Nuna BURNSIDE

Solid Waste Management Facility
Operation and Maintenance (O&M) Plan
Hamlet of Kugluktuk

Prepared by

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Table of Contents

Figures

Appendices

1.0 Introduction

This Operation and Maintenance Plan has been prepared to assist the Community of Kugluktuk in the operation of their Solid Waste Management Facility. It provides a description of the regular operating procedures as well as monitoring requirements.

The Hamlet of Kugluktuk Solid Waste Management Facility consists of the following components:

- Landfill (also referred to as the Municipal Solid Waste Disposal Area)
- The Bulky Materials Disposal Area
- The Landfarming Area
- The Hazardous Waste Storage Area.

The facility has been in use for approximately 15 years, and currently operates under Water Board License NWB3KUGO308 issued November 20, 2003. The license expires November 30, 2008. A copy is included in Appendix A.

1.1 Hamlet Description

The Hamlet of Kugluktuk (formerly known as Coppermine), is situated on Coronation Gulf at the mouth of the Coppermine River. The Hamlet is situated on a rocky area on the west side of the Coppermine River, at latitude 67°49'N, longitude 115°06'W, as shown on Figure 1.

The community has a population of approximately 1,585, with an approximate 1.5 percent projected growth rate. Community infrastructure includes:

- A water treatment plant, that draws water from the Coppermine River and stores it for treatment
- Trucked water to holding tanks in each building
- A sewage lagoon that receives trucked sewage collected from holding tanks in each building
- Sewage treatment via an exfiltration lagoon to a wetland discharging north to the ocean
- A Solid Waste Management Facility, that includes a Municipal Solid Waste Disposal Area, a Bulky Materials Disposal Area, a Hazardous Waste Storage Area and a Landfarm (all currently being upgraded)
- Several rock and sand quarries
- Diesel powered generators
- Two wind generators (one partially dismantled and the other currently off-line)
- Barge landing area.

Key features of the community are shown on Figure 2. The landfill and sewage lagoon locations are shown on Figure 3.

The Hamlet is predominately residential with a few small commercial establishments including a hotel, several construction contracting businesses, grocery store, and a variety of other small businesses. Hunting and fishing in the traditional manner is still a prime occupation for many of the inhabitants. Community buildings include a high school, an elementary school, arena, swimming pool, Hamlet office, public works yard, GN offices, and police station.

1.2 Climate

Kugluktuk is affected by Arctic air masses, and experiences a maritime Arctic climate characterized by short cool summers, and long cold winters. The mean annual air temperature is -12°C. Monthly averages range from -31°C in February to 10°C in July. Kugluktuk receives about 249 mm of precipitation per year, of which 134 mm falls as rain between June and September. Prevailing winds are from the east in summer and from the southwest in winter. The mean wind speed is approximately 15 km/hr.

1.3 Geology and Morphology

The terrain surrounding Kugluktuk consists of coastal lowlands of sand and clay plains dotted with shallow lakes.

The ground surface consists of bedrock and glacial deposits. Boulder and cobbles cover some areas. Much of the surface is covered with turf consisting of various grasses, sedges, and moss underlain by a thin (10 cm to 30 cm) layer of topsoil and/or peat.

The land area around Kugluktuk is underlain by permafrost estimated at several hundred metres thick. There is no permafrost under major water bodies such as Coronation Gulf. A deep zone of non-permafrost probably exists as a talik beneath the Coppermine River. The depth of the active layer over most of the land area is dependent on vegetation cover, soil type, and moisture conditions. Test pitting in the vicinity of the sewage lagoon and landfill found the top of the permafrost in early October to be approximately 0.9 m below surface.

The bedrock in the area consists of Proterozoic fine grained sedimentary and meta-sedimentary (shale) of the Rae Group. These have been intruded by the Coronation Sills, which are composed primarily of granular gabbro.

A northeast trending ridge of bedrock dominates the topography from Heart Lake to the mouth of the Coppermine River. Both gabbro and shale have been quarried locally for construction materials.

