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NUNAVUT WATER BOARD  
NUNAVUT IMALIRIYIN KATIMAYINGI  
OFFICE DES EAUX DU NUNAVUT

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File No.: 3BM-CLY0308/Amend

October 23, 2008

Mr. Bill Buckle  
Senior Administrative Officer  
Hamlet of Clyde River  
Box 89  
Clyde River, NU X0A 0E0  
Email: [saoclyde2005@qiniq.com](mailto:saoclyde2005@qiniq.com)

**RE: NWB Licence No. 3BM-CLY0308 Amendment No. 1 (Corrected Version)**

Dear Mr. Buckle:

Please find attached Amendment No. 1 to Licence No. 3BM-CLY0308 Type "B" issued to the Hamlet of Clyde River by the Nunavut Water Board (NWB) (Motion 2008-05-L05) 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*. The terms and conditions of the original Licence related to water use and waste disposal remain an integral part of this approval.

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

Sincerely,

Thomas Kabloona  
Chair

TK/tla/kt

Enclosure: Licence No. 3BM-CLY0308/Amendment No.1  
Comments from GN-DoE, INAC, EC, BGC

cc: Qikiqtani Distribution List

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## REASONS FOR DECISION

### I. BACKGROUND

The Hamlet of Clyde River has a population of approximately 940 people and is located on Patricia Bay on the east coast of the Baffin Region at the coordinates of 70°27'N latitude and 68°33'W longitude within the Qikiqtani region of Nunavut.

Currently, the annual average wastewater discharge volume of the community is approximately 36,636 cubic metres. The existing wastewater treatment facility is undersized to satisfy the present demand of the community and failed to meet the conditions of the water licence 3BM-CLY0308. As such, expansion of the existing facility was recommended and a new lagoon was designed to operate jointly with the existing facility so that both lagoons could function as storage cell lagoons and work in conjunction with an area of wetlands.

The project has been designed for a 20 year lifetime with a storage capacity of 58,500 cubic metres. Construction was to begin during the summer of 2008.

### II. PROCEDURAL HISTORY

The NWB issued a municipal water licence 3BM-CLY0308 (previously NWB3CLY0308) to the Hamlet of Clyde River on September 15, 2003, to allow for the use of water and disposal of waste. The municipal water licence expired on September 15, 2008.

The Hamlet of Clyde River, 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 March 10, 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 April 21, 2008.

Information contained in the March 10, 2008 submission and distributed for review included:

- Application cover letter;
- Application summary in English;
- NWB Water Licence amendment and renewal application;
- Environmental Assessment Screening, New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River, prepared for the Department of Community Government and Services Government of Nunavut by Trow Associates Inc., dated February 2008;
- Design Brief New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River, prepared for the Department of Community Government and Services Government of Nunavut by Trow Associates Inc., dated February 2008;

- Geothermal Analysis of Proposed Sewage Lagoon Clyde River, NU, prepared for Trow Associates Inc., Ottawa, ON by Naviq Consulting Inc. (Naviq), Calgary AB, dated February 2008;
- Geotechnical Investigation Proposed Sewage Lagoon Hamlet of Clyde River, Nunavut, prepared for CGS Projects –GN by Trow Associates Inc., dated January 16, 2008;
- Final Report Snowdrift Assessment Proposed Wastewater Lagoon Clyde River, Nunavut submitted to Trow Associates Inc., by RWDI Consulting Engineers and Scientists, dated February 29, 2008;
- Vegetated Filter Strip Wetland Assessment, Hamlet of Clyde River, Nunavut, prepared for Department of Community Government and Services Government of Nunavut by Trow Associates Inc., dated February 2008;
- Drawing No. SP-1, entitled Overall Site Plan prepared by Trow Associates Inc., project no. 0TCD00019055A, dated August 30, 2007;
- Drawing No. CSM-1, entitled Construction Site Management prepared by Trow Associates Inc., project no. 0TCD00019055A, dated August 30, 2007;
- Drawing No. SP-2, entitled Site Plan prepared by Trow Associates Inc., project no. 0TCD00019055A, dated August 30, 2007;
- Drawing No. SEC1, entitled Berm Sections prepared by Trow Associates Inc., project no. 0TCD00019055A, dated August 30, 2007;
- Drawing No. TD1, entitled Truck Discharge Site Plans prepared by Trow Associates Inc., project no. 0TCD00019055A, dated August 30, 2007;
- Drawing No. DE1, entitled Details prepared by Trow Associates Inc., project no. 0TCD19055A, dated August 30, 2007;
- Drawing No. DE2, entitled Details prepared by Trow Associates Inc., project no. 0TCD19055A, dated August 30, 2007; and
- Drawing No. T-1, entitled Topographic Map, prepared by Trow Associates Inc., project no. 0TCD00018881A, dated February 11, 2008

The scope of the amendment application includes:

- Rehabilitation of the existing Sewage Disposal Facility comprised of a sewage lagoon;
- Construction of a new sewage treatment cell to the south and west of the existing lagoon;
- Effluent release to a filter strip wetland area that is 720 metres long, 325 wide and flows into a marine environment; and
- Quarry development.

