

12.0 Waste Management

Waste includes those materials that are discarded, or are intended to be discarded.

This section addresses the issue of waste management with the goal of leaving as light a footprint as possible in an exploration program. It describes the various categories of waste and gives guidance in assessing the management and disposal options that are available.

All waste disposal activities require a permit from the local authorities, whether on-site or off-site. This may be issued by the Mines Department, the Environment Department or the local municipal government, and will vary from country to country (or even within countries).

It is therefore essential that, during the planning stages of an exploration project, explorationists consult with local authorities to determine the permitting requirements, prior to making decisions about on-site/off-site waste disposal options. This information will also aid personnel involved in planning the exploration project to determine which types of materials to use. For example, if disposal regulations for certain materials are considered too onerous, alternate materials could be used.

Different waste types require different treatment, so the first step in waste treatment is to define the waste type involved. Legal definitions for waste types have not been included in this section, as these will vary by location.

Six descriptive categories for waste types are:

1. Recyclable general waste
2. Non-recyclable general waste
3. Recyclable special management waste
4. Non-recyclable special management waste
5. Recyclable dangerous waste (e.g., waste oil, waste antifreeze)
6. Non-recyclable hazardous waste

Before setting up an exploration project, questions to ask in order to assess the waste that will be generated include the:

- Number of people in the project
- Presence of a site camp
- Anticipated life of the project
- Location of the project and possible environmental impacts

Determine specific features of the project area, including:

- Temperature
- Wind
- Rainfall
- Wildlife
- Local environmental regulations and standards

In this process, take into account the activities to be undertaken in the project, which may include:

- Trenching

- Diamond drilling (the number of rigs and additives to be used)
- Reverse circulation and other types of drilling (number of rigs)
- Construction of access roads with machinery
- Generation of general waste, special management waste and hazardous waste
- Materials to be recycled

The steps to go through to ensure proper waste disposal include:

- Identifying waste
- Source reduction and waste minimization
- Effective waste management
- Treatment and disposal options

Wherever possible, avoid waste disposal on-site, by bringing in only required materials, and segregating, recycling, and removing wastes. If on-site waste disposal facilities are required, ensure that they are appropriately designed using additional expertise as needed, and licensed where required by local legislation.

It is often necessary to obtain approvals for waste management activities, such as:

- Sewage treatment
- Landfills
- Incinerators

Discussions must be held with appropriate regulatory officials to determine which permits, if any, are required for waste management. For due diligence reasons, compile documentation of all wastes produced, their volumes, characteristics and their means of final disposal.

At large-scale exploration operations, additional precautions may have to be developed, such as a waste management plan.

The local disposal regulations and permit requirements may well dictate the type of disposal to use. For example, tires may be returned to the vendor, recycled, or buried. In some jurisdictions tire burial is prohibited, so returning the tires to the vendor or recycling them are the only disposal options available.

There may be an opportunity to develop some creative local disposal solutions for certain general waste materials, especially in Third World countries. For example, instead of burning or burying shipping crates, they could be donated to the local economy for reuse. In these situations, all general waste should be reviewed for potential local economic use and donations.

12.1 Definitions

In order to establish the most appropriate methods of management of materials and waste, classify them first. This section provides definitions to use when setting up a waste management program.

The advantage of defining the material or waste properly is that it makes it possible to specify handling and disposal in a manner that causes the least impact upon the environment.

12.1.1 Waste

Waste is a substance that has no further use and requires on-site or off-site treatment and disposal.

As mentioned earlier in this section, legal definitions for waste types have not been included; rather, descriptive definitions have been used. Examples of each type of waste are set out below.

