and the eventual decommissioning of a new solid waste management facility approximately 7.5 kilometers northwest of Iqaluit City Centre.

New Requests to the Original Scope (2015)

- The City is requesting that the length of term of the licence be twenty-five (25) years.
- An additional location for water extraction on Apex River to supplement Lake Geraldine.
- The City has requested to change its Monitoring Program requirements.

B. RESULTS OF REVIEW

Comments and recommendations are provided following the same large subdivisions that are present in the licence as well as a general section for comments pertaining to the whole licence.

1 GENERAL

1.1 Licence term

Reference:

- Letter: RE: Confirmation of Submissions and Scope for Type “A” Water Licence 3AM-IQA0611 Renewal Amendment Application, City of Iqaluit, March 2, 2015

Comment:

The Licensee has requested a twenty-five (25) year licence renewal term.

This requested term is not appropriate in light of the many changes to major undertakings such as the wastewater treatment plant, the landfills and water withdrawal sources planned for the next 5 years as well as the continued non-compliance with the expired licence.

Non-compliance issues are reported in all the Water Licence Inspections and gave rise to an Inspector's Direction from Environment Canada and Aboriginal Affairs and Northern Development Canada (AANDC) on March 5, 2013. Some of the problems raised by this direction have not yet been resolved, though there is a project schedule in place to do so.

Recommendation:
(R 1) Aboriginal Affairs and Northern Development Canada (AANDC) recommends that the license should be renewed for five years but we are not opposed to a term up to ten years, should the Board consider it suitable.

1.2 Monitoring program requirements

Reference:

- Letter: RE: Confirmation of Submissions and Scope for Type "A" Water Licence 3AM-IQA0611 Renewal Amendment Application, City of Iqaluit, March 2, 2015
- Letter: Water Sampling Criteria discontinuance and alteration, AANDC, December 5, 2014
- Canadian Environmental Protection Act (1999) Follow-up Report on a PSL1 Assessment for Which Data Were Insufficient to Conclude Whether the Substances Were "Toxic" to the Environment and to the Human Health – Chlorinated Paraffins, August 2008
- City of Iqaluit Annual Monitoring Report – 2014, exp Services, January 23, 2015

Comments and Recommendations:
The Licensee has requested several changes in the monitoring requirements of the licence (Part I and Schedule C), which are discussed individually below.

1.2.1 Chlorinated paraffins

The City is requesting the tests for chlorinated paraffins (now referred to as chlorinated alkanes) be removed from the water monitoring requirements. Their argument is the following: "*Chlorinated Paraffins are mainly found in heavily industrialized areas and the probability of receiving tests that show Chlorinated Paraffins above the accepted limit is assumed to be low*."

Short-chain chlorinated alkanes have been found in the Arctic food web. The higher volatility of certain short-chain compounds suggests that their presence resulted from long-range atmospheric transportation. Chlorinated alkanes are persistent pollutants and bio-accumulate. The available toxicity data indicate that they may be harmful to certain aquatic species at low concentrations.

(R 2) AANDC believes the possibility of chlorinated alkane concentrations in water exists and recommends keeping this testing requirement in the licence until the Licensee has sample results over three years to demonstrate that it is not a concern.

1.2.2 LC50 Bioassay

The City is requesting the LC50 Bioassay be removed from the water monitoring requirements for stations IQA-02, IQA-03 and IQA-05 and suspended until after 2018 for station IQA-04. Their argument is the following: "*It is understood that wastewater entering the WWTP is considered toxic and completing an LC50 Bioassay test on the influent provides no useful data for regulating effluent.*"

(R 3) AANDC agrees with the statement regarding influent toxicity and recommends removal of the LC50 Bioassay requirement IQA-03 and IQA-05 from the licence. AANDC also recommends suspending the testing requirement for station IQA-04 until after 2018, when the wastewater treatment plant will provide secondary treatment. Finally, AANDC recommends keeping the testing requirement for station IQA-02, the final discharge point from the sewage lagoon.

