Water License Annual Report 2008
Hamlet of Rankin Inlet Water Use
Government of Nunavut on Behalf of the Hamlet of Rankin Inlet
Water License NWB3GRA0207

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175 Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

March 2009

File No: N-O 14850

Water License Annual Report 2008
Hamlet of Rankin Inlet Water use
Government of Nunavut on Behalf of the Hamlet of Rankin Inlet
Water License NWB3GRA0207

March 2009

Table of Contents

Figures

Appendices

Water License Annual Report 2008
Hamlet of Rankin Inlet Water use
Government of Nunavut on Behalf of the Hamlet of Rankin Inlet
Water License NWB3GRA0207

March 2009

1.0 Introduction

Community and Government Services, Government of Nunavut (GN) manages water supply and sewage services on behalf of the Hamlet of Rankin Inlet, as per NWB License NWB3GRA0207. A copy of the license is included in Appendix A. The license requires the submission of an Annual Report. The Annual Report outlines the GN's efforts to achieve due diligence with respect to the conditions of the license.

A license renewal submission is in progress.

A copy of the NWB Annual Report form is included in Appendix B and the details are included in this report.

2.0 Background

The Hamlet of Rankin Inlet is located on Rankin Inlet, on the west coast of Hudson Bay. It is 96-air km southwest of Chesterfield Inlet and 1088 air km east of Yellowknife, at 62° 49'N latitude and 92° 05' W longitudes (Figure 1). Rankin Inlet is the regional centre for the Kivalliq Region of Nunavut. The hamlet has a land area of 20.24 km2 and as of the 2006 census a population of 2,358. The community and its facilities are shown in Figure 2.

3.0 Summary of Water Use and Waste Disposal Activities

The Government of Nunavut on behalf of the Hamlet of Rankin Inlet operates their water supply and sewage systems under the Nunavut Water Board License NWB3GRA0207 (Appendix A). Photographs taken during a field visit document the current state of the facilities (Appendix C).

3.1 Water Supply

The Hamlet draws its water from the Nipissar Lake, located 2 km northwest of the Hamlet. Water from the Nipissar Lake pumphouse is pumped to the community through a shallow buried insulated main, which operates year-round. The supply line passes through the Williamson Lake pumphouse where most of the water is chlorinated in the bottom of the water storage tank adjacent to the pumphouse. A small portion of the water is heated in the Nipissar Lake heat exchanger in the Williamson Lake pumphouse and then pumped back through the return line. Most of the heated water arriving in the Nipissar Lake pumphouse is injected back in to the supply line. Some of the heated water is bled into the Nipissar Lake intake casings to prevent freezing of the intake lines.

3.2 Annual Water Consumption

The GN was able to provide a data summary sheet of flows for two days in July, 2008. The data sheets contained data on the previous and current month water flows for the town. Since this was the only available data, we estimated a daily use rate from the two monthly averages. The daily use rate estimated was 2,108 m3/day which is 769,237 m3 per year. The records were taken from the months of June and July and were not complete annual measurements. To confirm the total annual water use, records for each month should be recorded in the future.

The currently expired license NWB3GRA0207, has a maximum allowable water use of 400,000 cubic metres annually. If the water use of the Hamlet is as estimated above the Hamlet is exceeding the maximum allowed volume.

3.3 Sewage Collection and Disposal

The majority of residential and commercial buildings in Rankin Inlet are serviced by a water and sewage utilidor and buried piping. The sewage flows by gravity and lift stations to a primary mechanical sewage treatment plant constructed in 1994. Pump out sewage is collected by the Hamlet's 1993 – 4540 L tank truck. The truck discharges the sewage into the piped system through a temporary facility in an old lift station, located just west of the macerator. The plant consists of a rotating drum screen, which provides

primary treatment and reduces BOD from an average influent level of approximately 230 to 280 mg/L to approximately 100 to 140 mg/L.

The primary effluent discharges via gravity to the subsurface marine environment. To date, no significant environmental impacts have been noted in the marine environment; however no detailed scientific studies have been undertaken.

3.4 Sewage Treatment Facility Operational Problems in 2008

The plant has had several operational problems including:

- Mechanical failure of the drum screener, which has reduced primary treatment efficiency during the period which repairs are conducted (this occurred again in the late summer of 2008 and was the subject of previous correspondence)

- A design flaw, which on rare occasions of high tides, results in sewage back-up inside the plant with some flow escaping the confines of the plant

- Health and safety issues resulting from some over-spray of sewage from the mechanical components within the plant.

In recognition of these operational issues and concerns about future CCME wastewater discharge guidelines and NWB discharge requirements, the Government of Nunavut retained an engineering firm in 2005 to prepare a design to upgrade the plant. This work is ongoing.

3.5 Work Completed to Date

A new Sequential Batch Reactor (SBR) sewage treatment plant was fully designed in early 2008.

Several significant issues were noted that raised questions about the sustainability for such a design including:

- Initial capital cost of $22M was deemed a poor capital investment for the GN
- High operating costs in the order of $2M annually were considered unsustainable
- Sophisticated equipment and operating procedures required university level scientific and technical staff, that would be difficult to retain and making the system vulnerable to manpower shortages.

Based on the findings the GN requested the consultant suggests more viable alternatives including:

- Forcemain to a large lagoon and wetland treatment system. Due to the distance to a suitable location this option was deemed effectively impractical with high capital and O&M cost

- Upgrades to the existing plant, with subsequent improvements of discharge quality and subsurface marine discharge in an environmentally sound manner supported by a comprehensive marine impact risk assessment. This option was deemed the most viable for long term sewage disposal for Rankin Inlet.