General Wastes are often associated with domestic or office activities, and include:

- Recyclable general waste (e.g., paper, wood, containers)
- Non-recyclable general waste (e.g., food scraps, construction materials)

Special Management Wastes require enhanced management due to their physical state, chemistry, volume, potential reactivity with other chemicals, or potential to harm human health or the environment. Examples of these include:

- Recyclable special management waste (e.g., tires, drill rig fluids)
- Non-recyclable special management waste (e.g., domestic sewage, wash water)

Hazardous Wastes (termed **Dangerous Wastes** in many locations) are commonly regulated in their handling and disposal, often at a national or international level. These include:

- Recyclable dangerous waste (e.g., oil, fuel, antifreeze, batteries)
- Non-recyclable dangerous waste (including hydrocarbon solvents, such as varsol and grease)

Confirm how these definitions match with legal requirements in the local jurisdiction, and adjust company descriptions accordingly.

Suppliers should be required to provide a Material Safety Data Sheet (MSDS) or similar manufacturer information, describing each material's characteristics (chemical and physical) and appropriate handling practices. If operating in a country where this is not possible or reliable, obtain an MSDS database.

When assessing the requirements for an exploration project, it is important that the materials posing a potential risk to the environment be:

- Identified
- Catalogued into one of the 6 descriptive waste type categories referenced above
- Quantified

Where possible, find alternate materials to replace materials identified as hazardous or dangerous.

A profile sheet such as the following may be of assistance in planning waste management:

Table 6: Sample Profile Sheet

PROFILE SHEET
DESCRIPTION: Grease
CHARACTERIZATION: Generally non-hazardous. Some greases may contain dangerous levels of toxic barium and lead. Metals content of each product should be evaluated prior to initial purchase.
Quantification: (project specific)
Sampling: Generally not required.
Analysis: Generally none. Use product information data sheets or material safety data sheets (MSDS) to evaluate. Unknown greases may require metals testing for lead and barium content.
MANAGEMENT:
Generation: (how and where waste is generated)
Site Storage: Store in closed containers away from heat, ignition sources and oxidizing agents.
Handling: No specific handling requirements.
Transportation: Package and transport according to local regulatory requirements.
Disposal: Recycle off-site.
Release Response: No specific response requirements.

Develop and implement an action plan to deal with the waste generated from the above identified materials. The details of this plan will depend on the size of the project and the anticipated duration of occupation.

12.1.2 Other Important Definitions

Other definitions that relate to waste management include:

- Project. For the purposes of exploration, a project can be defined as a particular site where activities, possibly including diamond drilling, reverse circulation drilling, trenching, and line-cutting have joined a group of people together for a common goal. The word “project” encompasses all these activities and the related support system (e.g., eating and sleeping quarters).
- Incinerate. Incinerate means to burn in a unit having engineered controls that permit the control of temperature and emissions. Note that various jurisdictions require permits for incinerating and may place limits on quantities or types of materials that can be incinerated.
- Burn. Burn means to destroy by fire in the open air or in a container that is open to the air.

12.2 Waste Identification and Management

Various types and volumes of waste will be generated depending on the scale of the project. Waste includes only those materials that are discarded, or are intended to be discarded. Note that recycled materials should be discarded off-site to a recycler.

It is important to classify the types of waste into one of the above categories in order to effectively manage it. Everyone in the project should be briefed on the importance of effectively and responsibly managing waste, with one person responsible for overseeing the waste management program.

Protect waste storage sites from:

- Wildlife
- Employees
- The community

Also ensure that storage sites are secured, to prevent unauthorized access and accidental disturbance.

In general, store all wastes away from sensitive locations such as water bodies. Removal of all waste from the site prior to closure is the most environmentally acceptable option.

12.2.1 Source Reduction and Waste Minimization

Source reduction and waste minimization are important forms of pollution prevention. When planning for an exploration project, regardless of the duration, remember: The fewer materials brought in, the less waste there will be to deal with when it is time to close the project.

Source reduction and waste minimization methods include:

- Elimination or reduction of the amount of a material or waste used or generated
- Elimination or reduction of the risk to human health or the environment presented by a material or waste

Effective source reduction and waste minimization can result in the following benefits:

- Resource conservation
- Reduced costs
- Reduced environmental hazards
- Reduced exposure to hazardous waste
- Reduced liability

In order to establish a source reduction and waste minimization program, it is necessary to evaluate:

- The quantity of material needed
- Associated costs
- Potential risks to health or environment of the material or waste
- The use of alternative materials

When evaluating the associated costs to decide what to do, make sure to weigh the material purchase cost against the waste management cost.

