Hamlet of Hall Beach, NU Solid Waste Facility Operation and Maintenance Manual

Hamlet of Hall Beach

June 2011

Solid Waste and Landfarm Facility – Operation and Maintenance Manual

Community & Government Services, Government of Nunavut

09-2156-2100

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Submitted by

Dillon Consulting Limited

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1 INTRODUCTION

1.1 Purpose

The purpose of this manual is to assist the Hamlet of Hall Beach personnel with the operation and maintenance of their solid waste facility. The manual has been developed according to the requirements of the Nunavut Water Board and is based on the *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories* (Duong and Kent, 1996).

1.2 Site Setting

The Hamlet of Hall Beach is located on the shore of the Melville Peninsula, at latitude 68°46'N and longitude 81°12'W (Environment Canada, 2011). Hall Beach is situated in the Foxe Basin, 840 km by air northwest of Iqaluit. It has an estimated population of 704 (Government of Nunavut, 2011). Hall Beach is located in continuous permafrost zone. The flat to gently rolling terrain is made up of raised beaches of sand and gravel which is studded by numerous lakes and ponds.

It is estimated that Hall Beach receives an average of 102.3 mm of rainfall and 124 cm of snowfall per year (Environment Canada, 2011). In the month of July, mean high temperatures are 9.4° C and mean low temperatures are 2.8° C (Environment Canada, 2011). In the month of January, mean high temperatures are -25.8° C and mean low temperatures -35.7 C (Environment Canada, 2011). Ice freeze-up typically occurs during the month of November, but may happen as early as September or October. Spring thaw typically usually occurs at the end of May.

Components of the Hamlet of Hall Beach solid waste management facilities include the existing solid waste site which houses household waste and other non-segregated waste. As well there are a number of bulky metal waste sites located on the shore leading to the solid waste site. The map below shows the location of these sites relative to the community centre. Section 2 describes each site in more detail.

