Section 2
Information for the Water Licence Application

Information for the Water License Application for the Hamlet of Hall Beach

(1) Name and Mailing Address of Applicant/Licensee:

The Hamlet of Hall Beach
P.O. Bag #3
Hall Beach, Nunavut
XOA OKO

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(3) Location of Undertaking

Hall Beach is located on the east shore of the Melville Peninsula at 68° 46" N latitude and 81° 12" W longitude. Situated in the Foxe Basin of the Arctic Lowlands, it is 840 air km northwest of Iqaluit and 1650 air km northeast of Yellowknife.

Due to depressions created during the glacial period, a resultant marine overlap is responsible for the low-relief topography of raised beaches and shallow lakes now found in the area. Marine sands and gravels cover the landscape, with fines in the depressions. The thin surface deposits are underlain by limestone bedrock.

The town site is situated on an elongated raised beach, oriented to the northwest. The beach is about 100 m wide. It is bordered on the east by the sea, and on the west by an elongated shallow water pond, 45 ha in area.

Hall Beach is located within the continuous permafrost zone. Materials located beneath the thin active layer are perennially frozen to a substantial depth.

Grasses, mosses, and lichens sit in a thin organic layer, 0.3 m thickness or less.

Hall Beach receives an average of 10.0 cm of rainfall and 121 cm of snowfall per year. Mean annual precipitation totals 21.8 cm. July mean high and low temperatures are 8.4° C and 2.3° C. January mean high and low temperatures are -26.9° C and -34.8° C. Winds are generally northwest and annually average 21.3 km/h.

Hall Beach was named after Captain C.F. Hall, an American explorer who spent a number of years on the Melville Peninsula in the mid-nineteenth century. The Hall Beach area has been inhabited at various times since the thirteenth century. The Iglulik Inuit of the area were found to have lived a much richer and varied life than other Inuit groups. The area supports a large population of walrus and whale, the staples of the Iglulik society. Marine mammal harvesting, hunting, trapping, and fishing still remain the major economic activities. The completion of the Foxe Main DEW-Line site in 1955 brought a wage economy to the area. Inuit from outlying camps migrated to the community to take advantage of steady income. The DEW-Line is now being minimalized. Clean

up of the site will have unknown consequences on the ecology of the area and economy of the Hamlet.

The tourism industry constitutes a significant portion of the economy. Within reach, historical interests and natural sites like the Nunapariavik waterfalls attract tourist interest. The area is known for its char fishing.

Building contractors, cartage, general retail, food, hotels, outfitters, and restaurants are some of the goods and services available in the Hamlet.

Hall Beach gained Hamlet status on April 1, 1978. The traditional name of the Community is "Sanirajak", meaning 'flat land'.

(4) Description of Undertaking

Water Supply and Treatment

The water source for the Hamlet and Foxe Main DEW-Line station, Water Supply Lake, was converted to a bermed reservoir with a capacity of 103 000 m^3. It is situated 1.6 km west of the station and fed by a diversion from a dam. Treatment consists of chlorination.

Water Storage and Distribution

There are no storage or pumping facilities within the community. The DEW-Line reservoir has a storage capacity of 600,000,000 litres.

Water is transported 4.6 km from the reservoir to the Hamlet by two trucks, a 1993 model (4546 L capacity) and a 1987 model (6819 L capacity). The Hamlet of Hall Beach delivers water five days per week. The operator usually makes ten deliveries per day. Newer homes on pressure water systems have 1135 L storage tanks, while older homes have 227 L tanks. All water deliveries are metered.

Water Quality:

See DIAND Inspection report

Sewage Collection and Disposal

Sewage is collected by two trucks, a 1987 model (4546 L capacity) and a 1993 model (6819 L capacity). The sewage is trucked 3 km, north of the hamlet, to a two-cell exfiltration lagoon and wetland system.

Solid Waste Collection and Disposal:

Solid waste is collected by the Hamlet twice per week using a 1992 Ford model F-350 stake truck and brought to the solid waste management site 3 km north of the hamlet.The site is situated on 200 m^2 of flat ground near the sewage lagoon. Bulky wastes are stored separately.