3.6 Next Phase of Work

The GN has requested and obtained a quote from an engineering firm, to conduct significant upgrades to the existing plant to alleviate the historic technical and operational problems, and improve the quality of the effluent discharge to the marine environment.

The plant upgrades will proceed in concert with the scientific studies needed to evaluate the expected effluent from the upgraded plant. Along with an environmental impact risk assessment to determine that it is an environmental sound practice to discharge the expected effluent to the subsurface marine environment.

The Canada-wide strategy for the Management of Municipal Wastewater Effluent prepared by CCME in draft, dated September 2007, provides Consideration for Arctic Conditions, which will allow alterative performance standards for arctic conditions within five years. The strategy allows for the development of Site Specific Effluent Discharge Objectives developed from a Risk Assessment based process.

The Government of Nunavut is currently preparing the Terms of Reference to undertake the scientific studies required to conduct an environmental risk based assessment of the proposed discharge of primary treated sewage.

The GN believes this strategy will provide a sustainable long term environmentally sound process for sewage treatment for Rankin Inlet.

3.7 Sewage Treatment Project Timeline

- January 2008 – SBR design complete – will remain on hold pending review of other options
- July 2008 – work plan and cost to upgrade existing primary treatment plant received and under review

- September – October 2008 – Water Board licenses renewal submission and annual reporting
- October 2008 – repairs to drum screener to be completed
- Winter 2009 – prepare Terms of Reference for a comprehensive risk based environmental assessment of the marine discharge environment to develop site specific discharge criteria
- Spring 2009 – award contract
- Spring 2009 through winter 2010 – conduct environmental and scientific studies
- Spring through fall 2009 – conduct upgrades to primary sewage treatment plant to improve operation mechanical reliability, and address health and safety issues.

The GN recognizes that there may need to be further design changes to the plant, and possibly the length and location of the outfall. Plant improvements will include:

- Mechanical improvements
- Addition of a forcemain pump on the outfall to prevent backups
- Health and safety review and implementation of improvements to the plant interior.

3.8 Sewage

The volume of sewage waste water corresponds to the annual water use of the Hamlet. According to estimates of water use above, the volume of waste water for 2008 will be 769,237 m3.

3.9 Sludges

Sludges are generated through the mechanical system of the Hamlet's sewage treatment plant. The sludges are taken to the municipal dump and put into a landfill site for disposal. The Sewage Treatment Plant produces approximately 1 cubic metre of sludge a week, according to Hamlet of Rankin Inlet Public Works staff member, September 2008. Therefore, a total of 52 m3 of sewage sludge is received by the landfill annually.

4.0 Spill Report

On June 30, 2008, a fuel spill occurred at the Nipissar Lake Pumphouse in Rankin Inlet.

Apparently youths attempting to climb on the roof of the pumphouse pulled down the fuel tank return line, and allowed the escape of a few hundreds liters of fuel oil into the sand and gravel surface next to the pumphouse. The fuel flowed overland away from the lake and seeped into the parking lot in front of the pumphouse. A small amount reached the shore of the lake.

An NT-NU Spill Report was prepared by CGS staff and forwarded to the GN Spill Report Centre.

Emergency response consisted of:

- Strongly repairing the pipe attachment to the building to avoid a repeat event
- Use of a floater boom and absorbent mats in the lake
- Excavation of the impacted soil and containing the material in bags
- Excavation continued until all evidence of fuel oil was removed
- Monitoring wells were installed
- EBA Engineering Ltd. arranged the removal and disposal of the impacted soil at the Hamlet landfill
- EBA collected confirmatory samples.

The site was inspected by Nuna Burnside Engineering and Environmental staff on September 10, 2008.

The inspection found no evidence of fuel oil impacts in the soil or lake water. Discussions with the plant operator Arsene Siksik indicated:

- The fuel oil sheen at the lake shore was contained and cleaned up
- The soil was excavated down to permafrost and apparently all the impacted area was removed
- There was never any indication of a threat to the submerged offshore intake.

A report entitled "Nippisar Lake Fuel Spill Assessment and Remediation, Rankin Inlet, Nunavut", dated September 10, 2008 was provided by EBA Engineering Consultants Ltd.

The conclusions and recommendations are as follows:

> *"Based on the results of the project, impacts from the diesel spill at the Nipissar Lake pumphouse have been remediated and contained. Lake and drinking water*

samples indicate impacts to the water from the spill are negligible. EBA recommends the following actions:

- *Seasonal sampling of the installed groundwater monitoring wells should be conducted to determine the effectiveness of the geo-membrane containment skirt in containing impacts below the pumphouse. The wells should be developed and sampled for laboratory analysis of hydrocarbon parameters, and compared to federal and Alberta guidelines. If samples indicate exceedance of adopted criteria, monitoring wells should be pumped and recovered water treated or disposed of in accordance with applicable guidelines*
- *Impacted soils from the excavation activities, which were placed in the landfill, should be relocated to a controlled environment to prevent further leaching of impacts*
- *Source water protection options, including secondary containment for all components of fuel systems, should be considered for Nipissar Lake*".

At this time, the GN feels there is not potential threat to the water quality of the lake from the fuel spill, and is evaluating an implementation plan for the recommendations provided.

5.0 Monitoring Results

Sampling results from sample point GRA-3 between May 2007 and September 2007 are included in Table 1 of Appendix D. The results show that samples in May and July exceeded the NWB license requirements for Fecal Coliforms. Mercury concentrations in samples from May and June exceed the CCME Water Quality Guidelines for Protection of Aquatic Life.

