Sewage Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Rankin Inlet
Department of Community and
Government Services, Government of Nunavut

Prepared by

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December 2008

File No: N-O 14850

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1.0 Introduction

1.1 Hamlet Description

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, as shown on Figure 1. The Hamlet has been growing substantially in the past 10 years. Economic activities now include government, commercial fishing, transportation/communications, carvings/handicrafts, trapping, hunting, and tourism. The community has a population of approximately 2,358 residents.

The Government of Nunavut (Community and Government Services) provides water supply and sewage disposal services for the Hamlet of Rankin Inlet.

The Hamlet provides solid waste collection for the residents, businesses and institutions. The water, wastewater, and solid waste systems include the following facilities and services:

- A water intake plant, which draws water from Nipissar Lake and provides treatment by chlorination
- A waste water treatment plant that provides primary treatment of sewage with use of a mechanical screen
- A current (old) solid waste disposal facility, which includes a bulky metals disposal area and a waste oil and liquid waste storage area
- A new solid waste management facility that has not been commissioned yet.

Key features of the community are shown on Figure 2.

1.2 Nunavut Water Board License

The Water Supply Facility currently operates under Nunavut Water Board License Number NWB3GRA0207 issued December 01, 2002 to the Government of Nunavut. The license expired November 30, 2008 (Appendix A). An application for a renewal/amendment of the licence has been submitted by Nuna Burnside.

This O&M Plan includes items outlined in the requirements of the current license such as:

- Operation and Maintenance Plans
- Environmental Emergency Contingency Plan (Spill Contingency Plans) – separate document
- Environmental Monitoring Program and Quality Assurance/Quality Control Plan – separate document.

This O&M Plan should be updated when the new NWB license is issued.

1.3 Climate

Rankin Inlet is affected by Arctic air masses, and experiences a maritime Arctic climate characterized by short cool summers, and long cold winters. The Rankin Inlet area receives an average of 18.1 cm of rainfall and 107 cm of snowfall per annum. Mean annual precipitation totals 29.7 cm per annum. July mean high and low temperatures are 14.9°C and 5.9°C, respectively. January mean high and low temperatures are -28.3°C and -35.5°C, respectively. Winds are generally north-west, and average 23 km/h (Rankin Inlet Weather Station, Climate Normals 1991-2000, Environment Canada, 2008).

1.4 Sewage Generation

The volume of sewage waste water corresponds to the annual water use of the Hamlet. Using calculated water use projections, the volume of waste water in 2008 is 769,237 m^3. Ten years from now in 2018, the annual volume of sewage generated by the Hamlet of Rankin Inlet will be approximately 840,000 m^3. Projected wastewater generation calculations are included in Appendix B.

1.5 Health and Safety

Health and safety of workers and the public is the first priority while operating the Water Intake Facility. The requirements of the Nunavut Safety Act must be followed at all times. All actions and operations must be undertaken with safety as the first priority.

Template forms to assist staff in operating the facility, planning and costing the short term and long term use of the facility are included in Appendix C.

1.6 Training

Staff training is an important aspect of the operation of a Sewage Treatment Facility. Staff must be adequately trained to follow this O&M Plan and operate the facility. This O&M Plan is dependent on sufficient site specific training to allow staff to operate the facility.

2.0 Operation and Maintenance of the Sewage Treatment Facility

2.1 Overview

The Sewage Treatment Facility of Rankin Inlet operated on behalf of the Hamlet of Community and Government Services, Government of Nunavut, consists of two components:

- The Sewage Collection System
- The Waste Water Treatment Plant.

In general all components of the Waste Water Treatment Plant work to:

- Collect and treat all sewage from the community including the Nuvuk Subdivision
- Discharge that sewage to the Prairie Bay ocean discharge through the outfall line.

Figure 3 illustrates the location of the waste water treatment plant and the sewage discharge location in Prairie Bay.

2.2 Sewage Collection System

There are two systems of sewage collection in Rankin Inlet: approximately 99% of the population has piped sewage service while the remainder receives trucked pump out service.

