

Hamlet of Aklavik

Background Report for Water Licence Renewal

Prepared by:

AECOM Canada Ltd.

17203 103rd Avenue, Edmonton, AB, Canada T5S 1J4
T 780.488.6800 F 780.488.2121 www.aecom.com

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AECOM

17203 103rd Avenue, Edmonton, AB, Canada T5S 1J4
T 780.488.6800 F 780.488.2121 www.aecom.com

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Project Number: 111270

Attention: Executive Director
Northwest Territories Water Board
5114 – 49 Street, CJCD Building
P.O. Box 1326
Yellowknife, NT X1A 2N9

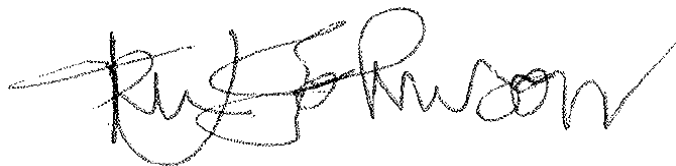
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Re: Hamlet of Aklavik Background Report for Water Licence Renewal

We are pleased to provide you with twelve (12) bound copies and one (1) electronic copy on CD of the Hamlet of Aklavik Background Report for Water Licence Renewal, on behalf of the Hamlet.

If you have any questions regarding the attached report, please contact the undersigned at (780) 453-0910.

Sincerely,
AECOM Canada Ltd.

A handwritten signature in black ink, appearing to read 'Ken Johnson', with a stylized flourish at the end.

Ken Johnson, P.Eng.
ken.johnson@aecom.com

Encl.

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Revision Log

| Revision # | Revised By | Date | Issue / Revision Description |
|------------|-------------------|----------------|---|
| 1 | Cortney McCracken | April 29, 2009 | Hamlet of Aklavik - Background Report for Water Licence Renewal |
| 2 | Tricia Hamilton | April 30, 2009 | Review of report and minor edits |
| 3 | Cortney McCracken | May 6, 2009 | Minor revisions – Final Report |
| | | | |
| | | | |

Signature Page

Report Prepared By:



Cortney McCracken

Report Reviewed By:



Ken Johnson, P.Eng.

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1. Introduction

In support of the Hamlet of Aklavik's application for renewal of its water license, AECOM has prepared a background report to provide an overview of the water and waste infrastructure within the community based upon the compilation of existing information. In addition, this report will serve as a communication tool for the community to address questions and concerns raised by the mayor, council, senior administration, residents, and other potential stakeholders of the community's water and waste infrastructure.

This report provides background information on potable water supply and distribution, sewage collection and treatment, and solid waste management. Previous engineering reports and INAC Inspection Reports are summarized to provide an overview of past issues and improvements to the systems. This report also describes planned improvements to the water treatment plant and the Hamlet's waste site.

This information review is presented through a combination of figures and text to provide a complete understanding of the community's infrastructure. The water and waste systems are illustrated in aerial photos, and tables are used throughout the report to summarize information. The variety of presentation techniques should make the information clear and convenient for the various stakeholders in the application process.

2. Community Brief

The Hamlet of Aklavik ("Place of the Barren Land Grizzly Bear") is located on the west shore of the Peel Channel in the Mackenzie River Delta. The community is accessible year-round by air and in the winter Aklavik can be reached via an ice road from Inuvik. **Figure 1** shows the location of the community.

Aklavik has a history as an excellent trapping area and was used by the Gwich'in and Inuvialuit peoples as a spot to gather for trading. By the 1920's, Aklavik was a permanent settlement with a Hudson's Bay trading post, Anglican and Roman Catholic missions, and the RCMP regional headquarters. The community grew to around 1500 people by the 1950's, mainly due to the booming muskrat fur trade, and was the seat of government services in the Mackenzie Delta area. However, after severe flooding and erosion in the 1950's, the Federal Government began construction on Inuvik about 50 km to the east, and most services were moved from Aklavik to Inuvik. While Aklavik's population dropped as people moved to Inuvik, many residents chose to stay. Today, a large percentage of the community is Gwich'in or Inuvialuit and many residents practice traditional activities such as trapping, hunting and fishing.

Table 2-1 presents a brief profile of the community including size, terrain, climate and socio-economic characteristics.

