

APPENDIX III.3

WASTE MANAGEMENT PLAN

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1.0 INTRODUCTION

De Beers Canada Mining Inc. (De Beers) is committed to ensuring that all wastes generated by the Snap Lake Diamond Project are collected, stored, transported, and disposed of in a safe, efficient, and compliant manner. This waste management plan builds on procedures and policies presently in place at Snap Lake for the advanced exploration program.

Although this plan is primarily intended for use during the construction phase of the project, the plan will be adapted for the operations phase.

2.0 PRINCIPLES AND STRATEGIES

2.1 Principles

The overall waste management philosophy, under De Beers' Environmental Policy (Appendix III.8), is based on the following principles:

- health and safety of all site employees, visitors and the environment;
- reduction, reuse, and recycling of waste materials;
- proactive management of wastes that may attract wildlife or result in the interaction between humans and wildlife;
- environmental awareness and waste management training;
- a site-based waste management auditing program; and,
- contractors' compliance with site waste management procedures.

The following are minimum standards of acceptability of the plan:

- establish compliance with the following federal and Government of the Northwest Territories (GNWT) environmental legislation:
 - Government of the Northwest Territories *Public Health Act*;
 - Government of the Northwest Territories *Environmental Protection Act*;
 - *Canadian Environmental Protection Act*;
 - *Transportation of Dangerous Goods Act* and Regulations;
 - Work Site Hazardous Materials Information System;
 - *Northwest Territories Waters Act*;
 - Government of the Northwest Territories *Pesticide Act*; and,
 - *Territorial Lands Act*.
- establish compliance with the following American Petroleum Institute (API), American National Standards Institute (ANSI), and Canadian standards of practice:
 - *Design, Construction, Operations, Maintenance and Inspection of Terminal & Tank Facilities*, API-2610;
 - *Standards for Aboveground Steel Tanks for Fuel Oil and Lubrication Oil*, Underwriters' Laboratories of Canada (UL Canada) - S602M;
 - *Lining of Above Ground Petroleum Storage Tank Bottoms*, ANSI/API-652; and,
 - *Environmental Code of Practice for Above Ground Storage Tank System Containing Petroleum Products*, National Task Force on Storage Tanks for Canadian Council of Ministers of the Environment.

2.2 Strategies

The waste management plan principles will be fulfilled by using proven strategies and applying modern methods to ensure materials are used efficiently and then disposed of in an environmentally compatible manner. General strategies include the following:

- the most environmentally suitable materials, equipment, and products will be used;
- procurement procedures will consider product substitution for materials that are hazardous to handle, generate hazardous wastes, or create an environmental liability;
- a “no feeding of wildlife” policy will apply to all site personnel and visitors. Adherence to this policy is a condition of employment and site visitation privileges;
- all site personnel will attend an orientation, which will address waste management and handling of hazardous goods, prior to being exposed to the work site. The site orientation for visitors will include a waste management module;
- a committee will be formed to conduct monthly waste management audits; and,
- a waste management facility will be built to facilitate the three R’s philosophy.

3.0 WASTE REDUCTION, REUSE, AND RECYCLING

3.1 Waste Reduction

Measures or devices will be implemented, wherever practical, to reduce waste at source, for example:

- refillable pump bottles instead of aerosol cans;
- rechargeable batteries;
- reduction of paper consumption by promoting the use of electronic mail, voice messaging, electronic transmittals, *etc.*;
- reduction of disposable cups and containers by issuing personnel and visitors non-disposable mugs for coffee and beverages; and,
- storage of bulk liquids in large drums (*e.g.*, 205 litre) and dispensing the liquids into smaller, refillable bottles and containers, instead of storage, usage, and disposal of several smaller containers.

Means of reducing the volume of waste generated will continue to be developed as the project progresses.