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. Most of the trucked service customers live in the Nuvuk subdivision.

The rest of the community is connected to the sewage treatment system by the sewer system. The sewage mains are 150 mm or 200 mm diameter insulated shallow-buried HDPE pipes. They are usually installed in the same trenches as the water mains to save installation costs. Sewage from the buildings enters the mains through 100 mm diameter insulated HDPE service connections.

2.3 Sewage Collection System Operation Procedures

The following operational procedures shall be carried out by the Government of Nunavut on behalf of the Hamlet of Rankin Inlet:

- Monitoring and inspections will occur as outlined in the NWB license and described in this O&M Plan

- In the event of an accident, a spill of sewage or sewage line breakage *the Hamlet of Rankin Inlet Environmental Emergency Contingency Plan* (separate document) shall be implemented.

2.4 Periodic and Seasonal Maintenance Procedures

The following procedures shall be undertaken by the staff of the Government of Nunavut on behalf of the Hamlet of Rankin Inlet during periodic and seasonal maintenance operations at the Sewage Treatment Facility:

- The sewer mains should be monitored during the winter months to identify freezing or breakage due to inadequate flow, insufficient slope, back grading, insufficient cover, damaged insulation, or freezing between the pipe and the insulation
- Winter bleeding from the water mains into the sewer mains can be used to mitigate some of the above problems
- The system should be inspected each summer with a sewer camera to identify sections of piping in poor condition that need repair or replacement.

2.5 Waste Water Treatment Plant Design

The WWTP is equipped with three ports for accommodation of screening equipment. Initially, the first port is equipped with the lead mechanical screening plant accommodating all flows. The second port has been left vacant for future expansion. The third port is equipped with a static bar screen to accept overflows.

The WWTP is designed to accommodate flows from the following sources:

- Johnston Cove Lift Station at 40 L/s peak flow
- Nuvuk Subdivision Lift Station at 25 L/s peak flow
- Internal plant flows – negligible contribution.

The upstream Johnston Cove and Nuvuk lift stations are designed to handle 100% of the peak flows utilizing a single pump and not allow overflows. That is all flows entering the stations could possible utilize 2 pumps thereby increasing their flows to approximately 125% of peak.

The WWTP is designed to reasonably handle all incoming flows and not discharge untreated effluent. The range of flows to the WWTP is from a low of 25 L/s with only Nuvuk peak flows entering the system, to 85 L/s with 65 L/s being the designed peak flow. The 85 L/s would result from both lift stations experiencing above peak flows simultaneously (that is 2 pumps at each lift station operating). The likelihood of both lift stations discharging above peak flows simultaneously (the travel time to the plant is

different for each lift station) is minimal as the lead pump in each lift station is designed to handle peak flows. To design the plant to handle 2 pumps each from each lift station would require the screens to be largely oversized and unnecessary.

Effluent from the treatment plant flows by gravity through a 300 mm diameter buried insulated HDPE pipe to the outfall, completed in 1995. The waste eventually reaches a point near the bottom of Prairie Bay (Figure 3).

To protect against ice scour, the top of the filled-in trench was armoured with rock for the last 35 m of the land section and all of the submersible section. To aid dispersal and mixing, the three steel bell mouths of the diffuser set 90° apart, divides the effluent into three separate streams as it enter the receiving waters.

2.6 Waste Water Treatment Plant Operational Procedures

The following operational procedures shall be carried out by the Government of Nunavut on behalf of the Hamlet of Rankin Inlet:

- Monitoring and inspections will occur as outlined in the NWB license and described in this O&M Plan
- Monthly wastewater volumes discharged from the Sewage Treatment Facility shall be recorded on the recording form attached in Appendix C
- Monthly solid sewage sludge volumes taken to the landfill shall be recorded on the recording form attached in Appendix C
- In the event of an accident, a spill of sewage or petroleum products or a fire during sewage treatment operations, *the Hamlet of Rankin Inlet Environmental Emergency Contingency Plan* (separate document) shall be implemented.

