



Hamlet of Cambridge Bay

Municipal Solid Waste Disposal Facility Operation and Maintenance Manual

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1. Introduction

In 2012, the Hamlet of Cambridge Bay's municipal solid waste (MSW) disposal facility was re-developed into an engineered facility. This manual presents the operation and maintenance (O&M) procedures associated with the new disposal facility.

Water use and waste disposal in the Hamlet of Cambridge Bay is regulated by a Type B Water License issued by the Nunavut Water Board, included in Appendix A.

1.1 Objective

This manual has been developed to:

1. Provide the Hamlet of Cambridge Bay with “best management practices” for the operation and maintenance of its Municipal Solid Waste disposal facility; and
2. Document these practices for review by the Nunavut Water Board (NWB) and the community.

1.2 Operating Principles

The facility is to be operated according to the following principles:

- Operations are managed by an Operator who is on-site during operations hours
- Access is controlled
- Only approved or authorized waste is accepted
- The facility is operated according to the design
- Wastes are compacted to the greatest practical density
- Wastes are covered with granular material to control nuisances
- Surface water is controlled and monitored
- Safe operating practices are followed
- Records are maintained with respect to operations and site development

Contact lists for relevant Hamlet personnel may be found in Appendix B.

1.3 Operation Policies

Operation Policies were developed to provide specific details related to the operation and maintenance of the facility in accordance with the intent of the design and in keeping with the requirements of the Water License.

These Policies, presented in Appendix C of this manual, cover a wide range of topics; including safety, access control, emergency response, record keeping, list of waste items not accepted, a list of waste items accepted, handling procedures for hazardous waste, litter control, controlled burning, etc. All personnel involved with the operation of the facility must be fully conversant with these Policies.

The Operation Policies may be amended by the Municipal Services Manager as required. In case of discrepancies between the content of the manual and the Operation Policies, the Policies shall govern.

1.4 Location of Cambridge Bay

The Hamlet of Cambridge Bay is geographically situated on the Dease Strait between the Queen Maud Gulf and the Coronation Gulf in the North West Passage, at 69°07' N latitude and 105°03' W longitude, shown in Figure 1-1. It is the largest community in the Kitikmeot Region and acts as the regional center and transportation hub.

The present source of the community's potable water is Water Lake, located approximately 3 km north of the community. The location of Water Lake relative to the community and to the waste disposal facilities is presented in Figure 1-2.

1.5 Geophysical and Climate Information

The Hamlet of Cambridge Bay is situated in an area of sags and swells, dry debris-strewn knolls, and moist depressions, with very little vegetation (Canadian Arctic Profiles – Indigenous Culture, 2006).



Figure 1-1: Location of Cambridge Bay

Modified from original work of Algalv and Dr. Blofeld, Wikimedia Commons

The surficial geology immediately surrounding the community is classified as a till veneer, with till deposits being patchy and generally less than 1 m. The bedrock geology of the Cambridge Bay area comprises Paleozoic sedimentary rocks (carbonates, shales and sandstones). Bedrock is generally exposed at sporadic locations close to sea level. Where exposed, the bedrock comprises layers of dolomite and shale, and is jointed and frost shattered.

Cambridge Bay is situated in an area of continuous permafrost. The reported ground temperature average below 3 m depth is about -9°C. The thickness of active layer varies from 0.3 m in poorly drained areas to over 2 m in well-drained areas. Excess ice contents of up to 10% have been reported in the subsurface soils.

The climate can be characterized by long cold winters and short cool summers. The daily average temperature is -14.4°C. The average total annual precipitation is 13.88 cm; consists of 82.10 cm of snowfall and 6.96 cm of rainfall. The July mean high is 12.3°C and mean low is 4.6°C. The January mean high is -29.3°C and mean low is -36.3°C. The prevalent wind direction is to the northwest at an annual average wind speed of 21.2 km/h (Canadian Climate Normals 1971-2000).

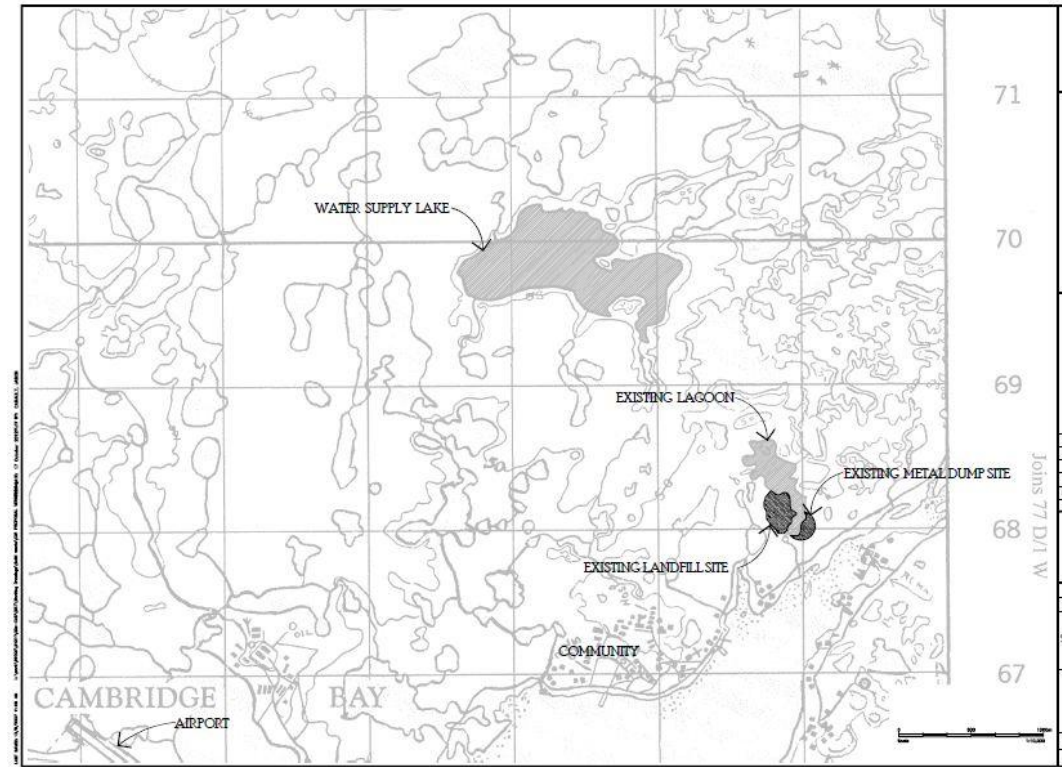


Figure 1-2: Cambridge Bay Water and Waste Disposal Facilities

2. Background

The report titled: “*Waste Facility Improvements Detailed Design Report*”, prepared by AECOM in 2008 provides details on sewage and solid waste generation and characterization, as well as population projections. Information from that report has been incorporated into this manual.

We note that the population projections from the report are higher than the current Government of Nunavut (GN) population projections and therefore, the calculations for sewage and waste generation based on those population projections are conservative.

For example, the population projections from GN estimates when the *Detailed Design Report* was prepared was 1790 in 2011; the new GN estimate for 2011 was 1626 (Government of Nunavut, Regional and Community Population Projections 2009 to 2036). The Canada Census in 2011 reported an actual population of 1608.

2.1 Waste Characteristics and Quantity

2.1.1 Types of Waste

Waste generated in Nunavut communities typically consists of household wastes and a few household hazardous wastes such as paints, solvents, waste oil or batteries, etc.

Since Cambridge Bay is a larger center and has a DEW Line site, the MSW facility also accepts waste from industrial activity and from the DEW Line site (IEG, 2005).

