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<td>Statement regarding use of old sewage treatment plant versus new plant, which had filter issues.</td>
<td>1.3, page 6</td>
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<td>Oily rags were listed as an incinerated item, however, they are actually backhauled.</td>
<td>2.4, page 13 (Table I)</td>
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<td>References to explosives were removed</td>
<td>2.4 page 12</td>
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<td>“Bulk Sample Pit” was added to the options list for on-site domestic waste disposal.</td>
<td>3.0, page 19</td>
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<td>Statement regarding 2014 stack testing was provided.</td>
<td>3.1, page 20</td>
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<td>The statement “weight and burn temperatures are automatically recorded on the incinerator Programmable Logic Controller” was added</td>
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<td>Land farm decommissioning</td>
<td>3.5, page 25</td>
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<td>4.0, page 27</td>
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<td>STP3</td>
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<td>Water treatment capacity volume was revised</td>
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<td>6.1, page 32</td>
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### ACRONYMS

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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>AN</td>
<td>Ammonium Nitrate</td>
</tr>
<tr>
<td>ANFO</td>
<td>Ammonium Nitrate Fuel Oil</td>
</tr>
<tr>
<td>ARD</td>
<td>Acid Rock Drainage</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>CCME</td>
<td>Canadian Council of Ministers of the Environment</td>
</tr>
<tr>
<td>De Beers</td>
<td>De Beers Canada Inc.</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>GNWT</td>
<td>Government of the Northwest Territories</td>
</tr>
<tr>
<td>MBR</td>
<td>Membrane Bioreactors</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet</td>
</tr>
<tr>
<td>MVLWB</td>
<td>Mackenzie Valley Land and Water Board</td>
</tr>
<tr>
<td>NFCC</td>
<td>National Fire Code of Canada</td>
</tr>
<tr>
<td>PAG</td>
<td>Potentially Acid Generating</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>POL</td>
<td>Petroleum, Oils, and Lubricants</td>
</tr>
<tr>
<td>SBR</td>
<td>Sequencing Batch Reactor</td>
</tr>
<tr>
<td>SHE</td>
<td>Safety, Health, and Environment</td>
</tr>
<tr>
<td>SHE OP</td>
<td>Safety Health and Environment Operating Procedure</td>
</tr>
<tr>
<td>SNP</td>
<td>Surveillance Network Program</td>
</tr>
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<td>STP</td>
<td>Sewage Treatment Plant</td>
</tr>
<tr>
<td>TDG</td>
<td>Transportation of Dangerous Goods</td>
</tr>
<tr>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
</tr>
<tr>
<td>WMP</td>
<td>Water Management Pond</td>
</tr>
<tr>
<td>WTP</td>
<td>Water Treatment Plant</td>
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1.0 INTRODUCTION

De Beers Canada Inc. (De Beers) owns the Snap Lake Mine, a diamond mine located approximately 220 kilometres (km) Northeast of Yellowknife, Northwest Territories. Final regulatory approvals for construction and operation of the mine were granted in May 2004, and construction began in April 2005. Operation of the mine commenced in 2007 and continued until June 2, 2016 when the mine officially went into the Extended Care and Maintenance. The general mine site plan can be viewed in Figure I.

The Snap Lake Mine operates under a Waste Management Plan, as required by Water License (MV2011L2-004), which came into effect June 14, 2012. As a requirement of Part E, Item 1, of the License, De Beers is submitting appropriate revisions of the plan to the Board.

The Plan describes how all waste streams associated with the Mine are managed. The Plan includes a detailed description on processes for handling all waste streams not specifically described in other management plans.

1.1 Environmental Management Policy

De Beers is committed to the goal of sustainable development. This approach requires a balance between the protection of human health and the natural environment with the need for economic growth. To meet this goal of sustainable development, De Beers looks to maintain safe and efficient transportation, storage, handling, and use of all hazardous materials including but not limited to; hydrocarbon products, ammonium nitrate and associated explosive materials. Diligence in the application of technically proven and economically feasible environmental protection measures will be exercised throughout exploration, mining, processing, and decommissioning activities to meet the requirements of legislation and to ensure the adoption of Best Management Practices (BMP). De Beers’ policy is to:

- assess, plan, construct, and operate its facilities in compliance with all applicable legislation;
- provide for the protection of the environment, employees, and the public;
- foster research directed at expanding scientific knowledge of the impact of the industry’s activities on the environment, of environment/economy linkages, and of improved treatment technologies;
work proactively with government and the public in the development of equitable, cost effective, and realistic laws for the protection of the environment; and,

- Enhance communications and understanding with government, employees, and the public.