1.2.3 Station IQA-01 – raw water supply

The City is requesting the station IQA-01 be removed from the water monitoring requirements. Their argument is the following: "*Water quality is already sampled and monitored by the City of Iqaluit and the Government of Nunavut, Environment and Health, in relation to safer drinking water standards set out in the Public Water Supply Regulations.*"

AANDC has noted the Licensee's 2014 Annual Monitoring Report (section 3.2.1) substantiates exceedances of the Guidelines for Canadian Drinking Water Quality for raw water quality (IQA-01). The parameters for which exceedances were measured are chromium, iron, copper, nickel, manganese, and fecal coliform. Reporting test results to the NWB will help the Board monitor raw water quality in order to determine if sufficient measures are in the licence to protect the City's water source.

(R 4) AANDC recommends keeping station IQA-01 in the renewed licence, but perhaps measures can be taken to streamline the process to allow presentation of sampling results taken for the City or the Government of Nunavut, Environment and Health.

1.2.4 Stations IQA-03 and IQA-05 – influent sewage lagoon and influent wastewater treatment plant

The City is requesting the stations IQA-03 and IQA-05 be removed from the water monitoring requirements. Their argument is the following: "*It is understood that the influent (to these stations) is deleterious to the environment and the only data that should require reporting is the discharge effluent.*" The City also mentions that the location of the influent pipe of the sewage lagoon is inaccessible making station IQA-03 inaccessible.

AANDC believes that influent and effluent water quality tests for a wastewater treatment plant not only determine the concentration of the contaminants of concern, but also provide data for the design (degree of treatment) and any future upgrade/modification of a particular wastewater treatment system. To help understand the efficiency of a

primary wastewater treatment facility, it is imperative to continue monitoring the raw sewage within the plant from input through to the final discharge.

(R 5) AANDC recommends keeping stations IQA-03 and IQA-05 in the renewed licence, but perhaps measures can be taken to streamline the process to allow presentation of sampling results taken for the City. Station IQA-03 should be moved to a location that allows access.

1.2.5 Stations IQA-07 and IQA-09 – surface water entering West 40 landfill and contaminated soils accepted at West 40 landfill

The City is requesting the station IQA-07 be removed from the water monitoring requirements because a perimeter berm prevents surface water from entering the landfill. The City is requesting the station IQA-09 be removed from the water monitoring requirements because no contaminated soils are accepted at the West 40 landfill.

AANDC supports the City's request to remove stations IQA-07 and IQA-09 from the renewed licence.

1.2.6 Sampling frequency

The City is requesting altered sampling frequencies for stations IQA-02 (sewage lagoon effluent), IQA-04 (wastewater treatment plant effluent) and IQA-06 (wastewater treatment plant sludge). The Licensee has not provided the reasons to change the testing frequency requirements.

AANDC supports the City's request to change the monitoring frequency for station IQA-02 from bi-monthly and annually, as appears in Table 2 of the expired water licence, to intermittently (before decants). The water in the lagoon is contained and does not pose a risk to the environment until it is released, therefore it is appropriate to test it only before decants.

(IR 1) AANDC requests that the Licensee provide motivation for changing the sampling frequency at stations IQA-04 and IQA-06 and presently does not support the change.

1.3 Annual reports

Reference:

- City of Iqaluit Annual Reports, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014

Comment:

Several Annual Reports (2007, 2008, 2009, 2010, 2011) that have been provided are incomplete, lacking monitoring data and information. AANDC has noted an improvement in the quality of the Monitoring Reports over the years. The 2014 Annual Monitoring was thorough and the Master Analytical Summary Table provided was helpful.

Recommendation:
(R 6) AANDC recommends requiring the Licensee to provide water quality monitoring data in a tabular format that identifies the station sampled and any criteria exceedance.

1.4 Outstanding licence requirements

Reference:

- Application for Water Licence Renewal, Appendices C-2 to C-5, City of Iqaluit, October 2, 2012
- City of Iqaluit Annual Reports, 2012, 2013, 2014
- Inspection Reports, AANDC, July 2010, July 2011, October 2012, July 2013, October 2013, June 2014, October 2014

Comments and Information Request:
In reviewing the documents submitted for the application, some deficiencies with regards to requirements of the expired licence were noted. Clarifications are requested for the following three comments:

1.4.1 Wastewater treatment plant drawings

The Wastewater Treatment Plant design and drawings available in appendices C-2 and C-3 of the application have the following shortcomings:

- The design (process flow) for Phase 1 of the Wastewater Treatment Plant has not been signed by the Professional Engineer.
- Mechanical drawings, electrical drawings, instrumentation drawings are not signed the Professional Engineer.

