Cape Christian Cleanup

Operations and Maintenance Manual
Non-Hazardous Waste Landfill
Version 1.1

QESin 2007P6
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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 Non-Hazardous Waste Landfill 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 Non-Hazardous Waste Landfill.

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 from north-east from the Hamlet of Clyde River, the nearest community.

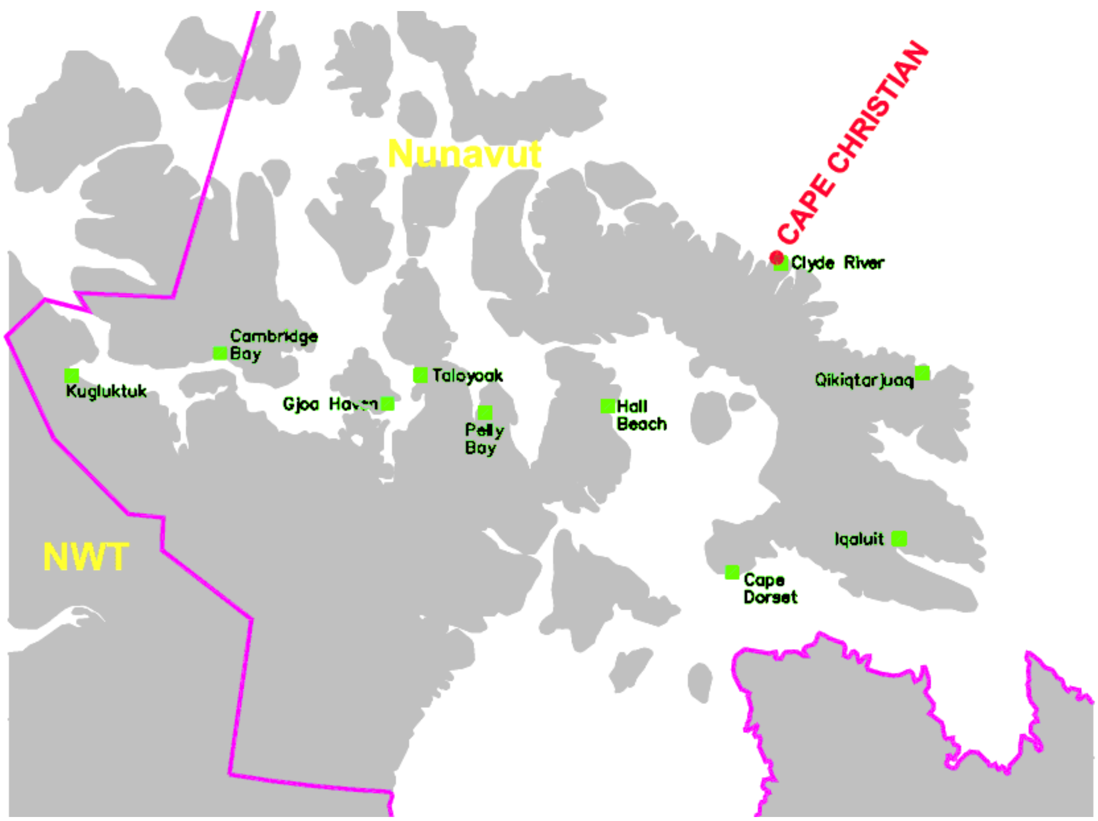

Figure 1 : Location of Cape Christian in Nunavut (INAC, 2009)

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

Figure 3 illustrates the location of the Landfill on the Cape Christian site.