The area is dominated by the effects of isostatic rebound following the last glaciation, and deposits related to the discharge of the Coppermine River. West of Kugluktuk (between the sewage lagoon and the ocean) is an area of raised beach ridges comprised of well sorted medium grained sand. More varied fine to coarse sediments are found in the Hamlet and along the west side of the Coppermine River. Sand is quarried at a pit located near the west end of the runway. Another area used for extraction of sandy construction material is located near the east end of the runway. A small clayey deposit has been identified on the south side of the runway and occasionally between beach ridges.

Most of the overburden material would be suitable as daily and interim landfill cover. Clay and silt materials would be suitable for final cover.

1.4 Nunavut Water Board License

The Solid Waste Management Facility operates under Nunavut Water Board License Number NWB3KUG0308, issued November 30, 2003. It expires November 30, 2008 (Appendix A).

An application for an amendment has been made, coincidental with work currently being conducted by Nuna Burnside, for the design of improvements to the sewage lagoon and Solid Waste Management Facility.

This O&M Plan has been prepared for the proposed changes to the Solid Waste Management Facility. Amendments to this document may be required once the Nunavut Water Board issues a revised license.

This O&M Plan includes items outlined in the requirements of the current license such as:

- Operation and Maintenance Plans
- Environmental Emergency Contingency Plan (Spill Contingency Plans) – separate document
- Monitoring Program and Quality Assurance/Quality Control Plan – separate document.

This O&M Plan should be updated when the amended NWB license is issued.

1.5 Health and Safety

Health and Safety of workers and the public is the first priority during the operation of the Solid Waste Management Facility. The requirements of the Nunavut Safety Act must be followed at all times. All actions and operations must be undertaken with safety as the first priority.

1.6 Training

Staff training is an important aspect of operating a Solid Waste Management Facility. Staff must be adequately trained to follow this O&M Plan and operate the facility. This O&M Plan depends on effective site specific training.

1.7 Detailed Design of the Solid Waste Management Facility

The location of the Solid Waste Management Facility is displayed on Figure 2. The layout of the facility, access road, and adjacent Sewage Treatment Facility is displayed on Figure 3.

The Solid Waste Management Facility is located on both sides of Coronation Drive. On the north side is the landfill (also referenced to as the Municipal Solid Waste Disposal Area), which includes the Landfarm and Hazardous Waste Storage Area. On the south side of the road is the Bulky Metals Disposal Area, which includes segregation of material for reuse and recycling. Design details are presented in Figure 4.

2.0 Operation and Maintenance

2.1 Overview

The Hamlet of Kugluktuk Solid Waste Management facility consists of three main components:

- Bulky Metals Disposal Area (which includes a recycling and reuse segregation area)
- Hazardous Waste Storage Area
- Landfill (solid waste disposal area).

The site is designed as a natural attenuation landfill. It does not have a liner, so small amounts contaminants are able to leach from the waste and enter the natural environment. The design also relies on permafrost gradually migrating into the waste at depth as it is covered over.

In order to protect the environment, the facility is designed to divert as much waste as possible from landfilling. This is especially important for hazardous wastes such as batteries, waste oil, waste antifreeze, and other materials that could harm the environment if landfilled.

Figure 3 displays the layout of the solid waste disposal facility and surrounding area. Figures 5 through 9 shows the site in cross-section at it develops over time.

Site operations must comply with the Nunavut Safety Act. The health and safety of workers and the public must be the first priority.

2.2 Material Arrival

Material will arrive at the facility either by a small dump garbage truck owned by the Hamlet or by private residential drop-off.

After Hamlet staff collects waste, the collection vehicles will progress to the landfill, where wastes will be tipped into the burn pile. After being tipped (or during collection), staff will perform an inspection of the waste to ensure that it does not contain visible hazardous waste or bulky metals. If such waste is noted, it will be segregated in the appropriate locations of the approved Hazardous Waste Storage area or the Bulky Metals Disposal Area.