Additionally, only the As-Built drawings in appendix C-5 are signed by a Professional Engineer whilst those in appendix C-4 are not. Pursuant to Part F, Item 5 of the licence, all construction of engineered structures should be supervised and field-checked by an Engineer in such a manner that the project specification can be enforced and, where required, the quality control measures can be followed.

(IR 2) AANDC request the Licensee to provide the construction record which shows that the construction was supervised and field-checked by an Engineer and recommends keeping the requirement for all plans and drawings to be stamped by a Professional Engineer registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG) in the renewed licence.

1.4.2 Ultraviolet lights at water treatment plant

The Licensee's 2013 and 2014 Annual Reports confirm that one Ultraviolet (UV) light system was not functional at the time of inspections. In five of the last seven Inspection Reports, the state of the water supply treatment system was found to be unacceptable and most often one of the UV light systems was non-functional.

AANDC encourages the Licensee to contact Public Health and keep them informed on what steps they are taking to ensure proper functioning of the UV system at the Water Treatment Plant.

1.5 Inspector's annual reports

Reference:

- Nunavut Water Board Licence 3AM-IQA0611

Comment:

Part A, Item 3 of the licence requires the Inspector to submit an annual report discussing five points including compliance, monitoring and emergency and unauthorised discharges. All these points are presently addressed in the Inspection Reports.

Recommendation:

(R 7) AANDC recommends rewording Part A, Item 3 of the licence so that the Inspector can address points 1 to 5 in their Inspection Reports rather than being required to produce a separate annual report.

2 WATER USE

The original renewal and amendment scope speaks of upgrade, operation and the eventual decommissioning of the Water Treatment Plant and other associated systems that supply water extracted from Lake Geraldine for municipal use with a maximum withdrawal of 1,100,000 cubic meters annually. No documentation was found regarding the eventual decommissioning of the water treatment plant. **(R 8)** AANDC requests the opportunity to review these documents when available and recommends that if the Water treatment plant decommissioning is included in the renewed licence, it be conditional on approval of a decommissioning plan.

In 2015, a new request for an additional location for water extraction on Apex River was added to the licence application to supplement Lake Geraldine.

2.1 Dam safety inspections for Lake Geraldine Reservoir

Reference:

- Lake Geraldine Dam Safety Inspection, McMillen, October 2014
- Lake Geraldine Dam Safety Review, Concentric Associates International Incorporated, 13-5021-B, March 27, 2014
- City of Iqaluit Dam Safety Inspection Lake Geraldine Dam Iqaluit, Nunavut, Concentric Associates International Incorporated, 12-4394, July 11, 2012
- Lake Geraldine Dam Iqaluit, Nunavut Dam Safety Inspection, Concentric Associates International Incorporated, 11-4000, September 21, 2011
- Lake Geraldine Dam Iqaluit, Nunavut Dam Safety Inspection, Concentric Associates International Incorporated, 10-3496, November 23, 2010

Comment:
The City has provided dam safety inspections and review for the Lake Geraldine Reservoir. The implementation status of several recommendations is unclear, including the following:

- In 2014, the Licensee's consultant recommended that repair to concrete spalling and joints on the upstream faces of the concrete structure is required by autumn 2016. However, the work should be completed sooner if concrete conditions deteriorate.
- The Licensee's 2013 Annual Report and states that, 'the Permanent Record File, Logbook and Operation and Surveillance manual requires updating for the year 2014.
- All of the inspection reports above mention an Emergency Preparedness Plan. Prior to 2012, the reports recommend its creation and after this they recommend including it in the documentation and Permanent Record File.

Information request:
(IR 3) AANDC requests that the Licensee provide details on actions taken in the light of consultant recommendations for the above mentioned items.

(IR 4) Additionally, the Licensee should provide the 2014 Lake Geraldine Dam Safety Inspection Report signed by a Professional Engineer.

Recommendation:
(R 9) AANDC recommends that the wording of Part D, Item 5 of the License be modified so that the Licensee is required to follow the current Canadian Dam Safety Guidelines, and submit inspections and reviews following the schedule in these guidelines. This would allow the inclusion of yearly inspections as necessary, as well as reviews as deemed necessary.