3.2 Waste Reuse

Waste will be reused to the furthest practical extent. Examples of waste reuse include the use of timber and other wood products generated from sources such as concrete formwork construction, and dunnage and cribbing from shipping of materials and equipment; and, the use of used oil to fire waste oil furnaces to supplement heating requirements.

3.3 Waste Recycling

Waste will be recycled where practical. Materials that may offer recycling opportunities in the future will be investigated on an on-going basis during operations in an effort to reduce landfill materials. For example, if suitable recycling facilities were to be established in or near Yellowknife in the future, waste materials such as tires, conveyor belting, lead-acid batteries, fluorescent lamp ballasts and other chemicals could be shipped off-site for recycling. If it is anticipated that markets exist for local recycling of these and other materials, and that the establishment of suitable businesses and facilities appears imminent in the near future, De Beers will store such materials on-site for future backhaul. There may also exist opportunities for recycling materials in other areas and such opportunities will be investigated to determine practicality and economic feasibility.

Recycling facilities in the Northwest Territories and Alberta will be utilized as governed by territorial, provincial, and municipal acts, regulations, and by-laws.

4.0 WASTE SOURCES

The sources and types of wastes that will be generated during the construction phase are presented in Table III.3-1:

Table III.3-1 Sources of Waste Generation

SOURCE OF WASTE	TYPES OF WASTE
Chemical handling and storage operations	waste petroleum products, used chemicals
Sewage plant	biological sludge
Equipment maintenance	used batteries, engine oil, oil filters, tires, scrap metals, <i>etc.</i>
Building maintenance	used transformers, fluorescent lighting ballasts/tubes, glycol, construction scraps (wood, piping, carpets, <i>etc.</i>)
Laboratory	chemical wastes and toxic substances
Domestic waste from: - construction camp - admin offices - kitchen facilities	domestic garbage, food wastes, paper, cardboard
Inert waste from: - construction-sites	cement, sand, used materials, metals, pipe, glass, insulation, <i>etc.</i>
Biological waste from: - medical facility	biological waste, needles, syringes, blood, human tissue, gauze pads

5.0 IDENTIFICATION, STRATEGY, AND DISPOSAL PLAN

Table III.3.-2 shows treatment strategies and disposal plans for wastes on-site during the construction phase.

Table III.3-2 Treatment Strategies and Disposal Plan – Construction Phase

WASTE TYPE	TREATMENT STRATEGY	DISPOSAL PLAN
Petroleum Based:		
Used oil	recycle	collect in trays and drums. Transfer to a lined/bermed storage area. A majority of the used oil will be used to fire waste oil heaters or ship off-site
Used hydraulic fluid	recycle	collect in trays and drums. Re-use in waste oil heaters or ship off-site
Contaminated or expired fluids	reuse/recycle	mix with waste oil and use in waste oil heaters or ship off-site
Oil filters	recycle/recover	drain oil into waste oil drums. Store crushed canisters in drums to ship off-site
Contaminated soils	bioremediation	spread in land farm area. Transfer to sanitary landfill site when ready
Waste batteries	recycle	drain and neutralize acid. Store for shipment off-site
Aerosol cans	reduce/incinerate after puncturing	use substitute dispensers. Incinerate or store for shipment off-site
Paint	dispose off-site	collect and store cans in drums for shipment off-site
Chemicals:		
Glycol	recycle	collect in trays and drums. Store for shipment off-site
Acids	neutralize/dispose of off-site	neutralize if safe. If unsafe store in lined drums for shipment off-site
Solvents	reduce/dispose off-site	use non-toxic solvents where possible. Store in drums for shipment off-site
Laboratory products	dispose off-site	store at source. Ship off-site
Domestic Wastes:		
Food	incinerate	collect in plastic bags, store inside designated containers, and incinerate regularly
Paper/cardboard	reuse/incinerate	reuse where possible or incinerate
Plastics	dispose off-site/incinerate	store toxic materials for shipment off-site. Incinerate others
General camp wastes	incinerate	sort to retrieve non-burnable. Incinerate