De Beers’ Environmental Management Policy also states that the company will “protect the environment through the wise use of resources and prevention of adverse environmental impacts, including pollution prevention”.

The primary focus to the wise use of resources is the conservation of raw materials. This is the “reduce” component of the “Reduce, Reuse, Recycle” philosophy. The monetary and environmental costs to replenish raw materials by air and/or ice road to a remote location such as the Snap Lake Mine may be significant and it is recognized that the physical replacement and consumption of raw materials depletes natural resources. Moreover, a small reduction in the consumption of raw materials may have far reaching benefits environmentally. Each person at the mine has the responsibility to be an active participant in reducing waste generation at source.

The secondary focus is the proper disposal of waste. This includes the implementation of “reuse and recycle” which minimizes waste. It also includes final disposal in the appropriate facility.

1.2 Objectives and Scope

The collection, storage, transportation, and disposal of all wastes generated throughout the duration of the Care and Maintenance Plan will be conducted in a safe, efficient, and environmentally compliant manner. De Beers recognizes the importance of achieving these goals and outlines their commitment in the preparation of this Plan.

The overall goal for this Plan is to create a framework for the proper handling and disposal of wastes, the minimization of potentially adverse impacts on the environment, and compliance with the mine’s Water License and other regulatory guidelines for waste management. To meet this overall goal, the Plan has been developed to address the following four specific objectives:

- to describe domestic wastes generated at the mine site;
to establish the principles of hazardous materials management during the operation of the Project;

to outline practices and procedures for the collection, storage, transport, and disposal of those wastes;
   - To present monitoring and mitigation procedures for domestic wastes.

The Plan also outlines procedures that promote reduction, recovery, reuse, and recycling of waste streams. The storage handling, treatment and disposal of mine waste water is included in the Mine Water Management Plan. The handling, deposition, and logging of mine waste including potentially acid generating rock (PAG) and processed kimberlite (PK) are covered in the North Pile Plan and Acid Rock Drainage (ARD) plan.

As a minimum standard of acceptability, the Plan will be compliant with the Snap Lake Mine EMS, environmental laws and appropriate sections of the following Acts and associated Regulations, and Guidelines:

- Canadian Environmental Protection Act;
- Department of Indian Affairs and Northern Development Act;
- Environmental Protection Act;
- Fisheries Act;
- Hazardous Products Act;
- Northwest Territories Waters Act;
- Transportation of Dangerous Goods Act;
- Territorial Environmental Health Act;
- Territorial Lands Act;
- Territorial Public Health Act;
- NWT Guidelines for General Management of Hazardous Waste; and,

Compliance will be monitored using the following mechanisms:

- On site compliance monitoring;
- Inspections;
- Environmental audits (internal and external);
• Communication with regulatory authorities (federal, provincial, regional, and municipal) and;

• Communication with other De Beers facilities.

The Plan gives consideration to the following as discussed in the Board waste management hierarchy:

• reducing volumes of waste through established plans and procedures;
• reducing waste disposal costs;
• prevention and reduction of adverse impacts on the environment including wildlife and fish, and their respective habitats;
• the health and safety of site personnel and visitors;
• the environmental integrity of soil, and water;
• maximizing the efficient use of resources; and
  • Ensuring due diligence by contractors, vendors, and management.

As part of the overall continuous improvement process for the mine site, De Beers have established Safety, Health, and Environment Operational Procedures (SHEOPs) integrated within the De Beers EMS system. These operational procedures are reviewed on a regular basis and updates are completed as required.
Figure 1  Snap Lake Mine: General Site Plan
1.3 Mine and Plan Status

The mine has evolved from an advanced exploration project in 2004, into construction 2005-2006, and commissioning and operations in 2007. A water and sewage treatment plant was commissioned in 2006, while a new sewage treatment plant, housed in the Utility building, was planned to be operational in January 2014. Due to mechanical issues with filter media, De Beers continued to use the old Sewage Treatment Plant (STP) until the Extended Care and Maintenance Plan took effect, necessitating a smaller plant to be built. The new smaller STP has been installed and will be commissioned in 2018.