2.2 Lake Geraldine water balance

Reference:

- Lake Geraldine Water Balance Assessment, Golder Associates, 12-1151-0264, August 20, 2013
- Letter: Preliminary additional information in support of supplementation design, Golder Associates, 12-1151-0264(6000), August 20, 2013

Comments and Information Request:
Clarifications are requested for the following three comments made regarding the assumptions present in the above referenced documents.

2.2.1 Thawing rates

The preliminary additional information in support of supplementation design letter presents water volumes required for supplementing the reservoir. It is not clear if the rate of spring melting and reservoir replenishment during the spring has been taken into account. In Section 2.0 the following assumptions are included:

3) The last day of winter is defined as the first day which exhibits an average daily air temperature above 2°C immediately following three (3) consecutive days that have each exhibited daily average air temperatures above 0.5°C.
5) Estimated supplementation volumes are based on the assumption that the reservoir supply will be exhausted on the first day of spring when a portion of the reservoir ice and watershed runoff replenishes the drinking water supply.

(IR 5) If the reservoir supply is exhausted at the end of winter, can spring melt provide the required daily water quantities on the fourth day after 3 consecutive days with air temperatures above 0.5°C?

2.2.2 Basin geometry

The Assessment states that the spillway elevation has been increased to 111.3 m above sea level (asl) and the reservoir bathymetry is only available to 109.3 m asl. Section 3.1.4 states that the reservoir geometry was extrapolated from 109.6 to 111.3 m asl. The basin geometry determines the reservoir storage.

(IR 6) How was the reservoir geometry extrapolation done? Was this extrapolated data used to develop the stage-storage relationship presented in Table 3 of Section 4.2? The reservoir volume between 109.3 and 111.3 m asl accounts for 32% of the available water supply. Given the sensitivity of reservoir volume to the topography/bathymetry, are the results accurate enough to have confidence in building a multi-year water management plan with them?

2.2.3 Timing of reservoir filling

A recommendation is made to fill the reservoir close to its maximum storage capacity during the early portion of the summer. One of the characteristics of changing climate is more frequent extreme events including extreme rains.

(IR 7) If the reservoir is filled to near capacity in early summer, what measures would be taken to prevent the dam from being overtopped during an extreme rain event? Would the Emergency Preparedness Plan referred to in comment 2.1 address this concern?

2.3 Monitoring Lake Geraldine reservoir levels

Reference:

- Lake Geraldine Water Balance Assessment, Golder Associates, 12-1151-0264, August 20, 2013

Comment:

The Licensee's consultant has provided the following recommendations:

- Monitoring of Lake Geraldine reservoir levels (at the Water Survey of Canada (WSC) gauge) should continue to remain a priority in order to provide information for water supply forecasting.
- The City should consider installing a secondary water level monitoring device for redundancy purposes and the City should establish a monitoring configuration that provides a real-time reservoir level.

AANDC agrees with the consultant and believes installing a water level monitor providing real-time levels could help with proper management of the water available. Incorporating redundancy in the system is also important because if the WSC gauge were to malfunction critical information for managing the reservoir would be unavailable.

Recommendation:
(R 10) AANDC recommends including the requirement for a real-time water level monitor to measure the reservoir level in Lake Geraldine in the renewed Licence.

2.4 Apex River as supplementary water source

Reference:

- Screening Decision Report 13UN034, Nunavut Impact Review Board (NIRB), November 3, 2014

Comment:
AANDC notes that the Apex River as a supplementary water source was not included in the project screened by the NIRB. In appendix A of their decision report, they specifically write: "*additional assessment by the NIRB would be required at such time as the Proponent wishes to undertake these or other activities:*

- *...*
- *Supplementary water supply in additional to Geraldine Lake;*
- *..."*

Recommendation:
(R 11) AANDC recommends that the Licensee be required to submit its proposed project of an additional water source to the NIRB for screening prior to including it in a water licence amendment.

2.5 Location selection for additional water withdrawal location on Apex River

Reference:

- City of Iqaluit Supplementary Water Supply Study, exp Services Inc., FRE-00209588-A0, August 2014

Comment:
The consultant's report states that the two possible water intake locations A1 and A2 were identified in an earlier work (Trow, 2004). The suitability of these locations is further assessed in section 4.1.4 of the present report based on a discussion of the pictures taken during the 2013 sampling activities.

