Environment Canada **Environnement Canada**

ENVIRONMENTAL PROTECTION OPERATIONS
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February 21, 2006

Our file: 4782 012
Your file: NWB3IQA

Lootie Toomasie
Acting Chair
Nunavut Water Board
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Via Email and Facsimile
Original to follow by regular post

Dear Mr. Toomasie:

Please find attached Environment Canada's written submission to the Nunavut Water Board in respect to the final public hearing regarding City of Iqaluit's Type A water license application for the use of water and deposit of waste in Iqaluit, Nunavut

Anne Wilson, Water Quality Specialist, will be in attendance at the public hearing to present this submission, and will be available to respond to any questions which the Nunavut Water Board members and/or staff, the proponent, or the public may have concerning the issues raised by Environment Canada in this submission.

If you wish clarification on any aspect of this submission prior to the upcoming meetings, please contact Mrs. Colette Spagnuolo, Qimugjuk Building 969, P.O. Box 1870 Iqaluit, NU X0A 0H0; Tel: (867) 975-4639; Fax: (867) 975-4645; Email: colette.spagnuolo@ec.gc.ca.

Yours sincerely,

Original signed by

Peter Blackall, P. Eng
Regional Director

cc: (Chuck Brumwell, Manager, Northern Division, Environment Canada, Yellowknife)
(Stephen Harbicht, Head, Assessment and Monitoring Section, Environment Canada, Yellowknife)
(Colette Spagnuolo, Environmental Assessment / Contaminated Sites Specialist, Environment Canada, Iqaluit)
(Anne Wilson, Water Quality Specialist, Environment Canada, Yellowknife)

Environment Canada's Submission to the Nunavut Water Board regarding the Type A Water License Application Submitted by the City of Iqaluit

Final Public Hearing

March 2006

TABLE OF CONTENTS

NON-TECHNICAL EXECUTIVE SUMMARY

Environment Canada (EC) has reviewed the Type A water license application submitted by the City of Iqaluit to the Nunavut Water Board (NWB) to allow for the use of water and deposit of waste for the City of Iqaluit. Environment Canada's submission focuses on issues related to the environmental effects on or related to aquatic quality, spills and hazardous materials management, and waste management.

Water Supply
Environment Canada recommends that the license require that the City of Iqaluit prevent the release of any sediment into the water flowing from Lake Geraldine and into Lake Geraldine itself during the construction of the new south berm, and the expansion of the existing berms and dam.

The license should require the City of Iqaluit to set up a program that monitors the changes in the water level in the reservoir, so that annual inputs from precipitation and snow melt are better understood. If the City intends to develop a new recharge location for the reservoir, EC recommends that the license require that the City submit potential recharge locations to the NWB for review before they are developed.

Solid Waste
Environment Canada recommends that the license require the City to collect, in a secure sump, any leachate generated from the landfill, to test the leachate to determine its composition, and to treat the leachate prior to disposal. The amount of leachate collected in the sump and the amount of leachate treated should be monitored and reported to the NWB via annual reports.

Prior to disposal / release into the environment, EC recommends that the leachate meet the criteria outlined in the Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of marine life. Alternately, if on-site treatment is not implemented, any leachate generated should be collected and shipped south to an approved and licensed disposal facility.

The license should also require the City to design, construct and operate a surface water management plan for the landfill to help prevent the creation of leachate.

The license should require the establishment of monitoring stations at the current landfill and the new expanded cell (once in operation) in order to monitor leachate generated at the landfill. Monitoring stations should also be created at the abandoned honey bag disposal site, and the abandoned solid waste disposal site in Apex. Environment Canada recommends that a quality assurance/quality control program should also be submitted under the monitoring program within 3 months of issuing the license.

Environment Canada recommends that the water license include a requirement that prior to any known contaminated soils being accepted into the landfill, the soils be tested and analyzed for contaminants. Only those soils with concentrations of contaminants below the CCME Canadian Environmental Quality Guidelines (CEQG) for Industrial sites should be allowed in the landfill.

The license should include a term requiring the City of Iqaluit to submit an updated Operation and Maintenance Manual for the landfill for review and approval within 6 months of the issuance of the license. The updated plan should address the types of cover material used, the frequency of

covering, litter control, contaminated soil handling, and hazardous materials management, as well any other items necessary for the successful operation of the facility. The license should also require the City to develop and implement an Emergency Response Plan for the hazardous wastes storage area. This plan should be submitted to the NWB for review within 6 months of the issuance of the license.

Wastewater

Given that the operation of the wastewater treatment plant (WWTP) will be phased-in, EC recommends that discharge criteria established for the WWTP in the water license also be staggered, such that they become more stringent over time. Establishing more protective discharge criteria to be implemented over a period of time will ensure that the City implements Phase 2 of the WWTP in a timely manner. Environment Canada also strongly recommends that an operation and maintenance manual and training program be developed and implemented for the WWTP.

Environment Canada strongly recommends that the license include a term requiring the City to implement the recommended repairs for the sewage lagoon. Given the concerns regarding the inadequate sizing of the lagoon, the insufficient retention time, and the stability of the berms, EC does not recommend using the lagoon for purposes other than as a back-up facility for the WTTP. The license should require the City of Iqaluit to develop and submit an Abandonment and Reclamation Plan for the existing sewage lagoon for review and approval within 90 days of the issuance of the license.

The City needs to clearly indicate whether it intends to implement the recommendations in the Sewage Sludge Management Plan. If the recommendations are adopted, EC also recommends that the license require the City of Iqaluit to develop and submit for review, within 30 days of the issuance of the license, a plan to deal with sludge produced during the interim period when the WWTP is operational but the infrastructure required for sludge management is not available.

Environment Canada recommends that the license require the establishment of monitoring stations to monitor the quality of the effluent from the final discharge point of the existing sewage lagoon, the WWTP and the sewage sludge management facility. Environment Canada recommends that a quality assurance/quality control program should also be submitted under the monitoring program within 3 months of license issuance.

The Spill Contingency Plans for the wastewater treatment system should be updated to reflect current wastewater treatment operations and to better reflect the key areas of planning, preparedness, response and recovery.

