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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

Water Licence Application
Supplementary Questionnaire
For Municipalities

I. GENERAL 3BMK- BAK 9904

1. Date: September 8, 2008

2. Applicant: Hamlet of Baker Lake, Kivalliq Region
Municipality and Region

3. Contacts: Nick Lawson, Nunami Jacques Whitford Limited
Name of Contact

Consultant to CGS, Government of Nunavut
Position

Telephone: 867-920-2216 Fax: 867-920-2278 Email: nlawson@jacqueswhitford.com

4. Community Status: __ Village __ Town __ City
X Hamlet __ Settlement Corporation

5. Indicate the status of the municipality's license on the date of the application.
___ New Application
X Renewal Water License # NWB#BAK9904

II. ATTACHMENTS

1. Attach current or up-to-date detailed map(s) showing the locations of the:
   a. Raw water intake;
   b. Water storage and treatment facilities;
   c. Fuel and chemical storage;
   d. Sewage treatment facilities (lagoon, honey bag pit, wetland);
   e. Wastewater treatment area and discharge outlets;
   f. Solid waste disposal areas and drainage patterns;
   g. Hazardous waste disposal area;
   h. Transportation access routes;
   i. Existing water bodies/courses and any changes to these water bodies/courses that have or may occur as a result of water use or waste disposal facilities, locations of environmental monitoring sites. (Outline drainage basin);
   j. Traditional use areas outlined on site map and areas around the community used for recreation, camping, fishing, etc.
   Abandoned and/or restored water treatment, sewage, and solid waste disposal facilities.

Are maps attached? X Yes __No

If no, please indicate when they will be available.

Indicate which organization has provided the various maps or diagrams.
Nunami Jacques Whitford Limited

III. WATER SUPPLY

Water Source

1. Type of source: _X_ Lake __River __Well __Other _____
_____

2. Name of water source and alternative, if any.

__Baker Lake_____ _____ _____
Primary Source Secondary Source

3. Usual break-up & freeze-up period: May/June Oct/November
Break-up Freeze-up

Water Intake

1. Please provide short descriptions for the following:

a. Freshwater intake facility

_ Fresh water is pumped directly from Baker Lake through an intake located approximately 120m off shore at a depth of 5-6 m below surface. Water is currently pumped from the intake to the truckfill station where it is chlorinated (Calcium hypochlorite) before being discharged into distribution trucks.

b. Operating capacity of pump used
Estimated at 1100 litres per minute

c. Intake screen size
Unkown

Water Storage

1. Type of water storage facility. (Check where applicable)
____ Reservoir/Pond ___ Storage tank ___ none

X Other, Description: Water is pumped on demand directly to the truckfill and into the distribution trucks.

2. If "reservoir" checked:

Is the reservoir lined? __Yes __ No

What type of liner? _____When was it installed?_____

Water Treatment

1. Indicate the quality of the water.

Summer:	X good	____ fair	___ poor
Fall:	X good	____ fair	___ poor
Winter:	X good	____ fair	___ poor
Spring:	X good	____ fair	___ poor

2. Describe.

3. Type of water treatment.

____ Filtration and chlorination
X Chlorination only
____ None
____ Other _____
Description

Water Use And Distribution

1. Volume of water use:

Distribution	Estimated number of people on the system **A**	Estimated average water consumption (Liters/capita/day) **B**	Total water consumption (Day/day) **A x B**
PIPED			
TRUCKED	**1744**	**104**	**181376**
		TOTAL	181376

General Condition of the water supply facilities

1. General condition of the:
   a. Water supply facility
   __X_ satisfactory __ Unsatisfactory

   If unsatisfactory, explain.

   b. Storage facility
   N/A
   ___ satisfactory __ Unsatisfactory

   If unsatisfactory, explain.

c. Distribution system
   __X satisfactory __Unsatisfactory

   If unsatisfactory, explain.

Modifications

1. Are there any changes *planned* for the water supply system?
   _X No ___Yes

   If yes, please attach a copy of the plan, or describe changes. Provide information on the implementation schedule.

