



i

TABLE OF CONTENTS

REASONS FOR DECISION	1
I. BACKGROUND	1
II. PROCEDURAL HISTORY	1
ISSUES	5
Compliance	5
Plan for Compliance	5
Annual Report.....	6
Design Issues.....	6
Operational Plans	8
Sewage.....	10
Stream Crossings	12
Quarry	12
Abandonment and Restoration Plan	13
Monitoring Program.....	14
LICENCE AMENDMENT No. 1	16
PART A: SCOPE AND DEFINITIONS.....	16
PART B: GENERAL CONDITIONS	17
PART C: CONDITIONS APPLYING TO WATER USE	19
PART D: CONDITIONS APPLYING TO WASTE DISPOSAL	19
PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION	21
PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE	23
PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION	24
PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM.....	25

REASONS FOR DECISION

I. BACKGROUND

The Hamlet of Arctic Bay (Hamlet or Applicant) has a population of approximately 855 and is located at the coordinates of 73° 02' north latitude and 83° 05' west longitude, on the north tip of Baffin Island within the Qikiqtani Region of Nunavut.

Currently, the community generates an estimated 33,600 cubic metres of sewage annually, which is treated in a sewage lagoon, ice pack area and associated wetland located 2.5 km east of the community. The existing lagoon is at the end of its useful life as it does not meet the storage needs of the community or the treatment requirements of the Hamlet's current water licence. Therefore, construction of a new sewage lagoon in a small valley northwest of the existing facility is proposed, with additional treatment through natural wetlands.

The new wastewater treatment facility has been designed for a twenty (20) year life with a projected annual sewage generation rate of 56,029 cubic metres.

II. PROCEDURAL HISTORY

The Nunavut Water Board (NWB) issued a municipal water licence to the Hamlet of Arctic Bay on November 1, 2002, to allow for the use of water and disposal of waste. Following application by the Hamlet, the NWB issued an amendment to the Licence on March 2, 2005 to allow for emergency remedial work required to prevent failure of the lagoon's containment berms, which could result in the release of waste into water and the environment surrounding the Hamlet's Sewage Disposal Facility.

Following the expiration of the water licence on October 31, 2007, a submission of a renewal application and a detailed assessment was received and the Board approved a water licence renewal on March 17, 2008, as Water Licence 3BM-ARC0810.

On August 22, 2008 the Nunavut Planning Commission indicated in an email to the NWB that no conformity determination was required for the Arctic Bay municipal project sewage lagoon. On February 27, 2008, the Nunavut Impact Review Board (NIRB) exempted from screening the construction of the new sewage lagoon.

The Hamlet of Arctic Bay, in conjunction with the Government of Nunavut, Department of Community and Government Services (GN-CGS), submitted an Application for Water Licence Amendment to the NWB on April 30, 2008. Following a preliminary review of the application, the NWB concluded that it met the requirements of section 48(1) of the *Nunavut Waters and Surface Rights Tribunal Act* (the Act) and advised the Applicant and distribution list accordingly on July 30, 2008.

Information contained in the April 30, 2008 submission and distributed for review included:

- Letter from GN-CGS to NWB, regarding Application for the amendment of the existing Water licence for the Hamlet of Arctic Bay, Baffin Region, Nunavut: 3BM-ARC0810, dated April 30, 2008;
- Drawings prepared by Trow Associates Inc. for the Government of Nunavut entitled Government of Nunavut, Arctic Bay, Decommissioning Existing Lagoon, Project No. OTCD00019054B, signed and stamped by a professional engineer registered in Nunavut;
- Report prepared by Trow Associates Inc. for the Government of Nunavut Community and Government Services Project Management Division – Baffin Region, entitled Arctic Bay Sewage Lagoon Decommissioning, dated April 2008, Project No. OTEN00019054C;
- Report prepared by Trow Associates Inc. for the Government of Nunavut Community and Government Services Project Management Division – Baffin Region, entitled Design Brief New Sewage Lagoon for the Hamlet of Arctic Bay, dated April 2008, Project No. OTCD00019054A;
- Report prepared by Trow Associates Inc. for the Government of Nunavut Community and Government Services Project Management Division – Baffin Region, entitled Environmental Assessment Screening New Sewage Lagoon for the Hamlet of Arctic Bay Conducted in Compliance with the Canadian Environmental Assessment Act, dated April 2008, Project No. HAEN00286312A;
- Report prepared by Trow Associates Inc. for the Government of Nunavut Community and Government Services Project Management Division – Baffin Region, entitled Geotechnical Investigation Sewage Lagoon, Hamlet of Arctic Bay, NU, dated April 24, 2008, Project No. OTGE00019054B;
- Report prepared by Naviq Consulting Inc. for Trow Associates Inc., entitled Geothermal Analysis of Proposed Sewage Lagoon, Arctic Bay, NU, dated April 2008, Project No. J008 Revision 1;
- Drawings prepared by Trow Associates Inc. for the Government of Nunavut entitled Government of Nunavut, Arctic Bay Wastewater Lagoon, Project No. OTCD00019054A, signed and stamped by a professional engineer registered in Nunavut;
- Drawings prepared by Trow Associates Inc. for the Government of Nunavut entitled Government of Nunavut, Arctic Bay Wastewater Lagoon Road, Project No. OTCD00019054A, signed and stamped by a professional engineer registered in Nunavut;
- Letter from Hamlet of Arctic Bay to Community and Government Services regarding Sewage Lagoon Project for Arctic Bay, dated December 19, 2007;
- Report prepared by Rowan, Williams, Davies & Irwin Inc. (RWDI) for Trow Associates Inc., entitled Snowdrift Assessment Proposed Wastewater Lagoon Arctic Bay, NU, dated April 14, 2008, Project No. 08-1032A;

- Report prepared by Trow Associates Inc. for the Government of Nunavut Community and Government Services Project Management Division – Baffin Region, entitled Vegetated Filter Strip Wetland Assessment, Hamlet of Arctic Bay, Nunavut, dated April 2008, Project No. HAEN00286312A;
- Topographic Map prepared by Trow Associates Inc. for the Government of Nunavut entitled Arctic Bay Wastewater Lagoon Topographic Map, dated 11/02/2008, Project No. OTCD00019054A;
- English Summary entitled Technical Report of the Wastewater Treatment Facility in Arctic Bay;
- Inuktitut Summary; and
- Completed Water Licence Application form signed February 26, 2008.

The scope of the Application for Water Licence Amendment includes:

- Construction and operation of a new Wastewater Treatment Facility comprised of a single cell sewage lagoon and wetland treatment area;
- Construction of a new gravel access road from the existing lagoon to the new lagoon including stream crossings;
- Effluent release from the new lagoon to a 11.2 hectare Vegetated Filter Strip Wetland area that is approximately 700 metres long, between 86 and 202 metres wide and flows northwest into Victor Bay;
- Decommissioning of the existing Sewage Disposal Facility once the new Wastewater Treatment Facility is commissioned; and
- Quarrying from the Arctic Bay quarry.