Additional information was collected from two studies that were completed on the Rankin Inlet Sewage Treatment Plant. These studies sampled for quality of the sewage generated by the community of Rankin Inlet. Tables in Appendix E summarize these results. As shown on the tables, there was a rare exceedance for BOD, but common exceedances for fecal coliforms. The results indicate the struggle of the plant operation to meet the discharge criteria and keep the plant operating effectively.

6.0 Inspection Reports and Comments

On July 23, 2008 Andrew Keim of Indian and Northern Affairs Canada completed an inspection on the Water and Waste Water Treatment facilities in Rankin Inlet. The inspection form is included in Appendix F. His report identified several concerns.

To address the concerns outlined in the inspection the Government of Nunavut has already submitted the following letters and reports:

- A Spill Report on the fuel spill at the Potable In-take titled "Nippisar Lake Fuel Spill Assessment and Remediation, Rankin Inlet, Nunavut" (submitted September 2008)
- A letter addressing repairs required at the sewage treatment plant and timeline for upgrades.

The licensee will also produce the following:

- A detailed Operations and Maintenance plan for the Sewage Treatment Facility and Water Supply Facility
- An Environmental Emergency Contingency Plan
- A Environmental Monitoring Program and Quality Assurance/Quality Control Plan for the Sewage Treatment Facility.

These items have been prepared and submitted to the NWB as part of the Water License Renewal Application.

7.0 Summary

The results of this Annual Report indicates that the water supply system is not causing a significant environmental impact and is in compliance with NWB requirements.

This Annual Report also documents the progress of the GN to upgrade the Sewage Treatment Plant for the Hamlet. Mechanical difficulties have resulted in periods of low efficiency treatment. Continued study and monitoring is required to determine the long term impacts of the discharge and compliance with regulations.

8.0 References

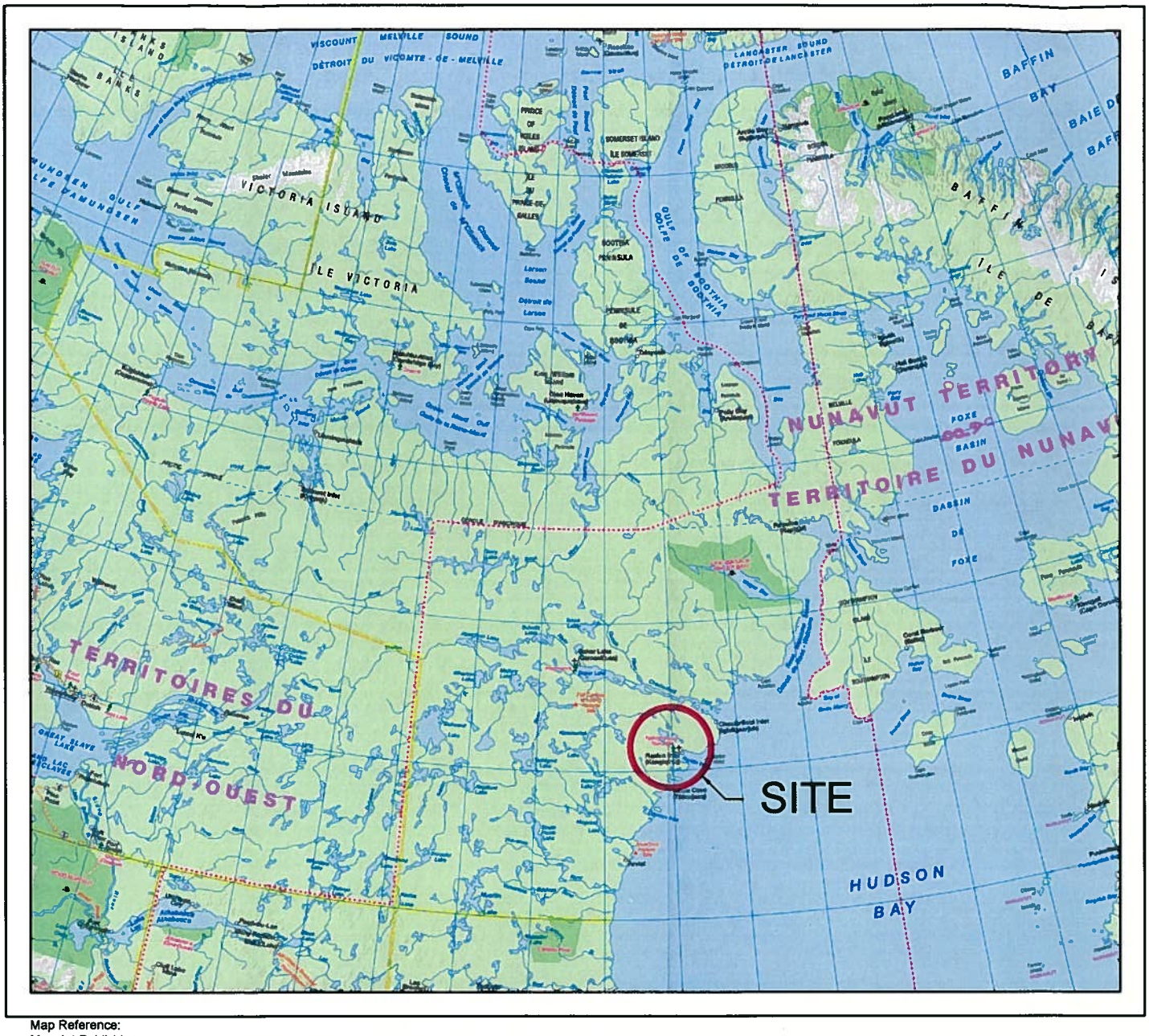
Dillon Consultants Inc. Waste Water Treatment Plant Upgrades, Community and Government Services, Government of Nunavut, June 2006.