2. Does the community believe changes needed to the water supply, storage or treatment facilities? Community members have expressed concerns regarding potential contamination of their drinking water supply (Baker Lake) from the nearby municipal sewage treatment area. Please see attached Report of the Environmental Study and Evaluation of the Water and Sewage Treatment by Nunami Jacques Whitford (Nunami 2007) regarding drinking water quality and sewage treatment in the community.

Identification

Are there signs identifying drinking water sources presently used by the municipality?
_ _ Yes X No

IV. SEWAGE DISPOSAL

1. What type(s) of sewage treatment does the community have?

___ Lagoon
___ Mechanical system
__X Wetland
___ Honey bag
___ Combination/Other:

Describe: Sewage is discharged from the truck into a holding cell where it exfiltrates and flows into a wetland treatment system before eventually entering Baker Lake. A full description of the system and its performance is provided in Section 4 of Nunami 2007.

Lagoon *(if applicable)*

1. Has there been any operating problems with the lagoon? __X_ Yes ___ No
   If yes, describe

The holding cell was breached during the previous license period. It has been rebuilt; however, engineered improvements (increasing capacity and integrity) are currently in the preliminary design stage.

Mechanical System *(if applicable)*

1. Describe (type, specifications, operation and maintenance program for the mechanical wastewater treatment system).

2. Are sludge's produced ? X Yes _ No
   If yes, describe how the sludge's are disposed of:

Wetland *(if applicable)*

1. Please see Nunami 2007 for description of the wetland treatment system and performance.

Honey Bag Pit

1. Does the municipality use a honey bag pit?
   ___ Yes **X** No
   If yes, describe the location, drainage, and operation/maintenance of the site:

Commercial, Industrial and/or Hazardous Wastes

1. Are there any sources of commercial or industrial *liquid* waste being discharged or deposited to the wastewater treatment system that may affect the quality of the effluent or leachate produced? *(The municipality should be aware that any commercial or industrial discharge has to be approved by the municipality)*
___ Yes **__X_** No
If yes, indicate sources, types and quantities.

Sewage Discharge

1. Are fish, shellfish and other wildlife harvested in or near the discharge area?
___ Yes **__X_** No
If yes, indicate species harvested, and level of harvest.

General Condition of the sewage treatment facilities

1. General condition of the:

a. Sewage collection system _X_ Satisfactory __ Unsatisfactory
If unsatisfactory, explain.

b. Discharge control system __ Satisfactory _X_ Unsatisfactory
If unsatisfactory, explain.

The holding cell operates with exfiltration berms; however, the berms have been compromised during the previous licence period, resulting in an uncontrolled spill. Engineering design to improve control is currently in the preliminary design stage with construction planned for 2009.

c. Dams, diversion dykes, berms _ Satisfactory X Unsatisfactory
If unsatisfactory, explain. See response to (b) above.

Modifications

1. Are there any changes *planned* in the sewage treatment facilities? _ No X Yes

   Recommended improvements presented in the Nunami 2007 are currently in the preliminary design stage with construction proposed for 2009. Improvments include: reconstruction and enlargement of the sewage holding cell, installation of attenuation berms in the wetland and installation of a fence around the primary wetland treatment area to prevent access by humans and wildlife.

2. Does the municipality or residents believe changes are needed to the sewage treatment facilities?

   Both residents and municipality have expressed concerns about the integrity of the sewage treatment facility. The Nunami 2007 report has confirmed that effluent discharge standards in the existing water licence are being met and water quality in Baker Lake meets Canadian Drinking Water Quality Guidelines. However, the Nunami 2007 report includes recommendations to enhance sewage treatment within the wetland. These improvements are currently at the preliminary design stage with construction planned for 2009.

Abandonment and Restoration

1. List and describe abandoned or restored sewage treatment facilities.

   Please see Drawing # 3 of Nunami 2007 for the location of the previous sewage lagoon. The lagoon has been remediated and revegetated.

Identification

Are there signs identifying past and present sewage disposal sites? __Yes **X** No

V. SOLID WASTE DISPOSAL

1. Briefly describe how solid wastes are collected and delivered to the disposal area.

Solid waste is collected from residences on a scheduled basis and transported to the landfill by truck.