Location A2 was deemed more suitable as a water extraction location because the stream flow is more channeled than at location A1 and there is a pool that might allow for sedimentation of finer material.

The consultant's report also discusses stream flow using data for the years 1973-1995 and 2007-2012. There is no stream flow data presented for the year the pictures were

taken. It is therefore not possible to assess the flow relative to median and low flow years. If 2013 was a high flow year, perhaps the selected location would not be suitable in a median or low flow year.

Information request:
(IR 8) AANDC would like the Licensee to provide the referenced report (City of Iqaluit Raw Water Supply and Storage Review, Trow Associates Inc., OTC00016888A, April 2004). We would like to know if a Topography and Bathymetry Survey as well as Sedimentation and Erosional Analysis have been considered.

(IR 9) AANDC requests that the Licensee demonstrate that the proposed water intake location A2 is suitable in all years and flow conditions in a report signed by a Professional Engineer registered with NAPEG.

Recommendation:
(R 12) AANDC recommends withholding the inclusion of an additional water withdrawal location until it has been determined to be adequate.

2.6 Minimum flow requirements for Apex River

Reference:

- City of Iqaluit Supplementary Water Supply Study, exp Services Inc., FRE-00209588-A0, August 2014

Comment:
The Licensee's consultant has assumed there is no minimum flow requirement in the Apex River because it is not a commercial or an active recreational fishery. The only fishing activity noted is beyond the point of discharge where the Apex enters into the estuary at its mouth.

Fish are likely present in the Apex River and the Licencee would have to demonstrate that those fish do not support the fishing activity occurring at the River's discharge in order to be exempt of protecting fish habitat.

AANDC believes that a minimum flow should be required for ecological reasons as well as for social acceptability (esthetic flow).

Information Request:
(IR 10) AANDC requests the Licensee provide a discussion of the potential impacts of leaving no flow in the river and what mitigation measures proposed. Specific detail should be provided regarding the impact on stopping the river flow on the fishing occurring at the mouth of the river.

(IR 11) Additionally, AANDC requests information on any public consultation that has taken place regarding potential water withdrawals on the Apex River.

Recommendation:
(R 13) If public consultation regarding using the Apex River as a water source and minimum flow requirements has not been undertaken, AANDC recommends it be included in the planning process.

(R 14) AANDC recommends that any water withdrawal quantity authorized on the Apex River be limited to a fraction of the flow.

2.7 Water withdrawal quantity

Reference:

- Application for Water Licence Renewal, City of Iqaluit, October 2, 2012
- Letter: RE: Confirmation of Submissions and Scope for Type "A" Water Licence 3AM-IQA0611 Renewal Amendment Application, City of Iqaluit, March 2, 2015
- Lake Geraldine Water Balance Assessment, Golder Associates, 12-1151-0264, August 20, 2013
- Letter: Preliminary additional information in support of supplementation design, Golder Associates, 12-1151-0264(6000), August 20, 2013

Comment:
The Licensee has requested permission for the use of less than 3013.7 m^3/day or 1 100 000 m^3/year or water from Lake Geraldine.

Projected water consumption rates are included in Table 4 of the Lake Geraldine Water Balance Assessment. At the City's design consumption rate of 400 L/person/day, the daily required consumption for a population of 8000 (3200 m^3) will exceed the requested water quantity. The shortfall between required and requested water quantities will increase as the population grows. The high projection population for 2040, which is the term of renewal requested, would result in a shortfall of 4986.6 m^3/day.

Supplementation requirements for different scenarios are presented in Table 2 of the Supplementation Design letter. However, the City's letter requesting an additional water intake location in the scope of the licence's renewal does not specify a withdrawal quantity for this location.

Information request:
(IR 12) AANDC requests that the Licensee provide the maximum quantity of water it proposes to withdraw from the Apex River.

Recommendation:
(R 15) AANDC recommends adjusting the water withdrawal quantity with the term of the licence whilst considering the reservoir's capacity. AANDC also recommends including a water withdrawal quantity for the additional water withdrawal location that is respectful of ecological flow requirements.