Members of the community may drop off materials directly at the facility. The public should be encouraged to place materials in the appropriate location; generally bulky metals within the Bulky Metals Disposal Area, and hazardous waste in the Hazardous Waste Storage Area. Wood in the wood pile, etc.

The layout of the site and the waste diversion process is displayed on Figure 11.

Effective placement of bilingual signage encourages diversion and directs the public to the appropriate areas within the facility (Figure 11).

As shown on Figure 11, materials are assessed prior to disposal in the landfill. If the material is something other than municipal solid waste, it is assessed according to the following criteria:

- Canadian Environmental Quality Guidelines
- Environmental Guideline for Industrial Waste Discharges.

If the material meets the industrial landuse criteria for disposal in the landfill, it is landfilled. If not, it must be treated (landfarmed) or stored as hazardous waste.

Suitability for landfarming will be based on the volume, type of contaminants, and concentration of contamination. A cost/benefit analysis is done to determine if landfarming is a better alternative than storage as hazardous waste and eventually shipped out of the community.

The staff will record the number of trips to the Solid Waste Disposal Facility per day and estimate the approximate quantity in cubic metres on the Waste Placement Forms included as Appendix B. If waste is present on site that has been tipped by others, an estimate of the quantity shall be made and recorded. Records are to be delivered to the Hamlet office once per week, were they will be retained on file for inclusion in the Annual Report.

2.3 Wood

Wood materials that may have reusable value are placed in the wood pile in the reuse/recycle area that is part of the Bulky Metals Disposal Area. The wood pile should be burned on occasion when quantities build up. Burning should take place when wind and climate conditions are favourable.

2.4 Bulky Metals Disposal Area

The Bulky Metals Disposal Area consists of a segregation area for reuse and recycling of materials such as metals, tires, vehicles, and equipment. Bulky metals are segregated and stockpiled until there is a sufficient quantity that warrants a burial event.

2.4.1 Regular Operation

Staff should inspect the bulky metals disposal area on a regular basis to check for new materials. Fluids (oil, antifreeze) should be drained from vehicles, batteries should be

removed and transferred to the Hazardous Waste Storage Area. Bulky metals should then be tagged to indicate that they have been inspected and cleaned.

Bulky metals should be moved to the appropriate location to maximize segregation of the materials. These groupings can be developed by the operation staff based on needs and materials, but are anticipated to consist of tires, appliances, bicycles, ATV's, snowmobiles and miscellaneous materials.

2.4.2 Regular Maintenance

Although reuse of the material is possible, there are materials that will have no potential future life. It is recommended that periodically (i.e., every 3 to 5 years), bulky metals with no further recyclable value be removed and buried in a dedicated burial pit developed to the east of the existing Bulky Metals Disposal Area. The location of the burial area is shown on Figure 2.

A detail of the pit for the burial of bulky metals at the Bulky Metals Disposal Area is displayed on Figure 10.

2.5 Hazardous Waste Storage Area

2.5.1 Operations

During regular operations work on the facility, any hazardous materials placed on site should be transferred to the Hazardous Waste Storage Area. Batteries must be stored upright. Oils, lubricants and antifreeze may be bulked together in common drums, preferably remaining in their original packaging. Unknown substances should remain in their packages and placed into drums.

Hazardous wastes will be labelled and assigned for removal from the community to a licensed receiver in the south when the storage area nears capacity or when a cost effective volume to warrant shipping was accumulated. Based on historical accumulation notes, this is expected to be once every five years. One alternative to shipping oils, fuels and glycol is to bring in a portable incinerator to treat the materials on-site. An appropriately licensed contractor should be retained to conduct the work.

Only persons with the appropriate skills and training are permitted to handle hazardous wastes.

2.5.2 Maintenance

The area should be inspected on a regular basis for signs of spillage or leaks. Degraded containers (i.e., rusted drums) should be replaced as required.

When materials within the facility have accumulated to quantities that constitute a load, the Hamlet should arrange for them to be removed from site by a licensed hauler who will remove them from the community and dispose of them in a licensed facility.

The Hazardous Waste Storage Area is lined and contained in a berm.