2. Is the solid waste site fenced? __X_ Yes __ No

3. Is the fence adequate? __X_ Yes __ No
   If no, describe:

Waste Reduction

1. Does the municipality burn garbage?
   ___Yes X No
   If yes, describe how and when this is done.

2. Has the municipality considered measures for waste reduction such as recycling or reuse?
   __ Yes _X No
   If yes, describe

Animal Carcasses Pit

1. Does the municipality have an area for the disposal of animal carcasses?
   X Yes __ No
   If yes, describe the location, drainage and operation/maintenance of the site

   A designated animal carcass pit is situated in the solid waste area approximately 10 m north of the entrance. Drainage at the pit is considered poor. The pit is managed by the Baker Lake by-law department.

Waste Oil Pit

1. Describe the waste oil storage area.
   There is a lined waste oil cell located south of the main refuse disposal area. Local waste oil generators are; however, encouraged to dispose of waste oil with a local contractor who can utilize it in a waste oil compatible furnace.

Bulky Scrap Metal Waste Disposal Area

1. Does the municipality have a scrap metal or bulky waste disposal area?
   X Yes __ No
   If yes, briefly describe its location and operation plan.
   Located within the solid waste disposal site. Please see Sewage and Solid Waste Disposal Operations and Maintenance Manual (2005).

Commercial, Industrial and/or Hazardous Wastes Disposal Area

1. Are there any commercial or industrial waste being discharged or deposited in the solid waste disposal area? (The municipality should be aware that any discharge of commercial or industrial waste has to be approved by the municipality)
   ___ Yes X No

If yes, please indicate sources, types and quantity.

2. Will the municipality use a hazardous waste disposal area?
X Yes __ No

If yes, describe: A fenced portion of the bulky waste area has been designated for storing hazardous materials. A container is in place for storage of paints and household hazardous wastes. Batteries are disposed off in a sea-can at the site.

a. Structure: **Note:** disposal area.
b. Operation and maintenance

General Condition of the Solid Waste Disposal Area

1. Comment on the general conditions of the:
a. Solid waste disposal area X Satisfactory _ _ Unsatisfactory

Modifications

1. Are there any changes planned for the solid waste disposal area?
No X Yes
If yes, attach a copy of the plan, or describe changes. Provide information on the implementation schedule. Please see recommendations in Nunami 2007 which includes the construction of a cell to treat landfill leachate before discharge to the wetland treatment system. Currently in preliminary design stage with construction planned for 2009.

2. Are changes needed to the solid waste disposal area? Describe.

Abandonment and Restoration

a. 1. List and describe abandoned or restored solid waste facilities. Please see Section 4.2.1 of Nunami 2007 for a description and location of such sites.

Identification
Are there signs identifying past and present solid waste disposal sites?
_ _ Yes X No

VI. INSPECTION AND MONITORING

1. When were municipal facilities inspected by?

Indian and Northern Affairs Inspector Date: **August 2008**

___ Municipal and Community Affairs Date: _____

___ Other: _____ Date: _____

2. Is there a system in place for reporting spills?

X Yes _ _ No

If yes, describe.

As per Sewage and Solid Waste Disposal Operations and Maintenance Manual (2005)

3. Is there a contingency plan for clean up of spills?

X Yes ___ No

If yes, describe.

As per Sewage and Solid Waste Disposal Operations and Maintenance Manual (2005)

4. Have any spills occurred in the past five years?

X Yes ___ No

If yes, describe and show on a map the locations of the spills. What action has been taken to clean the affected areas?

Spill # 2003742 – P50 Heating Fuel Spill at School. Unknown volume spilled as a result of overfilling tank. Fuel and contaminated snow cleaned up and incinerated. File closed.

Spill 2005507 – P50 Heating Fuel Spill at Residence. Estimated 90 litres spilled as a result of a faulty valve. Fuel collected with absorbent pads and disposed of. No further information available.

Summer 2006 – Breach of berm in sewage holding cell. Sewage flowed over breached berm directly into wetland. Sewage transferred from cell to wetland and berm repaired.