2.7 Periodic and Seasonal Maintenance Procedures

The following procedures shall be undertaken by the staff of the Government of Nunavut on behalf of the Hamlet of Rankin Inlet during periodic and seasonal maintenance operations at the Sewage Treatment Facility:

- The roadway and truck pad outside the facility shall be maintained by snow clearing in the winter and surface grading in the summer, with any defects repaired as necessary
- Site warning signage, which identifies the sewage outfall shall be inspected weekly, and repaired or replaced as necessary

- The outfall pipe shall be inspected during the summer for erosion, settlement, or blockage and repaired as necessary
- Facility generators and associated fuel storage shall be monitored daily
- Ice in the area of the discharge pipe should be flagged to warn travellers of potentially poor ice conditions. Residents should be aware that the area thaws earlier and freezes later.

Forms to assist site staff in conducting the inspections and data recording are included in Appendix C.

The activities described above shall be completed by the staff of the Government of Nunavut on behalf of the Hamlet and details of any repairs shall be reported in the Annual Report submitted to the Nunavut Water Board, in compliance with the Water License.

3.0 Sewage Treatment Facility Monitoring Program

All water sampling completed by the Government of Nunavut on behalf of the Hamlet of Rankin Inlet shall be in accordance with the *Hamlet of Rankin Inlet Environmental Monitoring Program and Quality Assurance/Quality Control (QA/QC) Plan* (separate document).

3.1 Water License Requirements

As outlined in the NWB water license, regular monitoring of the quantity and quality of sewage discharging from the treatment system is required.

As part of the general conditions, the licence requires that monthly and annual quantities in cubic metres of waste discharged from the facility be recorded and reported in the Annual Reports. It also requires that metres, devices or other such methods to record the volume of waste discharged be installed, operated and maintained by the Licensee. The Licensee must maintain the Sewage Treatment Facilities to the satisfaction of the Inspector.

A Surveillance Station will be established at the discharge point of the sewage treatment facility (GRA-3). Monthly sampling of discharged water shall be collected during the months of May to August inclusive. Annual quantities of sewage solids removed from the facility should be measured and recorded on a form similar to that presented in Appendix E.

4.0 Emergency Response and Contingencies

In the event of an emergency, guidance regarding containment and site emergency response can be obtained from the following sources (Table 1):

Table 1: Emergency Contacts

Contact	Location	Telephone Number	Fax Number
INAC – Water/Wastewater Resources Manager	Iqaluit	(867) 975-4550	(867) 979-6445
Hamlet of Rankin Inlet – SAO	Rankin Inlet	(867) 645-2895	(867) 645-2146
Government of Nunavut (Regional Engineer)	Rankin Inlet	(867) 645-8159	(867) 645-8196
Environment Canada – Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Fire Department	Rankin Inlet	(867) 645-2525	-
RCMP Detachment	Rankin Inlet	(867) 645-1111	(867) 645-2568
Community Health Center	Rankin Inlet	(867) 645-8300	(867) 645-8324

Contingency plans are designed to provide site staff with direction and options when there is an unexpected event or accident.

The Environmental Emergency Contingency Plan, Hamlet of Rankin Inlet (prepared as a separate document) provides procedures and direction in the case of a spill or accident.

As outlined in the Contingency Plan, the health and safety of workers and the public are the first priority.

5.0 Reporting

The Nunavut Water Board License on Part B: General Conditions include the requirement to file an Annual Report with the NWB no later than March 31st of the next calendar year. The report shall include:

- Tabular summaries of all data generated under the "Monitoring Program"
- The monthly and annual quantities in cubic metres of each and all waste discharged
- The monthly and annual quantities in cubic metres of each and all waste discharged
- A summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures
- A list of unauthorized discharges and summary of follow-up action taken
- A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year
- A summary of any studies, reports and plans (i.e. 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
- Any other details on water use or waste disposal requested by the Board by November 1st of the reporting year.

The format of the NWB Annual Report is included in Appendix D.

