Cape Christian Cleanup

Operations and Maintenance Manual
Sewage Lagoon- version 1.1

QESin 2007P6
January 2010

1.0 Introduction

This document was prepared in accordance with the "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories; 1996".

1.1 Purpose

Developed to present operational and maintenance procedures related to the Sewage Lagoon at Cape Christian, as requested in Part E, Item 2 of the Water License (1BR-LOR0813) issued by the Nunavut Water Board, this manual is to be used as a reference guide by all Qikiqtaaluk Logistics personnel involved directly or in-directly with the operations and maintenance of the Sewage Lagoon.

1.2 Location

As seen in Figures 1 and 2, Cape Christian is located on the east coast of Baffin Island in Nunavut; approximately 16 km north-east from the Hamlet of Clyde River, the nearest community.

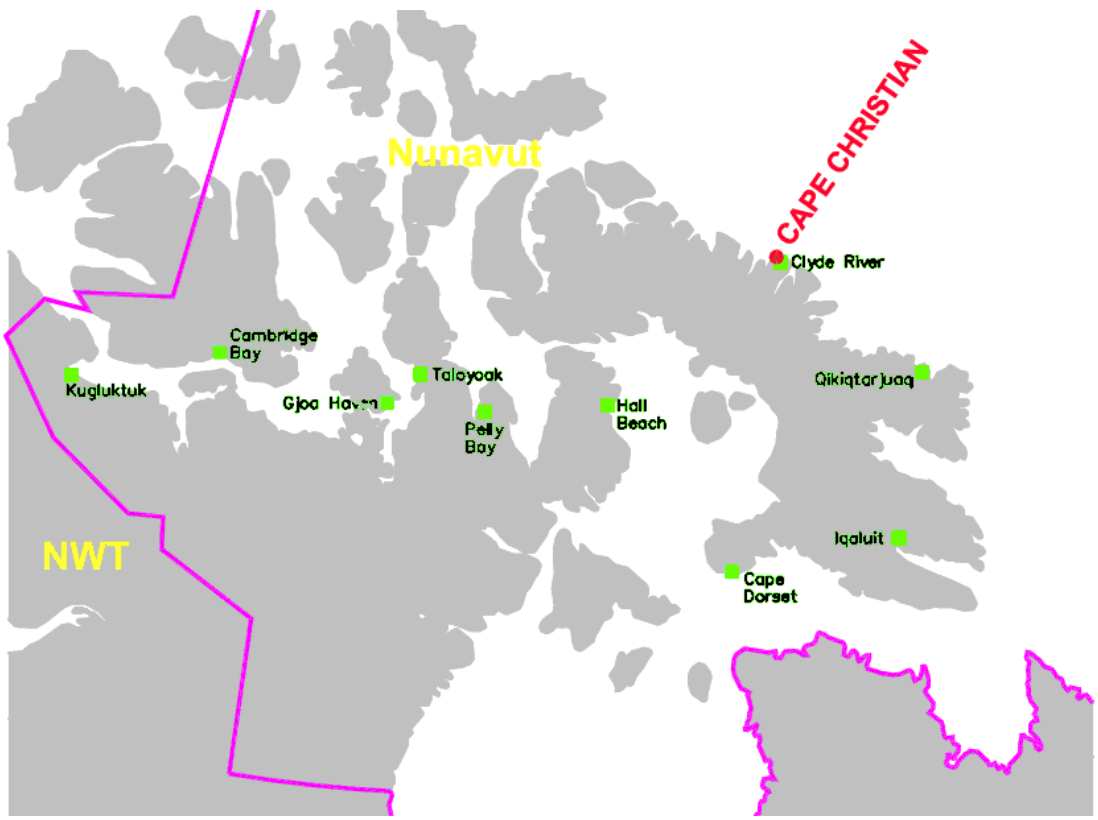

Figure 1 : Location of Cape Christian in Nunavut (INAC, 2009)