Monitoring Program

1. Is water sampling and analysis done?

X Yes ___No

If Yes, answer the questions a to e:

a. Briefly describe how samples are taken and sent to the laboratory.

Two samples are taken from raw water entering the pumphouse and four water samples are taken from the water trucks, twice per month.

b. Briefly describe any monitoring done for wastewater effluent and leachate.

b. Who is responsible for water sampling?

Name: Hugh Ikoe or Jeremy Singati

Position: Settlement Maintainers

Telephone **#:** 867-793-2744

Fax #: 867-793-3331

Level of training: Northern Territories Water and Waste Association, Community Operators Training

d. Recognized laboratory performing analysis of samples.

Name: Health and Social Services, Government of Nunavut

Address: Rankin Inlet Health Centre

Telephone #: 867- 645-8347

Fax #: 867-645-8348

e. Are any changes planned in the water quality-monitoring program? ___ Yes **X** No

If yes, describe.

VII. PUBLIC CONCERNS

1. What concerns does the municipality or residents have regarding the municipal water supply water supply or waste disposal facilities? List the concerns and describe what steps have been taken to address those concerns.

Residents have voiced concerns about the quality of drinking water from Baker Lake. Concerns over the potential effects of the sewage effluent on drinking water have been raised as primary concern. The Nunami 2007 study includes results of a number of sampling events indicating good quality drinking water and treatment of sewage effluent.

VIII. **PUBLIC HEALTH** *(Help may be obtained from the Regional Environmental Health Officer if you have difficulty with this section.)*

1. Date: _September 8, 2008_____

2. Municipality: __Baker Lake

3. Contact: (Environmental Health Officer) _Wanda Joy _

   Telephone # (867)975-4817_____

   Fax #: (867)975-4833_____

4. Have there been any problems or health/environmental concerns with drinking water?
   ___ Yes __**X** No
   If yes, describe:

5. Have there been any problems or health/environmental concerns with sewage disposal/treatment?
   ___ Yes __X_ No
   If yes, describe

6. Have there been any problems or health/environmental concerns with solid waste disposal?
   ___ Yes __X_ No

   If yes, describe:

Monitoring Program

1. Does the Regional Health Board perform water quality sampling?
   __X_ Yes ___ No
   If Yes, answer questions (a) to (e)

   a. Briefly describe the sampling methodology. Samples taken from all water trucks, 1 raw water sample and a few building in the community on a monthly basis.

   b. Briefly describe any monitoring of wastewater effluent and leachate.

c. Who is responsible for sampling?

Name: Hamlet of Baker Lake

Position: Usually Foreman or Water Truck Driver

Telephone #: ____793-2874_____

Fax #: _____793-2509_____

Level of training: trained by EHO when in community.

d. Recognized laboratory performing analysis of samples.

Name: _____

Address: _____

_____

Telephone #: _____

Fax #: _____

e. Are any changes planned in the water quality-monitoring program?

__ Yes _X_ No

If yes, describe.

IX. TECHNICAL INFORMATION *(Assistance may be obtained from the Regional Community Government (CG&T) office if you have difficult with this section).*

1. Date: **September 8, 2008**

2. Municipality: **Hamlet of Baker Lake**

3. Contact: **Dennis Zettler, SAO**

Telephone #: 867-793-2874

Fax #: 867-793-2509

4. Population: **1744**

5. Estimated growth rate over next 5 years**: 2.0%**

6. Has any baseline data collection and evaluation been undertaken with respect to the physical, biological, and chemical characteristics of the main water bodies in the area?

X Yes __No

If yes, provide a summary of program details or site title, authors, cities, and dates: Please see Nunami 2007 for analysis of sampling programs conducted in 2006 and 2007.

If no, are such studies being planned?

X No ___Yes (If yes, when and by whom):

7. Have Elders been consulted in the collection of baseline data on main water bodies in the area?

___No XYes

If yes, specify. Please see Nunami 2007 report

8. Has any baseline data collection and evaluation been undertaken with respect to the various biophysical components of the environment potentially affected by the project?

No XYes

If yes, provide details below.

Nunami 2007 includes water quality data from a number of stations throughout Baker Lake near the community during 2006 and 2007.