(5) Type of Undertaking

Municipal

(6) Water Use

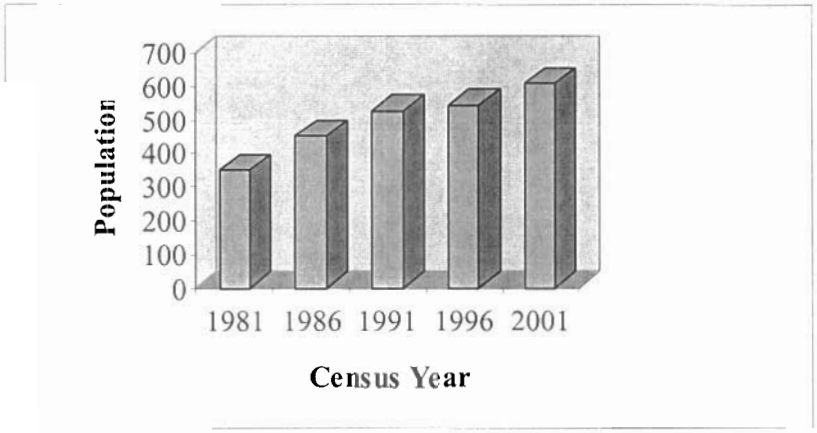
To obtain water, dispose waste

(7) Quantity of Water Involved:

Water Generation Projections:

The 2001 Census Report shows the increase in population of the Hamlet of Hall Beach between the census years of 1981 to 2001. Figure 1 illustrates this population increase. A per capita growth rate of 2.52% was determined between the census years of 1981 and 2001.

Figure 1 - Population Increase in the Hamlet of Hall Beach



CG&T planning guidelines suggest that the increase in the projected per capita water use in a trucked service community should be modelled as follows:

(1) RWU x (1.0 + (0.0023 x Population)) **Population <2000**

The RWU or residential water use is estimated to be 90 litres per capita (Lpcd) for populations lower than 2000.

Ln is the natural logarithm.

The water use is projected as follows:

- The current amount of water use was estimated to be 25,193,867 L annually. This corresponds to a per capita water use of 106.0 Lpcd.

- In the year 2008, the per capita water use would be 107.9 Lpcd corresponding to an annual water use of 29,864,899 L.

Therefore, the community is requesting an annual volume of 30,000,000 litres.

Table 1 - Water Use Projection for the Hamlet of Hall Beach

Planning Year	Calendar Year	Total Population #	Projected Water Use Lpcd	Daily Projected Volume Litres	Annual Projected Volume Litres
0	2002	651	106.0	69,024	25,193,867
	2003	667	106.4	70,996	25,913,518
	2004	684	106.7	73,029	26,655,629
	2005	701	107.1	75,126	27,420,989
	2006	719	107.5	77,289	28,210,415
5	2007	737	107.9	79,520	29,024,756
	2008	756	108.3	81,822	29,864,899
	2009	775	108.7	84,197	30,731,761
	2010	794	109.1	86,647	31,626,300
	2011	814	109.5	89,177	32,549,510
10	2012	835	109.9	91,787	33,502,427

(8) Waste Generated

Sewage:

The volume for the year 2002 of sewage generated by the community of Hall Beach is 25,193,867 litres annually corresponding to the annual water use. In 2008, the annual volume of sewage generated by the Hamlet of Hall Beach will be 29,864,899 litres.

The sewage lagoon was enlarged in 2002 to accommodate the 20 year volume. The expanded exfiltration lagoon is comprised of two cells. Cell #1 has a volume of 15,295 m^3; cell #2 has a volume of 15,462 m^3. The design is such that cell #1 will exfiltrate to cell #2 which, in turn, exfiltrates to a ditch leading to a wetland.

The wetland system at Hall Beach comprises of two wetlands connected by a ditch with a combined area of 6 ha. Predominant vegetation consists of grasses, mosses, and lichens in a thin organic layer, 0.3 m thickness or less.

Sludges:

Sludge is generated through the sewage lagoon process. If the sludge interferes with the sewage treatment process, they would have to be removed to a Nunavut Water Board approved facility. No plans have been made at this time. The two cell lagoon design will facilitate sludge removal if/when required.

Greywater:

Greywater is collected with the liquid sewage and deposited in the sewage lagoon.

Abandoned Sewage Lagoon:

There is an abandoned sewage lagoon at the dew line site. The lagoon is located approximately 200 to 250 metres from the ocean. There is a large quantity of shallow standing water in the area. The lagoon may be leaking in all areas, but most water appears clean. The berms are wide and appear to be in good condition.

Solid Waste Volume Projections:

The types and quantities of materials in the Hall Beach waste stream available for reuse, recycling, recover and composting programs was estimated in by reviewing current information and by literature.

A recent solid waste composition study has not been conducted in Hall Beach. The literature provides an insight. The Heinke and Wong study (1989) used by MACA in their planning studies to determine waste volumes suggests a certain volume and mix of MSW. A study by Quay and Heinke (1992) in Inuvik, Tsiigehtchic, and Fort McPherson suggests similar waste stream mix shown in the table that follows.