Table III.3-2 Treatment Strategies and Disposal Plan – Construction Phase (continued)

WASTE TYPE	TREATMENT STRATEGY	DISPOSAL PLAN
Inert Bulk Wastes:		
Conveyor belts or tires	reuse/recycle	use where feasible on-site. Dispose of in landfill. Ship off-site
Vehicles	recycle	drive or ship off-site
Buildings/bulk debris	reuse off-site/dispose on-site	dispose of material underground or ship off-site for reuse
Incinerator ash	landfill	dispose of in landfill
Scrap metal	landfill	dispose of in landfill
Sandblasting residue	landfill	dispose of in landfill
Organic Wastes:		
Sewage sludge	incinerate	bag, drain, and incinerate
Biological wastes	incinerate	store in special waste receptacles, medical techs to ensure proper handling. Incinerate

6.0 WASTE MANAGEMENT

6.1 Sorting

Waste must be sorted at source before it can be disposed of or transported to specific designated areas in order to prevent materials from being disposed of improperly. Measures that will be implemented for sorting will include, but will not be limited to, the following:

- Separate bins will be located throughout the camp, service complex, process plant, underground shops, and other facilities on-site for immediate sorting of domestic waste. Separate bins will be provided for separate waste streams, (*e.g.*, food waste, paper and cardboard, glass and aluminum cans and bottles, and other waste). Wastes will be collected from these bins and immediately placed into appropriate bags or containers prior to being transported elsewhere on-site for disposal.
- Steel bins and dumpsters will be located around the site at each major facility for collection of burnable and non-burnable, and recyclable wastes, such as scrap metal, timber, tires, unsalvageable equipment, *etc.* General inspection of the dumpster contents will be conducted prior to transport to ensure that there are no food wastes or unacceptable materials contained in them. These bins and dumpsters will be regularly transported to their respective facilities for further sorting or disposal. For example, when full, the burnable dumpster will be transported to the incinerator yard, and the materials fed to the incinerator. The non-burnable and recyclable dumpsters will be transported to the waste transfer storage area, where the materials will be sorted and stored for either site land filling, on-site reuse or recycling, or backhaul for off-site land filling or recycling.
- Wastes stored in the waste transfer storage area will subsequently be transported to the landfill every two to four days, to the service complex or camp if locally reusable or recyclable, or off-site during the winter road season.
- Materials designated for off-site disposal will be tagged according to designation. Since it is the intention to landfill inert bulk wastes at site, materials designated for off-site disposal will normally comprise hazardous materials and wastes that cannot be disposed of on-site or can be recycled at off-site facilities. De Beers will identify the facilities where such disposal or recycling will take place.

6.2 Food Waste Handling

Food wastes will be collected from the food waste bins in the camp, service complex, and other facilities, and immediately placed and sealed in plastic bags. The plastic bags will then be placed in sealed containers (further details of food and non-food waste containers are discussed in Section 3.5.3.5) available at each facility, and transported directly to the incinerator storage area where they will be fed to the incinerator. Incineration of food wastes and plastic waste from food containers will be performed as soon as practically possible (typically on a daily basis) to avoid longer-term storage and potential wildlife attraction. Food wastes will not be stored outside the incinerator area or waste transfer storage area.

All food waste storage containers (bins, drums, plastic receptacles) will be clearly identified with “FOOD WASTE ONLY”. An additional label stating “NO FOOD WASTE” will be applied to all containers not designated for this purpose.

As a means of preventing wildlife attraction, food and beverages, and their containers, will not be permitted in any outdoor recreational areas. Designated snack and break areas for construction and outdoor operations personnel will be provided to prevent food and wastes from being generated uncontrollably around the site.

Discarded foil-lined drinking boxes are a known wildlife attractant and will not be permitted on-site.