The creation of the report can be greatly simplified by staff regularly filling in and filing the Site Forms included in Appendix C. The forms include:

- Form 1 – Monthly Sewage Discharge Form – a monthly record of treated wastewater discharge flow measurements
- Form 2 – Monthly Solid Sludge Removal Form – a monthly record of volumes of solid sewage sludge removed from the facility to the landfill
- Form 3 – Sewage Treatment Facility Inspection Form – a monthly record of conditions and issues at the sewage treatment facility
- Form 4 – Sewage Treatment Facility Planning Form – which provides a list of items to be discussed by the site foreman and Hamlet Council related to short term and long term sewage treatment decision making.

In addition to these forms, there would be sampling information and analytical data collected. The Monitoring Plan and QA/QC Plan (prepared as a separate document) outlines sample collection and analytical data handling protocols. Using the forms and following the procedures provided herein should make submitting the annual monitoring report relatively straight forward.

6.0 Summary

This Operation and Maintenance Plan (O&M) has been prepared for the Hamlet of Rankin Inlet Sewage Treatment Facility. The facility is operated by the Government of Nunavut on behalf of the Hamlet.

Appropriate training for site staff is necessary as part of the implementation of this O&M Plan. This document should be reviewed and updated annually, and whenever the NWB Water License is amended or new relevant legislation is issued.

7.0 References

Department of Municipal and Community Affairs, Government of Northwest Territories, October 1996. *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories*. Queen's Printer: Yellowknife, Northwest Territories.

Environment Canada, 2008. *Canadian Climate Normals 1971-2000, Rankin Inlet A Weather Station*, Environment Canada. <http://climate.weatheroffice.ec.gc.ca/climate_normals/results_e.html?StnID=1721&autofwd=1>. Accessed Nov 10, 2008.

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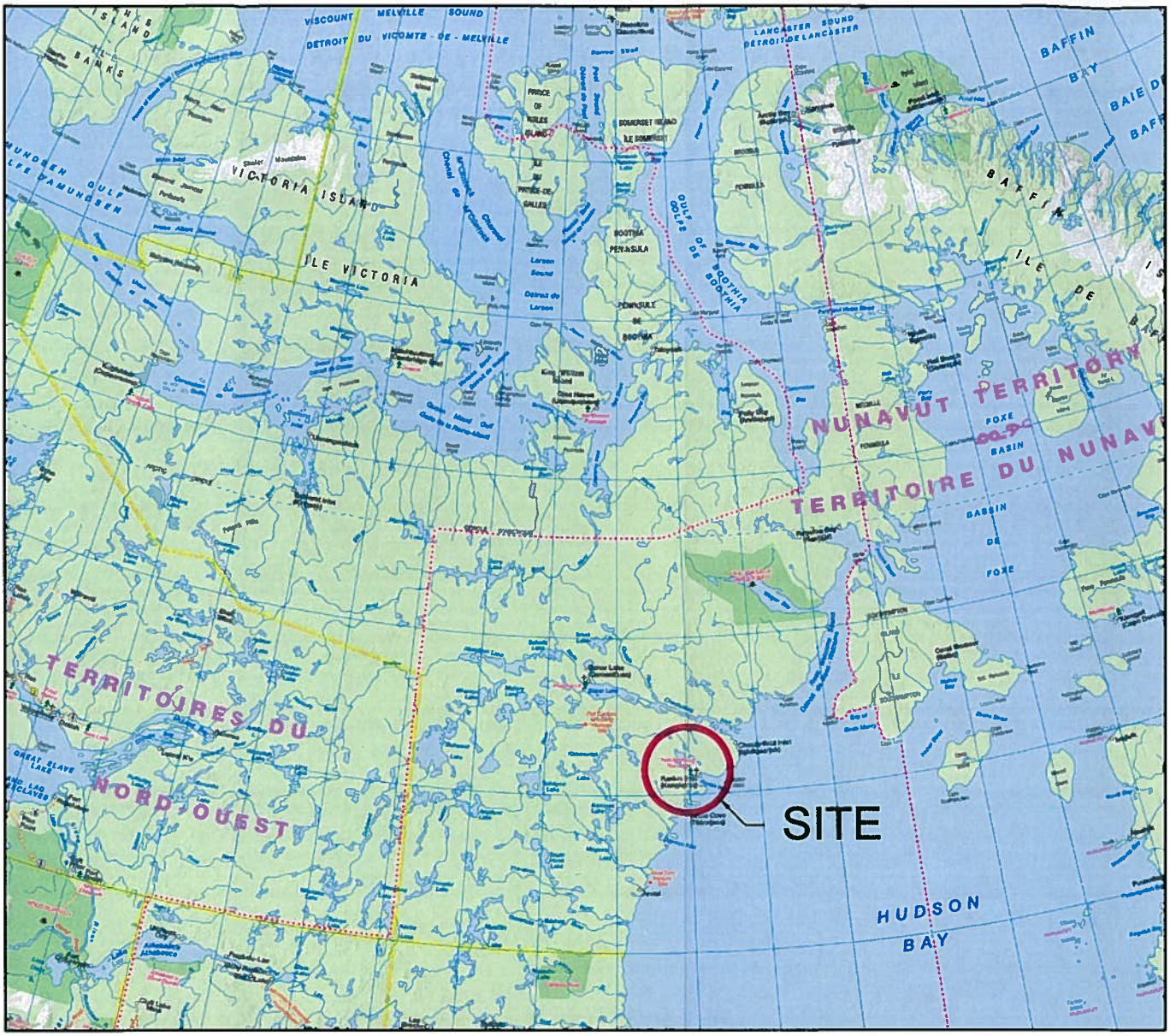
Nunavut Water Board, December 2002. *Hamlet of Rankin Inlet Water Licence NWB3GRA0207*. Gjoa Haven, Nunavut.