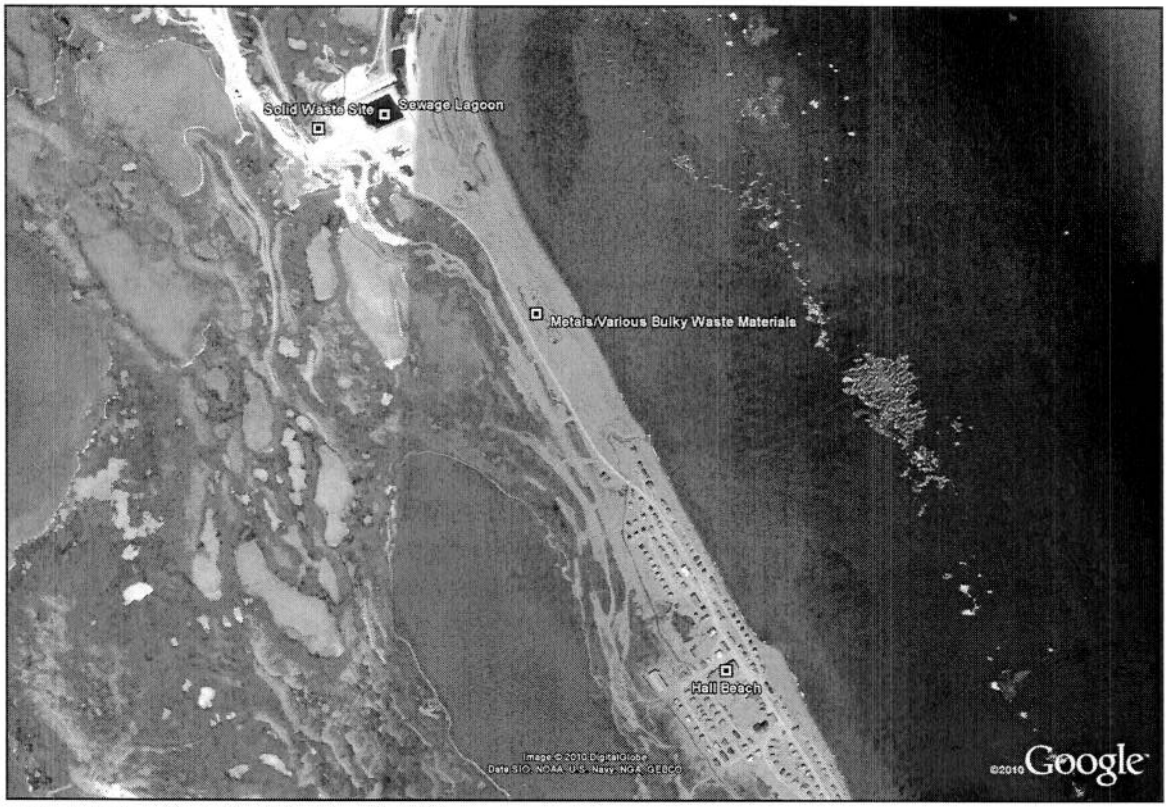


**Image taken from Google Earth Pro, December 2010*

Figure 1 Map of the Hall Beach Solid Waste Site

2 BACKGROUND

2.1 Solid Waste Facility

The Hall Beach solid waste facility's general household waste site is located adjacent to the sewage lagoon. Waste at this site is mostly burned, but sometimes buried. There are numerous other piles of wastes located at various points along the road out to the solid waste facility. These wastes include miscellaneous metals, construction and other bulky wastes.