EBA Engineering Consultants Ltd. Nippisar Lake Fuel Spill Assessment and Remediation, Rankin Inlet, Nunavut, September 2008.

Stanley Associates Engineering Ltd., Nipissar Lake Watershed Model, for Department of Public Works and Services, GNWT, February 1996.

Nunavut Water Board, December 2002. Hamlet of Rankin Inlet Water License NWB3GRA0207. Gjoa Haven, Nunavut.

Figures



Map Reference:
Map Art Publishing

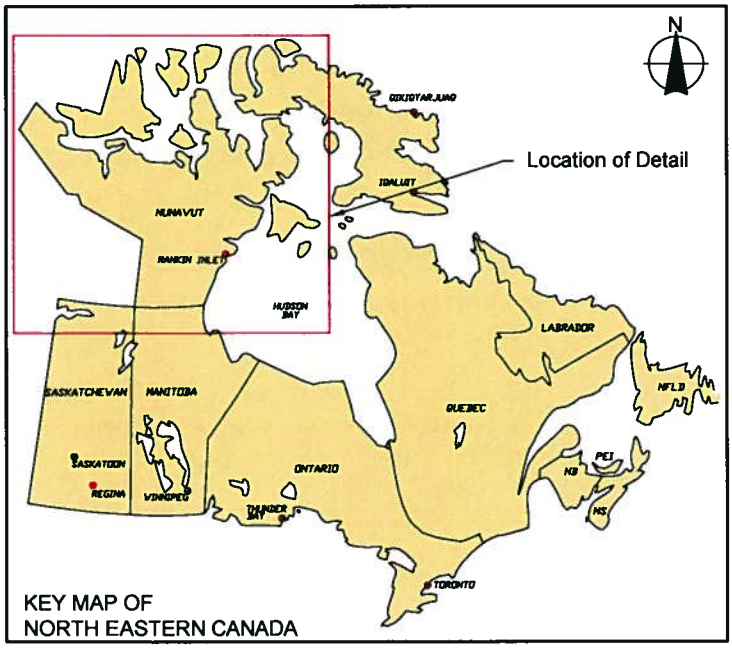


FIGURE 1 - SITE LOCATION MAP

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT

ANNUAL REPORT 2008

December 2008
Project Number: N-O14850

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 ANNUAL REPORT 2008 - GOVERNMENT SL.dwg

Plot Time: Mar 05, 2009 - 12:59pm

FIGURE 2

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT
ANNUAL REPORT 2008

COMMUNITY PLAN

Satellite Image Source:
Background 2006 satellite image covering the immediate community area obtained from MDA Geospatial Services.
Background colour satellite image covering the area beyond the immediate community obtained from the Google Earth Pro website.

N

0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4
Kilometres

1:30,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard
Verified by: J. Walls

BURNSIDE

N-O14850 ANNUAL REPORT 2008 - GOVERNMENT CP.dwg

Plot Time: Mar 05, 2009 - 1:02pm

FIGURE 3

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT
ANNUAL REPORT 2008

MONITORING LOCATIONS

LEGEND

● MONITORING STATION

Satellite Image Source:
Background 2006 satellite image covering the immediate community area obtained from MDA Geospatial Services.
Background colour satellite image covering the area beyond the immediate community obtained from the Google Earth Pro website.

N

0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4
Kilometres

1:30,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard
Verified by: J. Walls

BURNSIDE

N-O14850 ANNUAL REPORT 2008 - GOVERNMENT ML.dwg

Plot Time: Mar 05, 2009 - 1:03pm

BURNSIDE

Appendix A
Water License

P.O. Box 119
Gjoa Haven, NU X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6369

ᓇᐃᑦ ᐃᒪᓕᕆᔨᑦ ᑲᑎᒪᔨᖏᑦ
NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

DECISION

LICENCE NUMBER: NWB3GRA0207

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence originally filed by the Hamlet of Rankin Inlet on 20 November 2002:

Department of Public Works & Services, Government of Nunavut

to allow for the use of water and disposal of waste in the Hamlet at Rankin Inlet, Nunavut.

With respect to this application, the NWB gave notice to the public that the Hamlet had filed an application for a water licence.

DECISION

After having been satisfied that the application, which had originally been filed by the Hamlet of Rankin Inlet on November 20, 2002, was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S. 12.3.2 of the *Nunavut Land Claim Agreement* (NLCA), the NWB decided that the application could go through the regulatory process.

Based on the review of the comments and concerns , it was noted that the issue of the operation of Water Treatment and Sewage Treatment Facilities in Rankin Inlet by the Department of Public Works and Services (Government of Nunavut) prevented the issuance of water licence to the Hamlet of Rankin Inlet for the operation of these Facilities. It was determined that the most appropriate action was to issue a water licence to the Hamlet of Rankin Inlet for the operation of the Solid Waste Disposal Facility, while the Department of Public Works and Services would be licensed for the operation of the Water Treatment and Sewage Treatment Facilities, on behalf of the Government of Nunavut.

Applications reflective of this division of activities were received from both the Hamlet of Rankin Inlet and the Department of Public Works and Services. Notice of these applications was posted with local organizations in Rankin Inlet. As the technical information previously reviewed remained unchanged, the Nunavut Water Board accepted written concerns and comments on these applications until December 6, 2002.