Summary

This water license application illustrates the substantial progress that the City of Iqaluit has made in improving the quality of municipal waste management in Iqaluit. Environment Canada appreciates the work that has been completed to date, and looks forward to continuing to work with the City of Iqaluit and the NWB to ensure best practices are implemented in managing municipal wastes in Nunavut. Environment Canada appreciates the opportunity to participate in the review of the City of Iqaluit Type A Water License application and hopes that these comments will be useful to the NWB in their determinations.

1.0 INTRODUCTION

Contributing to the realization of sustainable development in Canada's North is a priority for Environment Canada (EC). The Department focuses on providing scientific expertise for incorporation into decisions on developments, such that all parties working together can ensure that there is minimal impact on the natural environment, and that ecosystem integrity is maintained and preserved.

The general mandate of EC is defined by the *Department of the Environment Act*. This Act provides the Department with a general responsibility for environmental management and protection in terms of the need to foster harmony between society and the environment for the economic, social, and cultural benefit of present and future generations of Canadians. The Department shares this responsibility with the provinces and territories. Environment Canada is also responsible for providing specialist or expert information and knowledge to federal government agencies and for the preservation and enhancement of environmental quality.

Environment Canada's roles and responsibilities related to wastewater management include:

- the administration and enforcement of federal Acts and/or regulations applicable to wastewater; and,
- the provision of information related to federal regulatory and environmental protection requirements for wastewater systems.

The key federal Acts that are applicable to wastewater are the *Fisheries Act* and the *Canadian Environmental Protection Act, 1999* (CEPA 1999). In 1978, the Prime Minister assigned to the Minister of the Environment the responsibility for the administration and enforcement of the *Fisheries Act* pollution prevention provisions dealing with the deposit of deleterious substances into water frequented by fish. In 1985, a Memorandum of Understanding was signed between the Department of Fisheries and Oceans and the Department of the Environment outlining the responsibilities of the two departments for administration and enforcement of those provisions. Subsection 36(3) prohibits the deposit of any substance that is deleterious to fish into water frequented by fish. In addition, EC's *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments* (EPS 1-EC-76-1) (1976 Guidelines) apply to all effluents discharged from land based establishments under the direct authority of the Federal Government, which includes all wastewater facilities on federal and Aboriginal lands. Under CEPA 1999, EC is addressing risks from a number of substances found in wastewater effluents. On December 4, 2004, EC published a *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents* and a *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents* in *Canada Gazette, Part 1*.

Wastewater management in Canada involves federal, provincial, territorial, aboriginal and municipal governments. Effective wastewater management requires co-operation among all these governments. To this end, EC is participating in the development of a Canada-wide Strategy for the Management of Municipal Wastewater Effluents under the aegis of the Canadian Council of Ministers of the Environment (CCME). The Canada-wide Strategy, which will address specific parameters and governance, will be developed by December 2006. As part of

the federal government's implementation of the the CCME Canada-wide Strategy, it is EC's stated intention to develop a regulation under the *Fisheries Act.* The Canada-wide Strategy will more clearly define regulatory requirements related to the release or discharge of wastewater in to surface water. Environment Canada's goal is to ensure that effluents from wastewater systems are treated before being discharged to the receiving environment so that effluents do not pose unacceptable risks to ecosystem and human health, or to fisheries resources.

Until a regulation under the *Fisheries Act* for the wastewater sector is in place, EC must provide information that takes into account:

- the prohibition in subsection 36(3) of the *Fisheries Act*;
- the *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents,* published in *Canada Gazette,* Part I on December 4, 2004;
- the *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents* published in *Canada Gazette*, Part I on December 4, 2004;
- the direction of the Canada-wide Strategy for the management of wastewater effluent to be developed by 2006 under the direction of the CCME;
- Environment Canada's intended use of a regulation under the *Fisheries Act* as its principal implementation tool for the Canada-wide Strategy to set requirements for wastewater treatment systems equivalent in performance to conventional secondary treatment, with additional treatment where required;
- the *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments, 1976*;
- departmental responsibilities under the *Canadian Environmental Assessment Act* (CEAA), and the Nunavut Land Claims Agreement; and,
- other applicable legislation and regulations that may apply to the management of wastewater in Canada.

Toward these goals, EC has reviewed the Type A water license application submitted by the City of Iqaluit to the Nunavut Water Board (NWB) to allow for the use of water and deposit of waste for the City of Iqaluit (initially submitted January 19, 2004, with subsequent modifications). Environment Canada's submission focuses on issues related to the environmental effects on or related to aquatic quality, spills and hazardous materials management, and waste management.

The operation of the facilities associated with the City of Iqaluit's water license, including the Lake Geraldine water storage facility, the wastewater treatment facilities and the West 40 solid waste management facility, will be subject to the following statutes administered by Environment Canada: Section 36(3) of the *Fisheries Act*, the *Canadian Environmental Protection Act (CEPA 1999)* and regulations, the *Migratory Bird Convention Act* and regulation and the *Species at Risk Act*.

The document is divided into four main sections. Section One provides an introduction to the review, including an overview of EC's mandate. Section Two provides an overview of the operations proposed for the City of Iqaluit water license and the water licensing process to date. Section Three provides EC's technical comments and recommendations to the NWB. Finally, a

summary of the recommendations provided is outlined in Section Four.

2.0 BACKGROUND

The City of Iqaluit has applied for a Type A water license under the Nunavut Surface Waters and Surface Rights Tribunal Act in order to allow for the use of water and deposit of waste by the City of Iqaluit. Due to the proposed volume of water for use (approximately 1.29 million L/day), this application triggers a public hearing under the Northwest Territories Waters Regulations.

The infrastructure associated with the City of Iqaluit water license includes the operation and expansion of the Lake Geraldine raw water storage facility, the operation of the recently commissioned water treatment plant, the operation and expansion of the West 40 solid waste disposal facility, the operation of the new wastewater treatment plant, the continued use of the existing sewage lagoon as a back-up to the wastewater treatment plant, the closure and reclamation of the sewage lagoon, and the establishment and operation of sludge management facilities.