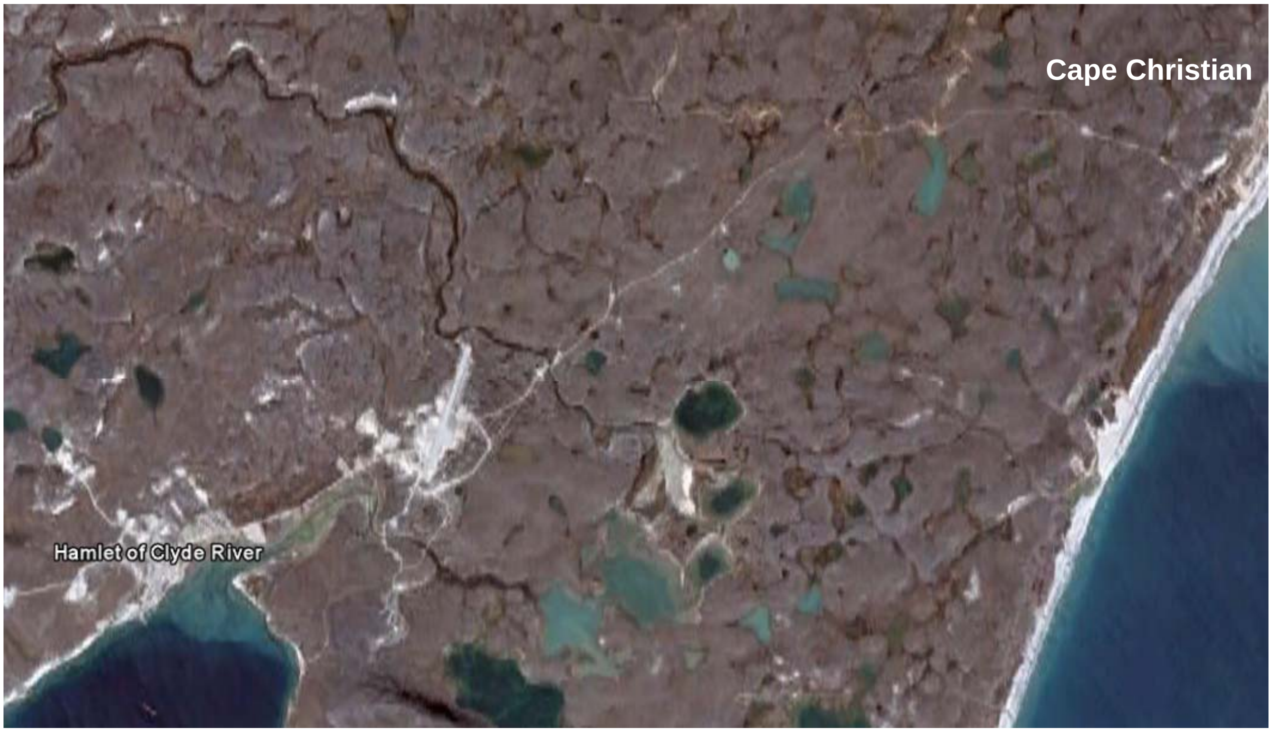

Figure 2 : Location of Cape Christian with respect to the Hamlet of Clyde River (Google Earth, 2010)

Refer to Figure 3 and Figure 4 (Section 3.1) for a more detailed localization of the Sewage Lagoon on the Cape Christian site

1.3 Population Serviced

The Sewage Lagoon at Cape Christian is connected to a temporary work camp. The camp houses up to 43 persons during the summer months in 2009 and 2010. At a minimum, during mob and demob periods, the camp will house a small team of 5. The camp is closed from October to June.

2.0 Background

2.1 Drinking Water

Drinking water for the camp is obtained from a local creek located approximately 300 meters from the camp as seen in Figure 3. The water is pumped directly into an 11,000L roll-off truck which is then connected directly to the camp's pre-treatment system. An ultraviolet-lamp and a 5 micron filter are used to pre-treat the water before it is distributed via the camp's piping system.

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QIKIQTAALUK ENVIRONMENTAL

General Notes:

Legend:

No.	DATE	REVISION	REVISION	APPR.

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Qikiqtaaluk Logistics Inc.

PROJECT - PROJET
CAPE CHRISTIAN, NUNAVUT

TRADE - METIER	DATE
SITING	**2008-12-15**

SCALE - ECHELLE
NOT TO SCALE

SUBJECT - SUJET

CAPE CHRISTIAN REMEDAITION PROJECT
SITE DETAILS

PRODUCTION	CONCURRENCE - ASSENTIMENT
DESIGNED ETUDIE	**Greg Johnson**
DRAWN DESSINE	**Greg Johnson**
CHECKED VERIFIE	**Phillppe SImon**
COORDINATION	REVIEWED - REVU

DWG. NO. - DESSIN NO.
QESIn 2007 P6-2010-01

2.2 Sewage Generation & Treatment

Liquid sewage from the camp (black and grey water) flows to the Sewage Lagoon by gravity in a 6” PVC pipe. The raw sewage is treated naturally in the shallow lagoon under aerobic conditions through the effect of sunlight and wind surface reaeration.

2.3 History

The Sewage Lagoon was constructed in July 2009 and will be decommissioned at the end of the 2010 work season (approx. mid-September 2010). The lagoon is used to treat sewage generated during the summer work months.