After reviewing the submission of the Applicant and written comments expressed by interested parties, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *Nunavut Land Claims Agreement* and of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA), decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S. 49(a) of the NWNSRTA and determined that:

Licence Number NWB3GRA0207 be issued subject to the terms and conditions contained therein. (Motion #: 2002-22)

SIGNED this 1st day of December, 2002 at Gjoa Haven, NU.

Original signed by:

Philippe di Pizzo
Chief Administrative Officer

TABLE OF CONTENTS

I. INTRODUCTION

Following an application filed by Ferguson Simek Clark on behalf of the Hamlet of Rankin Inlet on 6 June 2002 to the Nunavut Water Board, the Board conducted an initial assessment of the Hamlet's request for a municipal water licence for water use and waste disposal activities within the Hamlet. The assessment was conducted so that the Nunavut Water Board could make a fully informed decision on the application. The application was referred for review and comments to Federal, Territorial and local organizations. Based upon the results of this initial assessment and the technical review, including consideration of any potential accidents, malfunctions, or cumulative environmental effects that the overall project might have in the area, the Board concluded that this application was complete and could go through the regulatory process.

In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* S. 55.1 and Article 13 of the *Nunavut Land Claims Agreement*, public notice of the application was posted. No public concerns were expressed, and the NWB waived the requirement to hold a public hearing for the application. Authority to approve the application was delegated to the Chief Administrative Officer pursuant to S. 13.7.5 of the *Agreement*. After considering and reviewing the comments submitted by interested parties, the NWB has issued licence NWB3GRA0207.

II. GENERAL CONSIDERATIONS

Term of the Licence

In accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* S. 45, the NWB may issue a licence for a term not exceeding twenty-five years. The NWB believes that a term of five years is appropriate. Because this is the first licence issued to the Department by the Nunavut Water Board for operations in Rankin Inlet, a 5-year licence will allow enough time for the Department to establish a consistent compliance record. The 5-year licence will allow the Licensee to properly carry out the terms and conditions of the licence and to ensure that sufficient time is given to permit the Licensee to develop, submit, and implement the plans required under the licence to the satisfaction of the NWB.

Annual Report

The requirements imposed on the Licensee in this licence are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year. This information is maintained on the public registry and is available to any interested parties upon request. Refer to attached standard form for completing Annual Report (see Attachment I).

Regulated Parameters

Effluent quality criteria imposed in this Licence are consistent with the *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* (Northwest Territories Water Board; 1992), and follow advice received from both the Department of Indian and Northern Affairs and Environment Canada.

Operation and Maintenance Manual (O&M)

The purpose of an Operation and Maintenance Manual is to assist Department staff in the proper operation and maintenance of their waste disposal facilities. The manual should demonstrate to the Nunavut Water Board that the Department is capable of operating and maintaining all waste disposal sites adequately. The Plan should be completed using the *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; see Attachment II).

Abandonment and Restoration (A&R)

To ensure that all future abandoned facilities are reclaimed in an appropriate manner, the NWB has imposed the requirement for the submission of Abandonment and Restoration Plans. These plans should be submitted when the Licensee files preliminary design drawings for the construction of new facilities to replace existing ones.

Monitoring Program

The Monitoring Program is a program established to collect data on water quality to assess the effectiveness of treatment for protection of public health and to assess potential impacts to the environment associated with the municipal facilities. As this is the first Municipal Water Licence issued to the Department by the Board, minimum requirements have been imposed, but additional sampling may be required by an Inspector.

Quality Assurance/Quality Control (QA/QC) Plan

The requirements to develop a QA/QC Plan imposed on the Licensee in this licence are for the purpose of ensuring the NWB that samples taken in the field as part of the Monitoring Program will maintain a high quality, so as to accurately represent the physical and chemical nature of the samples being taken.

LICENCE NWB3GRA0207

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

DEPARTMENT OF PUBLIC WORKS & SERVICES, GOVERNMENT OF NUNAVUT
(Licensee)

of **RANKIN INLET, NUNAVUT, X0A 0S0**
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water for a period subject to restrictions and conditions contained within this licence:

Licence Number **NWB3GRA0207**

Water Management Area **NUNAVUT 05**

Location **RANKIN INLET, NUNAVUT**

Purpose **WATER USE AND WASTE DISPOSAL**

Description **MUNICIPAL UNDERTAKINGS**

Quantity of Water Not to be Exceeded **400,000 CUBIC METRES ANNUALLY**

Date of Licence **DECEMBER 1, 2002**

Expiry Date of Licence **NOVEMBER 30, 2007**

Dated this 1st of December 2002 at Gjoa Haven, NU.

Original signed by:

Philippe di Pizzo
Chief Administrative Officer

PART A: SCOPE AND DEFINITIONS

1. Scope

a. This Licence allows for the use of water and the disposal of waste by the Department of Public Works and Services, Government of Nunavut for municipal undertakings at the Hamlet of Rankin Inlet, Nunavut (64°49'N, 92°05'W);

b. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

In this Licence: **NWB3GRA0207**

"Act" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"Analyst" means an Analyst designated by the Minister under Section 85 (1) of the *Act*;

"Appurtenant undertaking" means an undertaking in relation to which a use of waters or a deposit of waste is permitted by a licence issued by the Board;

"Average Concentration" means the arithmetic mean of the last four consecutive analytical results for contained in composite or grab samples collected from the Waste Facility's final discharge point;

"Average Concentration For Faecal Coliforms" means the geometric mean of the last four consecutive analytical results for faecal coliforms contained in composite or grab samples collected from the Waste Facility's final discharge point;

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement*;

"Chief Administrative Officer" means the Executive Director of the Nunavut Water Board;

"Commercial Waste Water" means water and associated waste generated by the operation of a commercial enterprise, but does not include toilet wastes or greywater;

"Effluent" means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant;

"Freeboard" means the vertical distance between water line and crest on a dam or dyke's upstream slope;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"Inspector" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"Licensee" means the holder of this Licence;

"Modification" means an alteration to a physical work that introduces new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion, and changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"Monitoring Program" means a program established to collect data on surface water and groundwater quality to assess impacts to the environment of an appurtenant undertaking.