The Nunavut Water Board 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 April 21, 2008. This assessment process included the referral of the application to a variety of Federal, Territorial and local organizations for their review and comment.

No public concern was expressed during this review, therefore 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 Indian and Northern Affairs Canada (INAC), and the Government of Nunavut Department of Environment (GN-DOE) on or prior to May 21, 2008. The review identified a number of issues with the Application and the file in general that needed to be addressed by the Licensee prior to the NWB making a decision on the amendment of the Hamlet's water licence. Five issues were identified and included: 1) clarification regarding the specific undertakings and activities to be carried out versus those recommended by consultants; 2) the operation and maintenance of the facility; 3) hazardous materials and spill contingency planning; 4) monitoring; 5) quality assurance and quality control; and 6) timing for licence renewal.

In addition, on June 5, 2008 BGC Engineering Inc. (BGC) provided comments on the geotechnical and geothermal aspects of the project at the request of the Board as a third party independent reviewer. A number of additional issues were identified from this review including: 1) design effort with respect to stability and geothermal analyses; 2) technical deficiencies with respect to slope stability analyses; 3) uncertainty with respect to the sensitivity of the subsurface profile geometry to stability analyses; 4) uncertainty with respect to geothermal analyses for rehabilitated berm configuration; 5) uncertainty with respect to geothermal analyses for interior berm sections; 6) uncertainty with respect to predicted effect of long term permafrost thaw and warming; 7) uncertainty with respect to source and quality of borrow materials for construction; and 8) monitoring of settlement.

On June 6, 2008 the NWB received correspondence from Mr. Bill Buckle, Senior Administrative Officer (Interim) for the Municipality of Clyde River, that emergency decanting of the sewage lagoon would begin that evening due to a freeboard measurement of 0.70 metres at the lowest point, in accordance with Part D Item 3 of the Licence which states that a freeboard limit of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dams, dykes, or structures intended to contain, withhold, divert, or retain water or wastes.

On June 18, 2008 the Nunavut Impact Review Board (NIRB) issued its NLCA Article 12 Part 4 screening decision regarding the *Quarry for WasteWater Treatment Facility – Sewage Lagoon* project proposal to the Honorable Levinia Brown recommending that the project proposal proceed subject to specific terms and conditions contained within its screening decision.

On August 6, 2008, the Applicant provided a response to the concerns identified by the NWB. The response included the following additional submissions:

- Letter from Trow Associates Inc. to CGS regarding sludge accumulation dated July 25, 2008;
- Letter from Trow Associates Inc. to CGS regarding response to comments dated August 5, 2008;
- Geotechnical Investigation Proposed Sewage Lagoon Hamlet of Clyde River, Nunavut prepared for CGS-Projects by Trow Associates Inc. dated August 6, 2008; and

- Clyde River Sewage Lagoon Geotechnical Investigation submitted to Government of Northwest Territories Municipal and Community Affairs prepared by Thurber Engineering Ltd, dated October 1994.

The above additional information was distributed to interested parties for review on August 12, 2008. By August 25, 2008 additional comments were received from INAC, GN-DOE, Environment Canada (EC) and BGC. On August 26, 2008 a draft Operations and Maintenance Manual Table of Contents was also received by the NWB and distributed for additional comment. By August 29, 2008 comments on the draft O&M Manual were received from the GN and INAC.

Due to the need from parties for clarification regarding the additional information, the NWB scheduled a teleconference on September 16<sup>th</sup>, 2008. Participants on this teleconference included representatives of the GN-CGS, Trow, Naviq, INAC, BGC, and NWB. Issues discussed during the teleconference included:

- Geotechnical site investigation;
- Geothermal regime;
- Slope stability;
- Effluent monitoring;
- Thermal monitoring;
- Operations and Maintenance Manual;
- Term of the Licence; and
- Quarrying.

Based upon the results of the detailed assessment of the amendment application file, including consideration of any potential accidents, malfunctions, or impacts to water that the overall project might have in the area, the Board has approved the application and has amended Licence 3BM-CLY0308.