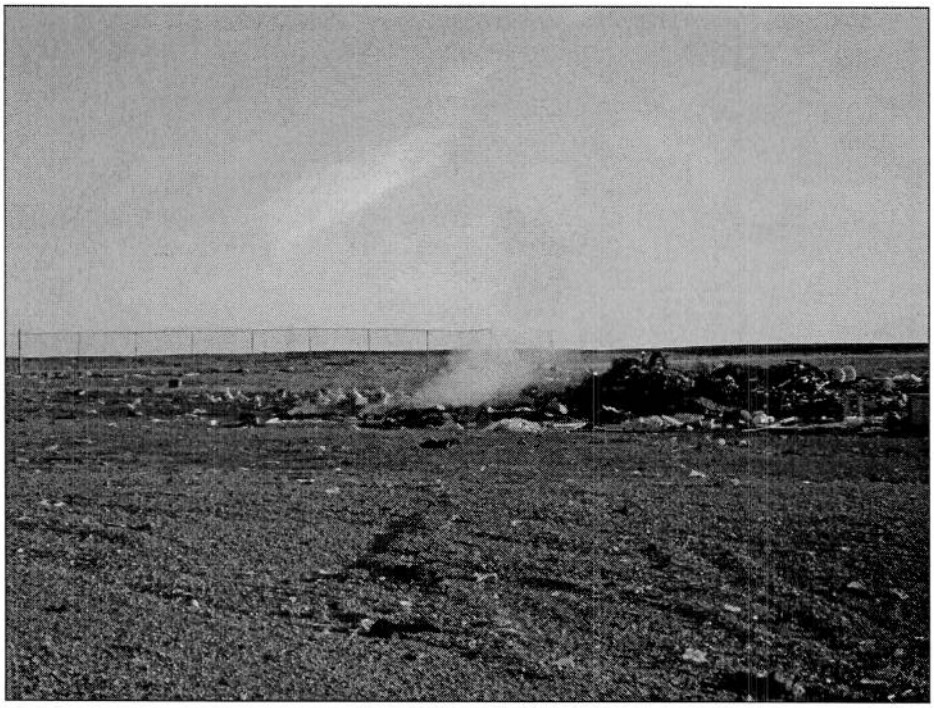


Figure 2. Solid Waste Facility, Household Waste Area

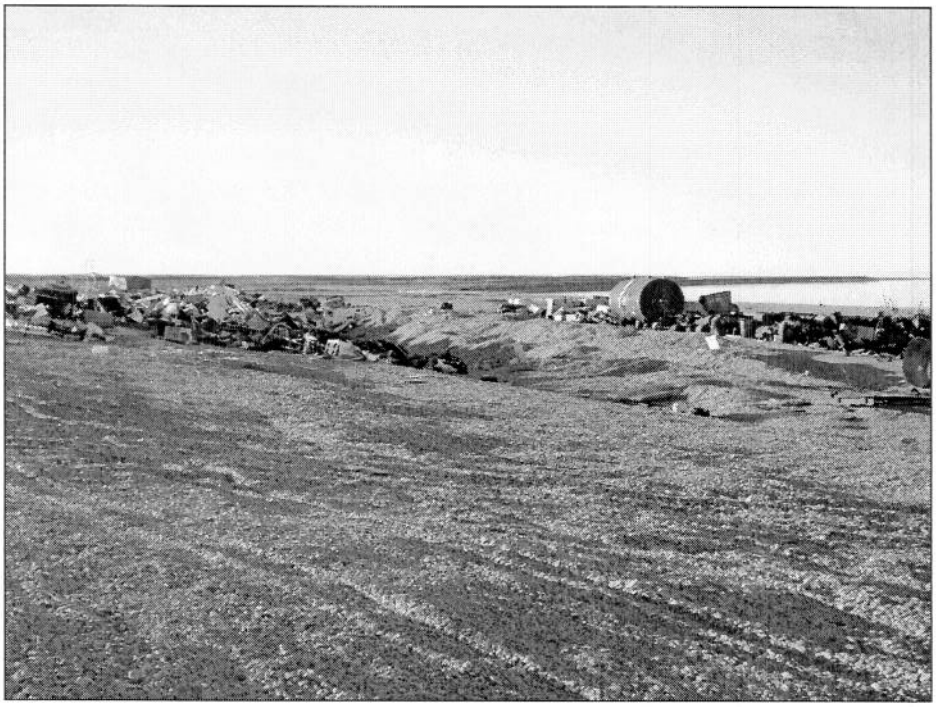


Figure 3. Solid Waste Facility, Bulky Waste Area

The bulky waste area is unsorted and hazardous waste was found mixed in as well. Scrap metals were located 1 km along the road but outside of the boundaries of the solid waste facility. There is a constructed flat surface close to the bulky waste site, the purpose of which is unclear.

Additionally, there is some exploration activity being performed near the community. This activity generates waste that is dumped at the Hall Beach solid waste facility. The Coast Guard and DEW line site disposes of its waste in this facility. Hamlet staff have reported that calcium chloride was brought for disposal a few years ago, the origin of which is unknown.

There is some fencing at the household waste site, but it does not encompass the whole area. There is no fencing around the bulky waste site.

Currently, there is no designated area for the storage of hazardous waste materials. The Hamlet has a waste oil furnace, however this furnace is not in operation at this time. Waste oil is being stored outside the hamlet garage and behind the housing workshop. According to Hamlet staff, antifreeze is being mixed with waste oil. If this is the case, the Hamlet must check with the waste oil furnace manufacturer prior to burning waste oil mixed with antifreeze and other glycols and greases as this may be unsafe to both humans and the environment. It is unclear as to the fate of waste glycol and grease within the Hamlet.

Used batteries are stored in the parking garage. According to Hamlet staff, propane canisters are stored in a sea container. The location of this sea container is unclear. Propane canisters and used batteries should be collected, stored and disposed of as per Section 3.1.6 – Hazardous Waste Management (Section 3.1.6.1 – Waste Batteries, Section 3.1.6.11 – Propane Tanks) located in this manual. Improper collection, storage and disposal techniques may lead to human injury or environmental damage.

It was reported by Hamlet staff that batteries and propane canisters were shipped out to a southern facility 1-2 years ago. White goods are stored with metals, but it is unclear as to whether refrigerants or other hazardous materials were removed prior to storage. It was also reported that the Housing Corp. shipped some white goods to a southern facility for final disposal last year.

3 OPERATIONAL PROCEDURES

3.1 Waste Disposal

The purpose of the solid waste facility is to take waste from the Hamlet of Hall Beach and dispose of it in a safe and environmentally conscious manner. The following sections describe what types of waste are acceptable and what types are unacceptable.

Additionally, agreements should be set up for all waste accepted from parties external to the Hamlet of Hall Beach, such as the Coast Guard, Dew Line site and exploration outfits.

3.1.1 Acceptable Waste

The Site Operator will ensure that the landfill accepts only the materials that it has been designed to handle and that all waste is deposited in the designated areas. Any exceptions must be reviewed and approved by regulatory agencies.

The following items are acceptable for disposal at the solid waste site:

1. Non-recyclable plastic, metal, and paper wastes; packaging; cardboard; newsprint; food; rubber; leather; glass; wood; from residential, commercial or industrial premises
2. Animal and vegetable (organic) waste material
3. Sweepings, clothing and textiles, consumer electronics, and discarded household utensils
4. Furniture and major appliances
5. Non-salvageable metals
6. Vehicles
7. Tires
8. Construction & Demolition wastes (provided the waste is not a hazardous or banned material)

3.1.2 Non-accepted Waste

Wastes which present a danger at the solid waste facility, require special disposal techniques, or may interfere with the level of service to the public, are not acceptable for disposal. In some cases, wastes which are acceptable in small quantities may not be acceptable in large quantities from a single generator because they may cause the level of service to other users to deteriorate and cause handling problems at the site and increased environmental liability. To some extent, the acceptability of large quantity wastes must be at the Site Owner's discretion, depending on the ability to accommodate disposal without deterioration in the level of service. In cases where unacceptable wastes are identified, site staff will attempt to identify allowable management alternatives to material haulers.

All wastes which pose potential safety or environmental problems cannot be listed in their entirety. The Site Owner and site personnel in general must be wary of accepting wastes which could cause future operational problems and must watch for the inclusion of unacceptable wastes in regular loads of refuse.