12.2.1.1 Practices

After identifying priority materials and waste, determine specific practices for source reduction and waste minimization.

This can include:

- A responsible purchasing program
- Modifications to current practices
- Recycling

Make purchasing choices based on informed decisions about the materials. Purchasing a biodegradable product in place of a non-biodegradable one, lessens the impact on the environment and on human health. Make a serious effort to identify alternatives to current practices.

12.2.1.2 Specific Examples

Listed below are some specific examples of source reduction and waste minimization that may be applied in an exploration program.

Grease

- Use non-toxic, or less harmful greases

Oils and lubricating fluids

- Where legislation allows, use these fluids in waste oil heaters

Containers

- Use materials completely before opening a new container
- Use good material conservation procedures
- Purchase in bulk
- Purchase refillable containers
- Where appropriate and allowed by legislation, reuse containers for other purposes
- Support minimal packaging and the removal of unnecessary packaging by suppliers

12.2.2 General Waste

General waste is waste that does not meet the host country's hazardous (or dangerous) waste criteria. Do not assume to know what these criteria are, but verify them on a case-by-case basis. In a country whose norms fall short of the company's norms, use company criteria to define what is considered general waste.

Some examples of general waste are:

- Used office products, including general paper products

- Containers
- Cafeteria and/or kitchen waste
- Inert construction or operational wastes (e.g., concrete, bags, aggregate, scrap)

If this material is not controlled and disposed of properly, it will be unsightly and may cause safety and health concerns. It could also cause conflicts with wildlife.

Depending on the size of the project, various methods can be used to manage general waste.

In a small-scale project (< 5 people):

- Burn paper products and other obvious clean combustibles in designated areas with proper supervision, extinguishing control, and only under appropriate weather conditions. Government approvals may be required for open air burning, particularly in dry areas.
- Store cafeteria and/or kitchen waste in covered animal-proof receptacles until removed for disposal. Burning of dry organic cafeteria and/or kitchen waste may be appropriate to reduce wildlife issues and prevent disease.
- Pack out all other general waste for disposal in an approved landfill or recycling. Disposal of organic wastes by burial at site may be appropriate, depending on location and after discussion with regulatory officials.

In a larger project (>6 people):

- Burn paper products and other clean combustibles in designated areas with proper supervision, extinguishing control, and only under appropriate weather conditions
- Store solid waste, particularly cafeteria and/or kitchen waste, in covered animal-proof receptacles
- Collect solid waste and incinerate in approved incinerators, or pack out

Bury incinerator ash at an approved on-site landfill if legislation allows (refer to landfill specifications later in this section), or remove it to an off-site facility.

12.2.3 Special Management Waste

Special management waste is non-hazardous waste that requires enhanced management, due to its increased potential to impact human health and the environment, if spilled or mismanaged. It also includes waste requiring special management due to its physical state, chemistry, volume (oversized), or potential reactivity with other chemicals.

The main example of special management waste likely to be involved in constructing access is tires. If not properly managed, waste tires can create a fire hazard. In an exploration project, used tires are usually not an issue but you should know how to properly manage them so that you can minimize any impact they may have on the environment.

Basically you have three options to dealing with waste tires. You can:

- Return them to the vendor.
- Recycle them.
- Bury them in a landfill if local regulations and standards allow.

Tires that are disposed of by burying in a separate landfill site should be placed in layers and you should cover each layer with inert earth fill. In no case should you allow waste tires in the top four feet of the final lift on a landfill.

Tires may also be used as construction materials during the exploration program, such as for holding signs and protecting areas from collision, but you are still required to handle them properly at site closure.

Examples of special management waste include:

- Domestic sewage and waste water.
- Tires.
- Other wastewater.