### **III. ISSUES**

#### **Extension to Expiry Date of Licence**

Licence No. 3BM-CLY0308 expired on September 15, 2008, during the licensing process for the requested amendment. INAC, in its comments dated May 21, 2008, noted the expiry date of the Licence and recommended that the Licensee submit a licence renewal application as soon as possible. On August 5, 2008, Trow, on behalf of the GN-CGS, responded to INAC's comment stating the following:

*“GN-CGS has requested an amendment on behalf of the Hamlet, since this is a long process, the GN request for a new licence for a 4 year period.”*

This additional information was distributed to parties for further review prior to the teleconference on September 16<sup>th</sup>, 2008. No concerns were expressed with respect to the licence term requested. However, given that a renewal application for Licence 3BM-CLY0308 is expected to be submitted, the NWB has decided to extend the expiry date of the current licence by six (6) months, from September 15, 2008 to March 15, 2009, to allow for the processing of the renewal application.

## Design Issues

A number of documents were submitted as part of the Water Licence Application in support of the design of the new sewage lagoon and rehabilitation of the existing sewage lagoon including:

- Design Brief New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River, prepared for the Department of Community Government and Services Government of Nunavut by Trow Associates Inc., dated February 2008;
- Geothermal Analysis of Proposed Sewage Lagoon Clyde River, NU, prepared for Trow Associates Inc., Ottawa, ON by Naviq Consulting Inc., Calgary AB, dated February 2008;
- Geotechnical Investigation Proposed Sewage Lagoon Hamlet of Clyde River, Nunavut, prepared for CGS Projects –GN by Trow Associates Inc., dated January 16, 2008;
- Construction Drawings – GN, Project OTCD00019055A, February 22, 2008;
- Letter from Trow Associates Inc. to CGS regarding response to comments dated August 5, 2008;
- Geotechnical Investigation Proposed Sewage Lagoon Hamlet of Clyde River, Nunavut prepared for CGS-Projects by Trow Associates Inc. dated August 6, 2008; and
- Clyde River Sewage Lagoon Geotechnical Investigation submitted to Government of Northwest Territories Municipal and Community Affairs prepared by Thurber Engineering Ltd, dated October 1994.

These documents were reviewed by BGC Engineering Inc. (BGC), a third party independent reviewer retained by the Board. The results of this review submitted on June 5, 2008 and August 22, 2008 identified a number of concerns related to the site description and the geothermal and stability analyses for the lagoons including:

- the appropriateness of extrapolating the results of the geothermal analyses for the new lagoon to the rehabilitation of the existing lagoon berm and the potential affect of warmer subgrade soils beneath the existing berm on natural refreezing of the containment berm and permafrost foundation as well as any subsequent potential effects on effluent containment and the design of the liner; and
- the conservativeness of the stability analyses given that the stability of the containment berm is partly governed by the assigned strength and depth to the upper ice layer, parameters for which have not been fully supported in the documentation.



Concerns with respect to the feasibility of the lagoon's water retention berms were also expressed by INAC in its August 25, 2008 comments.

These design issues were discussed during a teleconference on September 16<sup>th</sup>, 2008. Based on the results of the teleconference, the Board has decided to impose additional thermal monitoring within the lagoon liner key trench and that the vertical thermistors and casings extend at least 5 metres below the base of the berm (ie below existing ground level). In addition the Board is requiring settlement monitoring of the lagoon berms. This monitoring data will be essential to the assessment of the geotechnical and geothermal performance of the lagoons following construction, as required in Part H Item 17.

Pending results of monitoring, additional instrumentation may be necessary for the purposes of monitoring berm performance and providing adequate geotechnical and geothermal data to accurately assess the performance of the engineered facilities prior to commissioning and throughout the operation.

### **Operational Plans**

Under Part F Item 1 of the Licence, the Licensee is required to submit a Plan for the Operation and Maintenance (O&M) of the Sewage and Solid Waste Facilities. This Plan has not been submitted.

Both the GN-DOE and INAC noted that an O&M Manual should be provided. The GN-DOE recommended in its comments dated May 14, 2008 and August 22, 2008 that due to the rate of sludge accumulation within the Sewage Disposal Facility, the O&M Manual should include Sludge Maintenance Procedures including when (time of year), how and the required sampling criteria. The GN-DOE also recommended that the O&M Manual provide details related to the annual decanting of the lagoons.

INAC recommended in its comments dated May 21, 2008 and August 25, 2008 that the Operations and Maintenance Manual should; 1) specify waste handling and storage procedures, including the handling of hazardous wastes; 2) the Manual should reference procedures that identify all monitoring requirements, including wastewater sampling protocols; and 3) the Manual should include sludge management procedures including anticipated sludge storage capacity, criteria to determine when sludge should be removed, and the final disposal of removed sludge.