The NWB publicly posted notice of this application, in accordance with Section 55.1 of the Act and Article 13 of the *Nunavut Land Claims Agreement* (NLCA), on July 30, 2008. This assessment process included the referral of the application to a variety of Federal, Territorial and local organizations for their review and comment.

As no public concern was expressed, the NWB waived the requirement to hold a public hearing and proceeded with the application process.

The NWB received comments on the application from interested parties including Environment Canada (EC), Indian and Northern Affairs Canada (INAC), the Government of Nunavut Department of Environment (GN-DoE) and the Government of Nunavut Department of Culture, Language, Elders, and Youth (GN-CLEY) on or before September 12, 2008. In addition, on September 5, 2008, BGC Engineering Inc. (BGC), at the request of the NWB, carried out a technical review on the geotechnical and geothermal aspects of the project and provided the NWB with a summary of findings.

Between October 27th, 2008 and November 10th, 2008, the NWB received a response from the Applicant. The response addressed comments from the interested parties and included the following documents:

- Letter from Trow Associates Inc. to GN-CGS regarding response to comments Arctic Bay Sewage Lagoon, Nunavut, dated November 10, 2008;
- Letter from Trow Associates Inc. to GN-CGS regarding response to BGC Letter of September 5, 2008 Geotechnical Investigation, Arctic Bay Sewage Lagoon, Arctic Bay, Nunavut, dated October 27, 2008;
- Letter from Trow Associates Inc. to GN-CGS regarding Sludge Accumulation, Arctic Bay Sewage Lagoon, Nunavut, dated November 10, 2008;
- Table 1: Summary of Review of Geotechnical and Geothermal issues;
- Report prepared by Naviq Consulting Inc., for Trow Associates Inc., entitled Geothermal Analysis of Proposed Sewage Lagoon, Arctic Bay, NU dated October 2008 as revision 2, project number J008; and
- Document prepared by Trow Associates Inc., entitled Arctic Bay Sewage Lagoon O&M Manual Outline, Project number OTCD00019054A.

This additional information was forwarded to BGC on November 13, 2008, for review, to provide the NWB with a final summary of issues, which was provided to the NWB on December 10, 2008.

Based upon the results of the detailed assessment, including consideration of any potential accidents, malfunctions, or impacts to water, that the overall project might have in the area, the Board approved the application and has amended Licence 3BM-ARC0810.

ISSUES

Compliance

The decision for the renewal of Licence 3BM-ARC0810, on March 17, 2008 indicated that there were several issues of non-compliance with conditions of the previous licence 3BM-ARC0207. These included:

- Unauthorized release of Effluent and failure to file a spill report;
- Unacceptable Effluent discharge quality, decant structure, erosion, dike failure, and available freeboard of lagoon;
- Failure to submit annual reports for 2002 to 2005 (2006 annual report received on April 7, 2007);
- The Licensee did not submit an Operations and Maintenance Plan during the Licence term; and
- Incomplete monitoring data.

In response to the above compliance issues, the Board then decided on a shorter two (2) year term for the licence renewal and as noted in its decision fully expected the Licensee to take immediate steps to come into full compliance with the licence requirements. In addition, the Board required, as a condition in Part B Item 10 of 3BM-ARC0810, the Licensee to submit a Plan for Compliance within the lesser of ninety (90) days or upon the filing of any application in relation to the Licence, that clearly demonstrates how the Licensee will achieve full compliance with the Licence conditions.

As part of the review of this Application for Water Licence Amendment, the NWB conducted a compliance assessment of the current licence 3BM-ARC0810. The results of this assessment indicate a number of additional, and continued compliance issues including:

- Failure to submit to the Board, a Plan for Compliance within ninety (90) days or upon the filing of the amendment application in accordance with Part B Item 10;
- Failure to submit to the Board for review, within six (6) months of the issuance of the Licence, a report identifying each Final Discharge Point in accordance with Part D Item 10; and
- Failure to submit to the Board for approval, within ninety (90) days of issuance of the Licence, an Operations and Maintenance Manual in accordance with Part F Item 1.

Plan for Compliance

As noted above, the Licensee to this date, has not complied with Part B, Item 10 of the current licence 3BM-ARC0810, requiring the Licensee to submit a Plan for Compliance that clearly

demonstrates the ways and means the Licensee will undertake to achieve full compliance with the conditions of the Licence, during the licence term.

The NWB is therefore maintaining this requirement, but has amended the condition in Part B Item 10 to require submission of the Plan within a time frame of **thirty (30) days** following issuance of this Licence Amendment, for approval by the Board in writing. In addition, this condition has been amended to require that the Plan clearly demonstrate the measures the Licensee will undertake, including an implementation schedule, to achieve full compliance with the conditions of this Licence, including the issues raised in the Inspector's reports.

Annual Report

As noted above, the Licensee's failure to submit annual reports has been an ongoing compliance issue.

The NWB will maintain the condition in the License to produce annual reports. These reports are important in ensuring that the NWB has an accurate annual update of municipal activities during a calendar year with respect to water use and waste disposal. This information is maintained on the public registry and is available to interested parties upon request. A *Standardized Form for Annual Reporting* is to be used by the Licensee and is available for use by the Licensee at the NWB's ftp site at <ftp://nunavutwaterboard.org/ADMINISTRATION/Standardized%20Forms/>. This standardized form should not limit the amount and quality of information provided by the Licensee, but is made available to assist in the preparation of the annual report.

Although an Annual Report has been received by the NWB for 2006, not all data that should have been generated under Part H, Monitoring Program was included. The Board is requiring the Licensee to submit all available data generated under the previous Licence NWB3ARC0207 and the Renewal, 3BM-ARC0810 Monitoring Program to the Board within thirty (30) days of issuance of this Licence Amendment.

Design Issues

A number of documents were submitted as part of the Application for Water Licence Amendment in support of the design of the new Wastewater Treatment Facility as indicated in the procedural history of this decision. These documents were reviewed by BGC, an expert reviewer retained by the Board. The results of BGC's review, submitted on September 5, 2008, identified a number of concerns related to the site description and the geothermal and stability analyses for the lagoon including:

- Inconsistency between the results of the geothermal analyses and the design;
- Description and justification for the derivation of parameters used in the slope stability analysis including effective cohesion for ice;

- Uncertainty with respect to the derivation of the design stratigraphic sections used in the stability analyses;
- Uncertainty with respect to the installation of the impermeable liner to be installed along side valleys of the lagoon impoundment to minimize lateral migration of effluent;
- Uncertainty with respect to the effects of predicted long term permafrost thaw and warming;
- Uncertainty with respect to the source, quality and specifications of borrow materials for construction; and
- Thermal, settlement and displacement monitoring.