The Lake Geraldine raw water storage facility was constructed in the 1960's and has undergone several modifications over the years. The City of Iqaluit plans to increase the storage capacity of the Lake Geraldine storage facility during the summer of 2006 by raising the height of the existing berms by 2 metres. Further, a new water treatment plant was recently commissioned in 2004, which provides for a high intensity ultra-violet light treatment system, four additional filters and a larger intake pipe.

The solid waste landfill facility is located in the West 40 area of town. The City of Iqaluit currently operates a 1.5 hectare facility, and plans to expand the facility to another cell. Wastes are currently spread into lifts, compacted, and covered. Hazardous wastes are stored at the landfill and shipped south to a licensed disposal facility during the annual sealift.

The City of Iqaluit currently operates a facultive sewage lagoon as the primary wastewater treatment method. This lagoon provides between 6-14 days of treatment prior to release into Koojesse Inlet. Due to capacity and treatment issues, the City commissioned the construction of a new mechanical wastewater treatment plant (WWTP) in 1998. However, the WWTP was never made operational, and the City of Iqaluit continued to rely on the sewage lagoon for treatment of their wastewater. In 2004, the City of Iqaluit decided to convert the pre-existing WWTP into a waste activated sludge treatment plant. These renovations were completed in early 2005, and the City of Iqaluit plans to commission the plant in early 2006. The operation of this facility will involve the management of sludge. The City of Iqaluit plans to design, install and operate air drying beds, utilizing freeze-thaw technology, as well as composting to assist with the stabilization of the sludge. The sludge will then be used as cover material at the solid waste landfill. Following the commissioning of the WWTP, the existing sewage lagoon will be used only as a back-up system in the event of the WWTP becoming non-operational, and will eventually decommissioned.

Following a technical meeting and pre-hearing conference in August, 2004, the NWB scheduled a final public hearing for this water license application for October, 2004. However, due to outstanding information requests, the hearing was postponed. Upon submission of the majority of the outstanding information, a technical meeting and pre-hearing conference were held in May 2005. A final public hearing was again scheduled for July 4-5, 2005 in Iqaluit, NU, and was again postponed. Upon receipt of the outstanding draft Sludge Management Plan, the NWB conducted a pre-hearing conference by teleconference on January 17, 2006, and scheduled final public hearings on the water license application for March 7-8, 2006 in Iqaluit, NU.

3.0 TECHNICAL COMMENTS AND MAJOR ISSUE IDENTIFICATION

Environment Canada has reviewed the City of Iqaluit's Type A water license application to allow for the use of water and disposal of wastes. The application submitted by the City of Iqaluit consists primarily of a variety of plans and reports created by consultants for the City of Iqaluit over a number of years. However, the application does not include a clear indication of which recommendations contained within those reports/plans have been or will be adopted by the City of Iqaluit. This makes the water license application difficult to follow, as the intentions of the City are not clear. Environment Canada recommends that the City clearly indicate what path forward it intends to follow in managing the raw water, solid waste, and wastewater facilities in Iqaluit.

Environment Canada appreciates the multitude of issues requiring the attention of the City of Iqaluit employees, and the fiscal and staffing constraints that the City faces. However, EC is of the opinion that the environmentally-sound management of municipal wastes should be a priority for the City. Environment Canada also encourages the City of Iqaluit to implement best practices in the management of municipal wastes, in order to ensure the protection of the receiving environment. The current application reflects the considerable efforts that the City of Iqaluit has made toward improving the quality of municipal waste management. Environment Canada commends that City for the work that has been completed to date, and looks forward to continuing to work with the City in the future.

This submission takes into consideration all of the documents submitted with the water license application, as they relate to areas within EC's mandate. In case of any discrepancy between this information and any Acts of Parliament, most notably the *Canadian Environmental Protection Act, 1999* or the *Fisheries Act* or regulations made under these Acts, the Acts of Parliament and associated regulations take precedence. The City of Iqaluit should be advised that, notwithstanding any other regulatory or permitting requirements, any deposits, discharges and releases from City operations or activities must comply with all applicable federal Acts and regulations. Further, should new or additional relevant information be brought forward by the proponent or be identified during the public hearing, this submission will be re-examined. Within the context of the additional information, EC requests the opportunity to make any required changes in its recommendations and/or positions in writing to the NWB and City of Iqaluit at a later date.

3.1 Water Supply, Treatment, Storage and Distribution

3.1.1 Expansion of Raw Water Storage

3.1.1(a) – Erosion Control during Expansion of Lake Geraldine Reservoir
The March 2005 Trow Report, "Preliminary Design Report – Expansion of City of Iqaluit Raw Water Storage, City of Iqaluit, Nunavut" indicates that the City has decided to increase the storage capacity within Lake Geraldine by raising the existing containment dam and berms by 2.0 meters, and constructing a new berm south of the dam.

Discussion
Silt fences and or silt curtains should be used when operating near the banks of the lake. Materials used for the construction of the berms should be clean and free from fines. Further, during construction, these materials should be stockpiled above the high water mark and in such a manner as to prevent them from entering any water body frequented by fish.
Recommendation
Environment Canada recommends that the license require that measures be taken to prevent the release of sediment into the water flowing from Lake Geraldine and into Lake Geraldine itself during the construction of the new south berm, and the expansion of the existing berms and dam.

3.1.1(b) – Additional Recharge for Lake Geraldine Reservoir
The Trow report "City of Iqaluit Raw Water Supply and Storage Review" (2002) indicates that the existing capacity of the Lake Geraldine Raw Water Storage Facility can be increased by raising the height of the existing dam and berms by 2.0 m. The report goes further to state that "The City of Iqaluit cannot delay actions required to address recharge of the reservoir" (page 37), and identifies a withdrawal site along the Apex River as a permanent refill alternative.