On August 26, 2008 the NWB received a draft O&M Manual outline from the Applicant which was distributed for further review. By August 29, 2008 additional comments on the Manual outline were received from the GN-DOE and INAC reinforcing their previous submissions.

During the September 16, 2008 teleconference, the Licensee stated that a complete O&M Manual would be available prior to commissioning of the Sewage Disposal Facility.

The Board agrees with the GN-DOE and INAC and will require a submission of the O&M Manual in accordance with Part F Item 1 of Licence 3BM-CLY0308. In addition, the Board is requiring that this Manual be revised and resubmitted for Board approval prior to commissioning of the Enhanced Sewage Disposal Facility under Item 2 of Amendment No.1. The revised Manual needs to be developed to the satisfaction of the NWB for 1) the operation and maintenance of the sewage and solid waste facilities; 2) hazardous waste management procedures; 3) the management of sludge from the Sewage Disposal Facility; 4) the protection of the environment with regard to potential spills through day-to-day operations, and 5) include a monitoring program Quality Assurance/Quality Control Plan.

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 as deemed appropriate.

During the September 16<sup>th</sup>, 2008 teleconference, the Licensee also informed parties that the procurement of construction material from the quarry site is scheduled to begin upon issuance of the Licence Amendment. In light of this information, the Board is requiring the Licensee to submit, in addition to the O&M Manual, a stand-alone Spill Contingency Plan that specifically addresses existing facilities, particularly the quarry.

## **Sewage**

The Hamlet of Clyde River currently utilizes a Sewage Disposal Facility approximately 1.2 km west of the Municipality. Currently, the Sewage Disposal Facility is a single-cell exfiltration lagoon with a capacity of 19,500 m<sup>3</sup>. The effluent that exfiltrates from the lagoon berm proceeds downstream through an undefined natural wetland where it receives additional treatment prior to reaching the marine environment.

With an annual average wastewater discharge volume from the community of approximately 36,636 cubic metres, the existing Sewage Disposal Facility is undersized and as noted above, has failed to meet the effluent quality criteria of the Licence. As such, expansion of the existing facility is proposed for this water licence amendment including the construction of a new lagoon to the south and west of the existing lagoon to supplement the existing lagoon storage capacity.

It is also proposed that the land between the current facility (and expansion) and Patricia Bay remain as undisturbed tundra and be included in the Enhanced Sewage Disposal Facility as a Vegetated Filter Strip Wetland Area. The treated sewage effluent will be pumped from the lagoon to the wetland area beginning in mid-August and continuing until mid to late September.

The end of the Vegetated Filter Strip Wetland Area is located approximately 720 metres from the discharge point of the sewage lagoon, at Patricia Bay.

As noted by INAC in its comments dated May 21, 2008, the Water Licence Application consists of a report, drawings, and recommendations prepared by the consultant (Trow Associates Inc. or Trow) retained by the Applicant (Government of Nunavut, Department of Community Government Services (GN-CGS)). However, the Applicant does not specify which recommendations of its consultants would be implemented. In its response to intervenor comments, dated August 5, 2005, the Applicant stated that it had accepted Option 4 of the consultant's recommendations, construction of a new lagoon south of the existing lagoon and rehabilitation of the existing lagoon, consistent with the design prepared by Trow. On August 25, 2008 INAC further recommended that a technical rationale should be provided to the NWB for the final or preferred option.

For greater certainty, the NWB has included an additional condition in Part E Item 5 of the Licence, that requires the Licensee to implement the recommended options identified in the Water Licence Application document entitled "Design Brief New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River" dated February 2008 and prepared by Trow Associates Inc. In the event of a conflict between the conditions of this Licence and the above referenced document, the conditions of this License shall prevail. With respect to INAC's recommendation that the Applicant provide a technical rationale for the preferred option, the Board deems Section 5 of above mentioned document, entitled Lagoon Alternatives sufficient as it contains an assessment and evaluation of the alternatives based upon capital costs, life cycle costs, decanting operations, truck discharge, granular requirements, and level of treatment.

The Board has amended effluent quality criteria in Part D of the Licence, for the discharge of treated sewage effluent from the monitoring station located at the point of discharge from the sewage lagoon to the Vegetated Filter Strip Wetland Area, as well as the monitoring station located at the end of the Vegetated Filter Strip Wetland Area prior to natural discharge to Patricia Bay. The amended effluent quality criteria is reflective of the predicted level of treatment expected by the Applicant as provided in the document entitled "Design Brief New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River" dated February 2008 and prepared by Trow Associates Inc. The Board is requiring compliance at both discharge locations given that following discharge to the Vegetated Filter Strip Wetland Area, the operator will no longer exercise control over the quality of the effluent in accordance with the definition of the term Final Discharge Point.