Table 2-1 Profile of Aklavik

| Category | Description |
|------------------|---|
| Location: | 68° 13' N and 135° 0' W. |
| Population: | 629 in 2007 (NWT Bureau of Statistics). |
| Residences: | 220 (2006 NWT Bureau of Statistics). |
| Proximity: | 58 air km west of Inuvik, 1143 air km northwest of Yellowknife. |
| Weather: | Annual Daily Average = -8.8°C. July Daily Average = 14.2°C and January Daily Average = -27.6°C. (Canadian Climate Normals for nearby Inuvik). |
| Precipitation: | 11.7 cm of rainfall and 167.9 cm of snowfall annually. |
| Vegetation: | Aklavik is within the Boreal forest zone. White spruce (upper delta) or balsam, poplar and black spruce (lower delta) grow on high ground, and low lying areas may have willows, alders, marshy vegetation and muskeg (GNWT, 1982). |
| Transportation: | Accessible by air or ice road in winter, air or boat in summer. |
| Economy: | Major activities include trapping, hunting and fishing. |
| Services: | Public School, Health Centre, RCMP Station, Canada Post outlet, etc. |
| Geology/Terrain: | The delta region surrounding Aklavik is characterized by alluvial deposits of fine sand and silt. Permafrost is continuous, with an active layer between 0.3 and 0.9 m thick. Aklavik is about 10 m above sea level, or 3.5 m above summer water level, so flooding is occasionally a problem. |

3. Infrastructure Descriptions

This section provides an overview of Aklavik's water supply and waste disposal systems. See **Figure 2** for the locations of the water and waste infrastructure described below.

3.1 Water Treatment Plant

Aklavik's raw water comes from the Peel Channel. After water is pumped to the treatment facility, it passes through a pre-treatment clarifier and a packaged Water Treatment Plant (WTP), where it undergoes coagulation/flocculation, clarification and filtration. Water is disinfected through chlorination prior to distribution. Treated water is stored in two above-ground storage tanks before it is delivered by water truck to residents. See **Figure 2** for the water supply site plan.

Aklavik's current WTP is being replaced by a new packaged conventional treatment plant. For information on the future system, see Section 6.1.

3.1.1 Raw Water Supply

Raw water from the Peel Channel can have high levels of turbidity (up to 363 NTU¹) and must be treated to meet the Guidelines for Canadian Drinking Water Quality. The water also has very high levels of colour,

¹ Based on samples taken June 1996, May 1999, February 2003 (GNWT 2003).

iron, and manganese, though the guidelines for these parameters are aesthetic objectives, rather than health-based limits.

Aklavik's WTP is supplied with raw water via one of two 50mm diameter HDPE intake pipes which extend approximately 80 m into Peel Channel. The intake lines, installed in 1979, are surrounded by partially insulated, submerged HDPE series 100 carrier pipes (250mm diameter). Electric heat trace cables provide freeze protection for the intake lines. Coarse mesh galvanized screens are provided at the intake mouths to prevent entrainment of fish.

The intake system was last modified in 2002 with the installation of a new backwash system and new intake pumps. The intake lines are susceptible to clogging with river silt, especially during spring break-up, so frequent backwashing is sometimes required. The system installed in 2002 provides simple, effective flushing of the intake lines to prevent clogging. The backwash process uses treated water and pressure head from the storage tanks to flush the intakes.

Prior to 2002, each intake line had a 3-HP submersible pump to pump water from the River to the WTP. In 2002 these were changed to 5-HP pumps. The operating capacity of the water supply pumps is 1000 L/minute.

3.1.2 Water Treatment

The current water treatment system consists of a pre-treatment clarification unit and a packaged conventional treatment plant. The water treatment system can be operated automatically or can be controlled using control panels on the pre-treatment unit and the packaged plant.

Raw water is first pre-treated in a Neptune FTC-25H flocculator tube clarifier to remove settleable solids. Powdered alum and a polymer² (coagulant aid) can be injected into the raw water pipe upstream of the pre-treatment unit to increase the removal of turbidity during the high-turbidity season (spring break-up and summer).