2.8 Water conservation measures

Reference:

- City of Iqaluit Supplementary Water Supply Study, exp Services Inc., FRE-00209588-A0, August 2014
- Lake Geraldine Water Balance Assessment, Golder Associates, 12-1151-0264, August 20, 2013

Comment:

The Licensee's consultant suggests that: "*when water conservation measures are implemented, that the demands are monitored to determine the 'elasticity' of the water demand, e.g. what is the effectiveness of the City's conservation measures and communication, and associated minimum consumption rate which conservation measures can attain?*"

A high consumption rate of 400L/person/day was used for the Water Balance assessment as a conservative measure. Between 2007 and 2012 the City's average consumption rate was 300L/person/day and the national trend since the mid-2000s has been a reduction in per capita consumption.

Information Request:

(IR 13) AANDC would like to know what measures if any the Licensee is taking or planning to take for the promotion of responsible water use because they would reduce the water necessary and thereby the efforts to procure and treat it.

3 WASTEWATER MANAGEMENT

The original renewal and amendment scope speaks of upgrade, operation and the eventual decommissioning of the West 40 Wastewater Treatment Plant and back-up Sewage Lagoon. No documentation was found regarding the upgrade, operation of upgraded facility or eventual decommissioning of the wastewater treatment plant or sewage lagoon. **(R 16)** AANDC requests the opportunity to review these documents when available and recommends that if the Water treatment plant upgrade and decommissioning are included in the renewed licence, it be conditional on approval of appropriate plans.

3.1 West 40 wastewater treatment plant upgrade

Reference:

- Inspector's Direction, AANDC, March 5, 2013
- Water Licence Compliance 3rd Quarterly Update 2014, City of Iqaluit, October 16, 2014
- Technical Memorandum: Iqaluit Wastewater Treatment Plant Technical Overview of 2005 Secondary Sewage Treatment Design, AECOM, 60225321-400, November 7, 2011

Comment:
Presently the majority of the treatment equipment has been removed from the Wastewater Treatment Plant building, leaving only the primary treatment portion in place. Biological oxygen demand (BOD) and total suspended solids (TSS) consistently exceed the effluent criteria stipulated by the water licence and resulted in directions being issued by Environment Canada and AANDC in March 2013. In response to the direction, the Licensee created a project schedule for the upgrade of the wastewater treatment plant which culminates with an operational upgraded plant in December 2018.

Only an efficient primary treatment system can produce influent for the secondary treatment system that will yield effluent meeting the regulatory requirements. AANDC is concerned that the number and duration of plant shutdowns in order to do maintenance and repairs and the Salsnes filter will leave the secondary treatment system vulnerable.

A decision had been made to abandon membrane bioreactor process and advance conventional activated process (biological nitrification and denitrification) making use of existing infrastructure. AANDC is concerned that the design for the proposed conventional activated sludge process should be based on an accurate estimation of the sewage composition and its volume.

Recommendation:
AANDC encourages the Licensee continue to work with its consultants for effective wastewater treatment and recommends incorporating the project schedule to attain compliance into the renewed water licence.

(R 17) AANDC recommends adding criteria for more parameters for the wastewater treatment plant effluent discharge to be more in line with national standards.

3.2 Sewage lagoon operation and maintenance

Reference:

- Process Operation & Maintenance Manual for the Iqaluit Wastewater Treatment Plant – Conversion & Expansion – Phase 1, 2006
- Sewage Lagoon Dam Safety Inspection, Concentric Associates International Incorporated, 13-5021-B, September 9, 2013

Comment:
The sewage lagoon is used as a backup facility during maintenance and malfunction of the primary treatment system at Wastewater Treatment Plant. According to the last few Annual Reports the lagoon is used for this purpose 4 to 6 times a year.

The Operation & Maintenance manual for the WWTP does not include information of the sewage lagoon. Moreover the 2013 Dam Safety Inspection notes that preventative maintenance should be undertaken because it is essentially a “leaky dam” and localized failure and/or seeps are expected. The Inspection report also recommends confirming the capacity of the sewage lagoon.

Information request:
(IR 14) AANDC would like the Licensee to provide an Operation and Maintenance Plan for the Sewage Lagoon and an update on the sewage lagoon capacity.