Nuna Burnside Engineering & Environmental Ltd., (2008). *Environmental Emergency Contingency Plan, Hamlet of Rankin Inlet.*

Nuna Burnside Engineering & Environmental Ltd., (2008). *Environmental Monitoring Program and Quality Assurance/Quality Control Plan, Hamlet of Rankin Inlet.*

Figures



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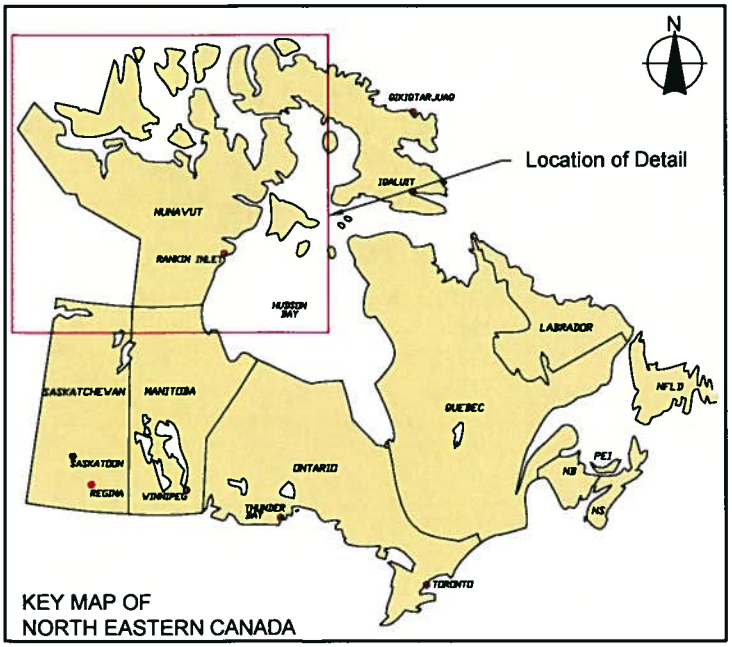

KEY MAP OF
NORTH EASTERN CANADA

FIGURE 1 - SITE LOCATION MAP

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT

SEWAGE TREATMENT FACILITY
OPERATION & MAINTENANCE PLAN

March 2009
Project Number: N-O14850

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 SEWAGE O&M PLAN - GOVERNMENT SL.dwg

Plot Time: Mar 06, 2009 - 1:47pm

FIGURE 2

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT
SEWAGE TREATMENT FACILITY O&M PLAN

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.