Wastes noted at the Metal Dump Site prior to the redevelopment consisted of un-segregated bulky wastes and waste metal including vehicles, heavy equipment, barrels, steel from burnt high school, white goods, fuel tanks, and other waste metal. It is expected that the types and relative quantities of solid waste will remain relatively consistent over time, especially the next 10 years or so.

For solid waste quantity projections, please refer to the “*Waste Facility Improvements Detailed Design Report*”.

3. General Overview

The Hamlet of Cambridge Bay MSW facility is located adjacent to the sewage lagoon, approximately 0.8 km northeast of the community, as illustrated in Figure 3-1. It appears that the site has been in use for the past 30 years. In 2012, the MSW facility was re-developed into an engineered facility, concurrently with re-development of the sewage lagoon.

The re-developed MSW facility consists of:

- A primary area which includes landfill disposal cells and several designated cells for diversion of tires, household hazardous waste, bio-hazardous waste and a burn pit
- A secondary area for the diversion of metals. The secondary area also incorporates a second lined cell for household hazardous waste and a lined containment for land farming of contaminated soils; although land farming cannot occur until amendments to the water license are made.

The primary and secondary areas have separate accesses to make them easier to reach, and are also interconnected with a road on site. Drawings for the landfill can be seen in Appendix D. A number of signs in English and in Inuinnaqtun guide the users to the various areas within the site.

The new landfill is essentially a re-development of the old landfill and therefore, incorporates the waste that has been deposited over the past 30 years. The landfill is now better delineated with a fence running around three sides (the fourth side borders the lagoon), improved access and improved surface drainage. A new area beside the original landfill was developed for locating the diversion cells, the burn pit and for equipment storage. The primary area is approximately 41,000 m², including approximately 13,000 m² of newly developed area.

The secondary area is a re-development of the old metal dump. All the metal waste accumulated over the past 30 years was crushed and buried at the locations shown on the landfill drawings in Appendix D. The redeveloped secondary area, which will continue to be used for the diversion of metals, is approximately 20,000 m².

The surface drainage plan for the entire waste site – which includes the MSW facility and the sewage lagoon – is provided in Appendix D. At the primary MSW facility surface drainage is directed via shallow ditches to a basin located at the North by the sewage lagoon. Drainage at the secondary area is directed towards the wetland located at the downstream end of the sewage lagoon.

The Hamlet provides a MSW pick-up service and therefore, it is estimated that the majority of the waste at the landfill will enter the facility via this service. It is assumed that metals, tires, bio-hazardous waste, household hazardous waste, and some MSW will be delivered to the facility by residents. No provision has been made at this time for commercial or industrial hazardous waste; if any commercial or industrial entities wish to dispose of their hazardous waste in the Cambridge Bay landfill, they will have to make an application to the Hamlet of Cambridge Bay and any appropriate government department before disposal is allowed.

The MSW facility is engineered to provide sufficient capacity for ten years starting in 2010 (i.e. 2020). However, proper operation and maintenance of the facility is critical for maintaining the expected life of the site, or even extending it beyond 2020. This manual provides the operation and maintenance procedures required to properly manage the MSW facility, and to satisfy the requirements of the water license.



Figure 3-1: Waste Facilities

4. Administrative Structure

4.1 Senior Administrative Officer (SAO)

The Senior Administration Officer (SAO) has overall responsibility over all Hamlet Departments, including the Municipal Services/Public Works Department which is responsible for management and operation of the MSW Solid Waste Disposal Facility. His responsibilities in relation to the solid waste facility include:

- Review and allocate operating budget
- Monitor overall operations to confirm compliance with the requirements of the Water License and this manual
- Confirm personnel obtains proper training
- Review emergency response plans and confirm exercises occur on a regular basis
- Coordinate annual audits of the facility
- Liaise with the NWB
- Review and submit reports to the NWB, as required by the Water License
- Respond to public inquiries.

4.2 Municipal Services Manager (MSM)

- Prepare annual operation and maintenance budgets
- Manage operation and maintenance activities in accordance with the Water License and as indicated in this manual
- Organize training of personnel
- Prepare emergency response plans and schedule regular exercises
- Update the Safety Plan for the facility
- Responsible for implementation and monitoring of compliance with the Landfill Operation Policies
- Review and update Landfill Operations Plan and associated policies as required;
- Monitor surface water management
- Prepare reports required by the Water License
- Prepare and maintain an operational record of the facility
- Organize landfill audits
- Monitor operation of the site and confirm regulatory compliance.

4.3 Landfill Operator

- Operate the site in compliance with the Landfill Operation Plan and Policies
- Access control
- Screen waste for acceptance or rejection
- Litter control
- Infrastructure maintenance
- Surface water management and assist with third party water sampling
- Site safety
- Emergency response and spill control
- Record keeping and reporting to Municipal Services Manager

5. Component Detail and Operation

5.1 Landfill

The following types of waste may be accepted at the landfill:

- Inert solids – including construction, renovation, and demolition debris
- Municipal solid wastes (MSW) – including plastics; paper; cardboard; wood; kitchen scraps; ceramics; etc
- Non-hazardous solid wastes – which may include, but not limited to: treated hydrocarbon contaminated soils; solid contents of sump wastes; empty containers (as described in the Empty Container Policy) and other such materials deemed to be non-hazardous as defined by the *Guidelines for the General Management of Hazardous Waste in the Northwest Territories*. In addition, asbestos may be accepted for burial in the landfill, provided that the Asbestos Handling Policy in Appendix C is followed.
- Hydrocarbon contaminated soils/materials that may be remediated with biological treatment (landfarming) may be stored in a lined cell at the facility for shipping out or treatment at a later date – the Hamlet is not currently authorized to operate a landfarm facility.

The landfill is to be developed in cells of manageable sizes, compacted and covered with soil prior to developing a new cell. The landfill has to be operated in accordance with the sequence shown in Figure 5-1, which illustrates a typical approach for operating a landfill cell. Compaction of waste is essential to minimize space. Compaction may be achieved using a large dozer; the height of each layer after compaction should be approximately 2 m.

In keeping with the development plan (as per drawings in Appendix D), construction of the cells should begin with a first cell located along the southeast edge of the landfill (i.e. upstream of the drainage area), and progress towards the northwest (i.e. the sewage lagoon) with the 2nd, 3rd cells, etc. The top of the cells, particularly after application of a soil cover should be given a minimum of 3% grade to the northwest side of the landfill (towards the sewage lagoon) to promote drainage towards the lagoon. The drainage collection basin and ditch provided along the northwest side of the landfill (along the sewage lagoon) to collect runoff from the landfill must be maintained to allow proper drainage.

Coverage of the waste will be required, particularly during summer months to reduce odour, wind-blown debris and animal scavenging. Intermediate cover will also be required over areas that will be exposed for long periods, to reduce odor, and/or the amount of wind-blown debris, minimize leachate production, and provide temporary driving surfaces.

It is anticipated that the majority of the waste directed to the landfill will originate from the Hamlet's waste collection service. Controlled burning of select materials is allowed in the burn pit.