The Board also recognizes the importance of meeting the requirements of Section 36(3) of the Fisheries Act, and that the Licensee comply with all other legislation when discharging effluent of any type. In order to effectively monitor effluent for compliance purposes the NWB has imposed acute toxicity testing as a licence requirement under Part D Item 10.

## **Quarry**

The proposed design of the Enhanced Sewage Disposal Facility requires in excess of 40,000 cubic metres of granular material. Since the Hamlet's current quarry sites are being used for municipal needs and do not have sufficient material to complete the project, a new quarry site is to be developed for this project.

This quarry development underwent an environmental screening by NIRB and on June 18, 2008 NIRB issued its screening determination recommending that the project proposal proceed subject to specific terms and conditions. Those conditions related to the mandate of the NWB regarding the use of water and disposal of waste, have been incorporated into this Licence Amendment.

In addition, the NWB requires as a new condition in Part F Item 7 of the Licence Amendment, that an undisturbed buffer zone of at least 100 metres be maintained between any proposed quarry operation and the normal high water mark of any water body.

## **Monitoring Program**

Additional monitoring stations have been added to the amendment for the monitoring of effluent from the Enhanced Sewage Disposal Facility, quarry runoff, sewage sludge, temperature within the lagoon berms and underlying permafrost foundation, seepage from the lagoon berms, and settlement of the lagoon berms. Additional monitoring parameters have also been incorporated into the amendment to identify potential contaminants of concern.

Based upon comments received from the GN-DOE dated May 14, 2008 and the response from the Applicant on August 5, 2008, the Board has altered the monitoring frequency for effluent discharged from the Enhanced Sewage Disposal Facility, from monthly between May and August, to three (3) times annually during decant (once upon commencement, once approximately mid-way through discharge, and once prior discharge ending). The Board has also imposed a new condition in Part H Item 13 that requires the Licensee to repeat the monitoring program at the point of discharge from the sewage lagoon, if for whatever reason, the discharge is suspended for a period in excess of 48 hours and subsequently restarted.

## LICENCE AMENDMENT No. 1

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<b>Licensee:</b>	<b>Hamlet of Clyde River</b>
<b>Licence No:</b>	<b>3BM-CLY0308      Type "B"</b>
<b>Licence Issued:</b>	<b>September 15, 2003</b>
<b>Effective Date:</b>	<b>September 26, 2008</b>

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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 September 15, 2003 with an expiry date of September 15, 2008, 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 Clyde River, located on Patricia Bay, on the east coast of Baffin Island at the coordinates of 70°27'N latitude and 68°33'W longitude, within the Qikiqtani Region of Nunavut.

New activities to be carried out include:

- rehabilitation of the existing Sewage Disposal Facility comprised of a sewage lagoon;
- construction of a new sewage treatment cell to the south and west of the existing lagoon; and
- controlled effluent release to a Vegetated Filterstrip Wetland Area that is approximately 720 metres long, 325 metres wide, and flows into a marine environment at Patricia Bay.

The Licence shall be amended to reflect the following:

### **LICENCE 3BM-CLY0308**

Expiry Date of Licence MARCH 15, 2009

#### **PART A:      SCOPE AND DEFINITIONS**

Insert

Item 2      **Definitions**

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

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

Amend  
Item 2

**“Waste Disposal Facilities”** means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facility, the Enhanced Sewage Disposal Facility, the Solid Waste Disposal Facility, and Bagged Toilet Waste Disposal Facility, as described in the Application for Water Licence filed by the Applicant on February 5, 2003 and illustrated in Drawings No. 2002-1000-050, and as described in the Application for Water Licence Amendment filed by the Applicant on March 10, 2008;

Insert  
Item 2

**“Enhanced Sewage Disposal Facility”** comprises the area and engineered sewage lagoons, decant structures, and Vegetated Filter Strip Wetland Area designed to contain and treat sewage as described in the Application for Water Licence Amendment filed by the Applicant on March 10, 2008 and illustrated in Drawings SP-1, CSM-1, SP-2, SEC-1, TD-1, DE-1, and DE-2 prepared by Trow Associates Inc., project no. OTCD00019055A, dated August 30, 2007;

**“Vegetated Filter Strip Wetland Area”** comprises approximately 23.5 hectares of land immediately downstream of the sewage lagoon, for approximately 720 metres at a slope of 6 to 7% and includes the lagoon dewatering pump and infrastructure as well as diversion berm and fencing as described in the Application for Water Licence filed by the Applicant on March 10, 2008 and illustrated in Construction Drawings prepared by Trow Associates Inc. Project OTCD00019055A dated August 2007.