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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 SEWAGE O&M PLAN - GOVERNMENT CP.dwg

Plot Time: Mar 06, 2009 - 2:19pm

FIGURE 3

GOVERNMENT OF NUNAVUT
HAMLET OF RANKIN INLET, NUNAVUT
SEWAGE TREATMENT FACILITY O&M PLAN

SEWAGE TREATMENT FACILITY

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.

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Kilometres

1:5,000
March 2009
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 SEWAGE O&M PLAN - GOVERNMENT ML.dwg

Plot time: Mar 06, 2009 - 2:32pm

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Appendix A

Nunavut Water Licence NWB3GRA0207

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

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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

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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.

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Appendix B
Projected Sewage Generation Rates

Projected Sewage Generation Rates for the Hamlet of Rankin Inlet

Planning Year	Calendar Year	Total Population[1]	Projected Sewage generation[2] (lpcd)	Projected Volume (litres/day)	Projected Volume (litres/year)	Projected Volume (m3/year)	Projected Sludge Quantity (kg/annum)	Cumulative Sludge Volume[3] (m^3)
	2006	2358	331.8	782,435	285,588,672	285,589	43,033.5	1,434.5
	2007	2391	332.8	795,751	290,449,108	290,449	43,636.0	2,889.0
0	2008	2427	333.9	810,255	295,743,018	295,743	44,290.5	4,365.3
	2009	2463	334.9	825,015	301,130,395	301,130	44,954.9	5,863.8
	2010	2500	336.0	840,035	306,612,851	306,613	45,629.2	7,384.8
	2011	2538	337.0	855,321	312,192,026	312,192	46,313.6	8,928.6
	2012	2576	338.1	870,876	317,869,588	317,870	47,008.3	10,495.5
	2013	2614	339.2	886,705	323,647,234	323,647	47,713.5	12,086.0
	2014	2654	340.2	902,813	329,526,689	329,527	48,429.2	13,700.3
	2015	2693	341.3	919,205	335,509,707	335,510	49,155.6	15,338.8
	2016	2734	342.3	935,885	341,598,071	341,598	49,892.9	17,001.9
	2017	2775	343.4	952,859	347,793,597	347,794	50,641.3	18,689.9
10	2018	2816	344.4	970,132	354,098,130	354,098	51,400.9	20,403.3
	2019	2859	345.5	987,708	360,513,544	360,514	52,172.0	22,142.4
	2020	2902	346.6	1,005,594	367,041,750	367,042	52,954.5	23,907.5
	2021	2945	347.6	1,023,794	373,684,685	373,685	53,748.9	25,699.2
	2022	2989	348.7	1,042,313	380,444,325	380,444	54,555.1	27,517.7
	2023	3034	349.7	1,061,158	387,322,674	387,323	55,373.4	29,363.4
	2024	3080	350.8	1,080,334	394,321,774	394,322	56,204.0	31,236.9
	2025	3126	351.9	1,099,846	401,443,699	401,444	57,047.1	33,138.5
	2026	3173	352.9	1,119,700	408,690,560	408,691	57,902.8	35,068.6
	2027	3220	354.0	1,139,903	416,064,502	416,065	58,771.3	37,027.6
20	2028	3269	355.0	1,160,459	423,567,707	423,568	59,652.9	39,016.0
	2029	3318	356.1	1,181,376	431,202,393	431,202	60,547.7	41,034.3
	2030	3367	357.1	1,202,660	438,970,817	438,971	61,455.9	43,082.8
	2031	3418	358.2	1,224,316	446,875,273	446,875	62,377.7	45,162.1
	2032	3469	359.3	1,246,351	454,918,095	454,918	63,313.4	47,272.5
	2033	3521	360.3	1,268,772	463,101,654	463,102	64,263.1	49,414.6
	2034	3574	361.4	1,291,585	471,428,363	471,428	65,227.1	51,588.9
	2035	3628	362.4	1,314,796	479,900,676	479,901	66,205.5	53,795.7
	2036	3682	363.5	1,338,414	488,521,087	488,521	67,198.5	56,035.7
	2037	3737	364.5	1,362,444	497,292,133	497,292	68,206.5	58,309.2
30	2038	3793	365.6	1,386,894	506,216,392	506,216	69,229.6	60,616.9