"Nunavut Land Claims Agreement" (NLCA) means the "Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada," including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"Sewage" means all toilet wastes and greywater;

"Sewage Treatment Facility" comprises the area and engineered lagoon and decant structures designed to contain sewage as described in the Application for Water Licence;

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means, as defined in S.4 of the *Act*, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"Water Supply Facility" means the area and associated intake infrastructure at Nipissar Lake, as described in the Application for Water Licence.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board not 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";

   ii. the monthly and annual quantities in cubic metres of each and all waste discharged;

   iii. a summary of modifications and/or major maintenance work carried out on the Solid Waste Disposal Facility, including all associated structures and facilities;

   iv. a list of unauthorized discharges and summary of follow-up action taken

   v. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

   vi. a summary of any studies, reports and plans (e.g., Operation 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

   vii. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.

2. The Licensee shall comply with the "Monitoring Program" described in this Licence, and any amendments to the "Monitoring Program" as may be made from time to time, pursuant to the conditions of this Licence.

3. The "Monitoring Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

4. Meters, devices or other such methods used for measuring the volumes of waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. The Licensee shall, within ninety (90) days after the first visit of the Inspector, post the necessary signs, where possible, to identify the stations of the "Monitoring Program." All signage postings shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector.

6. The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills of Waste, which are reported to or observed by the Licensee, within the municipal boundaries or in the areas of the Solid Waste Disposal Facility.

7. The Licensee shall ensure a copy of this Licence is maintained at the municipal office and at the site of operation at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(i) Chief Administrative Officer:

Executive Director
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369

(ii) Inspector Contact:

Water Resources Officer
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4298
Fax: (867) 979-6445

(iii) Analyst Contact

Taiga Laboratories
Department of Indian and Northern Affairs
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2781
Fax: (867) 669-2718

8. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. **Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.**

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from Nipissar Lake using the Water Supply Facilities or as otherwise approved by the Board.

2. The annual quantity of water used for all purposes shall not exceed 400,000 cubic metres.

3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

4. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Treatment Facility or as otherwise approved by the Board.

2. All Effluent discharged from the Sewage Treatment Facility at "Monitoring Program" Station Number GRA-3 shall meet the following effluent quality standards:

Parameter	Maximum Average Concentration
Faecal Coliforms	1 x 10^6CFU/dl
BOD_5	120 mg/L
Total Suspended Solids	180 mg/L
Oil and grease	No visible sheen
pH	between 6 and 9

3. 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 dykes and earthfill structures associated with a Sewage Treatment Facility.

4. The Sewage Treatment Facility shall be maintained and operated in such a manner as to prevent structural failure.

5. The Licensee shall maintain the Sewage Treatment Facility to the satisfaction of an Inspector.

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

1. The Licensee shall submit to the Board for approval design drawings stamped by a qualified engineer registered in the Nunavut prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes.

2. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply and Sewage Treatment Facility provided that such modifications are consistent with the terms of this Licence and the following requirements are met:

    a. the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the modifications;

    ii. said modifications do not place the Licensee in contravention of the Licence or the *Act*;

    iii. the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and

    iv. the Board has not rejected the proposed modifications.

3. Modifications for which all of the conditions referred to in Part E, Item 1, have not been met may be carried out only with written approval from the Board.

4. The Licensee shall provide as built plans/drawings of the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall, before December 1, 2003 submit to the Board for approval, a Plan for the Operation and Maintenance of the Water Treatment Facility and the Sewage Treatment Facility in accordance with *"Guidelines for Preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities"* (October 1996).

2. The Licensee shall implement the Plan specified in Part F, Item 1 as and when approved by the Board.

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 decision.

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

    i. employ the appropriate contingency plan as provided for in the Operation and Maintenance Plan;

    ii. report the incident immediately *via* the 24-Hour Spill Reporting Line at (867) 920-8130 and to an Inspector; and

    iii. submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities and the construction of new facilities to replace existing ones. The Plan shall include, but not be limited to where applicable:

    i. water intake facilities;

    ii. the water treatment and sewage treatment 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. consideration of altered drainage patterns;

ix. type and source of cover materials;

x. future area use;

xi. hazardous wastes; and

xii. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

2. The Licensee shall implement the plan specified in Part G, Item 1 as and when approved by the Board.

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.