3.0 Operational and Maintenance

3.1 Site Description

As seen in Figure 4, on the next page, the Sewage Lagoon is located approximately 100 meters south-west of the camp. The distance to the closest water body is at least 100 meters.

The Final Discharge Point (LOR-2) will be determined onsite at the end of the 2010 work season. It should be at least 100 meters from all naturally occurring bodies of water and 100 meters from major drainage channels. The discharge point should allow the percolation of the sewage through a wide vegetated corridor through the tundra before it reaches the Ocean.

3.2 Type of Lagoon

The Sewage Lagoon is an engineered aerobic oxidation pond which measures 65 metres long by 35 metres wide (outside the toe of slope). The berms are 1.5 metres high and have inside and outside slopes of 3L:1H to ensure stability.

3.3 Discharge Method

The Sewage Lagoon will be discharged once, before decommissioning, at the end of the 2010 work season. The sewage is to be pumped (using a floating intake device with a screen to ensure that no solids get pumped out of the lagoon) to a discharge location referred to as the Final Discharge Point (LOR-2).

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General Notes:

1. The location of the construction camp and the sewage lagoon have not bee survyed and are approximate.
2. The dimensions of the lagoon are based on an as built survey.
3. Distances shown are the minimum distances to be respected from water courses, water bodies and the construction camp.

Legend:

No.	DATE	REVISION	REVISION	APPR.

Qikiqtaaluk Logistics Inc.

PROJECT - PROJET: CAPE CHRISTIAN, NUNAVUT

TRADE - METIER: SITING

DATE: 2010-02-22

SCALE - ECHELLE: NOT TO SCALE

SUBJECT - SUJET: CAPE CHRISTIAN REMEDAITION PROJECT APPROXIMATE LOCATION OF THE SEWAGE LAGOON

PRODUCTION	CONCURRENCE - ASSENTIMENT
DESIGNED ETUDIE	Greg Johnson
DRAWN DESSINE	Greg Johnson
CHECKED VERIFIE	Phillppe Simon
COORDINATION	REVIEWED - REVU

DWG. NO. - DESSIN NO.
QESin 2007 P6-2010-02

3.4 Personnel

The Site Superintendant has the overall responsibility for the sewage waste disposal. The day-to-day operation and maintenance of the Sewage Lagoon is either carried by the Assistant Site Superintendant or by a designated worker.

- Site Superintendant (Jean-Louis Bertrand) - (604) 759-0910 ext 103
- Assistant Site Superintendant (Jeremiah Groves) - (604) 759-0910 ext 106

3.5 Normal Operations and Maintenance Procedures

These procedures must be carried out frequently to ensure smooth operation of the treatment system.

- Daily visual inspection of the piping and its support structure connecting the camp to the sewage lagoon to ensure the proper flow of sewage. Obstructions in the piping and soil settling underneath the piping supports are examples of incidents that may cause sewage to stop flowing from the Camp to the Lagoon or worse yet, cause the sewage to backup into the Camp.
- Daily visual inspection around the sewage lagoon. The sewage water level is to be monitored as well as the integrity of the berms.
- In the event that the integrity of the berms has been compromised, the Site Superintendant is to be notified and repairs are to begin as soon as possible.
- The sewage lagoon is to be pumped out when the sewage reaches 75% of its holding capacity and at the end of the project.
    - ◊ A written notice is to be sent to Nunavut Water Board at least ten (10) days prior to initiating any decant or discharge from the Sewage Lagoon.
    - ◊ The sewage is to be pumped (using a floating intake device with a screen to ensure that no solids get pumped out of the lagoon) to a discharge location referred to as the Final Discharge Point (LOR-2). The Final Discharge Point should be a bed of 10-20 large flat rocks at least 100 meters from all naturally occurring bodies of water and 100 meters from major drainage channels. The sewage will be allowed to percolate through a wide vegetated corridor in the tundra before it reaches the Ocean.

3.6 Sampling Procedures and Requirements

Monitoring the sewage effluent is an important requirement set by the Nunavut Water Board. In compliance with Part D, Item 10 of the Water License, a representative composite sample is to be collected for analysis once at the beginning of discharge upon initial release and prior to the end of discharge, from the Final Discharge Point (LOR-2). Sampling will be performed by the Contractor's Engineer.