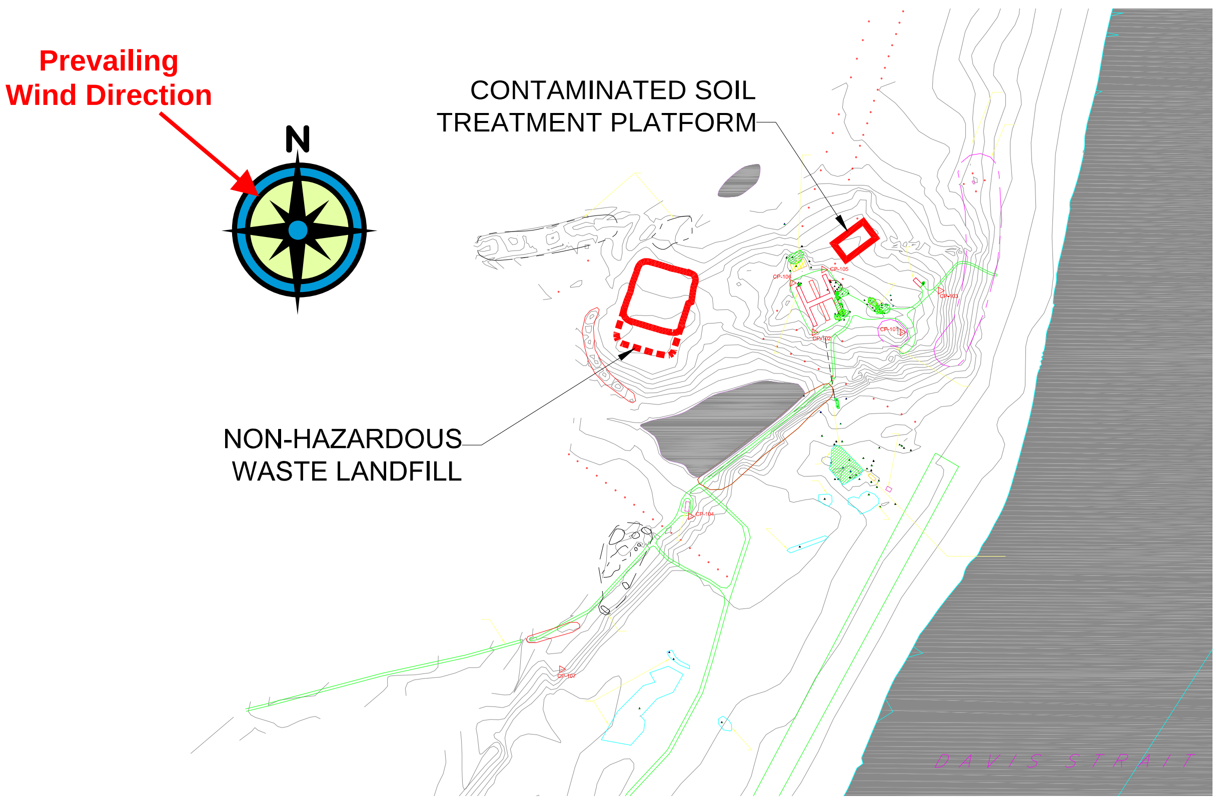

Figure 3 : Location of Non-hazardous Waste Landfill at Cape Christian

2.0 Background

2.1 Solid Waste Generation, Composition & Collection

The Non-Hazardous Waste Landfill is to be used for the disposal of all nonhazardous waste from the site and non-hazardous waste generated during site construction and remediation activities, including Type A soil and contaminated soils that exceed DCC Tier I criteria and are less than DCC Tier II criteria. All hazardous waste is to be disposed of off site.

All the non-hazardous waste generated from the clean-up of the Cape Christian site (i.e. infrastructure demolition, debris removal etc) as well as the non-hazardous waste generated from support activities (i.e. empty cleaned fuel drums) is hauled to the Landfilled to be disposed of onsite. The waste may have been previously piled alongside the roadway to reduce downtime.

Refer to Appendix A – Demolition Inventory and Appendix B- Debris Inventory of the Specifications for a detailed list of the non-hazardous waste to be disposed of in the Landfill.

2.2 Site History

The first phase of Non-Hazardous Waste Landfill (3 of the 4 berms) was constructed in July 2009. The remaining berm will be constructed as the volume of waste is confirmed in 2010 and the landfill will be capped at the end of the 2010 work season.

3.0 Site Description

3.1 Dimensions

The first phase of the Non-hazardous Waste Landfill measures about 100 metres long by 90 metres wide (outside the toe of slope). The berms are up to 3 metres high and have inside slope of 2L:1H and outside slope of 3L:1H to ensure stability. One additional phase for the landfill can be added should the amount of waste to be landfilled exceed the capacity of the first phase of the landfill.

3.2 Distance to Water Bodies and Drainage Paths

The Landfill is constructed on the North side of a higher point of land. The runoff water from the landfill will drain initially to the north and then proceed north-northeast.

The closest body of water along the drainage path is the ocean but it is well over a kilometre before any water would reach the ocean. The other closest body of water is the man made reservoir on the site. However, all of the water from the landfill would drain away from this water body.

3.3 Waste Segregation

The non-hazardous waste disposed of in the Landfill will be segregated into sections as much as possible (e.g. demolition debris, asbestos, old vehicles, crushed drums etc.) A succinct description and layout of the waste categories will be kept to date by the Contractor’s Engineer.

4.0 Equipment List

The following equipment is required to operate the Non-Hazardous Waste Landfill:

- 1 x Caterpillar D6R dozer
- 1 x Caterpillar 320 excavator
- 1 x Caterpillar 950 loader
- 1 x Caterpillar D250E Rock Truck
- 1 x Caterpillar rotary drum compactor

5.0 Personnel

The Site Superintendant has the overall responsibility for the construction, operation, maintenance and closure of the Non-Hazardous Waste Landfill, although day-to-day operations and maintenance activities will be carried out by the heavy equipment operators.

- Site Superintendant (Jean-Louis Bertrand) - (604) 759-0910 ext 103

6.0 Operational and Maintenance Procedures

These procedures must be carried out frequently to ensure smooth operation of the Non-hazardous Waste Landfill.