INAC, in its September 12, 2008 comments also provided a number of recommendations related to the design of the Wastewater Treatment Facility including:

- Details of the installation of the liners to be placed along the upstream slopes of the northwest and southwest berms as well as each side of the valley forming the lagoon should be provided. Details should include (1) the type of liner; (2) how the liner will be incorporated into the cell to prevent seepage; and (3) a discussion on the quality assurance and quality control measures applied during installation;
- The use and location of thermistor cables and vertical slotted standpipes within the lagoon berms for monitoring temperature and effluent seepage should be described as part of the Operations and Maintenance Manual; and
- An explanation regarding the need for any proposed spillways should be provided.

On November 12, 2008, the Applicant submitted additional information in response to the issues raised by BGC, including:

- Letter from Trow Associates Inc. to GN-CGS regarding response to BGC Letter of September 5, 2008 Geotechnical Investigation, Arctic Bay Sewage Lagoon, Arctic Bay, Nunavut, dated October 27, 2008;
- Table 1: Summary of Review of Geotechnical and Geothermal issues; and
- Report prepared by Naviq Consulting Inc., for Trow Associates Inc., entitled Geothermal Analysis of Proposed Sewage Lagoon, Arctic Bay, NU dated October 2008 as revision 2, project number J008

In its final summary, BGC noted that a number of the issues were not addressed in the Applicant's response of November 12, 2008. The main issue of concern being the location of the key trench liner and potential impact of berm displacements on liner integrity. BGC therefore recommended that the location of the liner key trench, horizontally from the upstream toe of the berm, be as recommended in Naviq Consulting Inc.'s geothermal design report. Furthermore, BGC recommended that the proposed 2 metres penetration depth of the lined key trench be considered a minimum and that the construction specifications indicate that it be keyed into sound rock or ice-saturated permafrost mineral soils or rock. Based on these concerns, the Board

has decided to impose the recommendations provided by BGC as conditions of the amendment in Part E Items 8 and 9.

In addition, BGC recommended that a detailed Instrumentation Monitoring and Surveillance Plan be submitted to the NWB for review and approval as a condition of the amendment. BGC recommended that this Plan include details of the proposed instrumentation plan, describe frequency of measurements and identify trigger values or observations for remedial action. INAC similarly recommended that the Operations and Maintenance Manual should provide a description of the thermal and seepage monitoring requirements of the lagoon berms. As such, the Board is requiring the Licensee to submit to the Board as part of the Operations and Maintenance Manual required in Part F Item 1(h), a detailed Instrumentation Monitoring and Surveillance Plan.

The Board has also included a condition in the Licence, Part E, Item 11, requiring the Licensee to submit within sixty (60) days of construction of the Wastewater Treatment Facility, a Construction Summary Report. This Report is to include as-built drawings identifying the areas where field changes were made from the original design drawings, preferably in the form of a revision bubble and a brief note in the revisions section of the title block. Given BGC's concerns regarding the finalization of specifications for fill materials to be used for construction of the berms of the Wastewater Treatment Facility, the Report shall also include details of the fill materials specification for dike and key trench construction. Due to conflicting information regarding the location of the lined key trench in the Application for Water Licence Amendment (the recommended location as indicated in the report prepared by Naviq Consulting Inc., for Trow Associates Inc., entitled Geothermal Analysis of Proposed Sewage Lagoon, Arctic Bay, NU dated October 2008 was at a distance of approximately five (5) metres back from the upstream toe of the dike, whereas drawing DE-2 indicates three (3) metres), the Report shall also include the final location for the lined key trench and reasons for selecting the final location. To address INAC's comments regarding the spillway, the Board is also requiring this Report to include confirmation regarding the requirement for a spillway including a rationale. Lastly, to address INAC comments regarding liner installation, this Report shall include details regarding the installation of impermeable liners including the type of liner, how the liners were incorporated into the cell to prevent seepage, and a discussion of the quality assurance/ quality control measures applied during installation.

Operational Plans

Under the current water licence 3BM-ARC0810, Part F Item 1, the Licensee was required to submit an Operation and Maintenance (O&M) Manual covering the Water Supply Facility, the Sewage Disposal Facility and Solid Waste Disposal Facility including plans for sewage sludge management, spill contingency and Quality Assurance/Quality Control (QA/QC) within ninety (90) days of issuance of the licence. To date, this Manual has not been received.

The GN-DoE, INAC, and EC all commented on the need for an O&M Manual. The GN-DoE commented in its August 21, 2008 submission that an O&M Manual should be provided for the two sewage lagoons (the existing and the proposed).

All parties also commented on the need for a Sewage Sludge Management Plan providing detailed recommendations regarding the contents of the plan including the rate of sludge accumulation, the frequency of desludging, sludge characterization procedures, sludge disposal standards, and sludge disposal procedures.

Moreover, EC commented on the need for a Spill Contingency Plan and INAC commented on the need for a diagram that references Monitoring Program station numbers that could be appended to the Licence.

On November 12, 2008, in response to comments received, the Applicant provided additional information including:

- Document prepared by Trow Associates Inc., entitled Arctic Bay Sewage Lagoon O&M Manual Outline, Project number OTCD00019054A;
- Letter from Trow Associates Inc. to GN-CGS regarding Response to Comments Arctic Bay Sewage Lagoon, Nunavut, dated November 10, 2008; and
- Letter from Trow Associates Inc. to GN-CGS regarding Sludge Accumulation, Arctic Bay Sewage Lagoon, Nunavut, dated November 10, 2008.

With respect to sewage sludge, the additional information indicated that the sewage lagoon would not likely require desludging within the twenty year design life of the lagoon. However, it conceded that sampling should be used as an indicator of the build up of sludge and that guidelines for desludging would be provided as part of the O&M Manual.

The Board acknowledges the Applicant's submission of an O&M Manual outline, but agrees with reviewers that this Plan should be fully developed. The Board is therefore maintaining the requirement for the submission of an O&M Manual. As such, the Board has amended the condition in Part F Item 1 of licence 3BM-ARC0810, to require submission of the O&M Manual for Board approval in writing, within **sixty (60) days** following issuance of this Licence Amendment. The timing for submission of this Manual takes into consideration the Applicant's proposal to begin construction during the summer of 2009. This Manual is to be developed to the satisfaction of the Board and include the following plans:

- a. Water Supply Facilities Operation and Maintenance Plan;
- b. Solid Waste Operation and Maintenance Plan;
- c. Sewage Operation and Maintenance Plan for the existing Sewage Disposal Facility and the new Wastewater Treatment Facility;
- d. Sewage Sludge Management Plan;
- e. Hazardous Waste Management Plan;

- f. Spill Contingency Plan including a Spill Response Plan for Aggregate deposits;
- g. Monitoring Program Quality Assurance/Quality Control Plan including a diagram that references Monitoring Program Station Numbers; and
- h. Instrumentation Monitoring and Surveillance Plan (See Monitoring section below, as this Plan is due within thirty (30) days of issuance of this Licence Amendment).