Insert  
Item 3

### **Enforcement**

- a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;
- b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*;

- c. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law; and
- d. The Licensee shall, in relation to any application to renew or amend the Licence, have in place a Plan for Compliance approved by the Board in writing, to achieve full compliance with the conditions of this Licence, or a Plan for Compliance must be submitted at the time of Application, in order for the Application to be deemed complete.

**PART B: GENERAL CONDITIONS**

Amend  
Item 1

The Licensee shall file an Annual Report with the Board, no later than March 31<sup>st</sup> 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”;
- ii. any modifications to the “Monitoring Program” in accordance with Part H Item 11;
- iii. the annual quantity, in cubic metres and tonnes, of sludge removed from the Sewage Disposal Facility and the Enhanced Sewage Disposal Facility along with the treatment/storage/disposal provided as required in Part H Item 9;
- iv. the results of sampling and analyses of sewage sludge in accordance with the Operations and Maintenance Manual referred to in Part F Item 1 as required in Part H Item 15;
- v. An assessment of the geotechnical and geothermal performance of the Enhanced Sewage Disposal Facility including an analyses of the results from the thermistor, standpipe and settlement monitoring stations, as required in Part H Item 19;
- 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. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the following year;
- xi. a summary of any studies, reports, and plans (e.g., Operations and Maintenance, Abandonment and Restoration, QA/QC) requested by the

- Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned; and
- xii. any other details on water use or waste disposal requested by the Board by November 1<sup>st</sup> of the year being reported.

Insert

Item 9

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

Insert

Item 10

The Licensee shall submit to the Board for approval, within ninety (90) 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.

Insert

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 12

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 13

Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and condition imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

Insert

Item 14

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

## **PART C: CONDITIONS APPLYING TO WATER USE**

Insert

Item 5

The Licensee shall not remove any material from below the ordinary high water mark of any water body unless otherwise approved by the Board in writing.

Insert

Item 6

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



**PART D: CONDITIONS APPLYING TO WASTE DISPOSAL**

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

Amend  
Item 5 The Sewage Disposal Facility and the Enhanced Sewage Disposal Facility shall be maintained and operated to the satisfaction of an Inspector in such a manner as to prevent structural failure.

Insert  
Item 8 All Effluent discharged from the Enhanced Sewage Disposal Facility at Monitoring Program Station CLY-5 shall not exceed the following Effluent quality limits:

Parameter	Maximum Average Concentration
BOD <sub>5</sub>	97 mg/L
Total Suspended Solids	116 mg/L
Fecal Coliforms	1 x 10 <sup>6</sup> CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

Insert  
Item 9 All Effluent discharged from the Enhanced Sewage Disposal Facility at Monitoring Program Station CLY-6 shall not exceed the following Effluent quality limits:

Parameter	Maximum Average Concentration
BOD <sub>5</sub>	18 mg/L
Total Suspended Solids	22 mg/L
Fecal Coliforms	< 1 x 10 <sup>6</sup> CFU/100mL
Oil and grease	No visible sheen
pH	between 6 and 9

Insert  
Item 10 All Effluent discharged from the Enhanced Sewage Disposal Facility at Monitoring Program Stations CLY-4, CLY-5, and CLY-6b shall be demonstrated to be Not Acutely Toxic under the following tests:

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

**PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION**

Amend  
Item 4

The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

Insert  
Item 5

The Licensee shall implement the recommended options identified in the Water Licence Application document entitled "*Design Brief New Sewage Lagoon and Rehabilitation of Existing Sewage Lagoon for the Hamlet of Clyde River*" dated February 2008 and prepared by Trow Associates Inc. In the event of a conflict between the conditions of this Licence and the above referenced document, the conditions of this Licence shall prevail.

Insert  
Item 8

All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage.

Insert  
Item 9

The Licensee shall ensure that sediment and erosion control measures are implemented prior to and maintained during activities carried out under this Part to prevent the release of sediment and minimize erosion.

Insert  
Item 10

The construction or disturbance of any stream/lake bed or banks of any definable water course are not permitted, unless authorized by the Board in writing.

**PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE**

Insert New  
Item 2

The Licensee shall submit to the Board for approval, ninety (90) days prior to commissioning of the Enhanced Sewage Disposal Facility, a revision to the Operations and Maintenance (O&M) Manual referred to in Part F Item 1, prepared where appropriate, in accordance with the "*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid*

*Waste Disposal Facilities in the Northwest Territories; 1996*”. The Manual shall take into consideration the comments received during the application review process and shall contain the following plans:

- a. *Sewage and Solid Waste Operation and Maintenance Plan;*
- b. *Hazardous Waste Management Plan;*
- c. *Sludge Management Procedures;*
- d. *Spill Contingency Plan; and*
- e. *Monitoring Program Quality Assurance/Quality Control Plan (QA/QC Plan).*

Amend Former

Item 2

(New Item 3) The Licensee shall review the O&M Manual referred to in Part F, Item 2 as required by changes in operation and/or technology and modify accordingly. Revisions are to be submitted in the form of an Addendum to be included with the Annual Report.

Remove

Former

Item 3

The Licensee shall revise the Plan referred to in Part F, Item 1, if not acceptable to the Board. The revised Plan shall be submitted to the Board for approval within thirty (30) days of notification of the Board.

Amend

Item 4

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 Clyde River;
- 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 5

The Licensee shall, prior to commissioning of the Enhanced Sewage Disposal Facility, install thermistors, monitoring standpipes and settlement monitoring stations as described in the application documents, dated March 10, 2008. In addition, thermistors are to be installed within the key trench corresponding to each station of vertical thermistor installation, for the determination of permafrost development around the key trench and confirmation of design criteria with

respect to the reliability of permafrost as an engineered system for seepage control.

Insert

Item 6

The Licensee shall submit to the Board, 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.

Insert

Item 7

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

Insert

Item 8

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 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.

Insert

Item 9

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

Insert

Item 10

The Licensee shall ensure that sediment and erosion control measures are implemented prior to and maintained during activities carried out under this Part to prevent the release of sediment and minimize erosion.

## **PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION**

Remove

Former

Item 2

The Licensee shall implement the Plan referred to in Part G, Item 1 as and when approved by the Board in writing.

Remove

Item 3

The Licensee shall revise the Plan referred to in Part G, Item 1 if not approved. The revised Plan shall be submitted to the Board for approval within thirty (30) days of receiving notification of the Board's decision.

Insert New

Item 2

For site reclamation purposes, the Licensee shall salvage top soil for future restoration of the site to promote re-vegetation.

Insert New

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.

**PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM**

Amend  
Item 1 The Licensee shall maintain Monitoring Program Stations and implement the Program as described in Schedule I attached to this Licence and conditions under this Part.

Amend  
Item 2 The Licensee shall sample water quality at Monitoring Program Stations CLY-4, CLY-5, CLY-6a, CLY-6b and CLY-7 three (3) times annually: once upon commencement, once approximately mid-way through discharge, and once prior discharge ending. Samples shall be analyzed for the following parameters:

Biochemical Oxygen Demand – BOD <sub>5</sub>	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 measure and record in cubic metres, the monthly and annual quantities of water pumped from Monitoring Program Station CLY-1 for all purposes and effluent pump from Monitoring Program Stations CLY-4 and CLY-5.

Amend  
Item 4 The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of raw sewage offloaded from trucks at Monitoring Program Stations CLY-3a and CLY-3b.

Amend  
Item 6 The Licensee shall, within sixty (60) days of Licence issuance, submit to the Analyst for approval, a Quality Assurance/ Quality Control (QA/QC) Plan, which

addresses both field and laboratory requirements. The Plan shall be submitted to the Board upon approval by the Analyst for inclusion with the O&M Manual, required under Part F, Item 2(e).

Amend  
Item 9

The Licensee shall measure and record the annual quantities of sludge removed from the Sewage Disposal Facility and the Enhanced Sewage Disposal Facility, in cubic metres and tonnes, along with details on the treatment of, storage, and disposal of the sludge.

Amend  
Item 11

Modifications to the Monitoring Program may be made only upon approval from the Board in writing.

Insert  
Item 12

The Licensee shall sample water quality at Monitoring Stations CLY-2 and CLY-13 once at the beginning, middle and near the end of the season during observed flow. Samples shall be analyzed for the parameters listed in Part H Item 2 as well as Total Petroleum Hydrocarbons.

Insert  
Item 13

If the discharge at Station CLY-4 or CLY-5 has been suspended and subsequently restarted with more than a 48 hour lapse, the sampling sequence described in Part H, Item 2 of the Monitoring Program shall be repeated.

Insert  
Item 14

The Licensee shall sample water quality at Monitoring Program Stations CLY-4, CLY-5, and CLY-6b with respect to acute toxicity testing referred to in Part D, Item 9, once annually during decant, with a minimum of six (6) months between sample events.