The following items are not acceptable for disposal at the solid waste site:

1. Pathogenic wastes
2. Radioactive wastes
3. Hazardous wastes
4. Asbestos
5. Batteries
6. Used oil
7. Any other materials not listed as acceptable or conditionally acceptable with the approval of the SAO

Of the above listed items, the following may be placed in specially designated areas of the landfill for storage until they can be shipped south by barge:

1. Hazardous wastes (eg. pesticides, insecticides, oil-based paint, anti-freeze, small flammable or explosive containers, mercury thermometers and switches)
2. Batteries
3. Used oil (must be placed in approved storage containers and stored in the designated area for hazardous waste)

The solid waste facility should be divided into sections for disposal of different types of waste. Each section may then be divided into smaller sections depending on the intended use. The main sections that should be located in the solid waste site are:

- General Household Waste
- Animal Carcasses
- Bulky Waste
- Hazardous Materials

3.1.3 General Household Waste

Currently, most household waste is burned. Only clean paper and wood is allowed to be burned according to Territorial regulations. As such, household waste should be buried. One method that may be suitable for the Hall Beach landfill is the area method, where waste is buried under cover material. Use of this method is dependant on the site topography. Prior to choosing an operational method for the landfill, the site should be reviewed by an engineer to help choose the most appropriate operational method. A figure describing the area method of disposal is shown below:

1. Build a 2m high berm in the general household waste disposal area. Dump collected general household waste in front of berm.
2. Drive over garbage 3 to 5 times to compact. Work garbage up the berm a little at a time to pack it.
3. Alternate between dumping and packing garbage until packed garbage is 2m high.
4. When finished compacting and piling garbage for the day, cover the pile immediately with a 300mm thick layer of granular cover material and compact.
5. Continue to pile garbage against the berm covering the garbage pile at the end of everyday. If during the day, the garbage pile reaches 3m in width, cover with a 300mm thick layer of granular material and continue packing garbage. Be sure to cover packed garbage at the end of the day.
6. When there is no more space available, cover the entire garbage pile with an extra 300mm thick layer of granular material. Compact and add more granular material until the top is level. Build a second berm on top of the garbage pile as shown.
7. Continue until no more space is available.
8. Pack a 600mm thick layer of granular material over the entire pile and compact. Dome the top of the pile to allow runoff of excess water from rain and snow.

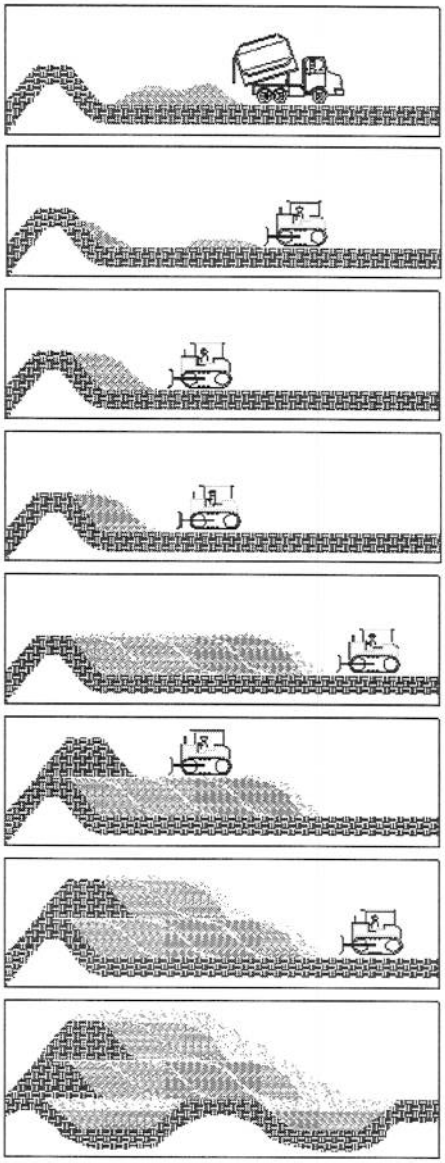


Figure 4 Area Method of Solid Waste Site Disposal in a Landfill

(Source: Kent, R., P. Marshall and L.Hawke. "Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories", Produced for Municipal and Community Affairs, Government of the Northwest Territories, 2003.)

The fence around the facility must be kept in good repair to prevent larger animals such as bears from getting into the landfill. These animals (bears, wolves, foxes, birds, etc.) pose a threat to Hamlet crews working in and around the landfill.

3.1.4 Animal Carcasses

All animal carcasses are to be deposited in a marked pit within the fenced in area of the solid waste facility. The pit will be clearly labelled and a gravel pile to use for cover material will be stockpiled beside it. Residents will be responsible for placing the carcasses in the pit and will be encouraged to cover them with stockpiled gravel. Any carcass found within the landfill that has not been placed in the pit, will be removed and placed in the pit by Hamlet crews. Hamlet crews will also check each day that all carcasses have been covered with granular material. If the stockpiled material has been used up, Hamlet crews will gather more granular material and stockpile it next to the pit. Carcasses must be covered immediately as their odours will attract wildlife to the landfill.