Item (c) above is intended to address operation and maintenance for both the existing Sewage Disposal Facility as well as the new Wastewater Treatment Facility.

Given that procurement of material from the Hamlet quarry is required to complete the project, the Board is also requiring as part of the O&M Manual required in Part F Item 1 of the Licence Amendment, that the Licensee's Spill Contingency Plan address operations at the aggregate deposit(s). This condition is also a requirement of NIRB's 06UN036 screening determination which states that the Proponent shall have an NWB approved Spill Contingency Plan in place prior to commencement of construction activities and that this Plan shall address any additional fuel stored at the quarry site.

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

Sewage

The new Wastewater Treatment Facility comprising a single cell sewage lagoon as the primary treatment system and a wetland as the secondary treatment system is proposed to be constructed in a small valley. This will replace the existing facility built in 1976 and expanded in 2003. Treated sewage effluent from the new lagoon will be pumped to the new 11 hectare Vegetated Filter Strip Wetland Area where it will be further treated and polished prior to runoff into Victor Bay. Victor Bay is a marine environment located approximately 700 metres away from the new lagoon.

The Application for Water Licence Amendment consists of a report, drawings, and recommendations prepared by Trow Associates Inc (Trow), retained by the GN-CGS on behalf of the Hamlet. However, the Applicant does not specify which of Trow's recommendations would be implemented. Thus, for greater certainty the NWB has included a new condition in Part E Item 6 of the Licence Amendment that requires the Licensee to implement the recommended options identified in the Application for Water Licence Amendment document entitled *Design Brief New Sewage Lagoon for the Hamlet of Arctic Bay*, dated April 2008, as

prepared by Trow, Project No. OTCD00019054A. In the event of a conflict between the conditions of this Licence Amendment and the above referenced document, the conditions of this License shall prevail.

The Board acknowledges that the Applicant predicts that effluent from the proposed Vegetated Filter Strip Wetland Area will meet the current licence effluent quality limits. However, due to uncertainty regarding the treatment efficiency of wetlands in the north, the Board has decided that the Final Discharge Point and point of compliance for the Wastewater Treatment Facility be located at the point of discharge from the lagoon to the Vegetated Filter Strip Wetland Area. In order to determine the performance of the Vegetated Filter Strip Wetland Area as a secondary treatment system, the Board further requires that the quality of effluent leaving the Vegetated Filter Strip Wetland Area be monitored and reported.

Furthermore, the Board has set effluent quality standards at the Final Discharge Point of the new Wastewater Treatment Facility at 120 mg/L for BOD₅ and 180 mg/L for TSS. In setting the effluent quality standards, the Board took into consideration EC's August 29th, 2008 comments as well as the *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories, 1992*, (Guidelines). According to Table 4.1 of the Guidelines, for a wastewater flow greater than 600 lcd during summer months into a marine receiving environment, the discharge criteria for BOD₅ should be set at 80 mg/L and the discharge criteria for TSS should be 70 mg/L. Taking into consideration note (k) to Table 4.1 of the Guidelines which states that where wetlands are to be used as part of the treatment systems, limits may be chosen to suit the point of measurement and control, the Board has decided to set limits from the lagoon that are less strict than the 80/70 (BOD/TSS) standards to take into account the potential for treatment in the wetland area and to be consistent with other recently issued water licences with comparable systems such as Clyde River. The discharge criteria for the existing Sewage Disposal Facility includes Fecael Coliforms as a licensed parameter and the NWB is maintaining this requirement for the new Wastewater Treatment Facility.

The Board has also amended the effluent quality standards to meet criteria based on the maximum concentration of any grab sample, as opposed to maximum average concentrations which cannot be calculated annually if only three (3) samples are collected per year in accordance with the Monitoring Program.

In addition, due to logistical constraints brought to the Board's attention with respect to providing evidence under the Licence, the Board has removed the requirement for the Licensee to demonstrate that Effluent is non-acutely toxic. However, the Board advises the Licensee, that compliance with this Licence does not absolve the Licensee from the responsibility to comply with other applicable legislation and to ensure that any effluent discharged from the system's Final Discharge Point is in compliance with Section 36(3) of the Fisheries Act. According to Section 36(3) of the Fisheries Act, where the deposition of deleterious substances of any type, under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter such water, is prohibited.

As noted earlier in this Decision, the Licensee has failed to submit to the Board a report identifying each Final Discharge Point for the existing Sewage Disposal Facility in accordance with Part D Item 10 of the current licence 3BM-ARC0810. Given that the existing Sewage Disposal Facility will remain in operation until commissioning of the new Wastewater Treatment Facility, the Board is maintaining this requirement and has amended the condition to require submission of the report within thirty (30) days of issuance of this Licence Amendment.

Stream Crossings

To access the new Wastewater Treatment Facility, a new access road approximately 1.25 km long is required to be constructed, extending from the road to the existing Sewage Disposal Facility to the new Wastewater Treatment Facility. The proposed road alignment is required to cross drainage paths. To accommodate the stream crossings, culverts will be installed at each crossing.

The Board has included a condition in Part E Item 7 prohibiting disturbance of any stream/lake bed or the banks of any definable watercourse unless authorized by the Department of Fisheries and Oceans (DFO).

In addition, the Licensee is reminded that a number of conditions of the original Licence 3BM-ARC0810 apply to stream crossings, including those conditions related to the requirement for as-built plans and drawings of any modifications in Part E Item 3 and the requirement for geotechnical inspections in Part F Item 3, as well as the conditions related to surface drainage, sediment and erosion control.

Quarry

On May 5, 2006, the NIRB issued a screening determination allowing the Arctic Bay Airport Redevelopment Project (NIRB File 06UN036) to proceed subject to terms and conditions. On November 21, 2007, the NIRB exempted the Hamlet's quarry permit application (QB07-001) from screening as it was understood that the application was previously screened under NIRB File 06UN036. On February 27, 2008 the NIRB exempted a revised Quarry Permit Application (QB07-0001) from the GN-CGS involving an additional amount of material to be removed from the Arctic Bay quarry. The additional material was to be used in part for the new sewage lagoon construction.

A new quarry permit (08-703-001) from GN-CGS was issued to the Hamlet on April 18th, 2008 authorizing the taking of 340,000 cubic metres of material from four (4) sites located approximately five (5) miles from the Hamlet. This quarry licence authorizes the taking of a sufficient amount of material for the completion of this project.

The Applicant is advised that the expansion of an existing quarry site or the creation of any new quarry site location requires screening by the NIRB in accordance with Article 12 of the NLCA.

The NWB cannot authorize water use or waste disposal associated with development of a new quarry deposit until NIRB has completed its review of the proposed activity. Finally, any new quarry development(s) that receive an approval to proceed from the NIRB will require an amendment to this Licence.

Those conditions of NIRB's screening decision 06UN036 related to the mandate of the NWB regarding the use of water and disposal of waste, have been incorporated into this Licence Amendment.