Discussion
The City of Iqaluit needs to ensure that there is adequate accessible storage volume in the Lake Geraldine reservoir to satisfy the 8-month winter period. Given that it has been indicated that the runoff from the existing basin will not be sufficient to meet the City's yearly demand, it is important to know if the City of Iqaluit intends to develop a new recharge area for the Lake Geraldine reservoir. Further, if a new recharge area is selected, watershed protection measures should be considered during municipal planning for the recharge area.

Recommendation
Environment Canada recommends that the license require the City of Iqaluit to set up a monitoring program whereby fluctuations in the level of the reservoir are monitored, so that annual inputs from precipitation and snow melt are better understood. Also, EC requires clarification regarding whether the City intends to utilize the recharge location identified by Trow. If a new area is to be developed, EC recommends that the license require that the City submit potential recharge locations to the NWB for review prior to development. The City is also encouraged to consider the need for a recharge area when establishing municipal plans to ensure that the watershed chosen is protected from anthropogenic sources of pollution.

3.2 West 40 Solid Waste Management Facility

3.2.1 Leachate Containment

The West 40 solid waste management facility (SWMF) is experiencing surface drainage issues, which have led to the creation of leachate from within the landfill. Recent analytical results from July 2004 indicate that copper, iron, lead, selenium and zinc levels all exceed CCME guidelines for the protection of aquatic marine life. The analytical results also indicate that benzene, toluene, ethyl benzene, and xylene (BTEX constituents) are present in the leachate.

The City of Iqaluit plans to collect any water that has come into contact with the SWMF within the waste cell. The plan outlined in the application is for any water collected in the waste cell to be periodically pumped into a truck and disposed of at either the sewage lagoon or sewage treatment plant. Section 3.9 "Runoff Monitoring Program" of the Operation and Maintenance Manual (2005) for the SWMF makes no reference to determining the chemistry of the runoff prior to "dumping it in the sewage lagoon". While this section of the Operation and Maintenance Plan makes reference to a leachate control system, no details are provided.

Discussion

Leachate should not be allowed to flow freely from the SWMF, and control measures should be implemented to prevent untreated leachate from entering the receiving environment. Further, in order to know how to deal with the leachate being produced, the runoff from the SWMF must be characterized, including analysis of heavy metals, pH, BTEX, and TSS.

The final discharge location for the leachate is not identified in the application, and therefore, it is unclear whether the City of Iqaluit plans to deposit the leachate in the sewage lagoon or direct it to the WWTP. The final discharge location needs to be identified. Environment Canada does not recommend using the sewage lagoon or the WWTP as a disposal location for untreated leachate. Inputting leachate with high levels of contaminants will increase the difficulty associated with disposing of sludge from either facility. Further, the addition of metal-rich leachate could also impair the biological processes that occur within the activated sludge wastewater treatment system.

The *Canadian Environmental Protection Act* (1999) advocates the prevention of pollution as opposed to managing pollution after it is created. As such, the City should design and operate a system of drainage ditches around the SWMF to prevent surface runoff from entering the landfill. Drainage ditches should be kept free of ice, snow and debris to ensure that they are able to effectively divert water from the landfill.

Recommendations

Environment Canada recommends that the City of Iqaluit ensure that the area within the SWMF into which the leachate drains is secure. The license should require that the leachate collection sump be lined with an impermeable liner to prevent infiltration of the leachate into the groundwater or soil. The amount of leachate collected in the sump and the amount of leachate treated should be monitored and reported to the NWB via annual reports.

Environment Canada recommends that the license require the City to collect, in an impermeable sump, any leachate generated from the SWMF, to characterize the leachate to determine its composition, and to treat the leachate prior to disposal. The leachate collection system should capture both surface and subsurface flows. Characterization of the leachate is critical, as elevated concentrations of inorganic compounds could affect the operation of the wastewater treatment facility or sewage lagoon, depending on the final discharge location chosen. Prior to disposal / release into the environment, EC recommends that the leachate meet the criteria outlined in the CCME guidelines for the protection of marine life, as Koojesse Inlet is the closest receiving water body. Alternately, if on-site treatment is not implemented, any leachate generated should be collected and shipped south to an approved and licensed disposal facility. This will require the establishment and operation of a secure hazardous waste storage facility for the leachate on site.

The license should also require the City to design, construct and operate a surface water management plan for the SWMF to help prevent the creation of leachate.

3.2.2 Contaminated Soils

The Operations and Maintenance Plan states that contaminated soils may be accepted at the SWMF if they meet the requirements of the Department of Environment.

Discussion

Further information is required regarding the acceptance of contaminated soils at the SWMF. Details regarding the quantities of soil accepted and the concentrations of parameters within that soil are also required. Information is also required regarding the parameters that the soil will be analyzed for. Is there a separate disposal area for contaminated soils that are accepted, or are they integrated into the general waste stream? Soils should not be accepted at the SWMF unless they fall below the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CEQG) for industrial sites. This is in keeping with the fact that the West 40 SWMF is not an engineered landfill and has no liner system. As such, the possibility exists for contaminated soils accepted at the SWMF to leach contaminates into the groundwater and surface waters.

Recommendations

Environment Canada recommends that the water license require that prior to any known contaminated soils being accepted into the SWMF, the soils be tested for heavy metals (full metals ICP scan), polychlorinated biphenyls (PCBs), and hydrocarbons, including BTEX parameters (benzene, toluene, ethyl benzene, and xylene). Only those soils with concentrations of contaminants below the CCME CEQG for Industrial sites should be accepted in the landfill. The license should include a term requiring the City of Iqaluit to submit for review and approval an updated Operation and Maintenance Manual, which includes appropriate operation and management provisions for acceptance of contaminated soils, within 6 months of the issuance of the license.

3.2.3 Hazardous Waste Management

The Operations and Maintenance Manual (2005) does not clearly define the types/volumes of hazardous wastes that can be accepted at the SWMF, or the procedure that is used for disposing of such wastes. For instance, Section 3.6.1.2 of the Plan states that unacceptable wastes include "large volumes of fuel tank sludge"; however, no indication is given as to what is considered a large volume. The Plan also states that hazardous wastes are collected and shipped south once a "significant volume" has accumulated. However, no trigger amount is provided at which the wastes should be shipped south for proper disposal.