3.1.5 Bulky Waste

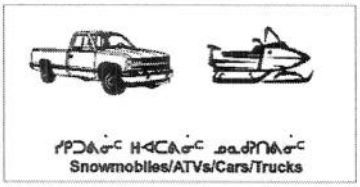
The bulky waste site is located at the solid waste facility and should be divided into separate areas for various types of waste. These areas might include:

- White Goods (Appliances)
- Vehicles (Snowmobiles, ATVs, Cars, Trucks)
- Tires
- Waste Barrels
- General Metals
- Wood Products

3.1.5.1 *White Goods (Appliances)*

White goods are larger household appliances such as fridges, freezers, stoves, microwave ovens, washers, dryers and hot water heaters. These items will be placed in a separate pile so they can be collected and shipped south for reclamation purposes. These appliances may contain hazardous materials such as refrigerants, mercury switches, ballasts and capacitors all of which must be removed before the appliance has been landfilled. More details on removal and disposal of refrigerants, mercury switches, ballasts and capacitors are described in Section 3.1.6.

3.1.5.2 *Vehicles (Snowmobiles, ATVs, Cars, Trucks)*



Prior to landfilling End-of-Life Vehicles (ELVs), the solid waste site must have a space dedicated to storing and inspecting vehicles when they arrive on site. Based on the National Code of Practice (2008), there is no requirement for this area to be paved. However all spills must be cleaned up and any contaminated soils and cleaning materials must be disposed of as hazardous waste, unless materials are tested and shown not to be hazardous. Vehicles should be checked for leaks as they arrive to prevent soil and water contamination in the vehicle storage area. Runoff from the storage area caused by precipitation (rain, snow, etc.) must not be contaminated (National Code of Practice, 2008). Methods to collect and treat runoff may be required. This may include obtaining regulatory approval for the facility from the applicable agencies.

Vehicles must be drained of all hazardous fluids and wet parts removed prior to landfilling and/or crushing the vehicle hulk. Wet parts are parts of the vehicle that contain hazardous fluids such as batteries, fuel tanks, transmissions, radiators and power steering units. Also parts that are leaking fluid, need to be treated as wet parts and their fluids removed.

Figure 5. Vehicle Ready for Dismantling

All hazardous fluids must be removed from ELVs before landfilling or crushing. If these materials are not removed, hazardous materials may be released thus contaminating the surrounding area and leaked into the environment. To ensure safe removal of all hazardous items, the vehicle's battery should be removed first, followed by refrigerants (if present) and thirdly fuel. The order of removal thereafter is not significant. Hazardous items that must be removed include:

- Battery;
- Refrigerants;
- Gasoline or Diesel;
- Antifreeze;
- Brake Fluid;
- Engine Oil;
- Transmission Fluid;
- Power Steering Fluid;
- Differential Fluid (if present);
- Windshield Washer Fluid;
- Mercury Switches (found in ABS brakes, convenience lighting); and,
- Lead (battery connectors, wheel weights).

Please refer to Section 3.1.6 for proper handling and storage techniques for the listed hazardous materials.

The space used for removing hazardous materials and dismantling vehicles should have a non-permeable base, such as concrete or poly liner, to provide an easy cleaning surface and to prevent spilled fluids from contaminating the environment. The space should be covered to protect it from the weather and to prevent spilled materials from being washed into the environment. The concrete pad should be high enough to prevent flooding during rainstorm events. An alternate for smaller/temporary locations is to undertake work outdoors in dry warm weather only upon an impermeable working surface. The constructed temporary vehicle fluid recovery area should consist of, for example, a protective sand layer/poly liner/sand layer covered with a plywood working surface. Absorbent materials should be on hand at all times to clean up any spills. All spills must be cleaned up and any contaminated soils and cleaning materials must be disposed of as hazardous waste, unless materials are tested and shown not to be hazardous.

Figure 6. Absorbent Material place over Spilled Vehicle Fluids

Once all hazardous materials have been removed, there must be an area designated for the storage of vehicle hulks. Hulks may be salvaged for useable or recyclable parts. Once the hulks have no more "salvage" value, they may be crushed and shipped south for recycling.