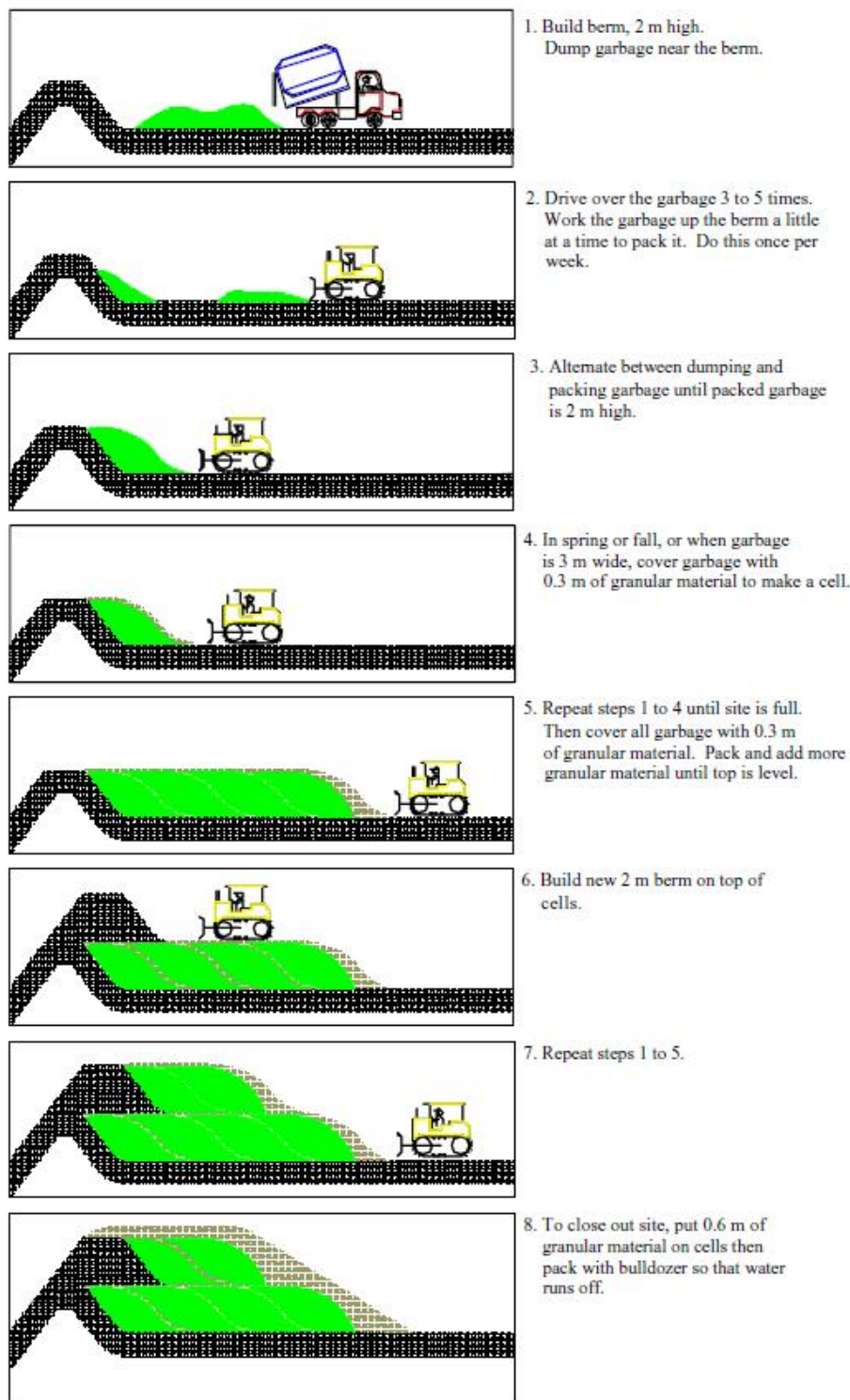


Figure 5-1: Typical Landfill Operation

Taken from *Guidelines for the Planning, Design, Operation and Maintenance of Modified Landfill Sites in the NWT*,
Government of the Northwest Territories, Municipal and Community Affairs, 2003

5.2 Burn Pit

Materials such as cardboard, untreated wood products and natural fiber textiles should be diverted to the burn pit. Ideally, these materials would be dropped-off directly at the burn pit. The landfill operator should sort and remove burnable items from the landfill on a regular basis and take them to the burn pit. The landfill operator should also remove any non-burnable items that have been placed in the burn pit, and place them in the appropriate landfill cell or storage/disposal area.

Materials in the burn pit should be burnt when environmental conditions permit, as indicated in the Clean Burn Policy provided in Appendix C. The operator should confirm that any fires in the burn pit are extinguished before the operator leaves the landfill for the day. Ash from the burn pit should be removed periodically and disposed of in the landfill.

5.3 Bio-hazardous Waste Cell

Bio-hazardous waste, such as honey bags and animal carcasses must be deposited in the bio-hazardous waste cell within the new primary MSW fenced area (Ref As-built Drawing C-08, Landfill Site Improvement Plan). Frequent coverage of the waste is required during summer months to reduce odour and prevent animal scavenging.

5.4 Household Hazardous Waste (HHW) Cell

There are two lined HHW cells, one is located in the northwest corner of the primary site; the second is located at the metal diversion area. Household hazardous waste collected at the metal diversion area is expected to include items such as compressors and air filters that have been removed from metal waste. The hazardous waste cells are designed for accepting household hazardous waste; such as paint, pesticides, batteries, solvents, antifreeze, used motor oil; etc. Batteries, antifreeze, motor switches, halogen bulbs, etc. must be placed inside secured box with cover and plastic sheet all around to be stored until they are shipped to another facility for treatment. Paint drums should be labelled and stored with covers; record types date, status, etc. It is anticipated that the majority of the HHW will be collected during HHW drop-off events organized by the Hamlet, as discussed in Section 6.3.

All hazardous waste accepted at the landfill shall be properly labeled and identified. Material Safety Data Sheets (MSDS) shall be obtained for all hazardous waste received. Material Safety Data Sheets for several products are provided with the Spill Contingency Plan in Appendix E of this manual

The Landfill Operator and all personnel responsible for handling hazardous waste shall have Workplace Hazardous Materials Information System (WHIMIS) training and shall follow appropriate safety procedures when handling hazardous waste. The Landfill Operator shall maintain a record of all hazardous waste on site; such as date of receipt, description, volume, generator, method of storage.

Hazardous wastes are stored here for eventual removal. Neither compaction nor coverage is required for this cell. The waste collected in this area is expected to be in containers such as cans or drums and therefore, for good housekeeping should be organized on pallets. Alternatively, HHW may be stored in a sea can for eventual removal once it has been logged. Any wastes stored in a sea can should be segregated by type. For example, batteries should be together, paint cans together, etc.

When hazardous waste is removed from the site the Landfill Operator shall maintain a record of the date, description and volume of waste removed, name of carrier, and obtain copies of the Transport of Dangerous Goods forms.

5.5 Tire Cell

The tire cell is located at the primary site. Good housekeeping must be employed in this area to keep the site organized and safe.

Tires are stored here for eventual removal. Neither compaction nor coverage is required. Access must be provided for fire fighting vehicles. Fire separation must be maintained from other combustible materials

5.6 Metal Waste Area

Metal waste should be placed along the southern edges of the area, building northward over time as shown in drawing C-12 (Metal Waste Improvement Plan). Metal waste includes car bodies, white goods (appliances), oil drums and miscellaneous scrap metal. Metal waste should be crushed when required.

Although not specifically identified on the landfill drawings, an area should be allocated for disposal of white goods (i.e. appliances). The Ozone Depleting Substances Management Policy in Appendix C must be followed when receiving refrigerators. Freon-containing white goods must be segregated until the Freon has been removed; after the Freon has been removed, white goods may be placed in the general metal waste area.

5.7 Land Farm

Water Licence 3BM-CAM0914 does not allow for the operation of a land-farm. An amendment application to operate a landfarm has been made to the NWB to operate a landfarm for treatment of hydrocarbon impacted soils and treatable materials inside the liner cells.

If the Hamlet receives permission for a land-farm, it may be possible to use treated material from the land-farm as cover material for the landfill. This would be entirely dependent on the License conditions and stipulations for the land-farm.