Discussion

The West 40 SWMF is not intended to be a long-term storage facility for hazardous materials. The City should ensure that any hazardous materials stored on site are located in a secure area with adequate secondary containment to prevent the release of these materials into the environment in the event of a spill. The management of hazardous wastes should provide sufficient detail to ensure that the collection and storage of the materials can occur in a safe and environmentally sound manner.

Recommendation

Environment Canada recommends that the Operation and Maintenance Manual set clear limits as to what types and quantities of wastes can be accepted at the SWMF. The Plan should also clearly indicate when the hazardous wastes stored on site will be shipped south for disposal. Environment Canada also recommends that the City implement recommendations in the Operations and Maintenance Manual regarding the need for secondary containment measures for the hazardous waste storage area. The license should require the City of Iqaluit to submit an updated Operation and Maintenance Manual for review and approval within 6 months of the issuance of the license.

The license should also require the City to develop and implement an Emergency Response / Spill Contingency Plan for the hazardous waste storage area. This plan should provide a clear path of response in the event of a spill, and address the key elements of prevention, preparedness, response and recovery. The Plan should also provide for the placement of spill response kits in the area. A current list of personnel and government officials that should be notified/contacted in the event of a spill should be included in the Plan. This plan should be submitted to the NWB for review within 6 months of the issuance of the license.

3.2.4 Monitoring

The current license application does not appear to address the issue of ongoing monitoring at the SWMF.

Discussion

Given the leachate concerns that have been identified at the current SWMF, it is vital that a monitoring point be identified within the landfill. The information that is generated from the monitoring station can be used to help fine tune and adjust the leachate control and treatment program.

Recommendation
Environment Canada recommends that the license establish Surveillance Network Program (SNP) stations at the current landfill and the new expanded cell (when created) in order to monitor leachate generated at the SWMF. These stations should include the requirement for pH, sample temperature, and weather conditions to be recorded in the field at the time of sampling. While EC recognizes that this application does not include the West 40 dump site, monitoring requirements should also apply to the abandoned honey bag disposal site and the abandoned solid waste disposal site in Apex. Environment Canada recommends that the SNP station monitor monthly volumes of both surface and subsurface (i.e. shallow groundwater) water during periods of flow, as well as pH, conductivity, TSS, nitrite, total phenols, sodium, magnesium, total arsenic, total iron, total mercury, total copper, total nickel, total zinc, ammonia nitrogen, sulphate, potassium, calcium, PCBs, and visual oil and grease.

Environment Canada recommends that a quality assurance/quality control program also be submitted under the SNP program within 3 months of license issuance.

3.2.5 Landfill Cover
Section 2.2.3 of the Operation and Maintenance Manuel (2005) states that the City of Iqaluit uses shredded waste, consisting of shredded construction debris, mattresses, tires and plastics, as cover material for the SWMF. However, Section 3.6.3 of the same report indicates that a soil cover is used. The Operations and Maintenance Manual indicates that waste is to be covered once per week in the summer and once per month in the winter.

Discussion
In order to ensure that the SWMF is properly managed and operated, it is vital that a comprehensive and current Operation and Maintenance Manual be maintained. The manual should contain sufficient detail to provide the direction required to ensure the safe and effective operation of the landfill. The manual should be updated whenever changes are made to the operation and/or maintenance of the SWMF. This would include updating the manual to reflect changes as a result of the expansion of the landfill, new leachate collection/monitoring requirements, and the use of stabilized sludge as cover material.

Recommendation
The Operations and Maintenance Manual should clearly indicate what type of cover material is to be used at the SWMF. The Manual should also indicate the depth of the cover material required for each lift. Once the planned sewage sludge infrastructure is in place and operational, the Operations and Maintenance Manual for the SWMF should be updated to indicate that stabilized sludge is to be used as the cover material. The planned expansion of the landfill would also necessitate updating the Manual. The license should require the City of Iqaluit to submit an updated Operation and Maintenance Manual for review and approval within 6 months of the issuance of the license.

3.2.6 Litter Control

Section 3.7.3 of the Operations and Maintenance Manual states that one of the methods employed to assist with the bird control at the SWMF is the daily collection of litter. However, Section 3.7.1, and Section 4.2 stated that litter collection is completed on a weekly basis.

Discussion

Control of scavengers and birds is an important component of the effective and safe operation of the SWMF. As the West 40 SWMF is located within the Iqaluit Airport buffer zone, it is essential that litter be managed. Bird control will become even more important with the planned expansion of the landfill facility.

Recommendation

Environment Canada recommends that the discrepancies between the sections of the Plan regarding this issue be resolved. Litter should be collected daily to help prevent attracting birds to the site, and also to help prevent bird strikes by aircraft, as the West 40 SWMF is located within the Iqaluit Airport buffer zone. The license should include a term requiring the City of Iqaluit to submit an updated Operation and Maintenance Manual for review and approval within 6 months of the issuance of the license.

3.3 Wastewater Treatment

All effluents from wastewater systems in Canada must comply with all applicable federal legislation including the *Canadian Environmental Protection Act, 1999* and the *Fisheries Act,* as well as any other legislation applicable depending on the geographical location of the system. The *Fisheries Act* allows for the establishment of federal regulations under subsection 36(5) of the Act, or under another federal Act, that would permit the discharge of deleterious substances to levels set out in the regulations. At this time, there are no federal regulations that apply to wastewater effluents. It should be noted that no other legislation provides an exemption to the *Fisheries Act*.

The deposit of a deleterious substance to water frequented by fish may constitute a violation of the *Fisheries Act,* whether or not the water itself is made deleterious by the deposit. Subsection 36(3) of the *Fisheries Act* prohibits anyone from depositing or permitting the deposit of a "deleterious substance of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water." The notion of a deleterious substance applies both to fish and to fish habitat. Case law accepts that a discharge or effluent that is acutely lethal to fish is deleterious.