Note: 1) Population in 2006 taken from Statistics Canada 2006 Census of Population. A population growth of 1.4% was applied to the subsequent years.

2) The projected sewage generation is based on the Nunavut water usage formula [RWU L/c/d x (-1 + (0.323 x Ln (population)].

3) The Residential Water Usesage Rate is estimated to be 220 L/c/d for populations greater than 2000 and assumes that the water is distributed by a piping system.

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Appendix C

Site Forms

Form 1
Monthly Effluent Discharge Log
Hamlet of Rankin Inlet

Month: _____

Date	Start Flow Reading		End Flow Reading		Approximate Flow Rate m^3/day	Approximate Volume Discharged m^3	Comments
	Time	Reading	Time	Reading			
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							

Date	Start Flow Reading		End Flow Reading		Approximate Flow Rate m^3/day	Approximate Volume Discharged m^3	Comments
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
Monthly Totals							

Form 2
Monthly Sewage Sludge Log
Hamlet of Rankin Inlet

Month: _____

Date	Total Accumulated Volume (m^3)	Volume of Sludge Removed from Facility (m^3)	Comments and Concerns
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Date	Total Accumulated Volume (m^3)	Volume of Sludge Removed from Facility (m^3)	Comments and Concerns
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
Monthly Totals			

Form 3
Monthly Sewage Treatment Facility Inspection Form
Hamlet of Rankin Inlet

Inspected By:_____ Date:_____

Issues and Conditions	Description/Condition/Problems	Action/Maintenance Required
Health and Safety (dangers and concerns)		
Odours/Appearance		
Lift Stations		
Sewer Mains		
Mechanical Screen		
Pumps		
Discharge Pipe		
Sludge Collection System		

Issues and Conditions	Description/Condition/Problems	Action/Maintenance Required
Equipment (septic truck, pump, etc.)		
Complaints		
Other Issues and Concerns		

Form 4
Sewage Treatment Facility Planning
Hamlet of Rankin Inlet

Prepared By: _____

Date: _____

Sewage Treatment Planning Issue	Current Operations	To Do Items and Schedule
Health and Safety		
Site Inspection Results/Concerns		
Current Volume		
Treatment Process		
Annual Reporting		
Nunavut Water Board License Requirements		

Sewage Treatment Planning Issue	Current Operations	To Do Items and Schedule
Environmental Monitoring		
Staffing		
Equipment		
Costs		
Other Issues/Concerns		

Appendix D

NWB Annual Monitoring Report Format

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

License No: **Issued Date:**
Expiry Date:

Project Name:

Licensee:

Mailing Address:

Name of Company filing Annual Report (**if different from Name of Licensee please clarify relationship between the two entities, if applicable**)**:**

General Background Information on the Project (***optional**)**:**

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

Select Select

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):
Water Quantity:
- Quantity Allowable Domestic (cu.m)
- 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
- ☐ Sewage
- ☐ Drill Waste
- ☐ Greywater
- ☐ Hazardous
- ☐ Other:

Additional Details:

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:
Date of Notification to an Inspector:
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

Revisions to the Spill Contingency Plan

Select

Additional Details:

Revisions to the Abandonment and Restoration Plan

Select

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;

Select

Additional Details:

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

Select

Additional Details:

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

Select

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.

Select

Additional Details: (Attached or provided below)

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

Select

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

Any additional comments or information for the Board to consider

Date Submitted:		
Submitted/Prepared by:		
Contact Information:	**Tel:**	
	Fax:	
	email:	