6. Site Management

6.1 Access Control

Access to the primary area of the facility is controlled by a gate (which must be locked outside operating hours), video surveillance and attendance. The Landfill Operator or his designate shall control access at the gate during operating hours and direct vehicles to the appropriate area(s), based on the type of waste.

Access to the secondary area of the landfill is currently not controlled by a gate. However, it is recommended that the Hamlet installs a gate and controls access to that location as well.

Access Control shall occur according to the following Landfill Policies provided in Appendix C.

- Hours of operations shall be as detailed in Hours of Operations Policy
- Access to the landfill outside operating hours shall be granted according to the After Hours Policy
- The Landfill Operator shall secure the site at the end of the work day according to the Last Man Out Policy
- Visitors shall be managed according to the Visitor Record Policy
- Distribution of keys for the gate shall be in accordance with the Key Policy

6.2 Waste Acceptance Procedure

All vehicles entering the MSW facility must report to the landfill operator. The landfill operator shall screen the waste and direct the customer to the appropriate cell for disposal. Items that are appropriate for disposal at the landfill and in the designated cells are identified in Section 5. A recycling program for MSW is planned for waste collection at the household level – which will segregate waste from hazardous and recyclable materials. Items that are not accepted at the facility are specified in the Prohibited Waste Policy. These include:

- Industrial or commercial hazardous waste
- Materials contaminated by hydrocarbons that are resistant to, or preclude, biological treatment (landfarming)
- Untreated biomedical waste as per CCME Guidelines for the Management of Biomedical Waste in Canada
- Radioactive waste
- Explosives
- Bulk liquids as defined in the Prohibited Waste Policy
- Waste that is smoldering upon delivery (hot loads)

Wastes that are accepted but require special handling include:

- Appliances containing CFC's (i.e. ozone depleting substances)
- Automobile batteries
- Propane tanks and bottles
- Asbestos
- Contaminated rags
- Treated wood
- Empty containers as per the Empty Container Policy (Appendix C)

Policies for handling these materials are included in Appendix C of this manual.

The Landfill Operator or his designate shall randomly inspect vehicles to confirm that:

- Prohibited waste does not enter the landfill
- Acceptable hazardous waste is placed at the designated location(s) for environmental protection;
- Waste requiring special handling is identified
- Special waste that has received prior approval corresponds with the description and volumes provided by the generator;
- Burnable items, tires and metals are diverted to appropriate management areas so that they don't consume space in the landfill

The Landfill Operator shall carry out random inspections according to the Random Load Checking Program Policy. The operator should be suspicious of waste that:

- Carries hazardous markings
- Liquids
- Powder or dusts
- Bright or unusual colours
- Drums or commercial size containers
- Chemical odours

When a load is rejected and turned away, the Landfill Operator shall record:

- Vehicle type and license number
- Identifying company names
- The source of the waste
- Name of vehicle driver
- Inspection results and reasons for rejection

The landfill operator shall maintain a record of the waste coming into the landfill as indicated above and in Section 7.

6.3 Hazardous Waste

The water license requires that hazardous waste be segregated and stored in a manner to prevent deleterious substances from entering the water, until such time as they have been removed for proper disposal at an approved facility.

Hazardous wastes are items that can potentially cause groundwater and/or air pollution when disposed of in a landfill. Therefore, two lined containments have been provided for that purpose; one is located adjacent to the landfill and the other is located adjacent to the metal area.

Household hazardous wastes must be separated from other wastes before they leave the households and therefore, a special effort by residents will be required to prevent household hazardous waste (HHW) from entering the landfill for disposal.

6.4 Litter Control

The Landfill Operator is responsible for litter control within the facility, surrounding areas and along access roads. The following procedures are recommended to limit litter:

- Install a waste container inside the gate;
- Limit the size of operating areas so that waste can be compacted and covered at regular intervals;
- Use portable fences to catch debris;
- Encourage users to secure their load properly for transportation by instituting a surcharge for unsecure loads

The Landfill Operator shall regularly collect litter from the site, surrounding areas and along access roads. Loads of waste dumped outside of the facility should be taken to the MSW facility for proper disposal. Items identifying the perpetrator (letters, utility bills, etc) shall be submitted to the Hamlet of Cambridge Bay Bylaw Officer.

6.5 Surface Drainage

Surface drainage at the primary area is directed to the northwest towards the sewage lagoon via a system of ditches and culverts, as illustrated in Appendix D. A shallow drainage ditch along the inside perimeter from the southwest corner to the northwest corner along with some shallow control ponds were constructed to collect surface runoff. The ditches and control ponds shall be maintained so they continue to serve their intended purpose. Water collecting in the control ponds can be pumped into the lagoon. Sampling and testing of the water is required prior to pumping, as described in Section 7 below and Appendices F and G.

6.6 Cover Material

The Landfill Operator is responsible to secure an adequate supply of cover material for use on site at all times. Cover material shall be hauled and stockpiled at a convenient location(s), where it will not interfere with traffic or activities.

6.7 Maintenance

The landfill operator is responsible for the maintenance of infrastructure and equipment related to the MSW facility; including:

6.7.1 Access roads

Access road maintenance includes snow ploughing, grading and dust control. Dust control can be achieved by watering or by using a dust suppressant. Occasionally the road will require reshaping and application of granular surfacing material.

6.7.2 Drainage System

The drainage system, which includes ditches, culverts and control ponds, shall be maintained to provide positive drainage towards the control ponds. Surfaces shall be graded such as to direct drainage towards the drainage system. Depression that could collect water should be eliminated.

6.7.3 Berms

Any signs of erosion, settlement or fissures (cracks) in the berms adjoining the lagoon shall be noted and reported immediately to a Professional Engineer to provide repair recommendations.

6.7.4 Gates, Signs, Fences

Gates, signs and fences shall be inspected and maintained. Evidence of deterioration or damage shall be noted and reported to the Municipal Services Manager.

6.7.5 Storage Containers, Buildings

Storage containers and buildings shall be inspected regularly. Evidence of deterioration or damage shall be noted and reported to the Municipal Services Manager.

6.7.6 Heavy Equipment

Heavy equipment used for the MSW operations shall be maintained in good operating condition.

7. Record Keeping and Reporting

Landfill management must establish and maintain an operating record and prepare annual reports, as indicated in the Landfill Operating Policies – Administration Record Keeping. Forms are provided in Appendix H.

7.1 Daily Log

The Landfill Operator shall maintain a record of daily operating activities. The log shall be maintained in the landfill site office and submitted to the MSM at the end of the month. Daily records shall include, but not be limited to:

- Weather conditions (i.e. precipitation, wind speed and direction, temperature)
- List of operating staff
- List of equipment operating
- Description of activities (e.g. controlled burning, compaction, site clean-up, etc)
- Visual inspections and environmental monitoring activities undertaken (including depth of water in control ponds during snow-free periods)
- Issues encountered and response or corrective action taken
- Estimated volume reduction achieved by compaction.

7.2 Waste Screening / Load Records

The Hamlet shall estimate the monthly and annual quantity of waste accepted at the MSW facility, and include this information in the annual report to the NWB.

Load records are maintained at the site and submitted to the MSM on a monthly basis and kept on file at the Hamlet of Cambridge Bay Office. Local records generally include:

- Time and date of delivery
- Waste hauler and/or customer
- Volume of waste
- Type of waste

7.3 Monthly Reports

The status of the active areas at the landfill shall be recorded on a monthly basis for the purpose of providing a record of their rate of development. Monthly reports shall provide an overview of activities that have occurred during the month, including:

- Location of active landfilling area(s) and the activities related to area filling
- Quantities of wastes and types of wastes received
- General weather conditions
- Maintenance, including litter control activities
- List of infractions and issues, including the measures undertaken to resolve them
- Monitoring Program sampling data (if any sampling was done that month)

Monthly reports can be a summary of the daily logs for the month, with information and observations added to complete the list above.