As of June 2, 2016 the Mine has entered Extended Care and Maintenance. As a result operations have ceased and the mine has been flooded requiring fewer personnel to be onsite making the aforementioned old Sewage Treatment Plant obsolete. Therefore a small scale Sewage Treatment Plant and Water Treatment Plant are to be housed in the former Wash Bay to better accommodate the reduction in personnel. This is in-line with De Beers’ plan to reduce the amount of infrastructure being utilized at the mine, therein minimizing the environmental impact and creating a smaller environmental footprint.

The landfill will be operated during the life of the mine in areas designated within the North Pile footprint. Currently the landfill is located in Cell 1 of the East Cell. There is an approved option to relocate the landfill to the West Cell, however, current design plans provide for life of mine containment in the East Cell.

1.4 Waste Management Strategy for Construction, Operations and Care and Maintenance

During operations waste generation was much lower than was generated during the construction phase; however, waste volume was directly proportional to the number of people on site which averaged approximately 400. Within the Care and Maintenance Plan, waste volumes have dropped significantly corresponding to the reduction of personnel on site; averaging approximately 25.

As the mine is located at a remote site, quantities of materials are transported and stored on-site to ensure availability of supplies during the periods when winter road access is not available. Though there is a significant reduction in the amount of waste produced during the Care and Maintenance phase, the waste management strategy will continue to focus on the following:
- reduction of the amount of material consumed wherever possible. These measures include the following:
  - use of bulk containers for items used in large quantities (i.e., lube oil, cooking oil, beverages);
  - tire recycling (where opportunities exist); and
  - use of waste oil for heat generation (waste oil burners in place in selected site facilities).
- selection of environmentally friendly packaging where possible;
- appropriate separation of waste for on-site and off-site disposal;
- effective and efficient disposal of waste on-site;
- appropriate storage of waste awaiting removal from site; and,
  - transportation of waste to an appropriate off-site facility for reuse, recycling, or disposal.
2.0 DESCRIPTION, IDENTIFICATION, CLASSIFICATION, AND STORAGE OF WASTE

Waste as defined in the Water License means any substance defined as waste by section 2 of the Northwest Territories Water Act, which states:

“waste” means

(a) any substance that, if added to water, would degrade or alter or form part of a process of degradation or alteration of the quality of the water to an extent that is detrimental to its use by people or by any animal, fish or plant, or

(b) water that contains a substance in such a quantity or concentration, or that has been so treated, processed or changed, by heat or other means, that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water to the extent described in paragraph (a),

and, without limiting the generality of the foregoing, includes

(c) any substance or water that, for the purposes of the Canada Water Act, is deemed to be waste,

(d) any substance or class of substances prescribed by regulations made under subparagraph 33(1)(b)(i),

(e) water that contains any substance or class of substances in a quantity or concentration that is equal to or greater than a quantity or concentration prescribed in respect of that substance or class of substances by regulations made under subparagraph 33(1)(b)(ii), and

(f) water that has been subjected to a treatment, process or change prescribed by regulations made under subparagraph 33(1)(b)(iii)

Mine waste and water are discussed in the ARD, North Pile and Water Management plans.
2.1 Introduction

The management of wastes requires that safety and proper techniques must be considered during transportation, handling, storage, distribution, use, and final disposal.

All hazardous materials will be labelled and classified according to Transportation of Dangerous Goods (TDG) and WHMIS regulations. Specific instructions for the storage and handling of hazardous materials are outlined in the Snap Lake Mine Operating Procedure, *SLM SHEOP-0026A Storage and Handling of Hazardous Materials*. This operating procedure forms part of the Snap Lake Mine Environmental Management System (EMS). Appendix I contains a copy of the procedure. The procedure is considered an uncontrolled document, as part of the EMS, and is subject to change without notification. Specific instructions for the storage of hazardous wastes are included in this Plan.