A common biological test to determine whether or not an effluent is deleterious is the *Reference Method for Determining Acute Lethality to Rainbow Trout,* Department of the Environment Report, EPS 1/RM/13, Second Edition – December 2000. The acute lethality bioassay test is not, however, the sole indicator of a deleterious discharge or effluent.

It should be noted that there may be, in some cases, an "artifactual" toxicity related to the EPS

1/RM/13 standard method caused by a shift in pH during the testing. Accordingly, EC is currently finalizing modified test methods, which incorporate pH stabilization procedures, to address this "artifactual" toxicity. More information on the pH stabilization procedures can be obtained from EC officials.

Furthermore, any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat is also deleterious. For example, substances which smother rearing areas or spawning grounds, or interfere with reproduction, feeding or respiration of fish, at any point in their life cycle are also considered deleterious.

3.3.1 Effluent Discharge Criteria

The City of Iqaluit has stated its intention to commission the WWTP in phases. Phase 1 would consist of primary screening, which would result in effluent of similar quality to primary effluent from a conventional primary sedimentation tank or primary clarifier (EarthTech letter dated March 7, 2005). Phase 2 would include the commissioning of the remainder of the WWTP, such that the waste activated sludge plant is fully operational. The final phase would provide an increase in overall capacity to address population growth projections.

Discussion

Municipal wastewater effluent (MWWE) is one of the largest sources of pollution, by volume, discharged to surface water bodies in Canada. Municipalities must ensure that they remain in compliance with Section 36(3) of the *Fisheries Act* when discharging effluent from wastewater treatment facilities. Environment Canada's has stated its intention to develop a regulation under the *Fisheries Act* to achieve effluent standards for wastewater treatment systems equivalent in performance to conventional secondary treatment with additional treatment where required that will apply to effluents released from all wastewater systems in Canada as the federal government's principal tool to implement the CCME Canada-wide Strategy for the management of wastewater effluents scheduled to be completed by 2006.

In a letter dated March 29, 2004, EarthTech Canada Inc. put forward proposed effluent quality for the Iqaluit wastewater treatment discharge (45 mg/L BOD_5, 45 mg/L Total Suspended Solids (TSS), 10 mg/L Ammonia). These effluent quality discharge criteria are a significant improvement over the effluent quality guidelines for marine embayed areas that are currently being followed in Nunavut (120 mg/L BOD_5, 180 mg/L TSS) and a step in the right direction towards meeting the requirements of Section 36(3) of the *Fisheries Act*. As stated in EC's letter to the NWB on April 15, 2004, "these limits are consistent with Environment Canada's current thinking on a long term strategy for maximum allowable limits for BOD_5 and TSS in municipal wastewater effluent. Environment Canada's current thinking is to have the target design of 20-30 mg/L BOD_5 and 20-30 mg/L TSS to allow for a factor of safety to ensure maximum limits of 45 mg/L BOD_5 and 45 mg/L TSS are never to be exceeded." It is noted, however, that the discharge criteria proposed by EarthTech Canada Inc. are in relation to effluent quality from a fully operational WWTP (i.e. Phase 2). The City of Iqaluit will also have to ensure that any effluent discharged as a result of Phase 1 of the WWTP is also in compliance with Section 36(3) of the *Fisheries Act*.

Recommendation
Consistent with the phased implementation of the WTTP, EC recommends that discharge criteria established for the WWTP in the water license be phased in, such that they become increasingly stringent over time. Establishing more protective discharge criteria to be implemented over a period of time will ensure that the City implements Phase 2 of the WWTP in a timely manner. Environment Canada also strongly recommends that an Operation and Maintenance Manual and training program be developed and implemented for the WWTP.

3.3.2 Decommissioning of the Sewage Lagoon
With the decision to commission and operate the WWTP, long term plans for the existing sewage lagoon need to be identified and developed.

Discussion
In a letter to the NWB dated June 1, 2005, the City of Iqaluit states that the existing sewage lagoon will continue to be used until the first phase of the WWTP is commissioned. Once the WWTP is operational, the City intends to use the lagoon only in the event of a catastrophic failure of the WWTP. As such, the City has stated its intention to develop and submit closure and reclamation plans for the lagoon, including any sludge contained therein. However, no plan has been submitted to date, and this aspect of the application remains outstanding.

The June 1, 2005 letter also states that subject to approval by the City Council, a number of repairs will be completed on the lagoon berms. The February 2005 Dam Safety Inspection carried out by Concentric Associates International indicates that the safety/stability recommendations outlined in the 2003 geotechnical report have not been implemented. Given that the report indicates that "localized failures or seeps are expected until such a time as the lagoon is lined with an impervious material, or rebuilt", it is essential that these repairs be completed to ensure the integrity of the lagoon.

Recommendation
Environment Canada strongly recommends that the license require the City to implement the repairs outlined in the February 2005 Dam Safety Inspection carried out by Concentric Associates International. Given the concerns regarding the inadequate sizing of the lagoon, the insufficient retention time, and the stability of the berms, EC does not recommend using the lagoon for purposes other than as a back-up facility for the WTTP. As such, once Phase 1 of the WWTP is operational, the license should restrict the use of the lagoon to those situations where emergency back-up for the WWTP is required.

Environment Canada also recommends that the license require the City of Iqaluit to develop and submit an Abandonment and Reclamation Plan for the existing sewage lagoon for review and approval within 3 months of the issuance of the license.

3.3.3 Sludge Management
The EarthTech (Canada) Inc. Sewage Sludge Management Plan submitted in December 2005 provides a framework for dealing with the sewage sludge that will be produced from the WWTP. However, no indication is given as to whether or not the City of Iqaluit has accepted the recommendations put forth by EarthTech (Canada) Inc. in the report.

Discussion
Confirmation is required regarding the preferred sludge management technology, including stabilization techniques, as well as the final disposal location. Information is also required regarding sludge management plans during the interim period between the commissioning of the WWTP and the generation of sludge and the development of the infrastructure required for the preferred sludge management plan.