6.1 Basic Operations and Maintenance Procedures

- Place non-hazardous waste in uniform, horizontal lifts. The maximum thickness of each waste lift shall not exceed 0.5 metre.
- Place bulky wastes in an organized manner, starting from the back and working towards the front.
- Track-pack each waste lifts 3-5 times with the bulldozer.
- Place Tier I contaminated soil or Type 6 granular fill as intermediate cover to a maximum loose thickness of 150 mm over each layer of non-hazardous waste or as required to infill voids within the waste layer, and track-pack with bulldozer (minimum 3 passes).
- Only dry and stable material is to be placed in the landfill.
- Each layer of solid waste and cover material is to be sloped to prevent ponding and seepage into the Landfill.
- Segregate all asbestos from other material and consolidate in one single location within the Landfill. Provide daily intermediate cover of minimum 150 mm Type 6 fill on asbestos waste. Do not operate equipment directly on asbestos waste containers. Replace ripped or torn asbestos waste bags.
- Also segregate metal, PCB-amended painted materials (<50ppm), and creosote treated materials from other material placed in the Non-Hazardous Waste Landfill.
- Ensure that all vehicles to be landfilled have been drained of all fluids and that the batteries have been removed.
- Ensure that all compressed air cylinders to be disposed of have been vented.
- Place debris in such a way as to prevent the wind from blowing them around or out of the Landfill (i.e. place intermediate fill or heavier waste over loose/light waste).
- Immediately cover any waste with intermediate fill that may cause disagreeable odours.
- At the end of each construction season, place and compact Type 3 granular fill as a temporary cover over the Landfill.

- Remove all surface snow/ice and the Type 3 granular cover at the start of the next construction season.

6.2 Sampling Procedures and Requirements

Monitoring any water collected within the landfill berms due to rain or snowmelt is an important requirement set by the Nunavut Water Board. In compliance with Part D, Item 12 of the Water License, a representative composite sample is to be composed from a minimum of 5% of the total volume to be released from the Final Discharge Point of the Non-hazardous Waste Landfill (LOR-5). 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

Seepage from Non-hazardous Waste Landfill shall meet the following wastewater discharge limits prior to being released onto land to a location at least thirty (30) metres distance from the ordinary high water mark of any adjacent water body, where direct flow into a water body is not possible and no additional impacts are created:

- pH - 6 to 9
- Oil and Grease – 5 000 µg/L
- Arsenic (total) – 100 µg/L
- Cadmium (dissolved) – 10 µg/L
- Chromium (dissolved) – 100 µg/L
- Cobalt (dissolved) – 50 µg/L
- Copper (dissolved) – 200 µg/L
- Lead (dissolved) – 50 µg/L
- Mercury (total) - 0.6 µg/L
- Nickel (dissolved) – 200 µg/L
- PCB (total) – 1 000 µg/L
- Phenols – 20 µg/L
- Zinc (total) – 500 µg/L

If the effluent does not meet the wastewater discharge limits, it shall be considered hazardous waste and disposed off-site at an approved facility.

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 Landfill.

6.3 Record Keeping

Records are to be kept to assist in planning, future monitoring 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 metres) of material deposited in Non-hazardous Waste Landfill;
- A summary of any construction work, modification and major maintenance work (including as-built diagrams) carried out at the Non-Hazardous Waste Landfill
- Specific location, depth and description of these materials on the Project Record Drawings:
    - Metal
    - Asbestos
    - Creosote treated materials
    - PCB-amended painted materials (<50 ppm)
- Visits by regulatory authorities or other activities on site
- Sampling results

6.4 Health and Safety

Health and Safety precautions should be taken by workers involved in the operation and maintenance of the Landfill:

- 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
- Reflective safety vests and a hard hat should be worn when working around heavy equipment

6.5 Access Control

Signs around the Non-Hazardous Waste Landfill and at the entrance of the Cape Christian site restrict the passage to authorised personnel only.

6.6 Waste Burning

No waste is to be burned in or around the Non-hazardous Waste Landfill.

6.7 Potential Hindering Conditions

The lack of access to an abundant supply of Type I cover material may potentially hinder the capping of the Landfill. INAC has been advised of this condition and hopes to remediate the situation.

7.0 Closure Procedures

- Complete the last berm to specifications.
- Install the final monitoring well once the last berm has been completed
- Do not place final cover until Engineer has determined that there is sufficient Type 6 intermediate cover.
- Construct final cover over landfill to the specified thicknesses and grades as indicated on the Drawings.

8.0 Hazardous Waste Management

No hazardous wastes are to be disposed of in the Landfill (except for properly packaged asbestos, creosote poles or vermiculite).

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.

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.

9.0 Emergency Responses

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

10.0 References

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

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

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