7.4 Water Sampling

Water sampling records from all CAM-4 sampling events (MSW Facility – including Metal Waste area – pumped discharges to the Sewage Lagoons) must be retained and submitted as documentation for the Annual Report.

The Water License states that effluent (i.e. surface runoff) from the Solid Waste Disposal Facility directed to the sewage lagoon shall not exceed Schedule I of the *Environmental Guideline for Industrial Waste Discharges, Government of Nunavut, Environmental Protection Service, January 2002*. This document was superseded in January 2011, by a document entitled: *Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities*. Therefore, the effluent from the solid waste facility shall comply with the new requirements, reproduced in Table 7-1.

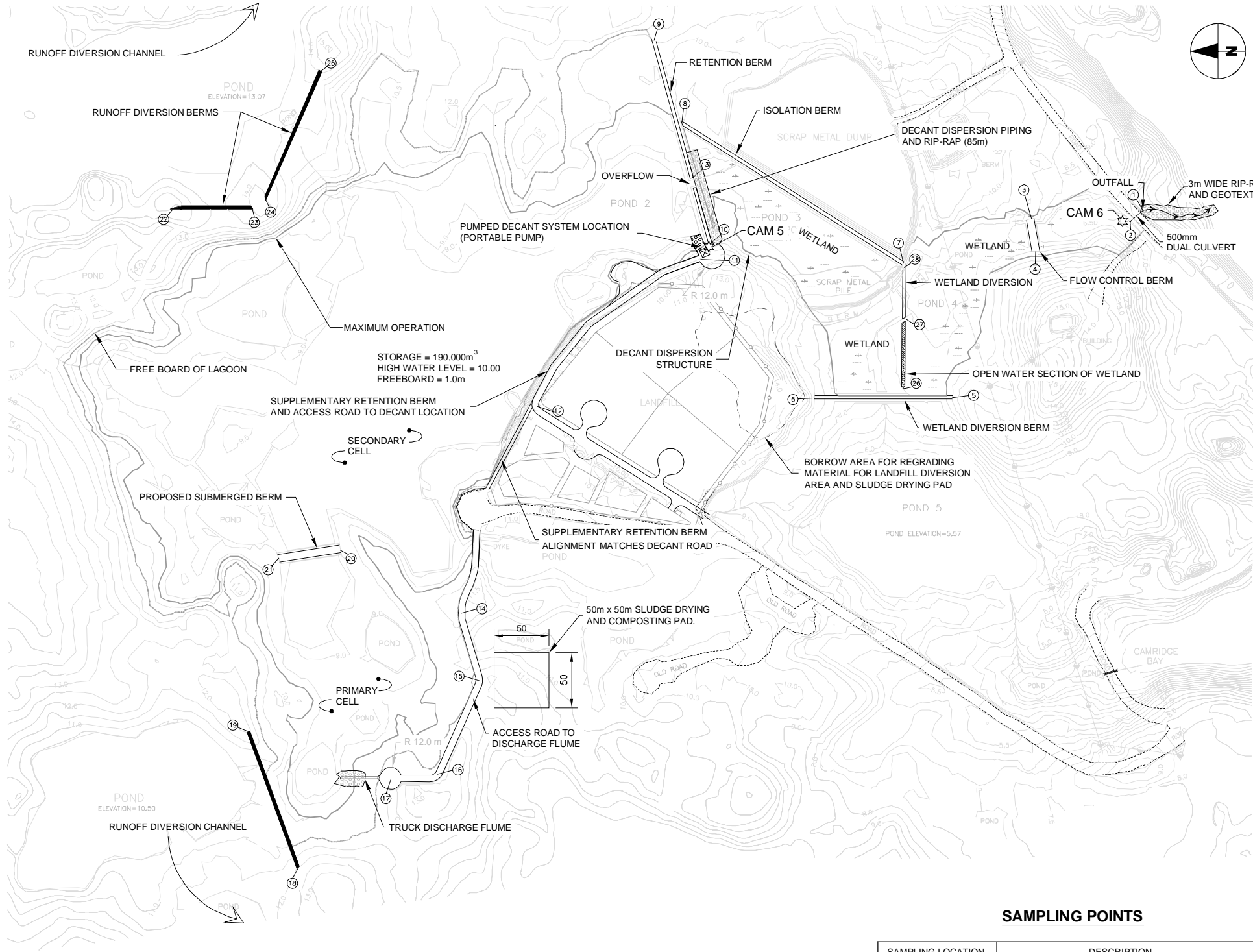
Table 7-1: CAM-4 Effluent Criteria

Substance	Criteria (mg/L)	Substance	Criteria (mg/L)	Substance	Criteria (mg/L)
Aluminum	50	Cyanide	2	Phenolic Compounds	1
Arsenic	1	Fluoride	10	Phosphorous	100
Barium	5	Iron	50	Silver	5
Biochemical Oxygen Demand, (BOD)	500	Lead	5	Sulphates	1500
Cadmium	2	Mercury	0.1	Sulphides	2
Chlorides	1500	Nickel	5	Suspended Solids	600
Chromium	5	Oil and Grease	150	Tin	5
Copper	5	pH Range	6.5 to 10.5	Zinc	5

Effluent exceeding these limits may require additional treatment prior to discharge into the sewage lagoon. The treatment required will depend on the characteristics of the effluent.

Refer to Appendix F – Quality Assurance and Control Plan; and Appendix G for Water Sampling Instructions.

Please refer to Figure 7-1 for monitoring program station locations.



SAMPLING POINTS	
SAMPLING LOCATION	DESCRIPTION
CAM 4	EFFLUENT FROM MODIFIED SOLID WASTE DISPOSAL FACILITIES BEING DISCHARGED TO THE RETENTION SEWAGE LAGOON
CAM 5	FINAL DISCHARGE POINT FOR EFFLUENT FROM THE RETENTION SEWAGE LAGOON TO THE SEWAGE WETLAND
CAM 6	OUTFALL AREA FOR THE SEWAGE WETLAND

LEGEND	
EDGE OF ROAD (ELEV. 10.0m)	
DRAINAGE ROUTE	
RIP-RAP	
SEWAGE LAGOON/WETLAND BERM	
RUNOFF DIVERSION BERM	
OPEN WATER SECTION OF WETLAND	
FREE BOARD	
MAX OPERATION WATER LEVEL	
OPEN WATER SECTION	
SAMPLE POINT	

NOTES:
ELEVATIONS ARE EXPRESSED IN METER OR DECIMALS THEREOF.

BERM LOCATION POINTS

BERM POINTS	NORTHING	EASTING
1	7667952.67	498928.34
2	7667964.75	498917.18
3	7668055.83	498919.56
4	7668050.75	498889.87
5	7668126.82	499757.16
6	7668252.15	498757.16
7	7668170.48	498878.77
8	7668372.90	499006.76
9	7668397.97	499082.42
10	7668347.00	498898.03
11	7668357.13	498883.20
12	7668505.96	498748.79
13	7668363.63	498956.63
14	7668573.61	498560.76
15	7668557.39	498499.29
16	7668597.34	498411.69
17	7668638.10	498410.28
18	7668722.31	498329.19
19	7668767.59	498452.94
20	7668684.04	498619.15
21	7668740.07	498610.20
22	7668835.17	498930.79
23	7668764.43	498930.23
24	7668752.28	498938.93
25	7668702.41	499054.24
26	7668171.72	498764.31
27	7668171.12	498829.37
28	7668170.48	498878.77
29	7667956.60	498915.42
30	7667970.84	498901.51

7.5 Annual Report

The Hamlet must file an annual report to the NWB no later than March 31st of the year following the calendar year reported. The information required in the report is described in Part B of the water license (complete water license can be found in Appendix A).