The Neptune Waterboy 82 packaged plant provides rapid mixing coagulation, flocculation, clarification, and filtration to remove turbidity and colour. The rapid chemical mixing is achieved using hydraulic energy to mix alum and a coagulant aid (Prestol) in the flash mix chamber. Raw water and coagulants are then slowly mixed by paddle type stirrers in the flocculation chamber. The flocs settle out of the water in the sedimentation chamber, which contains settling tubes at a 7.5° angle to horizontal. The water is polished as it passes through a single multi-media filter bed containing anthracite, sand and support gravel. After filtration the water is chlorinated for disinfection.

3.1.3 Storage and Distribution

Treated water is pumped to two pre-insulated steel storage tanks next to the WTP. One of these tanks was installed in 2000, and the other in 2002, to replace two older steel storage tanks and to meet storage requirements. Each tank is 6.1m high and 5.6m in diameter, with a total volume between the two tanks of 289 m³, of which 229 m³ is allocated for daily consumption and plant use and 60 m³ is an emergency fire reserve. Water in the tanks is freeze-protected by two means: a circulation system between the tanks and the WTP, and hot water injection to maintain the water temperature above 0°C.

The truckfill system uses an in-line centrifugal pump to bring treated water from the storage tanks to the water truck. The pump motor control panel is located inside the WTP, however, it can be operated using a remote start-stop button on the exterior truckfill arm or the control panel outside the WTP.

² At the time of the 2003 WTP review, the polymer system was not in operation.

3.2 Sanitary Sewage Facility

Construction began on a new sewage lagoon and solid waste landfill facility at Clearing Lake in the mid 1980's to replace the previous waste site (1.2 km northwest of the community) which had problems with flooding during spring break-up periods. Construction of the sewage, honeybag and solid waste disposal facilities at Clearing Lake was completed in 1987.

Aklavik's sewage is collected using trucked pumpout services. The sewage is treated at the Clearing Lake Sewage Lagoon, shown in **Figure 3**, approximately 2 km northwest of the community.

3.2.1 Trucked Sewage Pump-out

Sewage is collected by a local contractor, AC Contracting, using a 9000 L capacity vacuum truck. The sewage truck typically makes 6 trips/day from Aklavik to the Clearing Lake sewage lagoon.

3.2.2 Lagoon Access Road and Sewage Truck Discharge Area

The sewage is trucked approximately 2 km to the lagoon site via a gravel/dirt road. Sewage is emptied into the lagoon at a truck dump on the east side of the lagoon. The trucks empty into the lagoon through a discharge culvert at the edge of the discharge area.

The truck discharge area is identified by a sign. SNP 570-4 is also posted at this location, although this station is not currently regulated by the Water Licence.

3.2.3 Sewage Lagoon

The Clearing Lake Sewage Lagoon is a natural lagoon that operates with continuous discharge into the adjacent natural wetland. Freeze-up of the lagoon typically happens in early October, and break-up is in late May or early June.

The lagoon covers an area of approximately 290,000 m² and is about 1.5 m (5 ft) deep. The lagoon can therefore hold roughly 435,000 m³ of sewage. For an average sewage input of 78 m³/day (based on potable water use), the lagoon theoretically provides a retention time of 5577 days (15 years).

3.2.4 Effluent Discharge

Effluent discharges continuously from the Clearing Lake Sewage Lagoon into the adjacent wetland area. The outflow point, which is the location of SNP station 570-3, is on the west side of the lagoon, across from the sewage truck discharge area.

Effluent leaving the lagoon must have fewer than 10,000 counts of Fecal Coliforms per any 100 mL grab sample to meet the requirements of Aklavik's current Water Licence. The Licence also requires that the Hamlet conduct a Surveillance Network Program (SNP).

There is one SNP monitoring station at Aklavik's waste disposal site, SNP 570-3, at the point where effluent discharges from the Sewage Lagoon. The Hamlet's SNP requires that effluent from the Sewage Lagoon be sampled at 570-3 once in spring, immediately after break-up of the Lagoon, and once in fall, prior to freeze-up. However, the Hamlet has not taken samples over the course of the current Water Licence.

3.3 Solid Waste Disposal

Solid waste is collected from Aklavik by truck and deposited at the Clearing Lake Solid Waste Facility approximately 2 km northwest of the community, near the Sewage Lagoon. The landfill site plan is shown in **Figure 4**.