Table 3 - Estimated Solid Waste Composition

Food Wastes	20.3 %
Cardboard	9.8 %
Newsprint	2.4 %
Other Paper Products	14.8 %
Cans	4.4 %
Other Metal Products	6.2 %
Plastic, Rubber, Leather	14.0 %
Glass, Ceramics	5.7 %
Textiles	3.8 %
Wood	9.9 %
Diapers	3.8 %
Dirt	4.9 %
	100.0 %

NAPP Protocol

The National Packaging Protocol is an initiative by CCME in 1992 to respond to municipalities and the public over the proliferation of disposable consumer packaging. While per capita consumption of new packaging has decreased overall in the south where the data was generated, the implications for the North and, specifically, for Hall Beach is not as clear.

Southern reductions were primarily a result of recycling, an opportunity not available in Hall Beach. It is assumed that packaging for shipping foodstuff and consumer products has increased proportionately with population.

However, southern data for post-consumer packaging has shown an increase for various "sectors" of between 100 to 200 percent over a 5-year period (1992-1996). These sectors include: accommodation, food & beverage, amusement, and recreational services; retail; aluminium packaging; plastic; and paper sacks and bags. This data may have a direct implication in Hall Beach for increased quantities of waste as the data may transfer directly to current disposal practices.

The classes, "Other paper products", "Cans", and "Plastic, Rubber, Leather" may represent the increasing sectors as per the NAPP data. These first two classes currently account for approximately 19.2% of the estimated waste stream in Hall Beach. If it can be assumed equal contribution from each waste in the third stream, then plastics account for an additional 5%. It appears then, increasing packaging impacts on approximately 24% of the waste stream. Assuming worst case, then, the 200% increase over 5 years is about 40% per year and causes an overall increase of approximately (40% of 24%) 10% per year. This value may over estimate the additional contribution and is unlikely to remain at this level during the entire planning horizon.

Regardless, it is prudent to assume some increase during the planning horizon not directly attributed to a population increase, assuming that recycling programs may not be cost-effective, or implemented in Hall Beach.

Therefore, a 1% increase in the overall garbage generation rate has been incorporated in the volume estimations.

The following assumptions were made to prepare this table:

- Per capita volume described by Heinke and Wong (1990) has been increasing at a rate of 1 % per year
- The per capita population growth rate of the Hamlet of Hall Beach is 2.52% per year.
- The waste density is 0.099 tonnes/m^3 (Bryant et al., 1996)

Table 2 - Solid Waste Projection estimates for the Community of Hall Beach

Planning Year	Calendar Year	Total Population	Projected Daily Rate (m^3pcd)	Projected Daily Volume (m^3/day)	Projected Daily Weight (Tonnes)	Projected Annual Volume (m^3)	Projected Annual Weight (Tonnes)	Running Total (m^3)
0	2002	651	0.014	9.1	0.9	3,327	329	3,327
	2003	667	0.014	9.4	0.9	3,445	341	6,772
	2004	684	0.014	9.8	1.0	3,567	353	10,338
	2005	701	0.014	10.1	1.0	3,693	366	14,031
	2006	719	0.015	10.5	1.0	3,824	379	17,855
5	2007	737	0.015	10.8	1.1	3,960	392	21,815
	2008	756	0.015	11.2	1.1	4,100	406	25,915
	2009	775	0.015	11.6	1.2	4,245	420	30,160
	2010	794	0.015	12.0	1.2	4,396	435	34,556
	2011	814	0.015	12.5	1.2	4,552	451	39,108
10	2012	835	0.015	12.9	1.3	4,713	467	43,821

Solid Waste Treatment:

The solid waste management site (200 m^2) is situated on flat ground north of the Hamlet. Solid wastes are burned at the disposal site every day. Although gravel is readily available, the wastes are neither covered nor compacted.

Old batteries, bulky items and other hazardous wastes are segregated from the other wastes.

Solid Waste Water Runoff Quality:

See Diand reports

Bulky Waste:

The community uses two areas for bulky wastes. Both are separated from the main Solid Waste Site. The first site is located 50 m east of the MSW site and is approximately 30 m by 40 m. The second site is located 750 m to the south of the first site, and is approximately 30 m by 50 m.

Honey Bag Pit:

Community does not use honey bags.

Hazardous Waste:

The community stockpiles old batteries and the like in their old maintenance garage.
Other hazardous wastes are segregated to the bulky metal wastes area.

Abandoned Landfill Site:

The abandoned solid waste site is located outside of the community of Hall Beach. It has been compacted and covered with gravel.

(11) Inuit Water Rights

The project or activity will not substantially affect the quality, quantity, or flow of water flowing through Inuit Owned Lands and the rights of Inuit under Article 20 of the Nunavut Land Claims Agreement.

(12) Contractors and Sub-contractors

None

(13) Studies Undertaken to Date

Hall Beach Sewage Lagoon Design, Ferguson Simek Clark 2002

(14) The following documents must be included with the application for the regulatory process to begin

Supplementary Questionnaire (where applicable: see section 5)	Yes
Inuktitut/English Summary of Project	Yes
Application fee of $30.00 (c/o Receiver General for Canada)	Yes