Abandonment and Restoration Plan

Under the current water licence 3BM-ARC0810 Part G Item 1, the Licensee was required to submit to the Board for approval at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones, an Abandonment and Restoration Plan.

On April 30, 2008, the Applicant submitted a report prepared by Trow for the GN-CGS Project Management Division – Baffin Region, entitled Arctic Bay Sewage Lagoon Decommissioning, dated April 2008, Project No. OTEN00019054C. This report partially addresses the requirement of Part G Item 1 of the current water licence regarding the existing sewage lagoon. However, the NWB has identified that the report does not provide an implementation schedule, it does not address future area use, nor does it provide a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment as required by sub-items (vi), (x), and (xii) respectively.

In its submission dated September 5, 2008, BGC noted that the Arctic Bay Sewage Lagoon Decommissioning report involves adding a cover of fill material over the sludge to encapsulate the sludge in permafrost. However, it was not clear whether maintaining the sludge in a permafrost condition was a design requirement. BGC recommended that if it is a requirement, that geothermal analyses be carried out to confirm that the proposed cover thickness of 1.5 metres is sufficient to encapsulate the sludge in permafrost and if so, for how long a design period considering the effects of climate change. BGC noted again in its December 10th comments, that this issue had not been addressed in the Applicant's November submission of additional information.

Therefore, the Board is requiring as a condition in Part G Item 2 of the Licence Amendment, that the Licensee submit to the Board for approval within ninety (90) days of Licence issuance a detailed Final Abandonment and Restoration Plan for the existing Sewage Disposal Facility. This Plan should incorporate, where applicable, the appropriate sections described in Part G Item 1 and address the concerns raised by BGC.

In its submission dated September 12, 2008, INAC recommended that as-built plans and drawings following the decommissioned existing Sewage Disposal Facility be provided. The

NWB agrees with INAC and is requiring the Licensee, as a condition in Part G Item 5, to submit to the Board within sixty (60) days of completion of decommissioning of the existing Sewage Disposal Facility, a Decommissioning Summary Report including stamped as-built plans and record drawings.

Monitoring Program

According to the report submitted by the Applicant, entitled Design Brief New Sewage Lagoon for the Hamlet of Arctic Bay, (Trow, April 2008), the new Wastewater Treatment Facility's earth berms are classified as dams under the Canadian Dam Safety Guidelines. Therefore, the Applicant has proposed ongoing monitoring for stability including temperature and seepage monitoring within the lagoon berms. Furthermore, BGC noted in its December 8, 2008 comments, that the designers have indicated that settlement of the upstream and downstream toes of the berms should be monitored, and that some maintenance of the berms may be required. As such, the Board has amended the Monitoring Program to include additional monitoring stations for the monitoring of temperature, seepage, and settlement of lagoon berms.

A number of geotechnical and geothermal concerns raised by BGC in its September 5, 2008 comments were not addressed by the Applicant in its submission of additional information including:

1. The description of the surficial geology of the proposed wastewater lagoon site;
2. Divergent ground temperature measurements from two borehole locations noted by NCI, 2008 and short thermistor string installation depths;
3. The potential warming influence of thick snow pack developing at the toe of the berms;
4. The depth of thermistor strings into the subgrade soils;
5. The location of the key trench liner from the toe of the berm;
6. The impact of displacements due to thaw settlement and creep strain on liner integrity; and
7. The design intent of a granular cover over sludge for the existing wastewater lagoon for decommissioning.

While items 5 and 7 have been dealt with as part of the construction and abandonment issues, items 1 - 4 and 6 must be dealt with through monitoring. Therefore, the Board is requiring as a condition in Part H Item 16 of the Licence amendment, that the Licensee submit to the Board for approval in writing, within thirty (30) days of issuance of this Licence Amendment, a detailed Instrumentation Monitoring and Surveillance Plan. This Plan is for inclusion in the O&M Manual and takes into consideration the Applicant's proposal to begin construction during the summer of 2009.

To assess the performance of the Wastewater Treatment Facility's lagoon structure, the Board is also requiring as a condition in Part H Item 15 of the Licence Amendment, that the Licensee

submit the monitoring results of thermistor, standpipe, and settlement monitoring semi-annually, due no later than July 31 and January 31 of each year for the first two (2) years of monitoring. In addition, the Licensee shall submit to the Board as an addendum to its Annual Report an annual assessment of the geotechnical and geothermal performance of the Wastewater Treatment Facility.

The Board has also amended the Monitoring Program to include Monitoring Program stations for the monitoring of Effluent from the Wastewater Treatment Facility, quarry runoff and sewage sludge.

Based upon comments received from INAC, GN-DOE and EC and the response from the Applicant on November 10, 2008, the Board has revised the monitoring frequency for effluent discharged from the Wastewater Treatment Facility from monthly between May and August, to three (3) times annually during decant (once and the onset, once during, and once at the end). The Board also notes EC's recommendation that monitoring should be sufficient to inform how the system can best be managed to optimize treatment.

The Board has included a new condition in Part H as Item 13, requiring the Licensee to submit to the Board as part of its O&M Manual, a QA/QC Plan. This Plan is to be developed immediately in consultation with a Canadian Association of Environmental Analytical Laboratories (CAEAL) approved laboratory, chosen to perform the analyses required under the Monitoring Program, to address both the field and laboratory requirements of monitoring this Licence. In addition, this Plan will need to be updated for inclusion in the O&M Manual for the new Wastewater Treatment Facility as required in Part F Item 1.

In addition, regarding effluent monitoring as discussed above under Sewage, the Board has removed the requirement to report all results of acute toxicity testing.

The Board has also removed the requirement that the Licensee measure and record the monthly and annual quantities of raw sewage offloaded from trucks. Raw water intake volumes are sufficient for the Board's purposes for estimating raw sewage generation volumes. However, the Board has included a condition in Part H Item 18 requiring the Licensee to measure and record the monthly and annual quantities of Effluent pumped from the Sewage Disposal Facility and the Wastewater Treatment Facility to account for any input from annual precipitation, runoff and potential losses through control structures and groundwater movement.

LICENCE AMENDMENT No. 1

Licencee:	Hamlet of Arctic Bay
Licence No:	3BM-ARC0810 Type “B”
Licence Issued:	March 17, 2008
Effective Date of Amendment No.1:	April 16, 2009

Pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* and the *Nunavut Waters* and the *Nunavut Surface Rights Tribunal Act*, the Nunavut Water Board hereby grants the following Licence amendment.

The Licence issued March 17, 2008 with an expiry date of March 31, 2010 shall be amended to include the following terms and conditions, with respect to the use of water and deposit of waste for a municipal undertaking in the Hamlet of Arctic Bay, located at the coordinates of 73° 02’ north latitude and 83° 05’ west longitude on north Baffin Island within the Qikiqtani Region of Nunavut.