3.3.1 Solid Waste Collection and Site Access

A local contractor, Slyke Contracting, trucks Aklavik's solid waste to the landfill. Approximately 4 truckloads of solid waste are collected daily from Aklavik and taken 2 km north to the Clearing Lake landfill. The entrance to the landfill is not gated and the road continues a short distance past the landfill site to the sewage lagoon truck discharge area.

3.3.2 Landfill Site

The Clearing Lake landfill is located 2 km northwest of the community, just east of the Clearing Lake Sewage Lagoon. The landfill is a ground-level site, although there are low berms surrounding the bulky metal waste and honeybag areas. The entire site covers approximately 20,000 square metres (235 x 85 m). The landfill is not fenced, but is surrounded by trees which help keep windblown debris contained.

The landfill is organized to segregate some types of waste. Some signs are present, such as a "Danger: Solid Waste Site" near the entrance, "Metal Only", "No Dumping Garbage", etc. A bulky metal waste area is located north of the access road; this area is currently close to full. The rest of the landfill is south of the road. Hazardous wastes (tires, batteries, etc.) are separated from other wastes. There is a partially bermed pit for honeybags, however, all residents of Aklavik now use trucked sewage pumpout from tanks. Domestic waste is located in the area at the back (south side) of the landfill site. See **Figure 4** for the landfill site plan.

A rough estimate for the capacity of the entire landfill site is 40,000 m³, assuming the entire site of 20,000 m² is built up to a height of 2 m. The current domestic waste disposal area is about 45 x 80 metres (3,600 m²), so the capacity of this area is approximately 7,000 m³.

Any industrial wastes received at Aklavik's landfill come from housing construction and other contractors.

One domestic solid waste area at the Clearing Lake landfill was filled by 1993. A new section was cleared and the old cell was partially covered with soil.

Until recently, burning of domestic waste was done periodically at the Clearing Lake Solid Waste landfill. However, burning of non-segregated waste is no longer permitted. The Hamlet currently does not burn waste, because the landfill does not have an appropriate area (i.e. ash pit) for burning.

4. Water Licence, Studies and Reports During Water Licence Period

4.1 Water Licence and Amendments

Aklavik's Water Licence was first issued as N3L4-0570 in 1984 by the Northwest Territories Water Board (NWT WB). The Hamlet currently holds Licence N3L3-0570 with the NWT WB for municipal waste disposal, and Licence G99L3-003 with the Gwich'in Land & Water Board (GLWB) for municipal water use.

The Hamlet is currently applying for a renewal of its Water Licences.

Table 4-1 Summary of Water Licence Terms

| Effective Date | Expiry Date | Water Board | Licence # | Licence Scope |
|----------------|-------------------|---------------|-----------------------|--|
| August 1, 1999 | July 31, 2009 | Gwich'in L&WB | G99L3-003 | Municipal Water Supply |
| June 30, 1999 | June 30, 2009 | NWT WB | N3L3-0570 (renewal) | Municipal Waste Disposal |
| April 30, 1999 | June 29, 1999 | NWT WB | N3L3-0570 (extension) | Municipal |
| May 1, 1989 | April 30, 1999 | NWT WB | N3L4-0570 (renewal) | Obtain water (150,000 m ³ /year max) and dispose of waste |
| March 1, 1984 | February 28, 1989 | NWT WB | N3L4-0570 | Obtain water (150,000 m ³ /year max) and dispose of waste |

4.2 Water Licence Annual Reports

The Hamlet submitted water use amounts in 2007 and 2008. Average annual water use was 28,436 m³ between April 2006 and March 2008. This is an approximate use of 124 litres per capita per day (average community use of 78 m³/day).

The annual water use can be broken down as shown in the following table.

Table 4-2 Water Consumption By Group User (cubic metres)

| Year* | Residential | Commercial | Hamlet | Government | Total |
|-------|-------------|------------|--------|------------|--------|
| 2006 | 11,484 | 1,414 | 706 | 13,526 | 27,130 |
| 2007 | 12,412 | 1,491 | 594 | 15,247 | 29,743 |

* Measured from April of noted year to March of next year.

SNP samples have not been taken by the Hamlet, so lagoon effluent quality has not been reported over the past water licence period.