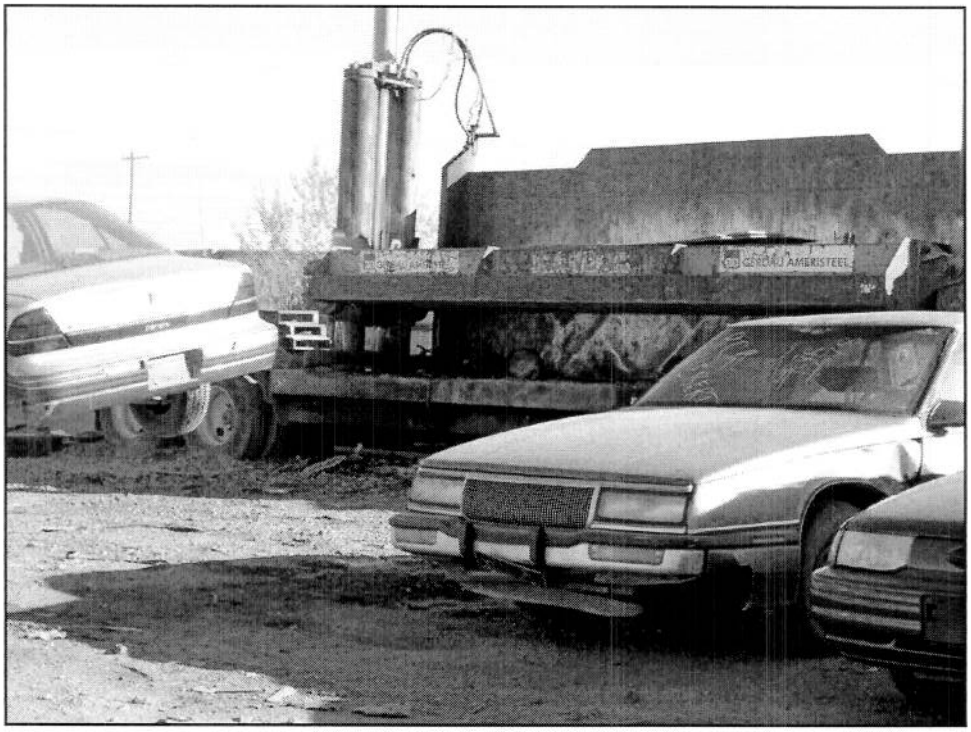


Figure 7. Vehicle Hulks Ready to be Crushed

The vehicle hulk storage area must be kept clean and any spills or leaks must be cleaned up immediately. Contaminated soil and materials must be discarded as hazardous wastes, unless tested and determined to be non-hazardous. Care must be taken not to contaminate any water or runoff from the area (National Code of Practice, 2008).

Hazardous fluids must be stored in proper containers and separated appropriately. These containers should be kept in the vehicle dismantling area, stored on the concrete pad. This will provide easy access to the containers when draining fluids from vehicles. Storing in this area will also provide protection from the weather and a non-permeable surface to store the containers on. Fuels must be stored in a separate well-ventilated area of a building or outdoors protected from the weather (British Columbia Ministry of Environment, 2008). Contact the Fire Marshall for specific instructions on the storage of fuels. Please refer to Section 3.1.6 for proper handling and storage techniques for each hazardous material.

Figure 8. Example of Plastic Totes Used for Collection of Vehicle Fluids - Not Used for Gasoline

Crushing of vehicles is intended to reduce the volume for shipping. Crushing may consist of flattening an auto or logging. Logging an auto consists of compressing an auto into a rectangular cube. A crusher may be brought to site and operated by a third-party when quantity of hulks warrant. If so, the crushing area must be large enough to accommodate the crusher and also have a space designated for the storage of crushed vehicles. According to the National Code of Practice (2008) and the British Columbia Ministry of Environment (2008), the following items should be completed in conjunction with crushing operations:

- All hazardous materials must be removed from the vehicles prior to crushing;
- Any spills must be cleaned up immediately and all contaminated soil and cleaning materials must be disposed of as hazardous waste (unless tested and shown otherwise);
- Any water resulting from the crushing operations should be treated through oil absorbent filters; and,
- Once the crusher has been removed from site, the site should be cleaned and debris removed to designated locations.