Insert  
Item 15

The Licensee shall sample and analyze sludge in accordance with the approved Operations and Maintenance Plan referred to in Part F Item 1.

Insert  
Item 16

The Licensee shall monitor annually in early to mid fall, for the presence of seepage within standpipes at Monitoring Station(s) CLY-11. If seepage is observed, the licensee shall sample and analyze the seepage for the parameters listed in Part H Item 2.

Insert  
Item 17

The Licensee shall monitor temperature at Monitoring Station(s) CLY-9 and CLY-10, a minimum of once every two months for the first two years following construction of the Enhanced Sewage Disposal Facility, and twice annually thereafter, in early spring and mid to late fall.

Insert  
Item 18

The Licensee shall monitor settlement and displacement annually at Monitoring Station(s) CLY-12.

Insert  
Item 19

The Licensee shall provide the monitoring results for thermistor, standpipe, and settlement stations at Monitoring Stations CLY-9, CLY-10, CLY-11, and CLY-12

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semi-annually, due no later than July 31 and January 31 of each year, for the first two years of monitoring. An annual assessment of the geotechnical and geothermal performance of the Enhanced Sewage Disposal Facility shall be provided as an addendum to the Annual Report.

**All remaining terms and conditions of Licence 3BM-CLY0308 Type ‘B’ dated September 15, 2003 still apply.**

This Licence Amendment issued and recorded at Gjoa Haven, NU on September 26, 2008.

Approved by,

A handwritten signature in dark ink, appearing to read 'T. Kabloona', with a long horizontal flourish extending to the right.

---

Thomas Kabloona  
Chair

**SCHEDULE I**  
**WATER LICENCE NO. 3BM-CLY0308**

<b>Monitoring Program Station Number</b>	<b>Description</b>	<b>Frequency</b>	<b>Status</b>
CLY-1	Raw water supply intake at Water Source Lake	Monthly and Annually	Active (Volume)
CLY-2	Runoff from the Solid Waste Disposal Facilities	Once at the beginning, middle and near the end of the season during observed flow/seepage	Active (Water Quality)
CLY-3a	Raw Sewage at Truck offload point (existing cell)	Monthly and Annually	Active (Volume)
CLY-3b	Raw Sewage at Truck offload point (new cell)	Monthly and Annually	New (Volume)
CLY-4	Effluent discharge from existing Sewage Disposal Facility	<u>Volume:</u> Monthly and Annually <u>Water Quality:</u> Three times annually (per Part H, Item 2); <u>Acute Toxicity:</u> Annually	Active (Volume and Water Quality)
CLY-5	Effluent discharge from Enhanced Sewage Disposal Facility (Lagoon decanting point)	Same as CLY-4	New (Volume, Water Quality and Acute Toxicity)
CLY-6a	Sampling well at the end of Vegetated Filter Strip Wetland at location shown on drawing CSM-1	<u>Water Quality:</u> Three times annually (as per Part H, Item 2);	New (Water Quality)
CLY-6b	Surface water at the end of the Vegetated Filter Strip Wetland in vicinity of CLY-6a	<u>Water Quality:</u> Three times annually (as per Part H, Item 2); <u>Acute Toxicity:</u> Annually	New (Water Quality and Acute Toxicity)



<b>Monitoring Program Station Number</b>	<b>Description</b>	<b>Frequency</b>	<b>Status</b>
CLY-7	Water five (5) metres from the point where Effluent enters Patricia Bay	<u>Water Quality:</u> Three times annually (as per Part H, Item 2);	New (Water Quality and Acute Toxicity)
CLY-8	Sewage Sludge	To be determined in accordance with Part F Item 2(c) and H Item 9	New (Volume and Quality)
CLY-9	All Thermistors at locations shown in drawing SP-2 of Water Licence Application (casings to extend 5 m below the base of the berm)	Minimum once every two months for the first two years following construction, then twice annually (early spring and mid to late fall) thereafter	New (Temperature)
CLY-10	All Single-bead thermistors placed below the liner and into key trench at locations adjacent to those defined in CLY-9	Same as CLY-9	New (Temperature)
CLY-11	All Standpipes at locations shown in drawing SP-2 of Water Licence Application	<u>Seepage:</u> Annually early to mid fall <u>Water Quality:</u> When seepage is observed	New (Seepage and Water Quality)
CLY-12	All Settlement stations at locations adjacent to thermistors shown in drawing SP-2 of Water Licence Application	Annually	New (location, elevation)
CLY-13	Runoff from the Quarry site	Once at the beginning, middle and near the end of the season during observed flow	New (Water Quality)