Recommendation:
(R 18) As in section 2.1, AANDC recommends that the wording of Part E, Item 8 of the License be modified so that the Licensee is required to follow the current Canadian Dam Safety Guidelines, and submit inspections and reviews following the schedule in these guidelines.

4 SOLID WASTE MANAGEMENT

The original renewal and amendment scope and additional scope include:

- operation and eventual decommissioning of the West 40 Landfill and associated infrastructure; and
- construction, operation and eventual decommissioning of a new solid waste management facility 7.5 km northwest of the City centre.

A report describing the site selection for the new facility was provided but no documentation regarding the construction, operation or eventual decommissioning of the new solid waste management facility. **(R 19)** AANDC requests the opportunity to review these documents when available and recommends that if the new solid waste management facility is included in the renewed licence, it be conditional on approval of appropriate plans.

4.1 West 40 landfill leachate and runoff

Reference:

- West 40 Landfill Drainage Management Review, AECOM, 60221928, September 16, 2011
- City of Iqaluit 2012 Annual Water Licence Report, City of Iqaluit, March 2013
- Annual Monitoring Report – 2013, exp Services Inc., April 7, 2014
- Annual Monitoring Report – 2014, exp Services Inc., January 23, 2015

Comment:
The Drainage Management Review states: "*The landfill site relies on the local permafrost regime to provide a low permeability barrier to control the subsurface runoff.*"

AANDC is concerned with potential threats of leachate and contaminated water (runoff containing leachate) to the groundwater because no data has been presented regarding the permafrost regime in this location. It is not clear if permafrost has aggraded into the landfill or if leachate can escape through the active layer. Knowledge of the thermal distribution through the landfill is crucial if permafrost aggradation through the landfill contents is to be an integral part of the design.

Table 3 in the Review proposes maximum allowable concentrations for runoff to be discharged without specifying the units of the values.

The Review also discusses four treatment alternatives of the surface runoff collected which is collected in ponds. The recommended option is the Geotube ® physical-chemical treatment system. It is not clear if this solution has been fully implemented. The Licensee's 2012 Annual Report states: "*Landfill runoff continues to be managed though on-site detention ponds and an off-site retention pond. Run-off in the off-site retention pond is filtered through a Geotube before being discharged.*" However, the effluent still had high metal concentrations as discussed in the Licensee's Annual Monitoring Reports for 2013 and 2014. These reports indicate that landfill runoff exceeded Canadian Council of Ministers of the Environment (CCME) criteria for ammonia, mercury, arsenic, cadmium, copper, iron, and zinc, whilst the total suspended solids were effectively reduced through the use of the Geotube bag during the decant.

Information request:
(IR 15) AANDC would like the Licensee to provide information regarding the permafrost regime below the landfill and any information they have on the groundwater.

(IR 16) AANDC requests the Licensee provide the units for maximum allowable concentrations in Table 3 of the Review.

(IR 17) AANDC requests that the Licensee provide details on treatment technologies for landfill runoff water. We would specifically like to understand why the Geotube method proposed by AECOM seems to result in only physical treatment instead of both physical and chemical treatment, as well as what solutions will be implemented for effective removal of all the contaminants of concern.

Recommendation:
(R 20) AANDC recommends that the renewed licence include thermal monitoring at the landfill through the installation of thermistor strings with thermistor beads at selected intervals to provide ground temperature profiles at various locations in the landfill.

(R 21) AANDC also recommends that the renewed licence include effluent discharge criteria that, at minimum, meet CCME freshwater quality guidelines for the protection of aquatic life for the parameters in Table 3 of the Drainage Management Review since the discharges are occurring in a freshwater environment. Additional parameters typically found in leachate or that may be produced at the sludge processing and composting facility that uses the same drainage system should have criteria as well, including chloride, nitrate, ammonia, phosphorous and Faecal Coliform.

4.2 Actions required after 2014 West 40 landfill fire

Reference:

- City of Iqaluit 2014 Annual Water Licence Report – Appendix K: Schedule 2 Landfill Fire: Actions Required, City of Iqaluit, March 2014
- Letter: Drafting pond used to draw and recirculate water for the purposes of extinguishing a fire, AANDC, June 8, 2015

Comment:
On May 20, 2014 a fire began at the West 40 Landfill. The Licensee took actions to extinguish the fire resulting in the creation of a drafting pond used to draw and recirculate water for the purpose of extinguishing a fire as well as the collection of contact water from the fire extinguishment.