4. The Licensee shall complete the restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall maintain Surveillance Stations at the following locations:

Station Number	Description
GRA-1	Raw Water supply prior to treatment
GRA-3	Effluent discharge from the Sewage Treatment Facility

2. The Licensee shall sample monthly at Monitoring Station GRA-3 during the months of May to August, inclusive.

3. The Licensee shall analyze samples collected at Station Number GRA-3 for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate-Nitrite	Oil and Grease (visual)
Total Phenols	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	

4. Additional sampling and analysis may be requested by an Inspector;

5. The Licensee shall conform to the Quality Assurance/Quality Control (QA/QC) Plan which shall be provided to the Licensee by the NWB within 60 days of the issuance of this licence;

6. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board;

7. All analyses shall be performed in a Canadian Association of Environmental Analytical Laboratories (CAEAL) Certified Laboratory, or as otherwise approved by an Analyst;

8. The Licensee shall measure and record in cubic metres the monthly and annual quantities of water pumped from Monitoring Program Station Number GRA-1 for all purposes;

9. The Licensee shall measure and record the annual quantities of sewage solids removed from the sewage disposal facility ~~shall be measured and recorded~~;

10. The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the "Monitoring Program" in the Licensee's Annual Report, as required *per* Part B, Item 1; and

11. Modifications to the Monitoring Program may be made only upon written approval of the Chief Administrative Officer.

BURNSIDE

Appendix B

NWB Annual Report Form

NWB Annual Report **Year being reported:** 2008

License No: NWB3GRA0207 **Issued Date:** December 1, 2002
Expiry Date: November 30, 2007

Project Name: Rankin Inlet Water Use

Licensee: Government of Nunavut

Mailing Address:
Department of Community and Government Services
P.O. Box 002
Rankin Inlet, Nunavut
X0C 0G0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):
Nuna Burnside Engineering and Environmental Ltd.

General Background Information on the Project (*optional):
see attached information

Licence Requirements: the licensee must provide the following information in accodance with

Part B | Item 1

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Nipissar Lake

Water Quantity:

400,000	Quantity Allowable Domestic (cu.m)
see attached	Actual Quantity Used Domestic (cu.m)
	Quantity Allowable Drilling (cu.m)
	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

- [ ] Solid Waste Disposal
- [x] Sewage
- [ ] Drill Waste
- [x] Greywater
- [ ] Hazardous
- [ ] Other:

Additional Details:
see attached

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)
Date of Spill: June 30, 2008
Date of Notification to an Inspector: June 30, 2008
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

see attached

Revisions to the Spill Contingency Plan

No Spill Contingency Plan (SCP) submitted or approved

Additional Details:

Spill Contingency Plan will be submitted by Nuna Burnside as part of an Environmental Emergency Contingency Plan for the Hamlet of Rankin Inlet in 2008.

Revisions to the Abandonment and Restoration Plan

N/A - not applicable

Additional Details:

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Details described below

Additional Details:

Nipissar Lake Water Intake - 62°49'23.92" N 92°06'52.91" W

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Details described below

Additional Details:

Sewage Effluent Outfall - 62°49'4.82"N 92°3'49.19"W
Current Landfill (Sludge from Treatment Plant) - 62°48'07.94"N 92°04'39.06"W

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc)

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

Inspection Report received by the Licensee (Date):

Additional Details: (Dates of Report, Follow-up by the Licensee)

Water Use Inspection Report - July 22, 2008
See attached for responses and follow-up actions.

Any additional comments or information for the Board to consider

Date Submitted:

Submitted/Prepared by: Jim Walls, Nuna Burnside Engineering and Environmental
Contact Information:
Tel: 519-941-5331
Fax: 519-941-8120
email: jwalls@rjburnside.com

BURNSIDE

Appendix C

Site Photographs

Water Supply Facility

Photo 1: Nipissar Lake Pumphouse

Photo 2: Fuel Storage Tank at Pumphouse

Photo 3: Area between storage tank and pumphouse

Photo 4: Monitoring well beside Nipissar Pumphouse

Photo 5: Shoreline of Nipissar Lake near pumphouse looking east.

BURNSIDE

Appendix D
Sample Results

Table 1: Waste Water Treatment Plant, Effluent Discharge Point - GRA-3

	Units	Detection Limit	CCME Guidelines (Marine)	Water Board Licence Requirements	Sampling Date 16-May-08	30-Jun-08	01-Aug-08
Total Alkalinity (as CaCO3	mg/L				143		
Conductivity	µS/cm	0.4			611	519	566
pH			7.0 to 8.7	6 to 9	7.76	7.62	7.96
TSS	mg/L	3		180	-	46	71
Ammonia as Nitrogen	mg/L	0.005			6.35	9.4	28.7
BOD	mg/L	2		120	110	61	90
Nitrate and Nitrite as Nitrogen	mg/L	0.01	16		<0.01	0.01	<0.01
Calcium	mg/L	0.1			34.1	27.1	23.8
Magnesium	mg/L	0.1			8.9	6.8	5.8
Potassium	mg/L	0.1			8.4	6.1	8.1
Sodium	mg/L	0.1			64	40.2	40.4
Sulphate	mg/L	1			29	24	24
Fecal Coliforms	CFU/100mL	100000		1.00E+06	**1.29E+06**	5.70E+05	**3.00E+06**
Oil and Grease (visible)				no visible sheen	non-visual	non-visual	non-visual
Arsenic	µg/L	0.2	12.5		1.5	0.9	1.4
Cadmium	µg/L	0.1			0.2	<0.1	0.4
Chromium	µg/L	0.3			1.5	1.4	2.3
Copper	µg/L	0.3			116	149	232
Iron	µg/L	50			377	313	612
Lead	µg/L	0.1			2	1.9	5.2
Mercury	µg/L	0.01	0.016		**0.03**	**0.02**	<0.01
Nickel	µg/L	0.1			6.3	9.6	6
Zinc	µg/L	10			85	91	140
Total Phenols	mg/L	0.001			0.03	0.019	0.055

BOLD - indicates exceedence in the licence requirements or CCME standards
CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Updated 2007

BURNSIDE

Appendix F

INAC Inspection Report

Indian and Northern Affairs Canada | Affaires Indiennes et du Nord Canada

WATER USE INSPECTION REPORT

Date: July 22nd,2008	**Licensee Rep.** (Name/Title): Joe Strickland- C& GS – Gov't of Nunavut
Licensee: Govemment of Nunavut	**Licence No.:** NWB3GRA0207 - Expired