Each of these is discussed in the subsections that follow.

12.2.3.1 Domestic Sewage and Wastewater

Sewage that has not been treated can create significant impacts on human health and the environment. Care should also be taken when disposing of other wastewater from showers, cleaning, and cooking.

Depending on the scale of the project, there are various options to contain and treat or dispose of domestic sewage and wastewater. Remember that sewage and domestic wastewater should be kept separate from other wastes, and sewage systems should not be used for the disposal of other materials. Locate sewage and wastewater treatment facilities well away from sensitive environmental areas, and do not allow them to discharge directly into water bodies, such as streams or lakes.

At a small scale project:

- Collect sewage in a bagging system
- Chemically treat sewage (e.g., in portable latrines)
- Digs pits (pit privies) or develop other non-chemical latrines

The bags used in a bagging system should be incinerated or removed from the site. Arrange for chemically treated effluent to be removed from the site by appropriate contractors. If this is not practicable, and government regulations allow, contain this effluent in a natural depression or pit.

Only use pit privies for projects of short duration, and treat them at least once a day with chemicals (e.g., lime), to promote decay or reduce fly populations. Locate pit privies downslope of the camp, and downstream of any water intake location. When full, cover the pits with compacted soil or other appropriate material. Determine whether or not government approvals are required for this.

At small sites, collect grey water from showers and other washing in a sump, or in some other manner, to minimize soil erosion. If local regulations allow, gradually disperse it over the ground surface. Locate the sump at least 15 m from a water body, and size it to hold 1.5 times the volume of water to be collected. Ensure that it does not discharge directly into a water body. If practical, use biodegradable soap and other environmentally friendly washing items.

At a larger scale project:

- A sewage system can be set up to handle both sewage and grey water
- Additional expertise is likely to be required
- Permits or approvals may be required under government regulations

- A sewage system may entail a holding tank for collection of sewage, followed by either on-site treatment (e.g., a tile field with gradual soil infiltration), or haulage off-site to an appropriate treatment facility
- Larger and more advanced sites may require aerobic treatment systems or a package reactor

12.2.3.2 Tires

If not properly managed, waste tires can create a fire hazard. In an exploration project, used tires are usually not an issue, but they should be dealt with properly to minimize any impact they may have on the environment.

Basically, there are 3 options to dealing with waste tires:

- Return them to the vendor
- Recycle them
- Bury them in a landfill, if local regulations and standards allow

Tires that are disposed of by burying in a separate landfill site should be placed in layers, with each layer covered with inert earth fill. In no circumstances should waste tires be allowed in the top 4 feet of the final lift on a landfill.

Tires may be used as construction materials during the exploration program (e.g., for holding signs and protecting areas from collision), but proper handling is still required at site closure.

12.2.3.3 Drill Rig Waste

Drill rigs produce a variety of wastes that require management. If possible:

- Use biodegradable and non-toxic drill fluids and hole additives at all times
- Recycle drill fluids

If biodegradable products are not available, use lined sumps or above-ground storage tanks to provide containment, and allow solids to settle. Treat petroleum-based drilling fluids as petroleum waste. If an oily residue appears on the water surface, use measures to render it inaccessible to birds and wildlife and use absorbents to periodically remove residue.

Various methods can be implemented to deal with drilling sludge and biodegradable fluids in an environmentally acceptable manner. They include the use of:

- Sludge boxes
- Containments constructed of filter fabric
- Filtration control devices
- Settling ponds
- Straw bales
- Geotextiles or other devices

Provide an adequate closed circuit facility for drilling mud and flocculating agents.

Alternatives may include:

- A settling pool or sump a short distance downslope from the drill
- A series of settling tanks adjacent to the drill

- A drill cuttings/sludge material water filter

Ensure that drill cuttings/sludge material from hydraulic stripping, and the discharge from any de-watering operation, does not enter any water source or flow uncontrolled. Dispose of diamond drill sludge collected in the sumps at an on-land site, sufficiently removed to prevent direct access of the material to a surface water course or water body.