If rainwater collects in the area it should be tested. If the quality is acceptable, it can be transferred to the sewage lagoon. If not, pre-treatment will be required. Treatment would be dependent on the type and concentrations of the contaminants. Refer to the Environmental Contingency Plan for details on assessment of hazardous materials. Sampling will be conducted, as needed, as outlined in the monitoring and QA/QC plan.

2.6 Landfill (Municipal Solid Waste Disposal Area)

The layout of the landfill is displayed on Figures 3 and 5. Operational procedures for the landfill are presented below:

2.6.1 Operation

Site operations include potentially hazardous practices such as burning and operation of heavy equipment. All work is to be conducted only by staff with the appropriate training to conduct the work safely. The health and safety of workers and the public takes precedence.

It has been indicated that the burning of waste is a necessity to prevent odour, eliminate flies, and to reduce potential problems with scavengers, such as bears and foxes (since the ability to cover waste is limited due to the short operational season). In order to minimize the potential for impacts from fires the following rules are to be followed:

- Burn only in the established burn area
- If possible, materials should not to be tipped directly onto burning or smoldering waste; it is preferable to not ignite the waste until it has all been collected for the day
- Ensure that the weather is acceptable for burning. The following guidelines are recommended:
  - Wind speed should be checked. If loose paper or debris can be lifted and carried off site (moderate breezes or greater), burning shall be avoided
  - The wind direction should be checked, to ensure that smoke does not drift towards the Hamlet, or workers in the vicinity
  - If heavy rain is present, burning should be avoided (as it may result in poor combustion and greater potential to generate deleterious by-products).

The site operators shall stay upwind of the fire at all times.

Prior to waste handling, the equipment operator will confirm that the waste is no longer hot or burning. As required, using a dozer or a loader, the ash and unburnt municipal wastes will be pushed away from the burn pit and along the active face, observing the following operating principles:

- All waste shall be removed from the tipping and burn areas
- The waste shall be pushed and spread along the disposal area at a maximum 3:1 grade (shallower grades result in the need for too much cover, steeper grades are typically not stable).

The operational procedures are as follows:

- Divert hazardous material, bulky metals, and reusable/recyclable materials – Figure 11
- Drop off waste at the designated area at the end of the access road. This could be end dumped from a ramp or piled on the ground as conditions allow – Figure 12
- Conduct burning on a regular basis when climate conditions are favourable – Figure 12
- Scrape the burned waste off the drop off area and move it into the fill area – Figure 13
- Compact and layer the waste 250 mm to 300 mm thick – Figure 13
- Gradually build up waste layers across the fill area – Figure 14
- Construct an additional berm once waste levels reach the height of the existing berm – Figure 14
- Continue filling to achieve final site grades over the designed waste footprint – Figure 15
- Close the fill area once final grades (maximum 3:1 slopes) are achieved – Figure 15
- Apply the final 600 mm of cover and stabilize the surface with cobbles – Figure 15.

The year 1 through 20 advancement to contour is shown on Figures 5 though 9. The site is designed so landfill staff have the flexibility to progressively fill the landfill in different patterns that is most suitable to their equipment and preferences. For example, the landfill can be progressively filled from one side to the other in a side to side cell fashion.

2.6.2 Maintenance

Operations staff will perform weekly site inspections and maintenance. During these inspections, weekly site inspection forms (Appendix B) will be completed. These forms are designed to note the standard items requiring inspection and maintenance at the site, as well as other relevant information, such as weather. Health and safety concerns will also be noted. They are also used to document the response to any incidents that affect site operations such as accidents, injuries, fires, flooding, or chemical spills.