Recommendation
Environment Canada recommends that the City clearly indicate whether or not they intend to implement the recommendations put forth by EarthTech (Canada) Inc. in the Sewage Sludge Management Plan. If the recommendations put forth by EarthTech (Canada) Inc. are adopted, EC also recommends that the license require the City of Iqaluit to develop and submit for review, within 30 days of the issuance of the license, a plan to deal with sludge produced during the interim period when the WWTP is operational but the infrastructure required for sludge management is not available.

3.3.4 Monitoring
The current license application does not appear to address the issue of ongoing monitoring at the sewage lagoon, the WWTP, or the sludge management facility.

Discussion
Wastewater systems should be monitored by means of sampling and analytical procedures that are in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater[1] and EC's reference methods for acute lethality tests. Sampling and analysis of the effluent may indicate whether or not the effluent is deleterious. It is the owner/operator's responsibility to ensure that the parameters they are sampling and analyzing at the discharge point are sufficient for determining the deleteriousness or non-deleteriousness of the effluent. The choice of parameters for testing may depend on facility design criteria, characteristics of the influent, and sensitivity of the receiving environment.

It is critical that discharge from the sewage lagoon, the WWTP and the sludge management facility be monitored to ensure compliance with the license limits and the *Fisheries Act*. Results from the monitoring program should also be used as a feedback mechanism to ensure that the WWTP and sludge management facility are operating according to design parameters/standards.

Recommendations
Environment Canada recommends that the license require the establishment of SNP stations to monitor effluent discharge from the final discharge point of the WWTP and the existing sewage lagoon. The components of an effective effluent monitoring program should include effluent testing of relevant parameters, effluent quantity monitoring and a monitoring schedule. At a minimum, the effluent quality monitoring program should include biochemical oxygen demand, chemical oxygen demand, total suspended solids, pH, ammonia, total nitrogen, total phosphorus, metals (including mercury), oil and grease, phenols, total and fecal coliforms, and *Escherichia*

[1] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998: American Public Health Association, American Water Works Association, Water Environment Federation, ISBN 0-87553-235-7.

coli (E.coli). Additionally, bioassay testing should be required from both SNP stations four times annually.

The license should also require the establishment of a SNP station at the sewage sludge management facility. This station should be monitored annually during periods of thaw for those constituents found to be present in the sludge during characterization. Parameters to be monitored should be based on the results of the characterization of the sludge, and should include, at a minimum, BOD_5, TSS, pH, heavy metals (including mercury), oil and grease, nutrients and total and faecal coliform.

Environment Canada recommends that a quality assurance/quality control program should also be submitted under the SNP program within 3 months of license issuance.

3.3.5 Emergency Response and Spill Contingency Planning

The application currently includes a Sewage Lift Station Spill Plan, dated 2003, as well as a more general Spill Contingency Plan dated November 2004. While the Spill Contingency Plan is dated November 2004 on the cover, it is noted that the footer text indicates that the contents of the Plan were created in May 1998.

Discussion

The spill contingency plans relating to wastewater should provide a clear path of response in the event of a spill, and address the key elements of prevention, preparedness, response and recovery. Deposits out of the normal course of events are covered in subsection 38(4) of the *Fisheries Act*. This includes overflows, spills, leaks, by-passes and regulatory exceedences or other deposits out of compliance. Paragraphs 38(4)*(a)* and (4)*(b)* and subsection 38(5) of the *Fisheries Act* require any person who owns, manages or controls the deleterious substance or causes or contributes to the abnormal deposit to report such occurrence to a fishery inspector. For this reason, it is recommended that environmental emergency plans to prevent, prepare for, respond to and correct environmental damage from abnormal deposits be developed by project proponents and owners/operators of wastewater systems.

The *Canadian Environmental Protection Act* (1999) also advocates the prevention of pollution as opposed to managing pollution after it is created, and as such, the development and implementation of Spill Contingency Plans can play a critical role both in preventing pollution through proper storage of hazardous materials, and the timely response to accidents and malfunctions that may occur. The City should ensure that the plans are up-to-date, and reflect current operations at wastewater treatment facilities.

Recommendations

Environment Canada recommends that the following items be included in the Spill Contingency Plans developed by the City of Iqaluit:

- The list of personnel included in the plan should be updated to reflect current contact information. The Plan should also include an overview of the reporting structure, such that first responders to the scene of a spill are able to quickly identify individuals that should be notified.
- The report indicates that the effectiveness of the plan is contingent on a number of

factors. Three of these factors involve training. Environment Canada recommends that a training program be developed and implemented on an as-needed basis, such that all new employees receive appropriate training in a timely fashion and refresher courses are offered as required.

- The report indicates that the City planned to purchase a variety of spill containment equipment. Environment Canada requests confirmation that the City now has adequate spill containment equipment available for use when required. If some equipment is not kept on site, the spill contingency plan should clearly indicate where the equipment can be procured from.
- Environment Canada recommends the use of secondary containment when storing fuel at City facilities. Appropriately sized spill kits should also be located at fuel storage and hazardous materials storage locations.
- The City of Iqaluit should note that all spills, regardless of size, are to be documented and reported to the 24 hour Spill Line at (867) 920-8130.
- Section 3.2 of the City of Iqaluit Spill Contingency Plan states that absorbent materials used in the clean-up of fuel spills are "taken to the landfill and burned after use." Environment Canada recommends that these materials receive proper storage and disposal at an approved facility, rather than burning the materials.
- The City of Iqaluit Spill Contingency Plan should provide contact information for Environment Canada personnel in Iqaluit. The Enforcement/Emergencies Officer contact number in Iqaluit is (867) 975-4644 (work) and (867) 975-1925 (cell). Alternatively, the 24-hour Emergencies Pager can be contacted at (867) 920-5131.

The Spill Contingency Plan should also be updated to reflect changes to the wastewater treatment processes, such as the operation of the WWTP and the use of the existing sewage lagoon only as a contingency in the event that the WWTP is not functioning.