4.3 Review of Community Water Management and Water System Infrastructure, 2003 and Update in 2005

In 2003 the Department of Public Works and Services (PW&S), Technical Support Services, Asset Management Division, prepared a report titled "Review of Community Water Management and Water System Infrastructure" on Aklavik's potable water system as part of the GNWT "Workplan towards Providing Safer Drinking Water in NWT Communities". An on-site assessment of Aklavik's water supply facility took place in February 2003. The review concluded that the water infrastructure in Aklavik was generally in fair condition and working as designed, considering the age of the facility. The report identified some deficiencies, mainly related to operation and maintenance of the water system.

In 2005, an update to this report was issued. The update contained additional information on the water system, and provided a recommended action plan for the community and GNWT.

4.4 Overview of the Water and Waste Disposal Facilities at Aklavik, 1982

In 1982, before Aklavik's water and waste facilities were licenced with a Water Board, DIAND inspector Bruce Mackenzie visited the facilities and completed a brief document called *Overview of the Water and Waste Disposal Facilities at Aklavik*. The solid waste disposal site at the time was located 1.2 km northwest of the community and 250 m away from the Peel Channel. The inspector noted that Hamlet representatives were concerned about this location because it was submerged under water during the spring break-up.

Refuse from the dump was making its way into Aklavik and there were serious concerns about contamination of the drinking water source. The document noted that at the time, there were plans to relocate the dump site (the waste disposal was moved in 1987 to the current Clearing Lake site).

5. Water Licence Compliance Inspections and Reports

5.1 Inspection Reports, 2004-2008

This section summarizes the Indian and Northern Affairs Canada (INAC) inspection reports from 2004, 2005, 2007 and 2008 on Aklavik's water and waste systems. INAC water and waste inspections are done to provide a general summary of the state of the infrastructure and current operation of the facilities operating under a Water Licence, highlight any concerns, and determine a community's compliance or non-compliance with its water license.

5.1.1 Water Supply

Table 5-1 presents a summary of comments from Inspection Reports on the Hamlet's Water Supply from 2004 to 2008.

Table 5-1 Summary of INAC Inspections (Water Supply)

| Inspection | Concerns | Notes |
|--------------------------------------|---|--|
| September 24, 2008 by Jan Davies | Oil containers present at Water Fill Station – these need to be properly stored and/or disposed of. | Spill kit needed on site Chemical storage room: holes in floor were repaired and chemical containers organized. Water Facilities to be upgraded in 2009/2010. |
| August 1, 2007 by Jan Davies | Chemical storage room: wooden floor had holes from chemical spills; one chemical drum was on its side and had leaked; possible seepage through the floor onto the ground below the facility. Containers for different chemicals were stored together; these need to be separated to avoid possibility of chemicals reacting with each other. | Intake screen may not satisfy current edition of Fisheries and Oceans Canada Guideline, however, upgrade to Water Supply Facilities is planned for 2010. Torn filter sand bags had spilled onto ground. Spill kit needed on site because of fuel storage. Empty oil containers by Water Fill Station should be disposed of. |
| September 15, 2005 by Kevin Glowa | | Daily water quality analysis records are in good order. |
| September 30, 2004 by Kevin Glowa | | Chemical storage building was not inspected (key unavailable). Holding tanks were recently constructed. Jurisdiction boundary issues for Aklavik (Inuvialuit Settlement Region (ISR) or Gwich'in region) should be addressed during licence renewal 2009. |

5.1.2 Waste Disposal

Table 5-2 presents a summary of comments from Inspection Reports on the Hamlet's Waste Disposal Facilities from 2004 to 2008.

Table 5-2 Summary of INAC Inspections (Waste Facilities)