If no, are such studies being planned?

X No ___Yes.

If yes, specify:

Attachments

1. Attach detailed plan or drawing(s) of the present *solid waste disposal area*. Include the following information:
   a. details of pond size and elevation;
   b. details of all retaining structures (dimensions, materials of construction, etc.);
   c. details of the drainage basin, and existing and proposed drainage modifications;
   d. details of all decant, siphon mechanisms etc., including sewage treatment facilities;

e. details regarding direction and path of wastewater flow from the area;
f. distance from watercourses and fish bearing waters;
g. location and construction of liners;
h. leachate and groundwater collection systems; and
i. control structures.

2. Attach detailed plan or drawing(s) of the present *sewage treatment system*. The drawing(s) should include the following:

a. details of all retaining structures (dimensions, materials of construction, etc.);
b. details of the drainage basin, and existing and proposed drainage modifications;
c. details regarding direction and path of wastewater flow from the area;
d. indications of the distance from watercourses and fish bearing waters;
e. all sources of seepage presently encountered near these areas, volumes (m^3/day) and directions.
f. The volume of seepage flow (m^3 / day); and
g. The direction of each flow.

3. Are drawings for the solid waste disposal area and sewage treatment system attached?
X Yes ___No

If Yes, who has provided them?
Produced by Nunami Jacques Whitford.

If no, indicate when they will be available.
Schematic Plan drawings are attached, detailed design drawings will be produced during fall 2008/winter 2009 for review and tender.

Hydrology

1. Effects on surface water flow:

Are any stream channels altered? __ Yes _X_ No

Is the natural storage or water level of any lake or pond changed? __ Yes _XNo

Are there changes in water flow downstream of the project? X Yes __ No

Is a storage reservoir created in a natural channel? __Yes X No

If yes to any of the above, briefly describe the expected change in flow or storage:

Attenuation berms will be constructed in the wetlands as per attached drawings. The intent of the berms is to spread out wastewater flow so that it achieves increased contact with the wetland surfaces to increase treatment efficiency.

2. Drainage Area:
   What is the drainage area? Uknown km^2
   What is the average elevation of the drainage basin? Uknown metres
   Is the drainage basin outlined on an attached map? ___Yes X No

   Describe the drainage basin characteristics, (vegetation, general soil type, lakes, swamps and permafrost areas, etc.).
   Sewage exits the holding cell and flows through several lakes and streams before entering Baker Lake. A detailed description of the wetland area is included in Section 4.2 of Nunami 2007.

3. Channel characteristics:
   Is the course of any channel changed? ___ Yes X No

   If yes, describe measures to maintain stream bed and bank stability.

4. Will the cross-section of any watercourse be changed? __ Yes X No
   If yes, describe the change and its effect on the flow capacity of the channel.

Water Supply

1. What is the rate of withdrawal from the source? 177 m^3/day

2. Is water drawn from the source _____ intermittently____**X** continuously

3. If it is drawn intermittently, during what month(s) is it drawn? _____

4. For what period is it drawn (days/weeks/months)? _____

5. What is the rate of flow of source (if river) or size (if lake)?_1887km^2___

6. At the intended rate of water usage, describe the effects on the river or lake from which water will be drawn. Water withdrawal for municipal uses is not expected to impact Baker Lake.

Water Intake

1. Please provide short descriptions of the following:
   a. freshwater intake facility

A single vertically mounted drum screen intake and inclined shaft casing intake is installed at a depth of between 5-6 meters approximately 100-120 m offshore. A 100mm diameter heat traced HDPE pipe connects the intake with the truckfill station on shore. The truckfill station includes a pump building and overhead truckfill arm. As the trucks are being filled, the chlorination is added for disinfection. The hypochlorite feed pump is controlled by the rate of water supplied to the truck by a flow-sensing meter mounted on the discharge line. The chlorine is supplied to the main line by a tube and chlorine injector.

   b. operating capacity of the pumps 1100 Litres/min

   c. intake screen size: Unknown

Water Storage

1. Is a dam or dyke being used to store or alter the flow of water? ___Yes _X_No

2. What are the dimensions of the dam or dyke?
   Length:_____ Width: _____ Height:_____
   U/S slope: _____ D/S slope: _____

3. Does the proposed dam create a reservoir in a natural watercourse?
   ___ Yes ___No
   If yes, what is the storage capacity and surface area of the reservoir?
   ____ m^3 _____ ha.