2.2 Description

The two forms of waste generated at Snap Lake for the purposes of this Plan are domestic waste and hazardous waste. Waste related to mine operations such as slurry and paste from the Process Plant, Acid Rock Drainage, seepage from the North Pile, and discharge from the Water Treatment Plant (WTP) are covered in detail, under separate cover, in the North Pile Management Plan, ARD Plan and Water management Plan.

Domestic waste at the mine site is considered as the waste generated from day to day operations, and is separated into two streams:

- solid domestic waste; and,
  - organic waste

Waste streams incorporate the type of waste, treatment or disposal strategy, site handling methodology, and primary responsibility, as shown in Table I below.

Hazardous wastes and hazardous recyclable materials are defined as waste with properties such as flammability, corrosiveness, or inherent toxicity. These wastes and materials can pose a variety of risks, from skin damage on contact to the contamination of ground water, surface water, and soil as a result of leaching into the environment.
Hazardous wastes and recyclables come from many sources, including material left over from industrial activities such as oil refining, chemical manufacturing and metal processing. Even some everyday household products such as used batteries, computers and other electronic equipment, cleansers, paints, and pesticides may be hazardous when improperly discarded or recycled.

2.3 Identification

It is important that personnel working on the mine site be knowledgeable of the potentially hazardous products that they may be exposed to. Therefore, all personnel who may come into contact with or manage hazardous materials will be trained in proper procedures. The Training Department ensures that environmental training needs are identified and that training is delivered and effective. Any employees working with acids, oils, fuel, radioactive materials, or other hazardous substances must be trained on the procedure for the storage, handling, and disposal of these products, and their containers, and be made aware of the consequences of not conforming to relevant procedures. All materials are labelled by WHIMIS categories and labels.

Specific procedures for training employees in environmental safety are included in the EMS system procedure; Training and Awareness. Specific procedures for implementing, maintaining, and ensuring compliance with the WHMIS at the Snap Lake Mine are included in the Safety, Health, and Environment (SHE) operating procedure, *SHEOP-0177 Workplace Hazardous Materials Information System* (Appendix II).

Responsibility for waste disposal varies depending on the waste type. All domestic and hazardous wastes are segregated, packaged, and stored in appropriate containers by Site Services personnel. Waste containers will be appropriately labelled and hazardous waste signs posted at the storage, transfer, and disposal facilities. It is the responsibility of Site Services to transport the containerized waste to the Waste Management Area. Shipments off-site will be the responsibility of Site Supervisor or delegate, including compliant legislative documentation.

2.4 Classification of Waste Streams and Hazardous Materials

Due to the remote location and logistics of the Snap Lake mine site, considerable volumes of materials are transported and stored on-site to ensure availability of
supplies when the winter road is not accessible. The majority of hazardous materials that will be used during the extended care and maintenance phase can be grouped into the following two categories:

- Petroleum, Oils and Lubricants (POLs); and
  - Other Hazardous Chemicals.

Lists of hazardous materials and estimated quantities that will be stored at the mine site are provided in Table II. These lists are approximate, and will be subject to change. Miscellaneous materials are those that are used in small volumes and/or not regularly stocked on site.

Hazardous materials are classified according to the *Transportation of Dangerous Goods Act* and Regulations. All of the substances that fall under these regulations will be labelled to inform personnel as to their toxicity and to comply with governmental regulations. Material Safety Data Sheets are available on-line at [http://ccinfoweb.ccohs.ca/msds/search.html](http://ccinfoweb.ccohs.ca/msds/search.html) for all hazardous materials located onsite and are available at various computer terminals located across site. No paper copies of the Sheets are used on site to prevent non-conformance with the Environmental Management System under ISO 140001. Hazardous materials will be grouped according to TDG categories by the Site Supervisor. Specific categories of hazardous materials that may be present on-site include:

- Class 1. Explosives (e.g., caps, ANFO, Emulsion, stick powder);
- Class 2. Compressed gases (acetylene, oxygen, propane tanks);
- Class 3. Flammable liquids (e.g., gasoline, diesel);
- Class 4. Flammable solids (e.g., calcium carbide);
- Class 5. Oxidizers (e.g., peroxide);
- Class 6. Poisonous and infectious substances (e.g., cyanide, pesticides);
- Class 7. Radioactive material (e.g., nuclear density gauges);
- Class 8. Corrosive material (e.g., caustic soda, acids); and,
- Class 9. Miscellaneous hazardous materials (e.g., PCBs, asbestos).
De Beers requires that all contractors and supplier’s storage, handling, and transportation procedures comply with Federal and Territorial TDG and WHMIS regulations. For example, the shipper/receiver must ensure that the carrier or transporter has the proper placards and labelling. The shipper/receiver must also ensure that handling and storage of dangerous goods comply with TDG requirements. Labelling of containers must comply with WHMIS standards.
<table>
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<tr>
<th>WASTE TYPE</th>
<th>TREATMENT OR DISPOSAL STRATEGY</th>
<th>SITE HANDLING METHODOLOGY</th>
<th>PRIMARY RESPONSIBILITY</th>
</tr>
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<tr>
<td><strong>DOMESTIC WASTE</strong></td>
<td></td>
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<tr>
<td>Food</td>
<td>Collect from receptacles every other day for as needed incineration</td>
<td>Incineration as needed at campsite incinerators</td>
<td>Site Services</td>
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<tr>
<td>Food Contaminated Plastics, Tin Cans, Glass</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services</td>
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<tr>
<td>General Camp Waste</td>
<td>Separate according to waste type</td>
<td>Recycle/Incinerate/Landfill as appropriate</td>
<td>Site Services</td>
</tr>
<tr>
<td>Non-recyclable plastics</td>
<td>Store in approved bins/containers</td>
<td>Landfill</td>
<td>Site Services</td>
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<tr>
<td>Paper/Cardboard</td>
<td>Recycle and/or blend with kitchen wastes</td>
<td>Incinerate</td>
<td>Site Services</td>
</tr>
<tr>
<td>Glass</td>
<td>Cleaned and stored in approved bins</td>
<td>Landfill</td>
<td>Site Services</td>
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<tr>
<td>Recyclable Beverage Containers</td>
<td>Collect and store in containers until ready for backhaul on winter road</td>
<td>Recycle</td>
<td>Site Services</td>
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<tr>
<td>Bio-hazardous Waste</td>
<td>Collect and store until ready for incineration</td>
<td>Incinerate</td>
<td>Physician’s Assistants/ Medic Technicians</td>
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<tr>
<td>Sewage Sludge</td>
<td>Dewater and landfill</td>
<td>Dewater sludge in Sewage Treatment Plant (STP), bag, load in transfer bin, deposit and bury in landfill</td>
<td>Site Services</td>
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<td><strong>Hazardous Waste</strong></td>
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<tr>
<td>Oily Rags</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal at an accredited facility approved to accept such waste</td>
<td>Site Services/Logistics</td>
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<td>Waste Glycol</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
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<tr>
<td>Used Oil Filters</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
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<tr>
<td>Waste Type</td>
<td>Instructions</td>
<td>Disposal Method</td>
<td>Department/Services</td>
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<td>----------------------</td>
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</tr>
<tr>
<td>Diesel/Glycol Impacted Water</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
</tr>
<tr>
<td>Waste Flammable Liquid (Waste Jet B, Gasoline, Diesel)</td>
<td>Collect and store for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
</tr>
<tr>
<td>Waste Aerosol Containers</td>
<td>Collect and store in lined crates for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
</tr>
<tr>
<td>Batteries</td>
<td>Collect and store in lined crates for backhaul on winter road</td>
<td>Off-site disposal</td>
<td>Site Services/Logistics</td>
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Table II: Hazardous Materials Stored at the Mine