In appendix K of the 2014 Annual Report, the Licensee states: "*After the water from the new drafting pond has been treated and discharged, the liner will be removed and the grade reinstated*." No timeline has been proposed for this work.

Recommendation:
(R 22) AANDC recommends that the effluent discharge criteria for landfill runoff apply to the collected contact water discharge. Additionally, AANDC recommends that a timeline for the draft pond dismantling be included in the renewed licence.

4.3 West 40 landfill decommissioning

Reference:

- Iqaluit Solid Waste Management Plan West 40 Landfill Decommissioning Technical Memorandum, AECOM, 60196419, January 2014

Comments and Information Request:
Clarifications are requested for the following four comments.

4.3.1 Drainage restoration

Section 4.4 of the technical memorandum states: "*Runoff and run-on surface water would be re-directed away from the cap via drainage ditching around the waste disposal area. The runoff drainage ditching will drain in a northern direction, and be further directed towards the offsite retention pond*." According to the maps presented, the offsite retention pond is to the south of the landfill.

Will another offsite retention be constructed to the north of the landfill? If so, will the pond used presently be decommissioned? If not, how will the water be moved from the runoff drainage ditching to the retention pond?

AANDC also has concerns with the potential threats from leachate to surface and groundwater as well as the proper treatment of the retention pond effluent. **(IR 18)** We seek confirmation that the solutions for these problems found for operation of the landfill will be continued after its decommissioning.

4.3.2 Environment conditions existing prior to use

The provided memorandum does not present data or a discussion of environment conditions before the use of the site by the Licensee, as required by Part J, Item 4 of the licence. AANDC is concerned that if materials were present before the site opened, they may create environmental hazards if not taken into account properly.

(IR 19) Are the site conditions before it became a landfill known? If there were materials on site prior to its use as a landfill, were they properly disposed of?

4.3.3 Sewage sludge composting site

The portion of the landfill used for composting sewage sludge is not included the drawing of the covered landfill.

(IR 20) Will the composting site be decommissioned in the same time as the landfill? If so, what are the plans? If not, how will the drainage for this portion of the landfill be altered by the decommissioning and how will runoff be contained?

4.4 Use of sewage sludge compost

Reference:

- Iqaluit Sewage Sludge Management Composting Pilot Project Report, AECOM, March 31, 2009
- Standards for the Use or Disposal of Sewage Sludge; Final Rules, 40 CFR Part 257 et al., United States Environmental Protection Agency (US EPA), February 19, 1993
- Guidelines for Compost Quality, PN1340, CCME, 2005
- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, CCME, 1999

Comment:

The Licensee's consultant concludes that Iqaluit's composted sewage sludge is suitable for use as a cover material for the landfill decommissioning based on a pilot project for which three compost samples were analysed, only one of which was tested for metals. Metal concentrations are compared to US EPA standards for land applied sewage sludge.

The list of metals for which the EPA has standards is the same as the "maximum acceptable trace elements for Category B compost" list of the CCME, with the exception of including chromium and excluding cobalt. The US EPA ceiling metal concentrations are often significantly higher than the CCME guidelines for both compost quality and for the protection of environmental health for industrial land use.

All three compost samples tested met the CCME compost quality guideline of <1000 MPN/g for Faecal Coliforms. Metal concentrations in the one compost sample tested also met the CCME guidelines for both Category B compost and protection of environmental health for industrial land use.

Recommendation:

(R 23) AANDC recommends that the renewed licence include quality criteria for composted sludge before it is used as a landfill cover or elsewhere. At a minimum it should meet the CCME compost quality guideline for Faecal Coliform concentrations. Additional criteria would be appropriate for trace metals that are pollutants of concern.

Metals which appear in the US EPA and both CCME lists are: arsenic, cadmium, lead, mercury, nickel, selenium and zinc.

C. TYPE OF TECHNICAL MEETING AND PRE-HEARING CONFERENCE

AANDC believes the Technical Meeting and Pre-hearing Conference should be held in person. This is because of the scale the City of Iqaluit's municipal water and waste management facilities, the need for clarity on the scope of licensed activities, documented non-compliance with licence terms and conditions, and anticipated public concerns.