New activities to be carried out include:

- Construction and operation of a new Wastewater Treatment Facility comprised of a single cell sewage lagoon and wetland treatment area;
- Construction of a new gravel access road from the existing lagoon to the new lagoon.
- Effluent release from the new lagoon to a 11.2 hectare Vegetated Filter Strip Wetland area that is approximately 700 metres long, 86-202 metres wide and flows northwest into Victor Bay
- Decommissioning of the existing Sewage Disposal Facility once the new Wastewater Treatment Facility is commissioned; and
- Quarrying from the Arctic Bay quarry.

The Licence shall be amended to reflect the following:

PART A: SCOPE AND DEFINITIONS

Insert
Item 2

Definitions

“Application for Water Licence Amendment” means the application filed by the Hamlet of Arctic Bay and GN-CGS with the NWB on April 30, 2008 including supporting documents;

“Construction” means any activities undertaken to construct or build any component of, or associated with, the new Wastewater Treatment Facility for the Hamlet of Arctic Bay, as described in the Application for Water Licence Amendment;

“Dam Safety Guidelines” means the *Canadian Dam Association (CDA) Dam Safety Guidelines (DSG)*, January 1999 or subsequent approved editions;

“Waste Disposal Facilities” means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facility, the Wastewater Treatment Facility, and the Solid Waste Disposal Facility, as described in the Application for water licence renewal filed by the Applicant on October 9, 2007 including supporting documents, and as described in the Application for Water Licence Amendment filed by the Applicant on April 30th, 2008;

“Wastewater Treatment Facility” comprises the engineered sewage lagoon and decant structures designed to contain and treat sewage as described in the Application for Water Licence Amendment filed by the Applicant on April 30, 2008 and illustrated in construction drawings prepared by Trow Associates Inc. Project OTCD00019054A;

“Vegetated Filter Strip Wetland Area” comprises approximately 11.2 hectares of land immediately downstream of the sewage lagoon, for approximately 700 metres at a slope of 6 to 13% and includes the lagoon dewatering pump and infrastructure as described in the Application for Water Licence Amendment filed by the Applicant on April 30, 2008 and illustrated in construction drawings prepared by Trow Associates Inc. Project OTCD00019054A;

PART B: GENERAL CONDITIONS

Amend
Item 1

The Licensee shall file an Annual Report with the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

- i. tabular summaries of all data generated under the “Monitoring Program”, including an interpretation and discussion of wastewater treatment levels of the Sewage Disposal Facilities and/or Wastewater Treatment Facilities, as well as the treatment efficiency of the Vegetated Filter Strip Wetland Area;
- ii. any modifications to the Monitoring Program in accordance with Part H Item 12;

- iii. the annual quantity in cubic metres or tonnes of sludge removed from the Sewage Disposal Facility along with the treatment/storage/disposal provided as required in Part H Item 10;
- iv. the results of sampling and analyses of sewage sludge in accordance with the Operations and Maintenance Manuals referred to in Part F Item 1 and as required in Part H Item 14;
- v. An assessment of the geotechnical and geothermal performance of the Wastewater Treatment Facility including an analyses of the results from the thermistor, standpipe and settlement monitoring stations, as required in Part H Item 15;
- vi. the monthly and annual quantities in cubic metres of fresh water obtained from all sources;
- vii. the monthly and annual quantities in cubic metres of each and all waste discharged;
- viii. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
- ix. a list of unauthorized discharges and summary of follow-up action taken;
- x. any updates or revisions for manuals and plans (i.e., Operations and Maintenance Manual) as required by changes in operation and/or technology;
- xi. detailed minutes of any public consultation and participation with local organizations and the residents of the community regarding licence amendments;
- xii. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the following year;
- xiii. a summary of any studies, reports, and plans (e.g., Operations and Maintenance, Abandonment and Restoration, Quality Assurance/ Quality Control) requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned; and
- xiv. any other details on water use or waste disposal requested by the Board by

November 1st of the year being reported.

Amend
Item 10 The Licensee shall submit to the Board for approval in writing, within thirty (30) days of Licence issuance or upon the filing of any application in relation to the Licence within that time, a Plan for Compliance that clearly demonstrates the measures the Licensee will undertake, including an implementation schedule, to achieve full compliance with the conditions of this Licence, including the issues raised in the Inspector's Reports.

Amend
Item 11 The Licensee shall, for all Plans, Manuals and Reports submitted under this Licence, include a proposed timetable for implementation. Plans, Manuals and Reports submitted, cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a Plan or Manual if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

Insert
Item 14 The Licensee shall, for all Plans, Manuals and Reports submitted under this Licence, implement the Plan as approved by the Board in writing.

Insert
Item 15 The Licensee shall submit to the Board for review, within thirty (30) days of Licence 3BM-ARC0810 Amendment No. 1 issuance, all available data generated under licence NWB3ARC0207 and subsequent renewal 3BM-ARC0810.

PART C: CONDITIONS APPLYING TO WATER USE

No changes

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

Amend
Item 1 Prior to commissioning the Wastewater Treatment Facility, the Licensee shall direct all Sewage to the Sewage Disposal Facility. Upon commissioning of the Wastewater Treatment Facility, the Licensee shall direct all Sewage to the Wastewater Treatment Facility, or as otherwise approved by the Board in writing.

Amend
Item 2 The Licensee shall provide notice to an Inspector at least ten (10) days prior to initiating any decant of the Sewage Disposal Facility or the Wastewater Treatment Facility.

Amend

Item 3

All Effluent discharged from the Sewage Disposal Facilities at Monitoring Program Station ARC-3 shall meet the following Effluent quality standards:

Parameter	Maximum Concentration of any Grab Sample
BOD ₅	100 mg/L
Total Suspended Solids	120 mg/L
Faecal Coliforms	1 x 10 ⁶ CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

Amend

Item 5

The Sewage Disposal Facility and Wastewater Treatment Facility shall be maintained and operated, to the satisfaction of an Inspector in such a manner as to prevent structural failure.

Remove

Item 6

All Effluent discharged from the Wetland Treatment Area Final Discharge Point (ARC-4) shall be demonstrated to be Not Acutely Toxic under the following tests to be conducted once annually approximately mid-way through discharge:

- Acute lethality to Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13); and
- Acute lethality to the crustacean, *Daphnia magna* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14).

Amend

Item 10

The Licensee shall submit to the Board for review within thirty (30) days of the issuance of this Licence amendment, a report identifying each Final Discharge Point of the existing Sewage Disposal Facility. The report shall at least include:

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

Amend

Item 11

If, during the term of this Licence, additional Final Discharge Points are

identified, the Licensee shall submit the information required by Part D Item 10 for each new Final Discharge Point, at least sixty (60) days prior to depositing Effluent from the new Final Discharge Point.