| Inspection Date | Concerns | Notes |
|--------------------------------------|---|---|
| September 24, 2008 by Jan Davies | <p>Discharge quality is unknown as no SNP samples were collected.</p> <p>Additional signage needed at landfill site for public guidance and waste segregation, and warning signs needed at lagoon.</p> <p>Spillage noted in waste oil storage area.</p> <p>Hazardous waste areas are becoming permanent storage areas – this material should be disposed of appropriately.</p> <p>Berm for the Honey Bag Pit needs to be lengthened to surround entire Pit.</p> <p>Garbage around discharge chute needs to be removed.</p> <p>Solid waste in cells in landfill need to be properly maintained and capped.</p> | <p>Discharge Measuring Device consists of using the amount of potable water delivered to Hamlet as an estimate of sewage discharged from lagoon.</p> <p>No evidence of burning at time of inspection.</p> |
| August 1, 2007 by Jan Davies | <p>Burning of non-segregated Municipal Solid Waste is no longer allowed. GNWT "Municipal Solid Wastes Suitable for Open Burning" document was attached to report.</p> <p>Discharge quality is unknown as no SNP samples were collected.</p> <p>Berm was constructed in 2007 around Bulky Metal Waste area without notification to NWT WB.</p> <p>Additional signage needed at landfill site.</p> <p>Spillage noted in waste oil storage area.</p> <p>Hazardous waste areas are becoming permanent storage areas – this material should be disposed of appropriately.</p> <p>Berm for the Honey Bag Pit needs to be lengthened to surround entire Pit.</p> <p>Sheen noticed on water in the wetland area/roadside ditch near Bulky Metal Waste area.</p> | <p>Used oil containers at sewage inflow structure should be taken to landfill.</p> <p>Discharge Measuring Device consists of using the amount of potable water delivered to Hamlet as an estimate of sewage discharged from lagoon.</p> |
| September 15, 2005 by Kevin Glowa | <p>Considerable windblown debris escaping to the NW of landfill.</p> <p>Waste segregation signs should be posted at landfill.</p> <p>An appropriate hazardous waste area should be constructed for short-term storage.</p> | <p>Asbestos was buried north of the hazardous waste/waste oil storage area and "Dangerous Goods Buried" sign erected (per concern in 2004).</p> <p>Facilities are posted and identified.</p> <p>Bulky Metal Waste location identified. This area is full.</p> |
| September 30, 2004 by Kevin Glowa | <p>Considerable windblown debris escaping from Landfill.</p> <p>Poor segregation of wastes at Landfill – signage needed.</p> <p>Numerous lead acid batteries in and around Landfill should be segregated and stored in designated hazardous waste area.</p> <p>No bermed (engineered) hazardous waste area, and current area is becoming permanent storage area which is not recommended.</p> <p>Bulky Metal Waste area contains other wastes that should be elsewhere.</p> | <p>Currently only 2-3 people are still using honey bag pit, sign is posted.</p> <p>Open burning occurred during inspection. Material was mainly wood debris but contained some other domestic garbage.</p> <p>Facilities are posted and identified.</p> <p>SAO indicated that a screen was installed at outflow of sewage lagoon.</p> |

5.1.3 Surveillance Network Program and Record-Keeping

Table 5-3 presents a summary of comments from Inspection Reports regarding the Hamlet's Surveillance Network Program (SNP) and records and reporting requirements from 2004 to 2008.

Table 5-3 Summary of INAC Inspections (SNP and Reporting)

| Inspection Date | Records & Reporting | SNP |
|--------------------------------------|---|--|
| September 24, 2008 by Jan Davies | Updated O&M Plan was not received. 2004, 2005, 2006, 2007 Annual Reports not received. | Sign 570-4 knocked down, unable to confirm sign 570-3. Both need to be re-installed so completely visible from discharge chute. |
| August 1, 2007 by Jan Davies | Updated O&M Plan was not received. 2004, 2005, 2006 Annual Reports not received. | Unable to confirm SNP sign 570-3. |
| September 15, 2005 by Kevin Glowa | Updated O&M plan was not received. 2004 Annual Report still not submitted. | No indication that samples are being taken. |
| September 30, 2004 by Kevin Glowa | Updated O&M plan was not received. 2004 Annual Report not submitted. Incomplete Annual Report for 2003 (no SNP data). | Upon consultation with SAO, SNP station 570-3 is only accessible by boat and is posted. SAO indicated that samples are taken in spring and fall at SNP 570-3. |

5.2 INAC Compliance Report, 1999

A Compliance Report indicates any non-compliance with the Water Licence terms during a particular calendar year in order to identify problem areas. The most recent Compliance Report for Aklavik was written by Scott Gallupe, Water Resources Officer with Indian and Northern Affairs Canada, in April 2000, shortly after the Hamlet's Water Licence renewal in 1999.