6.3 Non-food Waste Handling

6.3.1 Sewage

Treated effluent will be piped into the water treatment plant outfall pipe, such that there is no additional discharge structure required. Biodegradable organic components removed from the sewage treatment plant will be dewatered, temporarily stored in bags in a contained environment, and subsequently incinerated. Frequency of incineration will depend on the time required for sufficient dewatering, which will vary on a seasonal basis. Cyclical freezing and thawing of bags during winter conditions actually improves dewatering efficiency; therefore sufficient storage space will be allocated for bag storage.

6.3.2 Chemicals

Chemicals (*i.e.*, glycol, acids, solvents, battery acids, laboratory agents, *etc.*) will be collected in lined trays and drums, and will be stored in the waste transfer area in suitable

sealed containers. Chemicals that cannot be incinerated will be shipped off-site for disposal or recycling.

To prevent accumulation and/or runoff of glycol at the airstrip from aircraft de-icing operations, aircraft will be sprayed in a specific area on the strip that will be equipped with swales to collect excess glycol. Puddles of glycol in the swales will be removed by vacuum truck upon aircraft departure, and deposited into waste glycol drums, which will be stored for off-site shipment to recycling facilities.

6.3.3 Waste Oil

Waste oil will be collected and stored in the waste transfer area and subsequently utilized in waste oil furnaces to supplement heating requirements.

6.3.4 Domestic Wastes

Non-toxic, non-food solid wastes will be sorted into recyclable, reusable, combustible, and non-combustible in the waste transfer storage area. Combustible items will be burned in the incinerator, while non-combustible items will be land filled or recycled. Aerosol cans will be punctured and drained prior to incinerating.

Toxic materials will be stored in sealed, steel or plastic drums in the waste transfer area and shipped off-site for proper disposal.

6.3.5 Inert Bulk Wastes

Inert bulk wastes that cannot be readily recycled or reused, such general debris, incinerator ash, tires, *etc.* will be stored in bins and dumpsters in the waste transfer storage area and transferred to the landfill.

6.3.6 Hazardous Wastes

All other hazardous, non-combustible waste and contaminated materials not identified above will be temporarily stored in the waste storage transfer area in sealed, steel or plastic drums and shipped off-site for disposal or recycling.

The waste transfer area has been identified as the location in which used or generated hazardous materials will be stored prior to off-site shipment. During normal operations, hazardous materials will be stored in other various locations associated with their intended use to minimize site transport and handling requirements. These materials and locations are as follows:

- oils and greases will be stored in drums, pails, and bottles in the lube bay and warehouse, both of which are within the service complex building;
- batteries of all types will be stored in the service complex warehouse;
- ethylene glycol will be stored in drums in the service bays and warehouse in the service complex;
- ferric sulphate (water treatment plant reagent) will be delivered to site in drums and stored in C-can containers in the container storage yard, prior to being transported to temporary storage inside the water treatment plant building;
- all chemicals for laboratory usage will be stored in both the warehouse and laboratory storage room in the service complex; and,
- all other solvents, paints, acids, *etc.* will be stored in the service complex warehouse.

6.4 Waste Management Facilities

6.4.1 Containers

Drums, bins, receptacles, and dumpsters used for storage of waste will be selected based on waste material requirements (*i.e.*, physical and regulatory), prevention of wildlife attraction (*i.e.*, steel or heavy duty plastic containers with positive clamping lids), and transport requirements (truck, forklift, *etc.*). All containers will be labelled to identify only those wastes for which the containers are suitable.

6.4.2 Landfill

Inert solid waste will be deposited into a landfill area designated in the north pile (refer to location 8 on the overall site plan, Figure 3.1-3 in the Project Description). As part of daily waste rock management operations, wastes will be regularly buried with processed kimberlite by dozer and loader operations to minimize exposure to wind. Frequency of this process will depend on general north pile activities and weather conditions, but will typically be every two to four days. Disposal of ash will be suspended during extreme winds and blizzards. The specific site shown on the site layout drawing is nominal and will be relocated from time to time within the north pile to fit in with active deposition of processed kimberlite during mine life.