Insert

Item 12 All Effluent discharged from the Wastewater Treatment Facility at Monitoring Program Station ARC-8 shall not exceed the following Effluent quality standards:

Parameter	Maximum Concentration of any Grab Sample
BOD ₅	120 mg/L
Total Suspended Solids	180 mg/L
Faecal Coliforms	1 x 10 ⁶ CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

Insert

Item 13 The Licensee shall use clean material for construction, operation, and maintenance activities that is free of contaminants, obtained from an approved source and which has been demonstrated not to produce Acid Rock Drainage and to be non-Metal Leaching.

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

Insert

Item 6 The Licensee shall implement the recommended options identified in the Water Licence Application document entitled *Design Brief New Sewage Lagoon for the Hamlet of Arctic Bay*, prepared by Trow Associates Inc., dated April 2008, Project No. OTCD00019054A. In the event of a conflict between the conditions of this Licence and the above referenced document, the conditions of this License shall prevail.

Insert

Item 7 The construction or disturbance of any stream/lake bed or the banks of any definable watercourse are not permitted unless authorization is obtained from the Department of Fisheries and Oceans Canada (DFO).

Insert

Item 8 The Licensee shall locate the Wastewater Treatment Facility's lined key trench horizontally from the upstream toe of the berm in accordance with the recommendations provided by Naviq Consulting in the application document

entitled Geothermal Analysis of Proposed Sewage Lagoon, Arctic Bay, NU prepared for Trow Associates Inc., Project J008, October 2008, Revision 2.

Insert

Item 9

The depth of the Wastewater Treatment Facility's lined key trench shall penetrate a minimum of 2 metres into sound rock or ice-saturated permafrost mineral soils or rock.

Insert

Item 10

The Licensee shall submit to the Board for approval in writing, prior to commencing construction or procurement of construction materials from the quarry, a Spill Contingency Plan that specifically addresses the quarry site operations and existing facilities. This Plan is to be incorporated into the Operations and Maintenance Manual referred to in Part F Item 1.

Insert

Item 11

Licensee shall, within sixty (60) days of completion of Construction of the Wastewater Treatment Facility, submit to the Board a Construction Summary Report along with stamped as-built plans and record drawings, providing explanation to reflect the deviations from construction drawings taking into account construction and field decisions and how they may affect the performance of the engineered facility. This Report is to include information on the following:

- i. The as-built drawings must identify the areas where field changes were made from the original design drawings, preferably in the form of a revision bubble and a brief note in the revisions section of the title block;
- ii. Details of the fill materials specifications for dike and key trench construction;
- iii. The final location for the lined key trench and reasons for selecting the final location;
- iv. Confirmation regarding the requirement for a spillway including a rationale;
- v. Details regarding the installation of impermeable liners including the type of liner, how the liners were incorporated into the cell to prevent seepage, and a discussion of the quality assurance/ quality control measures applied during installation.

Insert

Item 12

The Licensee shall implement sediment and erosion control measures prior to and during Construction and blasting activities to prevent the release of sediment into any surrounding water bodies.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

Amend
Item 1

The Licensee shall submit to the Board for approval in writing, within sixty (60) days of issuance of this Licence Amendment, an Operations and Maintenance Manual prepared where appropriate, in accordance with the *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories; 1996*. This Manual shall take into considerations comments received during the application review process as well as any Inspector reports, and shall contain the following plans:

- a. Water Supply Facilities Operation and Maintenance Plan;
- b. Solid Waste Operation and Maintenance Plan;
- c. Sewage Operation and Maintenance Plan for the existing Sewage Disposal Facility and the new Wastewater Treatment Facility;
- d. Sewage Sludge Management Plan;
- e. Hazardous Waste Management Plan;
- f. Spill Contingency Plan including a Spill Response Plan for Aggregate deposits;
- g. Monitoring Program Quality Assurance/Quality Control Plan including a diagram that references Monitoring Program Station Numbers; and
- h. Instrumentation Monitoring and Surveillance Plan (This Plan is due within 30 days of issuance of this Licence Amendment. See Part H Item 16)

Amend
Item 3

An inspection of all engineered facilities related to the management of water and waste shall be carried out annually in July or August by a Geotechnical Engineer. The inspection shall be conducted in accordance with the *Canadian Dam Safety Guidelines* where applicable and shall include the decommissioned Sewage Disposal Facility. The engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a covering letter from the Licensee outlining an implementation plan addressing each of the Engineer's recommendations.

Amend
Item 5

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

- a. employ the appropriate contingency measures as approved under the Operation and Maintenance Manual for the Hamlet of Arctic Bay;
- b. report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130, to the Inspector at (867) 975-4295, and to the Government of Nunavut Department of Environment at (867) 975-7700; and

- c. submit to the Inspector, a detailed report on each occurrence, not later than thirty (30) days after initially reporting the event, that provides the necessary information on the location (including the GPS coordinates), initial response action, remediation/clean-up, status of response (ongoing, complete), proposed disposal options for dealing with contaminated materials and any preventative measures to be implemented.

Insert

Item 6

The Licensee shall maintain an undisturbed buffer zone of at least one hundred (100) metres between any proposed quarry operation and the normal high water mark of any water body.

Insert

Item 7

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

Insert

Item 8

If water is encountered during permafrost excavation which requires pumping, the Licensee shall locate the discharge for the pumped water above the high water mark of any water body and implement erosion control measures at the point of discharge.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

Amend

Item 1

The Licensee shall submit to the Board for approval in writing, an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

- i. Water intake facilities;
- ii. The water treatment and waste disposal sites and facilities;
- iii. Petroleum and chemical storage areas;
- iv. Any site affected by waste spills;
- v. Leachate prevention;
- vi. An implementation schedule;
- vii. Maps delineating all disturbed areas, and site facilities;
- viii. Stream crossings;
- ix. Consideration of altered drainage patterns;
- x. Type and source of cover materials;
- xi. Future area use;

- xii. Hazardous wastes; and
- xiii. A proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

Insert

Item 2

The Licensee shall submit to the Board for approval in writing, within ninety (90) days of Licence issuance, a detailed Final Abandonment and Restoration Plan for the existing Sewage Disposal Facility. The Plan shall incorporate, where applicable, the appropriate sections as described in Part G Item 1 and address intervener comments raised during the review process, including specifications and purpose of cover materials over sludge remaining following decommissioning of the Sewage Disposal Facility.

Insert

Item 3

The Licensee shall practice progressive reclamation of the quarry development in accordance with the restoration guidelines outlined in Indian and Northern Affairs Canada's document entitled *Environmental Guidelines for Pits and Quarries, 1982*.

Insert

Item 4

For site reclamation purposes, the Licensee shall salvage topsoil for future restoration of the site to promote revegetation.