The 1999 Compliance Report identified seven (7) violations of the Hamlet's Water Licence and concluded that the Hamlet's compliance with the terms of the Licence for 1999 was not satisfactory. However, the report did note that there were no effluent quality violations, and all of the violations concerned administrative tasks such as sampling, signage and reporting. The 1999 violations are as listed below:

1. Part A3: Hamlet's 1998 Annual Report was incomplete (no SNP data).
2. Part A3: Hamlet had not submitted 1999 Annual Report.
3. Part A4: Hamlet did not fully comply with Surveillance Network Program for 1999.
4. Part A9: SNP station 570-3 signage was not posted.
5. Part B8: Hamlet had not submitted O&M Plan for Sewage and Solid Waste Disposal.
6. SNP B1: Hamlet did not sample SNP station 570-3 after spring break-up of Clearing Lake. Sewage in 1999.
7. SNP D1: Hamlet did not submit all required information in 1998 annual report.

6. Recent and Planned Improvements

6.1 Water Treatment Plant

The Hamlet's potable water treatment system is being upgraded to meet new water quality standards. Corix is constructing a new Water Treatment Plant (WTP) off-site, which will be shipped to Aklavik for commissioning in fall 2009.

The new WTP will be located in approximately the same spot as the existing WTP. The new plant will utilize the existing raw water intake line, with two new 0.75 kW (1 hp) raw water supply pumps. Any large debris and sediments will be pre-screened from the water by two new stainless steel mesh intake screens which will meet Department of Fisheries and Oceans (DFO) requirements.

The following process brief was supplied by the consultant constructing the new WTP:

"The water treatment process consists of chemical injection, mixing, coagulation, flocculation, tube settle assisted clarification and high rate filtration. The treatment process is an automatic, gravity flow operation. It consists of two mechanical flocculation units, one tube settler sedimentation treatment train and two dual media gravity filters. The raw water enters the water treatment unit at the top of the flocculator section of the treatment train. The inlet flow rate to the train is controlled by a modulating electrical actuator butterfly valve and monitored by a flowmeter. The turbidity of the raw water is monitored by an online turbidimeter. Liquid alum, and a polymer, is added to the water to assist with the precipitation of particulates and the coagulation of suspended solids to form "flocs". The flocculator section is mixed so to increase the formation rate of the "flocs." The amount of the polymer added to the flocculation stage is proportional to the inlet flow rate as measured by the raw water flowmeter upstream of the train. The "flocs" that are formed in the flocculation stage are removed from the water in the clarifier. As the water flows from the flocculator section to the clarifier section, the larger "flocs" settle out by falling to the floor of the clarifier. These particles are hydraulically removed from the section through a 150 mm pipe that connects to the wastewater pipe. The clarifier water then flows into the filter section for final treatment. Here, the remaining contaminants that were not removed in the clarifier are filtered from the water. The filtered water exits the water treatment unit at the bottom of each filter cell."

Filtered water will be tempered, chlorinated, and stored in the existing above-ground insulated storage tanks.

While Public Works and Services operates the current WTP, the Hamlet's understanding is that the new WTP will be operated by a municipal employee (George Nerysoo) after he completes training at the new plant with MACA.

6.2 Landfill Improvements

The Hamlet is planning to cover part of the domestic landfill area this summer (2009). This would involve building berms around the full area and covering the compacted waste with soil/mud.

6.3 SNP Signage

Currently, the location for SNP 570-3 is recognized to be where effluent discharges from Clearing Lake Sewage Lagoon, however, there is no sign marking this location. The Hamlet intends to post a sign when ground and water conditions are suitable, hopefully this summer (2009).

7. Conclusions and Recommendations

Over the most recent term of its Water Licence (1999-2009) the Hamlet of Aklavik has had non-compliance issues with the SNP, record-keeping and reporting components of the Water Licence. Over this period the Hamlet has not sampled lagoon effluent, and Annual Reports have either not been submitted, or else have been submitted without any SNP information.