In certain locations, it may be necessary to recover drilling muds for treatment off-site. Backfill cuttings from a reverse circulation drill into the completed holes, if regulations allow. As this is not allowed in all locations, verify the requirements for specific abandonment practices with the regulatory bodies beforehand.

Saline drilling waste is a special case that may require additional expertise. Generally, do not allow saline waste to come in contact with vegetation or non-saline water.

In certain locations, ice drilling on a lake is a viable alternative to drilling in the warmer months. When drilling on the ice, use a heated sludge collector adjacent to the drill. This sludge box is composed of 2 heated compartments, 1 for runoff water and the other for collections of sediment residue. Clean out the residue compartment periodically, and put the residue on a waterproof tarpaulin on the ice and leave it to freeze. Once frozen, the sediment can be collected and disposed of in an appropriate location.

12.2.3.4 Other Wastewater

On occasion, exploration may require de-watering of existing inactive mine facilities (e.g., open pit, adit, shaft). De-watering is likely to require some form of wastewater treatment to minimize environmental impacts; this should be discussed with regulatory officials.

As a minimum, prior to de-watering, collect representative water samples, and conduct chemical analyses on them to assess existing water quality. This will provide sufficient information to ascertain what form of treatment will be required. Typically, at least a lined settling pond will be required to settle any solids out of solution, prior to release into the environment.

If acid-generating materials were exposed with the mine, or if the site was used for waste disposal, wastewater treatment could be significantly more complex. Ensure that any wastewater treatment facility is designed by appropriately experienced personnel, such as engineers.

Recognize that de-watering of mine facilities for exploration purposes may impose new environmental liabilities on the company, and obtain appropriate advice before proceeding.

12.2.4 Hazardous Waste

Hazardous (or dangerous) waste is waste meeting a host country's or other chosen hazardous waste criteria. It can be a source of significant legal liability when improperly managed or released into the environment. Ensure that crisis management policies and procedures are in place in case there is an accident.

It is important to identify all hazardous waste by keeping a comprehensive inventory list, and to have methods for managing it.

12.2.4.1 Hazardous Waste Identification

In each exploration project, a company is responsible for identifying or characterizing hazardous waste in accordance with a host country’s laws. In the absence of such laws, a waste is considered hazardous or dangerous if it meets 1 or more of the UN System Classes (Classes 1 through 8), as shown in the table which follows:

Table 7: Hazardous Waste Identification

Hazardous Waste Code	Hazardous Material Class	Exploration Example
Ignitable Hazardous Waste	Flammable Gas (Class 2)	Used Grease and Oil (Class 2)
	Flammable Liquid (Class 3)	
	Flammable Solid or Substance Susceptible to Spontaneous Combustion (Class 4)	
	Oxidizing Substance (Class 5)	
Corrosive Hazardous Waste	Corrosive Material (Class 8)	Pb-Acid and Vehicle Batteries (Class 8)
Reactive Hazardous Waste	Explosive (Class 1)	
	Compressed Gas (Class 2)	
	Dangerous when Wet Substance (Class 4)	
Radioactive Hazardous Waste	Radioactive Material (Class 7)	Certain Samples Collected in Uranium Prospection (Class 7)
Toxic hazardous waste	Poisonous (Toxic) Material (Class 6)	Used Hydrocarbon Solvents (e.g. Varsol) Used for Cleaning Drill Parts (Class 6)

12.2.4.2 Storage and Handling

Store and handle hazardous waste in an appropriate manner. Refer to the MSDS for further information, or contact personnel with expertise.

Ensure that containers of hazardous waste are marked with words identifying the waste, and indicating that it is hazardous. Store these containers apart from containers of non-hazardous waste and incompatible materials.