The annual report prepared by the MSM shall include:

- Tabular summaries of all data generated under the Monitoring Program
- The monthly and annual quantities (in cubic metres) of all waste discharged
- A summary of modifications and/or major maintenance work carried out on the facilities, including all associated structures
- A list of unauthorized discharged and summary of follow-up action taken
- A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for next year
- Any addendum with updates or revisions for manuals and plans (i.e. Operations and Maintenance Manual) as required by changes in operation and/or technology
- A summary of any studies or reports requested by the Board that relate to water use and waste disposal or restoration, and a brief description of any future studies planned

In addition for the report to the NWB, an annual operations summary shall be prepared by the MSM, and shall include:

- A record of the types of wastes received, detailing the amount landfilled and the amount diverted into designated cells for storage
- Major incidents and corrective actions taken, if applicable (other than those reported to the NWB)
- Record of public complaints and response actions
- Annual environmental compliance inspections
- Current operations in relation to design plans

7.6 Corrective Action Report

In the event that conditions of the Water License are not met, corrective action is required. The corrective action shall be documented and maintained in the operating record. A corrective action report may include:

- A description of the problem
- A description of activities undertaken to correct the problem and results
- A description of the monitoring and effectiveness of the corrective action

7.7 Accident/Incident Reports

Special reports shall be filed for any accident/incidents occurring on site; including vehicle accidents (Section 8), personal injury (Section 8), spill of deleterious substances (Appendix E), fires (Section 9), etc.

7.7.1 Spill of Deleterious Substances

In the event of a spill, the Landfill Operator shall immediately report to the MSM. The MSM will then notify NWB and Department of Environment of the release and will provide the following details:

- Nature of the spill
- Cause of the spill
- Current actions to contain the spill
- Anticipated time frame to correct the problem

The MSM will report the spill by telephone to the Hamlet of Cambridge Bay SAO. The MSM will document the call and keep a record of the call in the operating record. A spill contingency plan is provided in Appendix E.

7.7.2 Unauthorized Discharges

Unauthorized waste found at the site shall be documented in the annual report, along with a description of corrective action taken. Unauthorized waste shall be logged in the daily load record form.

Unauthorized discharges of surface drainage from the facility shall be documented in the annual report, along with a description of corrective action taken. Unauthorized liquid discharges shall be documented at the time of occurrence using the Incident/Near Miss Form (Appendix H)

7.8 Wildlife

The presence of bears or other animals at the site shall be reported to the MSM and to the Department of Environment Conservation's Office at (867) 983-4164.

7.9 Geotechnical Inspection

A Geotechnical Engineer shall inspect all engineered facilities annually in July or August, and the engineer's report shall be submitted to the NWB within sixty days of the inspection. With the engineer's report, the Hamlet shall provide a covering letter outlining an implementation plan for each of the engineer's recommendations.

8. Annual Inspection

The MSM (with the assistance of the Landfill Operator) shall conduct an annual inspection of the Solid Waste Facility; the Hamlet may opt to have this inspection carried out by a Professional Engineer who is experienced in landfill construction and management. The results of the inspection shall be documented. The Hamlet shall remedy any parts of the infrastructure or operation which are not in accordance with the O&M Plan and/or the requirements of the water license.

8.1 Site Inspection

The site inspection shall be conducted at the same time as the annual geotechnical inspection required by the NWB. A visual examination of the site shall be carried out to verify:

- Condition of all components (including the landfill, diversion cells and burn pit)
- Remaining capacity in relation to design life expectancy of the facility
- Condition of infrastructure and equipment (including gates and fences, signs, roads, drainage system, buildings, containers, heavy equipment)
- General site management and operation (including litter control, condition of the cells and contents, ensure that completed sections of the landfill have been compacted and covered with soil, presence of safety hazards, etc.)

8.2 Review of Records

A review of the daily, monthly and annual reports shall also be carried out to evaluate:

- Issues related to operations, spills, safety, fires, infractions, etc.
- Effectiveness of the waste diversion program
- Effectiveness of the hazardous waste collection program
- Public complaints
- Quality of record keeping practices

If the Hamlet wishes, it may carry out the annual review of records at the same time or immediately following the preparation of the annual report to the NWB.

9. Safety Plan

9.1 General

Site safety is coordinated through the Landfill Operator. The MSW facility shall be operated according to the Safe Work Policy provided in Appendix C.

All operations shall be conducted with safety as a priority at all times. All employees shall:

- Receive the appropriate safety training
- Wear the appropriate personal safety equipment
- Not endanger themselves or others at any time
- Report unsafe practices
- Notify other employees or site users when they are acting in an unsafe manner

All **accidents, injuries, or near misses** shall be reported to the Landfill Operator, the Municipal Services Manager and the appropriate safety official at the Hamlet, and the following steps shall be taken:

- Investigate the incident immediately
- Find out the cause
- Make a complete incident report
- Take immediate measures to correct the cause and prevent it from reoccurring
- Have a safety meeting with employees as soon as possible after the incident

9.2 Traffic Accidents

Traffic accidents occurring at the site shall be reported to the RCMP and investigated by the Landfill Operator who shall also complete an Accident Report Form (provided in Appendix H).

9.3 Medical Emergencies

All injuries, even minor injuries, should be considered important and should be reported as a safety incident to the MSM or Cambridge Bay Safety Officer.

First Aid should be applied in a manner that is appropriate to the nature of the injury. If the injury requires medical assistance, the individual should be taken to a medical emergency centre or an ambulance service contacted.

A medical doctor should be consulted for all injuries that may result in infections as a result of working with waste materials. This includes injuries such as cuts and scrapes, skin punctures with sharp items, and fire or chemical burns.

If the person injured on-site is a customer or visitor, the Landfill Operator and employees shall provide any assistance necessary and administer appropriate First Aid.

9.4 Personal Decontamination Procedures

In instances where workers accidentally come in contact with unknown substances, the following procedures shall be followed.

- Skin Contact:** Wash with water for approximately 15 minutes. See a physician if any sign of irritation occurs.
- Eye Contact:** Flush eye(s) with a gentle stream of water for 15 minutes (use eye wash station with distilled water). See physician, without exception.
- Ingestion:** Contact emergency services immediately and provide them with as much information as possible about the product that was ingested. Do not induce vomiting unless instructed to do so.
- Inhalation:** Remove person to fresh air. If discomfort persists, take victim to physician. Provide physician with as much information on the inhaled material as possible.

10. Fires

All fires shall be considered serious and immediately reported to the MSM. An incident report must be completed for all fire occurrences, with a copy kept on file and one sent to the Hamlet Safety Official.

The landfill operator may take charge of extinguishing fires that are small and contained. However, fires that are burning out of control or giving off toxic fumes shall be managed by the Fire Department.