- The tipping area and roadways shall be maintained by snow clearing in the winter and grading in the summer, and repaired as necessary
- Ditches and drainage channels shall be inspected for erosion, and repaired as necessary
- Site warning signage, which identifies the boundaries of the Solid Waste Management Facility (which includes the landfill, Hazardous Waste Storage Area, and the Bulky Metals Disposal Area) shall be inspected, and repaired or replaced as necessary
- Any airborne litter outside of the litter-control fences (which are located on top of the berm at the Facility) shall be removed, and deposited in the landfill
- Litter that has accumulated against the fences shall be removed and placed into the landfill
- After rain events and following the spring thaw, the site shall be inspected for leachate breakout. If leachate breakouts are identified, cover the face if possible and ensure that leachate is being contained
- The berms and final cover at the landfill shall be inspected for erosion and settlement
- The fences shall be inspected for damage, and repaired as necessary.

All details of any repairs shall be reported in the Annual Report.

Staff will place hazardous materials, such as oil or solvents into drums located in the Hazardous Waste Storage Area. Materials should be left in their original container and placed into the drums, sorted according to contents (i.e., waste oils stored with oils, solvents with solvents, cleaners with cleaners). Drums will remain sealed within the compound.

2.6.3 Health and Safety

Health and safety of the public and site staff is to be considered the first priority all the times.

Site staff must conduct their jobs on site safely and in accordance with the Nunavut Safety Act.

Close attention should be given to the unique hazards of this site including:

- Scavenging bears and other wildlife
- Open burning
- Moving equipment
- Adverse weather conditions
- Hazardous materials (in the waste and in the storage area).

Staff must be aware of these issues and operate the site in a manner that protects other staff and the public.

Complaints from the public should be recorded and reported to the Public Works foreman. Complaints and the responses to complaints should be documented in the Annual Report for the site.

2.7 Landfarm Area

2.7.1 Overview

The landfarm area is located within the Solid Waste Management Facility, and is contained within its berm and fencing. It is also enclosed with its own berms and access ramp (Figure 4). The landfarm is lined with an HDPE liner to protect the environment. The floor of the landfarm slopes slightly towards the end away from the access ramp, so any excess surface water will collect along the east berm creating a sump.

It is expected that the majority of the soils requiring landfarming will be impacted by petroleum hydrocarbons such as gasoline, diesel, heating oil, and lubricants.

Sewage sludge can also be placed in the landfarm for treatment if the quality of the sludge removed from the lagoon is unsuitable for direct placement as landfill cover.

The landfarm may be used to contain the sewage sludge while it dries and, with some treatment, bio-degradation of the sewage is possible.

The landfarm can be used in an active mode, which involves maintaining moisture and nutrients, regular tilling, and monitoring, or a more passive mode involving only occasional tilling and monitoring. This will be up to the Hamlet to decide which method is preferred.

2.7.2 Landfarm Operation

The following outlines the soil treatment operations and methods to prevent damage to the underlying liner. It is assumed that conventional construction equipment will be used and experienced operators will be conducting the soil mixing and moving operation.

- The impacted soil should be placed up to a maximum thickness of 0.6 m for treatment
- The facility will remain dormant over the winter periods until the ambient temperatures are favourable for treatment
- Low ground-pressure equipment (i.e., Bobcat; back-hoe) should be used to move the soil while operating inside the landfarm. Equipment should not travel directly on the liner until a minimum of 300 mm of impacted soil is placed. No sharp turning of equipment is allowed directly on the liner.

- Objects that have the potential to puncture the underlying liner, such as metals, sharp rocks, and scrap wood should be removed from the impacted soil before it is transported to the landfarm for treatment

- A small sump area should be left open along the east berm and not filled with impacted soil

- Liquid fertilizer should be sprayed over the impacted soil prior to soil turning and mixing. Site staff should determine the best type of fertilizer, the optimum concentration, and application quantity for the soil treatment. Spraying should not be conducted in windy conditions to prevent off site impacts

- The hydrocarbon impacted soil should be turned and mixed immediately after the fertilizer application. The soil is to be turned with an excavator to expose the soil from below. The mixing process should be conducted with care such that the underlying liner is not disturbed or damaged

- The impacted surface water and leachate collected from the collection sump (down slope berm face) should be stored temporarily in a tank. The liquid can be mixed with the impacted soil for treatment, provided the soil requires additional liquid for treatment. Soil moisture should be monitored to optimise and monitor the treatment process

- The excess leachate or surface water collected in the sump that will not be used in mixing with the soil can be stored in the Hazardous Waste Storage Area

- The liquid level shall be monitored to avoid overflow

- Any large accumulation of snow shall be removed as necessary, without removing any of the impacted soil, to prevent flooding or excessive soil moisture

- Mixing and turning of overly dry soil should be kept to a minimum to prevent dust generation

- The Environmental Contingency Plan should be implemented in the event of an environmental hazards (e.g. spill; liner damage, etc.)