As mentioned in the introduction to this section, ensure that storage sites are secure to prevent:

- Unauthorized access by wildlife, employees and the community
- Accidental disturbance

12.2.4.3 Used Petroleum Products

Waste petroleum products (e.g., fuels, lubricants) are generated from the operation of:

- Trucks
- Other vehicles (all-terrain vehicle, snowmobile, skidder)
- Heavy equipment

Waste petroleum products are not typically considered hazardous waste, but they may be in certain jurisdictions. Management of these products is crucial to maintaining a safe environment and reducing environmental impacts.

Manage used petroleum products according to the host country's laws. As a general rule, the materials should be stored on-site in labelled, competent, covered containers, placed in an impervious secondary containment (e.g., larger container, lined berm) wherever possible or practical, and away from flame sources, including cigarettes. Protect all storage from accidental impact, and take care to ensure that the quantity of used petroleum products stored on-site is limited, as this material is a fire hazard.

Possible management options to use include:

- Storage in competent, labelled containers, with these containers periodically returned to the vendor for recycling.
- Regeneration for reuse on-site (e.g., for heating, in explosives mixtures) or off-site.
- Burning for energy recovery on-site or off-site, but only if a chemical analysis shows that it is acceptable for burning, and usually only in high temperature furnaces designed for that purpose.
- Incineration.
- Disposal of petroleum-contaminated materials (rags, trash, filters, and spill absorbents) and soil in approved non-hazardous waste landfill, preferably off-site. Draining of materials into appropriate containers prior to disposal, and dealing separately with the liquids and solids is often preferred.
- Containerization and disposal in a designated area of an approved solid waste landfill.

Ensure that the materials do not become compacted in such a way that leakage occurs.

12.2.4.4 Used Antifreeze

Used antifreeze (ethylene glycol) is derived from draining various cooling systems. It does not always meet criteria for hazardous materials, but in some jurisdictions it does, and it is important to verify this. Like used petroleum products, used antifreeze can cause environmental damage and health concerns if not managed properly.

Some options for managing waste antifreeze are:

- Storage in competent, labelled containers, with these containers periodically returned to the vendor for recycling
- Containerization and disposal in an approved landfill, likely requiring shipment off-site

12.2.4.5 Treatment

Where allowed by law, the most desirable form of treatment after recycling and waste minimization is on-site treatment. At smaller projects, hazardous waste would likely only be stored for later off-site disposal. In larger scale projects, 1 or several of the options listed above may be considered, in consultation with specialists and local regulatory authorities. Potential treatments may include:

- Incineration of organic waste
- Neutralization of corrosive waste

- Solidification of liquid waste (usually after chemical treatment)
- Controlled chemical reaction of reactive waste

Many of these activities require supervision by properly qualified people. If they are not on-site for supervision, ensure that they are consulted before making any important high-impact decisions.

12.2.4.6 Transportation

When transporting hazardous waste off-site, do so in compliance with the host country's laws. As a minimum, each off-site shipment should be accompanied by a form that includes the following information:

- Waste name
- Generation source
- Quantity
- Temporary storage area
- Container type, labelling and packaging
- Shipment date
- Shipper
- Destination
- Name and coordinates of person responsible
- Basic emergency response or MSDS

It is important to set up a document filing system to retain records of shipments, and to implement a system of verification of receipt of goods at the destination.

12.2.4.7 Off-Site Management

Before any hazardous waste is shipped to an off-site location:

- Ensure that crisis management policies and procedures are in place
- Consider the environmental and/or human health risks if waste is spilled or mismanaged en route, or at the proposed site
- Investigate the qualifications and history of the shipping company
- Have a knowledgeable person from the company visit the proposed site
- Determine whether the host country's regulators have approved the shipping company and the disposal site
- Have a knowledgeable person verify legal implications if the shipper or facility do not comply with environmental requirements

12.2.4.8 On-site Waste Management Facilities

On-Site Waste Management Facilities Sometimes, due to the remoteness of the exploration site, waiting to take waste off-site at the termination of the program is not practical. In this case, you should consider on-site disposal and handling facilities in consultation with personnel with expertise and appropriate regulatory officials.