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SITE CATEGORY</th>
<th>APPROXIMATE AMOUNT</th>
<th>STORAGE LOCATION</th>
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<tbody>
<tr>
<td>Diesel fuel</td>
<td>POL</td>
<td>7,000,000 litres</td>
<td>Tank Farm</td>
</tr>
<tr>
<td>Gasoline</td>
<td>POL</td>
<td>2,500 litres</td>
<td>Adjacent Environment Shop</td>
</tr>
<tr>
<td>Gear Oils and Lubricants</td>
<td>POL</td>
<td>150,000 litres and 150,000 litres</td>
<td>- Lay down Area 1</td>
</tr>
<tr>
<td>- Lay down Area 1</td>
<td></td>
<td></td>
<td>- Services Complex</td>
</tr>
<tr>
<td>Jet-A Fuel</td>
<td>POL</td>
<td>31,000 litres</td>
<td>Waste Management Area</td>
</tr>
<tr>
<td>Windshield Washer Fluid</td>
<td>Other Hazardous</td>
<td>9,500 litres and 500 litres</td>
<td>- Warehouse</td>
</tr>
<tr>
<td>- Warehouse</td>
<td></td>
<td></td>
<td>- Services Complex</td>
</tr>
<tr>
<td>Ethylene Glycol</td>
<td>Other Hazardous</td>
<td>4270 litres and 16,176 litres</td>
<td>- Lube Shop</td>
</tr>
<tr>
<td>- Lube Shop</td>
<td></td>
<td></td>
<td>- Powerhouse</td>
</tr>
<tr>
<td>- Laydown 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propylene Glycol</td>
<td>Other Hazardous</td>
<td>Only what is used in current system</td>
<td>None stored</td>
</tr>
<tr>
<td>- Laydown 1</td>
<td></td>
<td>circulation</td>
<td></td>
</tr>
<tr>
<td>Propane</td>
<td>Other Hazardous</td>
<td>95 (20 lbs) and 20 (100 lbs)</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Acetylene</td>
<td>Other Hazardous</td>
<td>30 bottles</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Other Hazardous</td>
<td>60 bottles</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Paint</td>
<td>Other Hazardous</td>
<td>500 litres</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Solvents</td>
<td>Other Hazardous</td>
<td>500 litres</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Sulphuric Acid (Batteries)</td>
<td>Other Hazardous</td>
<td>0 litres (batteries are sealed)</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Sulphuric Acid (water treatment)</td>
<td>Other Hazardous</td>
<td>109,000 litres</td>
<td>Outside Utilities Bldg.</td>
</tr>
<tr>
<td>Lime</td>
<td>Other Hazardous</td>
<td>18,360 kg</td>
<td>Sewage Treatment Plant # 2</td>
</tr>
<tr>
<td>Sodium Hypochlorite (12%)</td>
<td>Other Hazardous</td>
<td>500 litres</td>
<td>Potable Water Plant</td>
</tr>
<tr>
<td>Cement</td>
<td>Other Hazardous</td>
<td>20,000 tonnes</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Concrete Additives</td>
<td>Other Hazardous</td>
<td>2,000 litres</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Curing Compounds</td>
<td>Other Hazardous</td>
<td>100 litres</td>
<td>Laydown Area 1</td>
</tr>
<tr>
<td>Flocculants</td>
<td>Other Hazardous</td>
<td>10 tonnes and 10 tonnes</td>
<td>- Process Plant</td>
</tr>
<tr>
<td>- Process Plant</td>
<td></td>
<td></td>
<td>- Water Treatment Plant</td>
</tr>
<tr>
<td>Ferric Sulphate</td>
<td>Other Hazardous</td>
<td>17,000 kg</td>
<td>Water Treatment Plant.</td>
</tr>
<tr>
<td>Ferrosilicon</td>
<td>Other Hazardous</td>
<td>500 tonnes</td>
<td>Process Plant</td>
</tr>
<tr>
<td>Alum</td>
<td>Other Hazardous</td>
<td>2,000 litres</td>
<td>Laydown Area 1</td>
</tr>
</tbody>
</table>

2.5 Storage of Wastes

At the mine site, hazardous materials will be stored in various locations associated with their intended use to minimize site transport and handling requirements. All hazardous, non-combustible and contaminated waste materials will be temporarily stored in the lined berm of the Waste Management
Area and contained in sealed, steel, or plastic drums and shipped off-site for disposal or recycling. Hazardous waste storage locations can be found in Table II above, Figure I shows the overall site plan for the Snap Lake Mine, locations of the current and previous landfill locations are depicted in Figure II and GPS co-ordinates of waste related areas and facilities are provided in Figure III below.