- Site staff will have to undergo appropriate training and be provided with the appropriate personal protective equipment.

2.7.3 Landfarm Soil Monitoring

Approved industry standards and methods for sampling, shipping, and handling procedures must be followed to ensure that representative soil samples are taken, and

chemical integrity of the soil samples is maintained during transportation. A work plan including sampling frequency, sampling location, and sampling methods should be prepared and implemented prior to the operation. Soil samples may be taken once every month during the period of active soil treatment depending on the remedial program. A record of sampling and chemical analysis shall be maintained to monitor the performance of the treatment.

A health and safety plan should be developed specific for the work involving soil sampling and handling. The plan should include personal protective equipment and an emergency response plan.

Monitoring of the soil will be specific to the material emplaced (hydrocarbon impacted, sewage sludge, etc.).

2.7.4 Comparative Criteria

The Canadian Environmental Quality Guideline (CCME, 2006) are recommended as the most appropriate comparative criteria, to determine when landfarmed soil can be removed from the landfarm and used as cover material at the landfill. The Industrial landuse criteria as outlined in Chapter 7 for soil in the Canadian Environmental Quality Guidelines must be met in order for the soil to be placed in the landfill (Appendix C).

The following guideline criteria are the most typical hydrocarbon fraction thresholds that must be achieved in order to use the soil in the landfill.

Clean-up Criteria for Contaminated Soil at Landfarm

	Criteria (mg/kg)
Petroleum Hydrocarbon Fraction-1 (F1)	310
Petroleum Hydrocarbon Fraction-2 (F2)	760
Petroleum Hydrocarbon Fraction-3 (F3)	1700
Petroleum Hydrocarbon Fraction-4 (F4)	3300

2.7.5 Use of Landfarmed Soil

Depending on the type of contaminants and the clean-up criteria achieved by the landfarming process, the soils could be suitable for re-use as landfill cover. This assumes the material can meet the Canadian Environmental Quality Guidelines as outlined in Chapter 7 for Soil Industrial Landuse criteria, which are the threshold limits for disposal

in the landfill. Once this is achieved, the material can be used for interim cover or part of final cover.

2.7.6 Environmental Monitoring

The landfarm is within the Solid Waste Management Facility, so environmental monitoring of impacts will be conducted as part of the monitoring and reporting for the entire facility.

2.7.7 Reference Document for Landfarm

The Code of Practice for Land Treatment of Soil Containing Hydrocarbons (Alberta Environment, 2005), provides a good reference source for landfarms in the absence of Nunavut specific guidelines.

2.7.8 Landfarm Operation Training

As outlined herein, detailed operational procedures for the landfarm cannot be developed until there is a specific case of material requiring landfarming. Staff must receive the appropriate training in order to operate the landfarm effectively.

2.8 Special Wastes

On occasion, the Hamlet may be faced with determining if a waste material is of an unusual nature (contaminated soil, ship ballast, sand blasting waste, etc.). Since the landfill is designed and licensed to accept only municipal waste, an assessment process is followed to determine if the special waste is suitable for disposal at the site. As a general protocol, any solid material which meets the Canadian Environmental Quality Guidelines for Soil – Industrial landuse Criteria is likely acceptable. If the material cannot be sampled and tested in this fashion, outside expertise should be brought in to make an evaluation and recommendation to the Hamlet. When in doubt the safest practice is to store the material in the Hazardous Waste Storage Area, or if the quantity is too great in the landfarm area, as both areas are lined.