- The Spill Contingency Plan should provide information regarding the WWTP bypass. It is indicated in the Preliminary Design Report: Iqaluit Wastewater Treatment Plant Conversion and Expansion (Earth Tech Canada Inc., May 2004) that an existing bypass located in the wet well would prevent the wet well from flooding during an emergency situation. However, this bypass sends flow directly to the outfall, presumably untreated. A second option involving the utilization of the existing sewage lagoon as an emergency storage cell is also briefly discussed. Further information regarding the WWTP bypass is required, including the location and storage capacity of any emergency storage areas/cells and how the raw wastewater would be circulated back to the WWTP for treatment.
- It is indicated that chemicals, including alkalinity adjustment chemicals, polymer and sodium hypochlorite will be required for the operation of the WWTP. Details are also given regarding the installation of an additional fuel storage tank outside of the WWTP. Environment Canada recommends that these storage areas incorporate secondary containment and spill containment provisions.

4.0 SUMMARY OF RECOMMENDATIONS

WATER SUPPLY

1. Environment Canada recommends that the license require that measures be taken to prevent the release of sediment into the water flowing from Lake Geraldine and into Lake Geraldine itself during the construction of the new south berm, and the expansion of the existing berms and dam.

2. Environment Canada recommends that the license require the City of Iqaluit to set up a monitoring program whereby the level fluctuations in the reservoir are monitored, so that annual inputs from precipitation and snow melt are better understood. If the City intends to develop a new recharge location for the reservoir, EC recommends that license require that the City submit potential recharge locations to the NWB for review prior to development.

SOLID WASTE

1. Environment Canada recommends that the license require the City to collect, in a secure sump, any leachate generated from the SWMF, to characterize the leachate to determine its composition, and to treat the leachate prior to disposal. The amount of leachate collected in the sump and the amount of leachate treated should be monitored and reported to the NWB via annual reports.

   It is recommended that the City of Iqaluit install and operate a treatment system to prevent the release of untreated leachate to the environment. Prior to disposal / release into the environment, EC recommends that the leachate meet the criteria outlined in the CCME guidelines for the protection of marine life. Alternately, if on-site treatment is not implemented, any leachate generated should be collected and shipped south to an approved and licensed disposal facility.

   The license should also require the City to design, construct and operate a surface water management plan for the SWMF to help prevent the creation of leachate.

2. Environment Canada recommends that the license establish Surveillance Network Program (SNP) stations at the current landfill and the new expanded cell (when created) in order to monitor leachate generated at the SWMF. While EC recognizes that this application does not include the West 40 dump site, monitoring requirements should also apply to the abandoned honey bag disposal site, and the abandoned solid waste disposal site in Apex. Environment Canada recommends that a quality assurance/quality control program should also be submitted under the SNP program within 3 months of license issuance.

3. The license should require the City of Iqaluit to submit an updated Operation and Maintenance Manual for the SWMF for review and approval within 6 months of the issuance of the license. The updated plan should address types of cover material, frequency of covering, litter control, contaminated soil handling, and hazardous materials management, as well as any other items necessary for the successful operation of the facility.

4. Environment Canada recommends that the water license include a requirement that prior to any known contaminated soils being accepted into the SWMF, the soils be tested for heavy metals (full metals ICP scan), polychlorinated biphenyls (PCBs), and hydrocarbons, including BTEX parameters (benzene, toluene, ethyl benzene, and xylene). Only those soils with concentrations of contaminants below the CCME CEQG for Industrial sites should be accepted in the landfill.

5. Environment Canada recommends that the Operation and Maintenance Manual set clear limits as to what types and quantities of wastes can be accepted at the SWMF. The Manual should also clearly indicate when the hazardous wastes stored on site will be shipped south for disposal. The license should also require the City to develop and implement an Emergency Response Plan for the hazardous wastes storage area. This plan should be submitted to the NWB for review within 6 months of the issuance of the license.

WASTEWATER

1. Consistent with the phased implementation of the WTTP, EC recommends that discharge criteria established for the WWTP in the water license be phased in, such that they become increasingly stringent over time. Establishing more protective discharge criteria to be implemented over a period of time will ensure that the City implements Phase 2 of the WWTP in a timely manner. Environment Canada also strongly recommends that an operation and maintenance manual and training program be developed and implemented for the WWTP.

2. Environment Canada strongly recommends that the license include a term requiring the City to implement the repairs for the sewage lagoon outlined in the February 2005 Dam Safety Inspection carried out by Concentric Associates International. Given the concerns regarding the inadequate sizing of the lagoon, the insufficient retention time, and the stability of the berms, EC does not recommend using the lagoon for purposes other than as a back-up facility for the WTTP. As such, once Phase 1 of the WWTP is operational, the license should restrict the use of the lagoon to those situations where emergency back-up for the WWTP is required.

   Environment Canada also recommends that the license require the City of Iqaluit to develop and submit an Abandonment and Reclamation Plan for the existing sewage lagoon for approval within 90 days of the issuance of the license.

3. Environment Canada recommends that the City clearly indicate whether or not they intend to implement the recommendations put forth by EarthTech (Canada) Inc. in the Sewage Sludge Management Plan. If the recommendations put forth by EarthTech (Canada) Inc. are adopted, EC also recommends that the license require the City of Iqaluit to develop and submit for review, within 30 days of the issuance of the license, a plan to deal with sludge produced during the interim period when the WWTP is operational but the infrastructure required for sludge management is not available.

4. Environment Canada recommends that the license require the establishment of SNP stations to monitor effluent discharge from the final discharge point of the existing sewage lagoon, the WWTP and the sewage sludge management facility. Environment Canada recommends that a quality assurance/quality control program should also be submitted under the SNP program within 3 months of license issuance.

5. The Spill Contingency Plans for the wastewater treatment system should be updated to reflect current wastewater treatment operations and better reflect the key areas of planning, preparedness, response and recovery.

As previously stated, this water license application illustrates the substantial progress that the City of Iqaluit has made in improving the quality of municipal waste management in Iqaluit. Environment Canada appreciates the work that has been completed to date, and looks forward to working with the City of Iqaluit and the NWB to continue to ensure best practices are implemented in managing municipal wastes in Nunavut. Environment Canada appreciates the opportunity to participate in the review of the City of Iqaluit Type A Water License application and hopes that these comments will be useful to the NWB in their determinations.