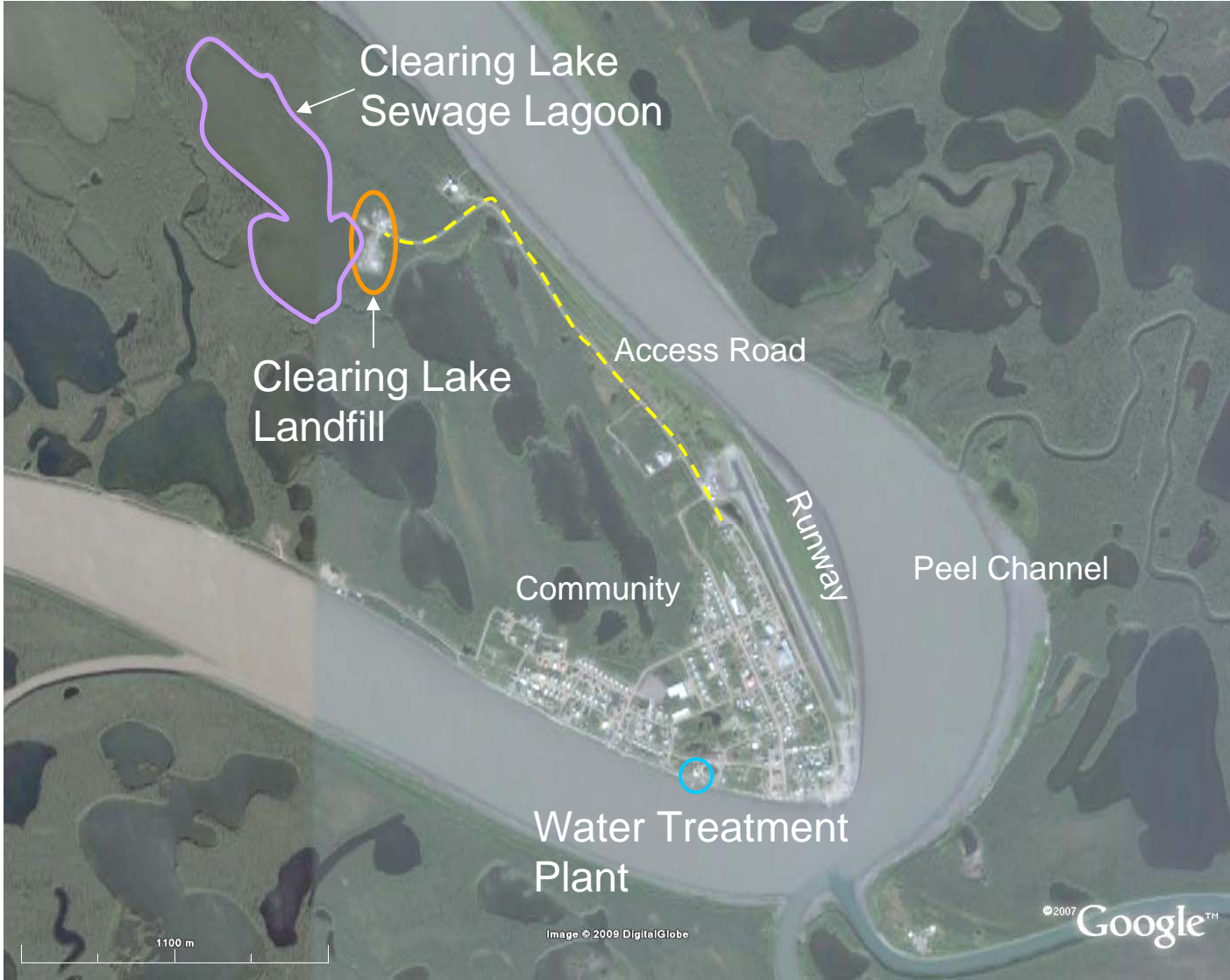
No significant operational problems have been noted over the recent Water Licence term by the community or by government inspectors. The Hamlet appears to be complying with Water Licence effluent quality requirements, as DIAND Water Resources did not report any problems after sampling Aklavik's Sewage Lagoon in 2007.

The Hamlet will continue to improve its waste facilities through actions such as posting signs, segregating landfill waste and reclaiming (compacting and covering) full landfill areas. The Hamlet has retained an additional Public Works person, who will make sure that sewage lagoon sampling will be done consistently in the future. The Hamlet is commissioning a new water treatment plant which will be operational in late 2009. The new WTP should provide high-quality potable water for Aklavik well into the future.

Aklavik's water and waste facilities have served the community successfully, and should continue to do so in the future.

8. References

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Hamlet of Aklavik
Water Licence Renewal Background Report

Figure 1. Infrastructure Locations



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Figure 2. Water Supply Site Plan



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Figure 3. Sewage Lagoon Site Plan



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Figure 4. Landfill Site Plan