The following factors are particularly important to producing meaningful results:

- Using the correct clean sampling container for the parameter being tested
- Collecting the samples from the correct location and completing any necessary field tests at that time
- Labelling the samples correctly and filling out a record sheet
- Using the correct procedure for field tested parameters
- Shipping the samples quickly and in the correct containers to the analytical laboratory

All waste discharged from the Final Discharge Point of the Sewage Lagoon shall not exceed the following effluent quality limits:

- Biological Oxygen Demand (BOD) - 120 mg/L
- Total Suspended Solids (TSS) - 180 mg/L
- Faecal Coliforms - 10,000 CFU/100mL
- pH - 6.0 to 9.0 (field tested)
- Oil and Grease - no visible sheen (field observation)

3.7 Record Keeping

Records are to be kept to assist in planning, the evaluation of the effectiveness of the sewage treatment system and the creation of reports for the Nunavut Water Board.

As a minimum, the following information should be recorded:

- The monthly and annual quantities (in cubic meters) of sewage generated
- Volumes and dates of any effluent discharged to the environment
- Sewage volume collected
- The dates any monitoring is conducted
- The results of the monitoring program
- Details of any maintenance activities carried out

3.8 Health and Safety Procedures

Due to the potential health hazards associated with sewage handling and treatment, the following safety precautions should be taken by all persons coming into contact with sewage:

- Equipment is to be kept clean (e.g. discharge pump)
- Hands are to be washed frequently, as a minimum after work and before eating or smoking
- Work gloves and boots should be worn at all times while performing work activities. Work clothes and boots should not be worn inside the Camp.
- Personnel should receive appropriate vaccinations

Due to the remote location of the Sewage Lagoon, it is important to be “Bear Aware”. Refer to the Health and Safety Plan for the proper precautions to take while working around the Sewage Lagoon.

3.9 Weed and Insect Control

Due to the short summer season, generally low seasonal highs and the short lifespan of the lagoon, weeds and insects are not a nuisance onsite. Thus, no measures need to be taken for their control.

3.10 Access Control

Signs around the Sewage Lagoon and at the entrance of the Cape Christian site restrict the passage to authorised personnel only.

3.11 Chemical Use

No chemicals are used for the treatment of sewage at Cape Christian.

3.12 Sludge Management

Significant volumes of sludge are not anticipated; for the primary treatment of wastewater, sludge volumes typically represent 0.25 to 0.35 percent of the volume of wastewater treated (Davis and Conwell, 1998).

During the decommissioning of the Sewage Lagoon (refer to section 6.0), the berms will be used to cap in place the remaining solids (sludge).

4.0 Hazardous Waste Management

A hazardous waste is defined as a contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage (Government of NWT, 1995). Waste Management includes the disposal, processing, controlling, recycling, and reusing the solid, liquid, and gaseous wastes of plants, animals, humans, and other organisms (CEPA Environmental Registry, 2007). When hazardous wastes are mismanaged, they have the potential to pollute the environment and threaten human health.

Due to its potentially toxic properties, raw sewage can be classified is a hazardous waste, more particularly as a biohazardous waste. Biohazardous waste can be broadly defined as all biological waste that could have the potential to cause harm to humans, animals, or plants. On a normal day-to-day basis, no one should be coming into direct contact with the raw sewage at Cape Christian; however it is essential the safety precautions listed in section 3.8 be followed anyway. The treatment of the sewage is performed naturally, as previously mentioned, by the aerobic lagoon and the effluent is disposed of according to section 3.4 and 3.5.

For more detailed notions of hazardous waste management refer to your HAZWOPER training course pack or consult the *Guideline for the General Management of Hazardous Waste in the Northwest Territories* and the *Guideline for Industrial Waste Discharges in the Northwest Territories* available in the Engineer's office.

5.0 Emergency Responses

Refer to Section 19 - Emergency Response Procedures of the Cape Christian Health and Safety Plan.

6.0 Decommissioning Procedures

At the end of the project just prior to closure of the site, the Sewage Lagoon will be decommissioned:

- The remaining sewage will be pumped out of the Lagoon, according to standard discharge procedures, and the berms will be pushed over the remaining solids (sludge)
- Pooling sewage will be pumped out as the berms are being pushed up
- Water in the surrounding ditches will also be pumped out and the ditches will be backfilled to match the surrounding terrain and prevent the ponding of water.
- If required additional soil will be used to cover the solid waste in the sewage lagoon
- The final cover will be track-packed using a Caterpillar D6 bull dozer.

7.0 References

Canadian Environmental Protection Agency (CEPA), 2007. *Environmental Registry: Glossary*. http://www.ec.gc.ca/CEPARegistry/gloss.cfm#H

Davis, M.L. and Cornwell, D.A., 1998. *Introduction to Environmental Engineering*. 3rd ed. Boston: The McGraw-Hill Companies Inc. p420.

Government of the NWT, 1995. *Environmental Guideline for General Management of Hazardous Waste.* Department of Renewable Resources, Yellowknife.

Date Modified: 23-02-2010