10.1 Fire Prevention

The landfill shall be operated in a manner that minimizes the potential for fires. Fire prevention techniques include:

- Prohibit staff and customers from lighting fires at the facility, with the exception of the Landfill Operator following the Clean Burn Policy
- Prohibiting smoking at the landfill facility outside of designated smoking area(s)
- Thoroughly compact all waste and apply soil cover regularly
- Maintain a comprehensive load checking program to prevent the dumping of hot/burning debris, explosives or highly combustible waste
- Provide an area apart from the general tipping area for dumping of ash barrels
- Maintain a reserve of cover material near active working areas for immediate action in case of fire;
- Conduct a site inspection at the end of the day looking for evidence of smoke
- Maintain the area around the burn pit free of combustible material
- Train employees on early fire hazard recognition

10.2 General Fire-Fighting Procedures

- Cover the burning material with gravel
- Dig out the burning debris and let it burn in a controlled environment, away from other combustible materials
- Use water

10.3 General Fire Response Procedure

- Secure the area
- In cases of small fires, direct customers to safe areas. In cases of large fires, follow Emergency Procedures (Section 8)
- Notify the MSM
- Call the Fire Department at (867) 983-2222
- Do not fight a fire alone, work with other staff members, and ONLY if safe to do so;
- Do not place yourself or others in danger while fighting a fire
- Heavy equipment shall only be used to place material to smother a fire, and only when safe to do so

11. Emergency Response

Emergency response may be required in cases of:

- Fire or gaseous release
- Spills
- Accidental Injury or Medical

In all emergencies the Landfill Operator shall have complete authority over the site. The Landfill Operator's responsibilities in an emergency are:

- Declare the emergency
- Evacuate non-essential personnel or isolate the area – as warranted by the severity of the situation
- Notify the appropriate response agency
- Notify the MSM and the Hamlet
- Establish control and manage the situation prior to arrival of the response agency
- Liaise with the emergency response representatives upon their arrival
- Declare the end of the emergency
- Complete a report documenting the nature of the emergencies and actions undertaken

The MSM will contact the appropriate agency to report incidents related to environmental or health and safety associated with the emergency.

Municipal Services / Public Works of the Hamlet of Cambridge Bay will review the emergency plan annually and following an emergency incident ensure that:

- Emergency response procedures for the landfill are effective and updated as necessary
- Appropriate individuals are appointed to manage emergency situations
- Regular fire prevention meetings are conducted with all landfill employees and the Fire Department
- Regular safety and emergency meetings are held with landfill employees

11.1 Contact Information

Contact information is also provided in Appendix B.

- Hamlet of Cambridge Bay Municipal Services / Public Works: (867) 983-4666 or (867) 983-2782
- Nunavut Department of Environment – Cambridge Bay Conservation Office: (867) 983-4164
- RCMP: (867) 983-0123
- Fire Department: (867) 983-4016
- Cambridge Bay Health Centre: (867) 983-4500
- Hazardous Waste Spill 24 Hour Hotline: 1-867-920-8130

12. Reference Guide

The following tables provide a quick reference guide describing how to prevent and respond to several potential contingency situations that may arise.

12.1 Fire at the Landfill

Prevention

- Staff training and awareness
- Waste acceptance procedures and policies
- Diversion of hot loads, combustible and/or explosive material from working area
- Application of cover soils to minimize size of the active working area

Response Plan

Action	Time Frame	Who?	Resources
Evacuate and secure the area	Immediately	Landfill Operator	Site staff
Call: <ul style="list-style-type: none"> • Fire Department • NWB • MSM • Hamlet safety official 	Immediately	Landfill Operator	Site staff
Isolate the burning wastes	Immediately	Landfill Operator	Landfill Equipment
Determine the nature and extent of the fire	Immediately	Landfill Operator	Site staff
Excavate, remove, and soak the burning waste	As soon as it is determined safe to do so	Landfill Operator	Site staff Fire Department Landfill equipment Water truck Water pumps
Cover the burning area	Immediately after the source of burning waste has been excavated and removed, and as soon as it is safe to do so	Landfill Operator	Site staff Fire Department Landfill equipment
Appoint staff for fire guard	After fire is extinguished	Landfill Operator	Site staff Fire Department
Confirm the fire is extinguished	Immediately	Landfill Operator	Fire Department
Review the cause of fire and implement mitigative measures	Within 1 month	Landfill Operator MSM Hamlet safety official	Site staff Fire Department

12.2 Fire in Diversion Cells

Prevention

- Site security
- Separation of materials according to the Fire Code

Response Plan

Action	Time Frame	Who?	Resources
Evacuate and secure the area	Immediately	Landfill Operator	Site staff
Call: <ul style="list-style-type: none"> • Fire Department • MSM • Hamlet safety official 	Immediately	Landfill Operator MSM	Site staff
Determine the nature of the burning material and potential for emission of toxic fumes	Immediately	Landfill Operator	Fire Department NWB
Isolate the burning material	Immediately, if safe to do so	Landfill Operator	Fire Department
Determine the nature and extent of the fire	Immediately	Landfill Operator	Site staff
Extinguish the fire as appropriate; according to the nature of the material	As soon as it is safe to do so	Landfill Operator	Site staff Fire Department Landfill equipment Water truck Water pumps
Confirm the fire is extinguished	Immediately	Landfill Operator	Fire Department
Review cause of fire and prepare appropriate mitigative measures	within 1 month	Landfill Operator MSM Hamlet safety official	Site staff Fire Department

12.3 Minor Medical Injuries

Prevention

- Safety plan and procedures
- Employee safety training and awareness
- First Aid training

Response Plan

Action	Time Frame	Who?	Resources
Apply appropriate First Aid	Immediately	First Aider	
Recommend that the injured person consult a physician	Immediately	First Aider	
Take the injured person to a medical emergency centre or contact an ambulance service if deemed appropriate	Immediately	First Aider	
Record injury in the daily report	By end of the work day	Landfill Operator	Landfill Operator
Review cause of the injury and prepare appropriate mitigative measures	Within 1 month	Landfill Operator MSM Hamlet safety official	Landfill Operator Occupational Health and Safety

12.4 Serious Medical Injury

Prevention

- Safety plan and procedures
- Employee safety training and awareness
- First Aid training

Response Plan

Action	Time Frame	Who?	Resources
Assess site conditions for personal safety and safety of others, and take appropriate actions to secure unsafe areas	Immediately	Landfill Operator First Aiders	Landfill Operator
Attend to the injured person and apply First Aid	Immediately when safe to do so	First Aider	
Contact: <ul style="list-style-type: none"> • Ambulance • MSM • Hamlet safety official 	Immediately	First Aider Landfill Operator	
Stay with the injured person until medical assistance arrives	Duration of medical emergency	First Aider	
Record injury in the daily report	By the end of the work day	Landfill Operator or Designated Alternate	Landfill Operator
Conduct an investigation to determine the cause of injury and prepare appropriate mitigative measures	Investigate immediately following the incident Complete mitigative measures within 1 month of the incident	Landfill Operator MSM Hamlet safety official	Site Personnel Occupational Health and Safety

12.5 Vehicle or Equipment Accidents

All vehicle accidents shall be reported and an investigation as to the cause should be carried out. Following the investigation, appropriate mitigative measure should be implemented to avoid future accidents.