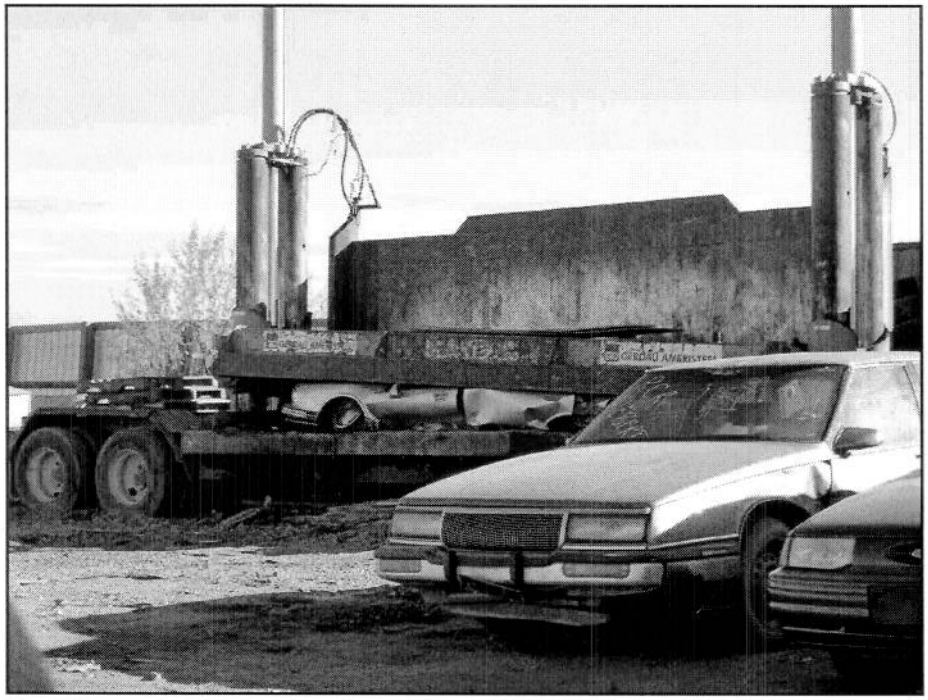


Figure 9. Vehicle Crusher in Operation

Figure 10. Example of "Logged" Metal

Hamlet crews will be responsible for checking landfilled vehicles to ensure all batteries and fluids are removed. If they are not, Hamlet crews will remove the batteries and place in the battery storage area. If the vehicle contains refrigerants, a refrigerant removal technician must then be brought in to remove these items. Hamlet crews should not remove any fluids or other parts (except batteries) until the refrigerants have been removed.

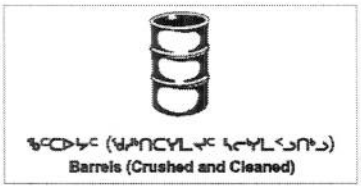
Once refrigerants are removed, Hamlet crews will drain all fluids, store in appropriate containers and place in the hazardous materials storage area. Once per year, Hamlet crews are to remove pieces from the vehicle storage pile that are no longer useful or recyclable. These pieces can then be crushed and placed in the general metals pile.

3.1.5.3 *Tires*

Tires are not considered to be hazardous waste and so may be stored in a designated area of the bulky waste site. However, they are quite flammable and burning of tires produces heavy toxic smoke which poses a serious health hazard to residents of the hamlet. Care must be taken to prevent fires within the bulky waste site. Burying of tires is not necessary. Landfills that have buried tires in the past have found that through natural processes (such as freezing and thawing of the ground) tires have resurfaced (Murray,

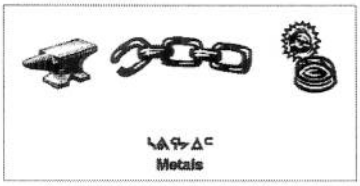
Depository Services Program, Government of Canada, 2002). Once the amount of used tires in the landfill becomes unmanageable, they should be shipped to a southern facility equipped to recycle old tires.

3.1.5.4 *Waste Barrels*



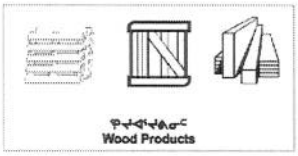
Waste barrels are to be cleaned and crushed before they can be placed in the crushed barrel pile. Barrels that previously contained hazardous materials (fuel, oil, etc.) must be cleaned by one of the following methods: solvent rinsing, steam cleaning or high pressure rinsing with the use of the appropriate cleaning solvents. This may be completed by contracting a commercial cleaning company (Environmental Protection Division, Environment and Natural Resources, 2008). Prior to cleaning the barrels, liquids held within the barrels must be identified by appropriate testing methods. Hazardous liquids must be stored in appropriate storage containers in the designated hazardous waste area of the solid waste facility and crated to be shipped out appropriately. Please refer to Section 3.1.6 for further details.

3.1.5.5 *Waste Metal*



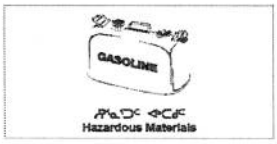
All other metal debris is to be placed within a general metals storage area. Metal scraps no longer useful for recycling purposes may be compacted and buried as per the area method. Useful metal material may be placed in this area separate from the non-useful metal material.