4. Will the dam or dyke affect fish migration or movement ?
   ___ Yes ___ No
   If yes, describe all measures for compensation of fish habitat lost due to the dam or dyke, and mitigation for fish migration or movement.

Water Treatment

1. Indicate the capacity of the treatment facility. _____ 18 l/sec.

2. What is the capacity of the water storage facility _N/A_litres

3. Describe the method of water treatment (i.e., backwash, flocculation, sedimentation, chemicals used), and provide the results of the most recent bacteriological and chemical analysis. Attach a diagram, if possible.
Calcium hypochlorite is added to the water at the truck fill as describe above.

4. Are there any changes planned in the water treatment facilities? X No ___Yes
If yes, attach a copy of the plan or indicate changes and include an implementation schedule.
Include excerpt from MACA Capital Plan if available.

Sewage Disposal

The Hamlet intends to continue to utilize the wetland treatment system authorized under the Water Licence. Enhancements to the current system are planned, however all designs are at a preliminary stage and specific details cannot yet be confirmed. Final design documents will be provided to the Board when available.

1. Indicate the level of sewage treatment:
__ primary X secondary ___ tertiary
Pre-treatment (if applicable): __ screening ___ maceration
Lagoons (if applicable): ___ anaerobic ___ aerobic ___facultative

2. Indicate the capacity of the sewage treatment facility _The current size of the wetland is approximately 9.7 ha. Based on a recommended minimum size of 5.7 ha/1000m3/day of wastewater and a projected sewage flows in 20 years, a wetland area of only 4 ha is estimated as necessary to effectively treat the communities sewage to within effluent discharge criteria. Planned improvements to the wetland are expected to effectively increase the area of the wetland providing treatment to approximately 40 ha, all within the current boundaries of the wetland.

4. Based on current population projections, the facility will meet the needs of the community until the year 2050 **or greater**.

4. Average depth of the wastewater lagoon _m. 2 m

5. What is the design freeboard? 1 m.

6. Indicate the retention time of the sewage while in the treatment facility
Three days.

7. Indicate the estimated rate of discharge of wastewater__2_ L/sec.

8. Indicate the location of the discharge point Sewage is discharged from the holding cell to the wetland treatment system.

9. Is the discharge: **X** seasonal ____
If the discharge is seasonal, during what month(s) is it done? _May/June to September (when liquids are not frozen)_____

What is the duration of the discharge (days/weeks/months) 4-5 months annually

10. Are there any changes planned in the sewage disposal facilities?
___ No _X Yes
If yes, attach a copy of the plan or indicate changes and include an implementation schedule. The holding cell enlarged and attenuation berms will be added to enhance wetland treatment as described in Nunami 2007. Additionally, a fence is being constructed around the primary treatment area of the wetland.

Include excerpt from MACA Capital Plan if available

Solid Waste Disposal

1. Indicate the capacity of the disposal area Uknown (approximately 1/3 of the area has been used) m^3

2. The *average* depth of the solid waste disposal site 3 m**.**

3. The current facility will meet community needs until the year 2019.

5. Do any natural watercourse enter the solid waste disposal area? None What methods are used to decrease the amount of runoff water entering these areas?

5. Indicate the volume of water that may enter these areas from any source(s) and attach all pertinent details of the diversions.

Source	Volume

6. Please describe any diversions of watercourses: _____

7. Are there any changes planned in the solid waste disposal facilities? __No __X_Yes
If yes, attach a copy of the plan or indicate changes and include an implementation schedule
As per Nunami 2007 a holding cell to treat landfill leachate prior to discharge to the wetland is proposed. The cell is currently in the preliminary design stage with construction planned for 2009.

Other

1. Describe any additional details on the existing municipal facilities which should be considered by the Nunavut Water Board during its review.