2.9 Site Closure and Restoration

The closure plan for the landfill area is displayed on Figure 9, assuming the site is filled in year 20. There is available land around the landfill which may permit site expansion and continued use beyond the current design. Post closure care will include:

- creation of a closure plan and post closure monitoring plan at least two years prior to closure, for which a new submission for a water license amendment will be required
- long term monitoring
- Surficial inspections and cover maintenance as required
- Restoration of the surface to match the surrounding natural tundra.

Figure 15 displays an alternative for continued use beyond year 20. Neither option has been "engineered" at this time. They are just presented as possibilities that could be explored as the site reaches capacity. The same closure design can be used to cover the hazardous waste storage areas and landfarm once they have been cleaned out and are no longer required. The closure plan for the bulky metals burial pit is shown in Figure 10. Each burial event will be conducted in the same fashion.

2.10 Reuse/Recycle

A reuse/recycle area has been established in the bulky metals area. Hamlet landfill staff have been operating it effectively and the current design includes continuing this practice. This is an effective way to reduce landfilling and prevent scavenging in the landfill.

3.0 Contingency Measures

3.1 General Contingencies

Contingency plans are designed so that site operators are prepared in the event of an accident or occurrence. The contingency measures described below are generic in nature since they must address a wide variety of issues.

3.1.1 Environmental Emergency Contingency Plan

A separate document entitled Environmental Contingency Plan, Hamlet of Kugluktuk, dated March 2007, was prepared as part of a submission for an amendment to the NWB license. Refer to that document for the response to spills and environmental contingencies.

3.1.2 Injuries

In the event of an injury to workers or members of the public:

- Apply first aid
- Seek medical assistance, if necessary
- Report the injury to the supervisor
- Document the incident and all response measures on the Weekly Waste Management Facility Inspection Form (Appendix D).

3.1.3 Fires

In the event of a fire, assess the situation. Do not attempt to fight a fire if it cannot be done safely. Standard fire fighting equipment that can manage most small fires is available in a shed near the Hazardous Waste Storage area. Alternatively, cover soils can be thrown onto the fire either by hand, or by using available equipment (i.e., bulldozer). Obtain help as necessary. Document the incident and all response measures on the Weekly Site Inspection Form and Supplementary Site Inspection Form (Appendix B).

3.1.4 Erosion

Erosion may become a problem if runoff rates exceed expectations or cover soils and vegetation are not well established. The preferred contingency measure for this is to repair the area of erosion with available materials and cover with blast rock.

3.2 Accumulation of Impacted Water

At some point, for a variety of reasons, impacted water may accumulate in the landfill, hazardous waste storage area or landfarm.

The water may or may not be impacted by leachate, hazardous wastes or contaminants from land farmed soil. Given the climate and current lack of issues with respect to accumulation of impacted water, this is not anticipated to be a significant problem, however, in the event this occurs, the following procedures will be followed:

- Collect samples as outlined in the Monitoring Program and QA/QC Program document
- Analyze samples for parameters of concern and compare the results to the recent criteria (Nunavut Guidelines, Canadian Water Quality Guidelines, etc.)
- Dispose of the water. Disposal options are dependent on the water quality and could include:
  - Transportation and disposal in the sewage lagoon – direct discharge to the environment is discouraged
  - Pre-treatment (filter, chemical, etc.) prior to discharge to the sewage lagoon
  - Containment and storage of hazardous waste.

4.0 Solid Waste Management Facility Monitoring Procedures

As outlined in the NWB water license, regular monitoring of runoff from the Solid Waste Management Facility is required. The Monitoring Program is to include effluent samples collected from the water collection pond during the months of June to September, if the pond requires discharging. Landfill impacts will also be assessed when sampling downgradient of the landfill as part of the Wetland Treatment Area sampling program as shown on Figure 16.

The monitoring program is outlined in detail in the Monitoring and QA/QC Plan, Hamlet of Kugluktuk (prepared as a separate document).

Effluent samples collected shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate-Nitrite	Oil and Grease
Total Phenols	Sulphate
Sodium	Potassium
Magnesium	Calcium
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	

In addition, any additional analytical parameters which are identified in the NWB water license or by an Inspector (as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act)* shall be included.