Insert

Item 5

The Licensee shall, within sixty (60) days of completion of decommissioning of the existing Sewage Disposal Facility, submit to the Board a Decommissioning Summary Report. This Report shall include stamped as-built plans and record drawings, providing explanation to reflect any deviations from original plans.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

Amend

Item 1

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

Monitoring Program Station Number	Description	Frequency	Status
ARC-1	Raw water intake at Marcil Lake	<u>Volume</u> Monthly and Annually	Active (Volume)
ARC-2	Raw sewage from pump out truck	NA	Inactive

ARC-3	Effluent discharged from the Final Discharge Point of the existing Sewage Disposal Facilities	<u>Volume</u> Monthly and Annually <u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	Active*
ARC-4	Discharge Point of the existing Sewage Disposal Facility's Wetland Treatment Area	<u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	Active*
ARC-5	Ocean water five (5) metres from point where Effluent enters the ocean from existing Sewage Disposal Facility	<u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	Active*
ARC-6	Run-off from the Solid Waste Disposal Facility	<u>Water Quality</u> Annually during periods of runoff or seepage	Active
ARC-7	Runoff from Quarry Site	<u>Water Quality</u> Annually during periods of runoff or seepage	New (Water quality)
ARC-8	Effluent discharged from the Final Discharge Point of the Wastewater Treatment Facility (at the sewage lagoon pump)	<u>Volume</u> Monthly and Annually <u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	New (Volume and Water quality)

ARC-9	Discharge Point of the Wastewater Treatment Facility's Vegetated Filter Strip Wetland Area	<u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	New (Water quality)
ARC-10	Ocean water five (5) metres from point where Effluent enters the ocean from Wastewater Treatment Facility	<u>Water Quality</u> Three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant)	New (Water Quality)
ARC-11	Thermistors in accordance with approved Instrumentation Monitoring and Surveillance Plan as required in Part H Item 16	TBD	New (Temperature)
ARC-12	Standpipes in accordance with approved Instrumentation Monitoring and Surveillance Plan as required in Part H Item 16	TBD	New (Seepage)
ARC-13	Settlement stations in accordance with approved Instrumentation Monitoring and Surveillance Plan as required in Part H Item 16	TBD	New (Location, Elevation)

* Active until the Sewage Disposal Facility is decommissioned.

Amend
Item 2

The Licensee shall sample water quality at Monitoring Program Stations ARC-3, ARC-4, ARC-5, ARC-8, ARC-9 and ARC-10 three (3) times annually (once at the onset of decant; once during decant; and once at the end of decant). Samples shall be analyzed for the following parameters:

Biochemical Oxygen Demand – BOD ₅	Faecal Coliforms
Total Suspended Solids	pH
Conductivity	Nitrate-Nitrite
Oil and Grease (visual)	Total Phenols
Magnesium	Calcium

Sodium	Potassium
Chloride	Sulphate
Total Hardness	Total Alkalinity
Ammonia Nitrogen	Total Zinc
Total Cadmium	Total Iron
Total Cobalt	Total Manganese
Total Chromium	Total Nickel
Total Copper	Total Lead
Total Aluminum	Total Arsenic
Total Mercury	Total Organic Carbon (TOC)

Amend
Item 3

The Licensee shall sample at Monitoring Program Stations ARC-6 and ARC-7 annually during periods of runoff or seepage. Samples shall be analyzed for the following parameters:

TPH (Total Petroleum Hydrocarbons)	
PAH (Polycyclic Aromatic Hydrocarbons)	
BTEX (Benzene, Toluene, Ethylbenzene, Xylene)	
BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Oil and Grease
Nitrate-Nitrite	Ammonia Nitrogen
Total Phenols	Total Alkalinity
Total Hardness	Calcium
Magnesium	Potassium
Sodium	Sulphate
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel

Remove
Item 4

The Licensee shall report all results of acute toxicity testing as required under Part D, Item 6 within the Annual Report as per Part B, Item 1.

Remove
Item 6

The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of raw sewage offloaded from trucks at Monitoring Program Station ARC-2, for all purposes.

Amend
Item 10

The Licensee shall measure and record the annual quantities of sludge removed

from the Sewage Disposal Facility and the Wastewater Treatment Facility along with the treatment/storage/disposal provided.

Amend
Item 11

The Licensee shall include all of the data and information required by the Monitoring Program as well as an indication of wastewater treatment levels upstream and downstream of the Vegetated Filter Strip Wetland Area in the Licensee's annual report, as required *per* Part B Item 1, or as requested by an Inspector.

Amend
Item 12

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

Insert
Item 13

The Licensee shall submit to the Board upon approval by an Analyst, for inclusion in the Operations and Maintenance Manual, required under Part F Item 1(g), a Quality Assurance/ Quality Control Plan. The Plan shall include up to date sampling methods to all applicable standards, acceptable to an accredited laboratory as required by Part H Item 8 and Part H Item 9. The Plan shall include a covering letter from the accredited laboratory and Analyst, confirming acceptance of the Plan for analyses to be performed under this Licence.

Insert
Item 14

The Licensee shall sample and analyze sludge in accordance with the approved Operations and Maintenance Plan referred to in Part F Item 1. The results shall be reported within the Annual Report as per Part B Item 1.

Insert
Item 15

The Licensee shall submit to the Board the monitoring results for thermistor, standpipe, and settlement stations at monitoring stations ARC-11, ARC-12, and ARC-13 semi-annually, due no later than July 31, and January 31 of each year, for the first two (2) years of monitoring. An annual assessment of the geotechnical and geothermal performance of the Wastewater Treatment Facility shall be provided as an addendum to the Annual Report required as per Part B Item 1. This assessment shall include:

- i. an interpretation of unexpected monitoring results;
- ii. an analyses of settlement station results on liner integrity; and
- iii. an analyses of thermistor and seepage results on berm stability.

Insert

Item 16

The Licensee shall submit to the Board for approval in writing, within thirty (30) of issuance of this Licence Amendment, a detailed Instrumentation Monitoring and Surveillance Plan for inclusion in the O&M Manual, required under Part F Item 1(h). This Plan shall include:

- i. Details of the proposed instrumentation plan, the frequency of measurements and trigger values or observations for remedial action;
- ii. A review of geothermal monitoring plans including the number of thermistors to be installed, the location of thermistor installations, the installation of thermistors within the key trench, the depth of thermistor strings in subgrade soils, justification for the final chosen depth of thermistor strings, and the final detailed design of thermistor strings, taking into consideration reviewer comments; and
- iii. Details of settlement monitoring at the upstream and downstream toes of the berms.

Insert

Item 17

The Licensee shall confirm the locations and GPS coordinates for all monitoring stations referred to in Part H Item 1 with an Inspector.

Insert

Item 18

The Licensee shall measure and record in cubic metres, the monthly and annual quantities of effluent pumped from Monitoring Program Stations ARC-3 and ARC-8.

All terms and conditions of Licence 3BM-ARC0810 Type “B” dated March 17th, 2008 still apply.

This Licence Amendment is issued and recorded at Gjoa Haven, NU on April 16, 2009

Approved by,



Thomas Kabloona
Nunavut Water Board, Chair