Prevention

- Safety plan and procedures
- Employee safety training and awareness
- Traffic control signs
- Traffic control during heavy traffic situations
- Scale traffic controls

Response Plan

Action	Time Frame	Who?	Resources
Report the accident to the Landfill Operator	Immediately	All employees	
If damage is minor, have the vehicle driver report the accident to the RCMP	Immediately	Landfill Operator	
If the damage is significant, call the RCMP	Immediately	Landfill Operator	
If an injury is involved, call the Hamlet of Cambridge Bay Municipal Services / Public Works (867-983-2782 or 867-983-2183), and implement medical response actions	Immediately	Landfill Operator	
Secure the area for a follow-up investigation	Immediately	Landfill Operator	
Record the injury in the daily report	By the end of the work day	Landfill Operator or Designated Alternate	Landfill Operator
Conduct an investigation into the cause of the accident and prepare appropriate mitigative measures	Within 1 month of the accident	Landfill Operator MSM RCMP Hamlet safety official	Occupational Health and Safety

12.6 Prohibited Wastes Delivered to the Landfill

Prevention

- Access control
- Waste acceptance policies and procedures
- Employee training and awareness

Response Plan

Action	Time Frame	Who?	Resources
Deny entry of the load	Immediately	Landfill Operator	Operation and Maintenance Plan Waste Acceptance Procedures NWB
Determine if load is safe for transport on local roads	Within 1 hour	Landfill Operator/MSM	Transport Canada Transport of Dangerous Goods Regulations
Inform the waste generator of the infraction	Within 1 hour	MSM	
Document the nature of incident and actions taken	Within 1 hour	Landfill Operator	Daily Activity Log Book Hazardous Material Load Check Form
Review waste acceptance procedures and implement necessary mitigative measures	Within 1 month	Landfill Operator MSM	Hamlet safety official

12.7 Prohibited Waste Discovered at the Landfill

Prevention

- Access control
- Waste acceptance policies and procedures
- Employee training and awareness

Response Plan

Action	Time Frame	Who?	Resources
Isolate waste and cease operations in the area of the waste	Immediately	Landfill Operator	NWB Environmental Consultant
Construct containment around perimeter of the waste if necessary	Immediately	Landfill Operator	Landfill equipment 50 Gal Spill Kit
Determine source of waste, and if possible the waste hauler and generator	Within 1 week	Landfill Operator	Scale Records Staff observations
If identified, contact the hauler and waste generator to review options	Within 1 to 2 weeks	Landfill Operator	
Document nature of incident and actions taken	Within 1 hour	Landfill Operator	Daily Activity Log Book Hazardous Material Load Check Form
Inform Nunavut Water Board	When results have been confirmed	MSM	
Review waste acceptance procedures and practices, and implement mitigative measures	Within 1 month	Landfill Operator MSM	Hamlet safety official

12.8 Hot Loads (Loads with Smoldering Materials) Delivered to the Landfill

Prevention

- Access control
- Waste acceptance policies and procedures
- Employee training and awareness

Response Plan

Action	Time Frame	Who?	Resources
Direct the load to the designated area away from the working area	Immediately	Landfill Operator	
Contain burning material within soil berms	Immediately	Operating staff	
Apply appropriate measures to extinguish the fire: wet, smother with soil, or allow to burn out	Within 1 hour	Landfill Operator	Water truck Landfill Equipment
Monitor fire	For duration of fire	Landfill Operator	
Remove extinguished material and dispose at working area	Within 2 to 3 days after being extinguished	Landfill Operator	Landfill Equipment

12.9 Contamination of Surface Water

Prevention

- Baseline surface water quality documented
- Surface water sampling and analysis
- Control of surface water releases
- Operational controls in active working areas
- Employee training and awareness

Response Plan

Action	Time Frame	Who?	Resources
Investigate the cause of surface water contamination	Immediately	Landfill Operator	Environmental Consultant AANDC Water Inspector NWB
Sample surface water to verify and validate	Within 2 days Lab results within 9 days	Landfill Operator	Environmental Consultant Taiga Environmental Lab
Identify and implement appropriate corrective actions	Within 1 month	MSM	Environmental Consultant AANDC Water Inspector NWB
Review surface water management plan and update and revise if necessary	Within 2 months	Landfill Operator MSM	Environmental Consultant AANDC Water Inspector NWB

12.10 Wind-Blown Litter

Prevention

- Ensure the customer or operator is transporting landfill acceptable materials which are properly covered and secured
- Maintain as small a working area as practical
- Maintain portable litter catchment fences around active areas
- Maintain perimeter fencing free of debris, papers and wind-blown substances

Response Plan

Action	Time Frame	Who?	Resources
Review working area and litter catchment fence placement	Immediately	Landfill Operator	Environmental Consultant
Implement off-site litter pick-up	Within 1 week	Landfill Operator	Temporary staff
Implement on-site litter pick-up	Within 1 month	Landfill Operator	Temporary staff
Review litter control program and revise if necessary	Within 2 month	Landfill Operator MSM	Environmental Consultant

12.11 Hazardous Material Spill Contingency

Prevention

- Waste acceptance, screening and handling procedures
- Employee training and awareness

Storage

Other than HHW as described in Section 5.4 there are no hazardous materials or petroleum products stored at the site. Secondary containment is provided by a liner in the bermed hazardous waste cells. The MSM should develop hazardous spill contingency plans associated with removal of hazardous material in conjunction with Nunavut officials when transportation opportunities arise.

Scope

Other than the HHW, which already has secondary containment, the most probable source of a hazardous material spill is petroleum products from vehicles or equipment at the site; which would be a spill limited to the size of the vehicle or equipment tank. For additional information please see the Hamlet of Cambridge Bay Spill Contingency Plan in Appendix E.

Equipment

- 50 Gallon Capacity Universal Sorbent Spill Kit includes:
 - (10) – 3" x 48" socks
 - (4) – 3" x 10' socks
 - (50) – 15" x 17" pads
 - (4) – pillows
 - (50) – wipers
 - (5) – disposal bags and ties
 - (5) – tamperproof seals
 - (2) – pair nitrile gloves
 - (1) – emergency response guidebook

Response Plan

Action	Time Frame	Who?	Resources
Contain and clean spill	Immediately	Landfill Operator	50 Gallon Spill Kit
Contact Fire Department for support & additional response	Immediately	Landfill Operator	
Call Hazardous Spill Hotline	Immediately	Landfill Operator	Environmental Consultant
Review operating procedures and acceptance policies and identify appropriate mitigative measures	Within 1 week	Landfill Operator MSM	Environmental Consultant Hamlet safety official

13. Reference Information

The preparation of this O&M manual is based upon the following information sources:

1. "NWB Water License 3BM-CAM0914" for the Hamlet of Cambridge Bay, NU (effective April 30, 2009 and expiring on March 31, 2014).
2. "Guidelines for the Planning, Design, Operation and Maintenance of Modified Solid Waste Sites in the Northwest Territories", R. Kent, P. Marshall, and L. Hawke, Department of Municipal and Community Affairs, Government of Northwest Territories, 2003
3. "Guidelines for the Collection, Treatment and Disposal of Hazardous and Bulky Wastes in the Northwest Territories", P.L. Heeney & G.W. Heinke, Department of Municipal and Community Affairs, Government of Northwest Territories, 2003
4. "Guidelines for Contingency Planning", Nunavut Water Board, 1987
5. "Draft Guidelines for Spill Contingency Planning", Nunavut Water Board, 2004
6. "Establishing Guidelines for the Separation of Solid Waste Disposal Sites and Airports in the Northwest Territories. Final Report - Phase 1", R. M. Soberman, G. W. Heinke, and M. Lovicsek, Department of Municipal and Community Affairs, Government of Northwest Territories, 1990
7. "Cambridge Bay Municipal Sewage Lagoon and Waste Facilities Assessment", IEG, Department of Community and Government Services, Government of Nunavut, October 2005
8. Earth Tech, August, 2006, Cambridge Bay Waste Facility Improvements Sewage Analysis – Summary Report.
9. Earth Tech, April, 2007, Hamlet of Cambridge Bay Waste Facility Improvements – Draft Preliminary Engineering Report for Solid Waste Site Improvements
10. IEG, October, 2005, Cambridge Bay Municipal Sewage Lagoon and Waste Facilities Assessment (GN Project No 04-4807)
11. Earth Tech, April, 2008, Hamlet of Cambridge Bay, NU, Waste Facility Improvements, Detailed Design Report for Redevelopment of Existing Waste Facilities
12. "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories", D. Duong & R. Kent, Department of Municipal and Community Affairs, Government of Northwest Territories, 1996
13. "Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities", Department of Environment, Government of Nunavut, 2011