It is recognized that it may take some time for results to be received from the accredited laboratory. In the event that the water retention area fills to the invert, it should be inspected for odours, stain, or signs of visible impact (sheens, floating scum). The invert may be blocked to facilitate additional water accumulation in this case, until the results are received.

Results of analytical testing and monitoring are to be recorded on a regular basis by the staff. Copies of the analytical certificates and Chain of Custody forms are to be kept for future reference.

Monitoring results will be compared to the Canadian Environmental Quality Guidelines (CCME, 2006), specifically the Chapter 4 Criteria for Water: Aquatic Life – Freshwater

(Appendix C). The water retention pond cannot be discharged unless the quality meets this criteria.

Monthly and annual quantities of solid waste offloaded will be estimated and recorded on the Waste Placement Form (Appendix B).

5.0 Reporting

The Nunavut Water Board License, Part B: General Conditions includes the requirement to file an Annual Report with the NWB no later than March 31st of the year following the calendar year reported, which shall include:

- Tabular summaries of all data generated under the "Monitoring Program"
- The monthly and annual quantities in cubic metres of fresh water obtained from all sources
- The monthly and annual quantities in cubic metres of each and all waste discharged
- A summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities
- A list of unauthorized discharges 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 the next year
- A summary of any studies, reports and plans (i.e. Operation and Maintenance, Abandonment and Restoration, QA/QC) requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned
- Any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.

The format of the NWB Annual Report is included in Appendix D.

The creation of the report can be greatly simplified by the regular filling in and handling of the Site Forms included in Appendix B. The forms include:

- Form 1 – Waste Placement Form – describing the day to day delivery of waste and site activities
- Form 2 – Weekly Waste Management Facility Inspection Form – to document the weekly inspection and observation of the site operation and infrastructure
- Form 3 – Solid Waste Planning – which provides a list of items to be discussed by the site foreman and Hamlet Council related to short term and long term solid waste decision making.

In addition to the context of these forms, there would be sampling information and analytical data. Using the forms and following the procedures provided herein should make submitting the annual monitoring report relatively straight forward.

7.0 Reference Documents

The following documents provide a resource of information to deal with specific issues:

- Canadian Council of Ministers of the Environment (CCME), *Canadian Environmental Quality Guidelines,* Update 6.0, July 2006
- *Guidelines for the Planning, Design, Operations, and Maintenance of Modified Solid Waste Sites in the Northwest Territories*, prepared by Northwest Territories, Municipal and Community Affairs
- *Consolidation of General Sanitation Regulations* under the Public Health Act
- *Nunavut Safety Act*
- *Nunavut Waters and Nunavut Rights Tribunal Act*
- The following guidelines prepared by the Department of Sustainable Development:
  - *General Management of Hazardous Waste*
  - *Environmental Guidelines for Waste Antifreeze*
  - *Environmental Guidelines for Dust Suppression*
  - *Environmental Guideline for Industrial Waste Discharges*
  - *Environmental Guidelines for Ozone Depleting Substances*
  - *Environmental Guidelines for Waste Asbestos*
  - *Environmental Guidelines for Waste Batteries*
  - *Environmental Guidelines for Waste Paint*
  - *Environmental Guidelines for Waste Solvent*
- The following polices prepared by the Government of Nunavut:
  - *Waste Lead (Draft)*
  - *Policies Regarding Open Burning*
  - *Management of Fluorescent Lamp Tubes.*
- *Spill Contingency Planning and Reporting Regulations*, Government of the Northwest Territories, 1998.

Hamlet specific documents include:

- The amended *Nunavut Water Board License* which may have additional specific requirements
- *Environmental Emergency Contingency Plan, Hamlet of Kugluktuk*
- *Monitoring Program and QA/QC Plan, Hamlet of Kugluktuk.*

For the landfarm:

- *Code of Practice for Land Treatment of Soil Containing Hydrocarbons*, Alberta Environment, October 2005.