The natural barrier of the north pile, which will increase in height over time, will limit access to landfill by animals.

“NO FOOD WASTE IS PERMITTED” signage will be erected around the landfill area, ensuring operators do not inadvertently place such waste in the landfill.

6.4.3 Waste Transfer Storage Area

A fenced area will be established (refer to location 11 on the overall site plan, Figure 3.1-3 in the Project Description) for the handling and transfer of wastes. Fencing will be 2-metres (m) high, slatted-type, and partially buried to prevent animal burrowing. Non-food waste products that are not incinerated or land filled immediately will be collected, sorted, and placed in designated areas within the fenced area. Depending on the nature of the waste (*e.g.*, hazardous, recyclable, *etc.*), it will be placed in sealed, wildlife-resistant containers and stored for backhaul to off-site disposal or recycle facilities, or for transport to the incinerator or landfill. Transport of materials to the incinerator and landfill will typically be performed once every two to four days.

6.4.4 Incinerator

An oil-fired incinerator will be located in the plant site area (refer to site plan), and will be used on a daily basis for the incineration of non-hazardous, combustible waste materials. Incinerator ash will be collected regularly (frequency depending on ash loading) in sealed, wildlife resistant containers and transported to the landfill.

The incinerator area will be fenced with 2-m high, partially buried, slatted-type fencing to prevent wildlife from entering the incinerator area. The incinerator will be located within 50 m of the accommodations complex to minimize the distance that food wastes must be transported, thereby minimizing potential for wildlife interaction.

6.4.5 Land Farm

Hydrocarbon-contaminated solids from spills will be deposited and spread in a land farm cell for bioremediation. This bermed cell, which will be confined within the north pile area, will include an Arctic geo-membrane liner under select fill material.

Hydrocarbon-contaminated soils will be placed on top and spread during summer months. This will allow for remediation to acceptable levels by using natural microbiological processes. Fertilizers such as ammonium nitrate could be added to aid the process and improve efficiency. Soil that has reached acceptable levels of hydrocarbon degradation will be removed and transferred to the landfill.

The land farm will be initially sized at approximately 50 m x 50 m. This will be increased in size as required depending on actual volumes of contaminated soil generated and the efficiency and duration of effective bioremediation, which is expected to vary on a seasonal basis. The cell will be no more than 2-m deep to ensure the soils are kept within the thermally active zone.

Refer to the Spill Contingency Plan (Appendix III.9) for the specific details on response procedures for the spillage of hydrocarbons.

It is recognized that the effectiveness of land farm operations can be reduced if not properly managed through regular inspections and sampling to determine if the bioremediation process is functioning efficiently. The harsh climatic conditions at Snap Lake may also adversely affect the remediation process, since subzero temperatures will inhibit natural biological activity.

Operation of the land farm will be conducted according to GNWT guidelines. De Beers intends to operate and manage the land farm to take full advantage of its benefits in order to minimize or eliminate the need for off-site disposal of contaminated soils. As part of regular operations, inspections of the land farm and turnover of the soil, which is required to provide aeration and promote remediation, will be performed. Sampling of soils at varying seasonal intervals will be performed to assess the effectiveness of remediation under different climatic conditions. If it appears that remediation is not effective in lower temperatures, the option of introducing special bacteria (psychrophiles), which are capable of activity at lower temperatures, will be investigated. If it becomes evident that effective remediation is still not achievable, De Beers will source an off-site land farm for disposal.

7.0 ACRONYMS

ACRONYMS

ANSI	American National Standards Institute
API	American Petroleum Institute
De Beers	De Beers Canada Mining Inc.
GNWT	Government of the Northwest Territories
UL Canada	Underwriter's Laboratories of Canada (UL Canada)