Depending on the complexity and scale of the exploration activities, it may be appropriate for you to designate one area for waste management. This location can have

- A designated burn or incinerating area.
- An area for sorting recyclables.
- A location for petroleum waste storage and draining of petroleum-related materials.
- A landfill/disposal pit.

Remember that on-site disposal facilities require design, permitting, operation and closure in compliance with host country laws.

When choosing the site for waste handling disposal, you should observe as many of the following criteria as possible:

- Location as far as practicable from human and environmental receptors, especially water bodies.
- Easy accessibility in all kinds of weather to company vehicles, yet inaccessible to local residents.
- Foundation of low permeability soil, such as clay, and tight rock.
- Suitable for appropriate liners.
- Flat topography requiring minimal grading.
- Located on company's property.
- As small an area of impact as possible while providing sufficient capacity.
- Conducive to closure monitoring and maintenance.

Landfills are prime sources of material in some parts of the world. Care is needed particularly where chemical waste is involved to ensure a physically stable foundation.

You must not place the disposal site near

- Stream channels, seeps, bogs and flood-plains.
- Sites susceptible to landslides or avalanches.
- Sites with foundations susceptible to failure.
- Protected areas, wetlands, critical habitat.
- Historic places.
- Coastal or river locations susceptible to erosion.

In areas of shallow groundwater, disposal sites should be lined with compacted clay or synthetic liners.

Non-hazardous Waste Landfill

The purpose of a landfill is to dispose of non-hazardous solid wastes through land filling when they cannot reasonably be removed from site.

You should observe the following guidelines:

- Designate waste wood, paper, steel, plastics and rubber as landfill materials. Most of these materials should be considered for recycling as a first option if facilities exist
- within reasonable proximity to the site.
- Do not permit dangerous wastes, liquid wastes and food-related wastes to be disposed of at the landfill.

- Do not permit burning at the landfill.
- Dedicate an area for tires.
- Cover and contour waste materials on a regular basis using clean fill.
- Cover and contour rubber less frequently than other wastes to allow an opportunity for these materials to be reused.

In the simplest form, and where allowed by government regulations, the on-site landfill may be a trench or series of trenches excavated in deep, dry soil that you progressively fill from one end to the other, with garbage covered each day to reduce wildlife issues. Once filled, you should cover the trench with compacted soil or other appropriate material, often from the excavation of another adjacent trench.

At larger sites, the landfill may become complex and you may require engineering input for such items as leachate collection. You should ensure that, if required, you obtain government approvals for complex landfills that might be required for large exploration operations.

Dangerous Waste Landfill

If your project will be short term in nature, all hazardous waste should be stored as mentioned in the previous section and transported off-site. If your project is of longer duration, you should verify the on-site storage period that is allowed by regulation and waste should be removed before project completion.

Waste Rock Disposal

Waste rock may be an issue. Certain types of rock containing sulphides may have the potential to generate acid on exposure to air and water. You should always analyze waste rock for acid generating and neutralizing potential and soluble metals prior to determining final storage locations.

When choosing a location for a waste rock disposal site, you should:

- Locate it on flat or stable slopes to ensure mass stability of the waste rock.
- Consider and minimize potential visual impacts, particularly on hillsides
- Avoid locations that will require re-handling over time, excluding closure activities.

You should not locate a waste rock disposal site at or near:

- Stream channels, whether active or not.
- Known springs or seeps.
- Other environmentally sensitive locations.

You should store inert waste rock and other mineral wastes in a manner that minimizes environmental impacts. Typically this will require storing the material in as compact an area as possible, either in stockpiles or, in the case of drill cuttings, over a limited surface area. If you store unconsolidated materials in a humid environment you may require establishing a collection pond down slope of the stockpile to ensure that sediment is not released into the environment.

If you know or suspect that waste rock or other mineral wastes (such as scrap core and cuttings) will be acid generating, special handling may be required, particularly in humid environments. In most circumstances at the exploration stage, only small quantities of material are likely to be produced. In any case, you should minimize the extraction of acid generating waste rock and its exposure to air and water.