3.1.5.6 *Wood Products*



Scrap wood products will be placed in the designated area at the solid waste facility. Residents will be encouraged to deposit wood products they do not want in this area for recycling and reuse by others. Any wood products found within the landfill that are not placed in the appropriate pile will be removed promptly by Hamlet crews and placed in the wood products area.

3.1.6 Hazardous Waste Management



Hazardous wastes include waste such as paint, waste oil, waste fuel, mercury thermometers and switches from household appliances, capacitors and ballasts, antifreeze, propane tanks, small flammable or explosive containers, etc. These items should be stored within a marked and separate area located at the solid waste site, until the wastes can be properly crated and shipped to an appropriate disposal facility. It is imperative that these wastes be kept separate from each other and that **NO** mixing of these materials is to occur.

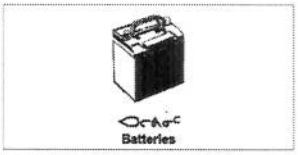
Currently, waste oil is being stockpiled outside of the Hamlet garage and behind the housing workshop. It is recommended that the Hamlet transfers all waste oil to a designated area for the waste oil drums at the solid waste facility.

Hamlet crews are responsible for segregating and depositing household hazardous waste materials into the designated areas. Hamlet crews must be properly trained to follow safe hazardous waste segregation procedures. Any hazardous materials not stored in the proper area must be removed and placed in the appropriate storage area by Hamlet crews. Hamlet crews will also be responsible for properly crating hazardous material for shipment. See Section 3.4 for details on shipping arrangements.

For further information specific to hazardous wastes, refer to the Department of Environment, Government of Nunavut website at:http://env.gov.nu.ca/node/82#Guideline%20Documents.

Only properly trained personnel should handle hazardous materials. Please contact the Workers' Safety Compensation Commission (toll free: 1-877-404-4407) for further information on obtaining proper training and certification to handle such materials.

3.1.6.1 *Waste Batteries*



Collection

Waste batteries include vehicle batteries from cars, trucks, snowmobiles, etc. A vehicle's battery should be removed first in order to de-energize the ELV. This will allow for safer removal of all other materials from the vehicle. Waste batteries from ELVs contain corrosive fluids and heavy metals that may

contaminate the environment if not stored and disposed properly (Department of Sustainable Development, Government of Nunavut, 2002). Therefore all waste batteries from ELVs must be removed during the dismantling process.

Stockpiling

Waste batteries should be stored in a leak-proof drum (metal or plastic) with a secured lid to protect batteries from rain and snow. Batteries may be stacked, but a layer of cardboard or plywood must be placed between the layers of batteries. If batteries are stacked without cardboard or plywood between the layers, there is the potential for the batteries to short and cause an electrical fire. The batteries must be secured to the pallets by nylon straps and must not be stacked more than two batteries high. A polyethylene containment liner must be used and must be large enough to place under the batteries and then wrap around them to create a sealed containment unit (Department of Sustainable Development, Government of Nunavut, 2002).

Disposal

Waste batteries may be sent to recycling facilities in southern Canada. The solid waste site operator will have to contact a recycling/disposal facility and make arrangements for that facility to receive the waste batteries. Please contact the appropriate transport authority (marine, rail, road) for appropriate shipping and transportation instructions of waste batteries (Department of Sustainable Development, Government of Nunavut, 2002). Proper packaging and labels will be required prior to transport out of the Hamlet. The Site Operator should contact the Transportation of Dangerous Goods Northern Regional Office at 1-888-463-0521 to ensure that the batteries are properly crated and have the appropriate labels prior to shipping. Ensure that manifests and transportation records are kept onsite.

Please refer to the *Environmental Guideline for Waste Batteries* (Environmental Protection Service, Department of Sustainable Development, Government of Nunavut, 2002), located on the Department of Environment, Government of Nunavut website at http://env.gov.nu.ca/node/82#Guideline%20Documents for further instructions on the collection, storage and disposal of waste batteries.

3.1.6.2 *Used Oil and Waste Fuel*

According to the *Used Oil and Waste Fuel Regulations Plain Language Guide* (Department of Environment and Natural Resources, Government of the Northwest Territories, 2003) used oil is defined as "any heavy, hydrocarbon-based lubricating oil that has become unsuitable for its original purpose". Examples of used oil include crankcase oil, hydraulic fluid, automatic transmission fluid and gear oil (Department of Environment and Natural Resources, Government of the Northwest Territories, 2003). In the same document, waste fuel is defined as "flammable or combustible hydrocarbon that has become unsuitable for its original purpose". Examples of waste fuel include gasoline, diesel fuel, furnace fuel, aviation fuel, kerosene and naphtha (Department of Environment and Natural Resources, Government of the Northwest Territories, 2003).