WATER SUPPLY

Source(s): Nipissar Lake	**Quantity used: Unknown** – NI
Owner:/Operator: C&GS Gov. Of Nunavut	Water and Sewage services provided by GN

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Intake Facilities: A	**Storage Structure:** A	**Treatment Sys:** A	**Chemical Storage:** NA
Flow Meas. Device: NI	**Conveyance Lines: A**	**Pumping Stations:** A	**Screen : NI**

Comments: The Government of Nunavut has an expired water license for these services. No annual reports, sampling results, Operations manuals or spill contingency plans were noted during the Inspection. A spill has occurred at the Potable in-take. Efforts to clean it up were on-going- a report is expected within 10 days.

WASTE DISPOSAL

Sewage: **Sewage Treatment System** (Prim./Sec/Ter.): **Direct discharge to Marine Environ.**

Natural Water Body: Hudson bay	**Continuous Discharge** (land or water): **Continuous**	
Seasonal Discharge: NA	**Wetlands Treatment:** NA	**Trench:** NA

Solid Waste: Non-combustible waste consolidated at waste metals area.
Owner/Operator: Municipality of Rankin Inlet

Landfill: U- No evidence of segregation	**Burn & Landfill:** U	**Other:** Hydrocarbon waste

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Discharge Quality: U	**Decant Structure:** NA	**Erosion:** NA
Discharge Meas. Device: NA	**Dyke Inspection:** NA	**Seepages:** NA
Dams, Dykes: NA	**Freeboard: NA**	**Spills:** U
Construction: NA	**O&M Plan:** U	**A&R Plan:** U
Periods of Discharge: Cont.	**Effluent Discharge Rate:** NA	

Comments: The Dept of Community and Government Services operates the water and waste water services within Rankin Inlet. The mechanical treatment system is off line and untreated waste is discharges to the marine environment. No notification was provided. Missing are files on Abandonment and reclamation plans, Operations and maintenance plans as well as outstanding annual reports. The water license has expired.

FUEL STORAGE:.

Waste Oil Storage: None noted at site **Owner/Operator:** Government of Nunavut

Indicate: **A** - Acceptable **U** - Unacceptable **NA** - Not Applicable **NI** - Not Inspected

Berms & Liners: A	**Water within Berms:** A	**Evidence of Leaks:** NI
Drainage Pipes: A	**Pump Station & Catchments Berm:** NI	
Pipeline Condition: A	**Condition of Tanks: A**	

SURVEILLANCE NETWORK PROGRAM (SNP)

Samples Collected	**Owner /Operator: Government of Nunavut – CG&S - None**	
2	**INAC:** Potable water source & Dump Leachates	
Signs Posted	**SNP:** One sign at treatment	**Warning:** U
Records & Reporting: Annual reporting is not up to date		
Geotechnical Inspection: N/A		

Non-Compliance of Act or Licence: The Government of Nunavut is currently in Non-Compliance with Nunavut Water and Nunavut Surface Rights Tribunals Act. Application for a new Water license is on-going and must be completed by the period of the next inspection. Modifications in Operation must be reported.

A.Keim
Inspector's Name

Sent by E-mail
Inspector's Signature

BURNSIDE

Appendix E
Sewage Quality Data

Table 2.0 Influent Quality to The Rankin Inlet Sewage Treatment Plant Sewage Sampling in 2004

Parameter	Measurement	Johnson cove Lift Station	Nanuk Lift Station
BOD(mg/L)	Average	147	241
	Deviation	94	62
	Summer Average	170	257
	Winter Average	142	233
	CG&T Model	134	134
TSS (mg/L)	Average	152	159
	Deviation	113	42
	Summer Average	208	160
	Winter Average	132	158
	CG&T Model	142	142
Ammonia as N (mg/L)	Average	22.7	40.9
	Deviation	6	18.6
	Summer Average	27.2	59.3
	Winter Average	20.4	31.6
	CG&T Model	23	23
Alkalinity (mg/L)	Average	180	286
	Deviation	23	63
	Summer Average	192	306
	Winter Average	173	277
	CG&T Model	N/A	N/A
Fecal Coliform (CFU/100ml)	Average	7.19	7.82
	Deviation	0.48	0.43
	Summer Average	7.31	7.81
	Winter Average	7.12	7.82
	CG&T Model	N/A	N/A
pH (mg/L)	Average	7.19	7.82
	Deviation	0.48	0.43
	Summer Average	7.31	7.81
	Winter Average	7.12	7.82
	CG&T Model	N/A	N/A
Nitrate-Nitrite as N (mg/L)	Average	7.19	7.82
	Deviation	0.48	0.43
	Summer Average	7.31	7.81
	Winter Average	7.12	7.82
	CG&T Model	N/A	N/A

Data from Ferguson Simek Clark, 2004

Table 3.0 Influent Quality for The Rankin Inlet Sewage Treatment Plant Sampling 2005

Parameter	9-Nov-05	16-Dec-05	20-Dec-05	22-Dec-05
BOD (mg/L)	123	97	140	92
TSS (mg/L)	117	94	72	75
Ammonia as N (mg/L)	15.2	14.1	13.4	5.53
Fecal Coliform (MPN/100mL)	>110000	>110000	>110000	>110000
Total Oil & Grease (mg/L)	35	22	21	22
Total Coliforms (mg/L)	-	>11000	>110000	>110000

Data from Dillon Consulting Limited, 2005