These storage locations and facilities will follow all the protocols mentioned in this Waste Management Plan. All containers used to store hazardous materials will be closed and sealed when not in use. All storage facilities will be in compliance with the GNWT legislation and the National Fire Code of Canada (NFCC). All storage tanks will be regularly inspected and maintained as per regulatory requirements. Storage facilities will be clearly identified with proper labelling as storage facilities for hazardous materials. They will also be well ventilated in order to prevent the build-up of toxic fumes or dust, which could harm both the personnel present and the environment. The facilities will be secured and only authorized personnel will have access to the area.

2.5.1 Waste Management Area

The waste management area is the primary location for waste storage. Located in the waste management area are two incinerators, a lined and bermmed area for hydrocarbon and hazardous wastes storage for backhaul, wooden crates containing recyclable materials such as aluminium cans and copper wire, a burn pit, and totes and bins containing other items stored until they can be backhauled off site.

2.6 Protective Clothing and Equipment for Hazardous Materials

It is of the utmost importance that personnel are aware of waste products they are handling and wear appropriate personal protective equipment (PPE) as outlined by WHMIS and TDG regulations and the Snap Lake Mine Operating Procedure, SHEOP-0026A, Storage and Handling of Hazardous Materials. Appropriate protective equipment and clothing, spill kits, and MSDS will be available to personnel responsible for the transportation, handling, storage, distribution, use, and disposal of hazardous materials. These safety items will be available in every vehicle that transports these goods, and in all facilities that store and handle hazardous materials. All personnel involved in handling hazardous materials at the Snap Lake Mine will receive an orientation related
to hazardous materials and WHMIS training as part of the general safety training for all employees. More specific information on procedures is included in the Snap Lake Mine Spill Contingency Plan.

2.7 Emergency Measures

The Snap Lake Mine Spill Contingency Plan has been prepared in accordance with the MVLWB’s “Guidelines for Contingency Planning”. The plan outlines the response organization, reporting responsibilities, and procedures for spills. It provides specific information about site facilities, response plans, and the training of response teams.
3.0 ON-SITE DISPOSAL

The overall waste management philosophy, under De Beers' environmental policy, is based on the following principles:

- Health and safety all of site employees and visitors is paramount.
- The “Three R” principles (Reduce, Reuse and Recycle) will be implemented.
- Treatment, disposal and management of waste will be performed on site to the maximum practical and economic extent in order to minimize the volume of waste shipped off site.
- The generation of wastes that may attract wildlife or the interaction between humans and wildlife will be minimized.
- Measures will be implemented to reduce waste generation at the source and minimize wildlife attractants.
- A materials procurement policy will stipulate which types of materials are prohibited on site, due to known unacceptable waste products, and will require that products with minimal waste generation be given priority over alternatives where economic and practical.
  - Waste management principles and procedures will form a fundamental component of personnel site orientation and education. Environmental awareness training and waste management training will form part of the EMS. Procedures outlined in this program will be enforced by site management personnel, through regular site inspections and auditing. Construction and services contracts will also include contractual requirements to comply with site waste management procedures.

Efforts will focus on recycling and reuse where possible. Waste oil will be used as an alternate fuel source to offset diesel oil consumption for heating some of the ancillary buildings. Destination of individual products is being reviewed. De Beers will ensure that receivers of hazardous waste are licensed facilities and ISO compliant where available.

Options for on-site domestic waste disposal are limited to four facilities:

- incineration;
- burn pit;
• landfill; and
• bulk sample pit

### 3.1 Incineration

De Beers currently employs two (2) Ketek incinerators (model CY-100-CA):

The Ketek incinerators are capable of meeting the conditions of the Land Use Permit, under section 26(1)(i), item 54, which states “The Permittee shall select a unit that is capable of meeting an emission concentration limit of dioxins and furans of 80 pg TEQ/m³”.

Furthermore, the unit is guaranteed to be capable of meeting the NWT emission regulations and CCME guidelines. The specifications of the units have been included in Appendix III. The following items are incinerated on site:

- food waste (e.g. some food containers, napkins, and wrappings);
- paper and cardboard;
- general camp and office wastes (cleaning rags, used office supplies, etc.); and
- first aid station waste.

Food waste or food-contaminated wastes are a prime wildlife attractant. It is critical that such wastes are accurately identified, sorted, and directly incinerated. The kitchen and dining room are the main sources of food waste. However, all wastes in offices are treated as food-contaminated waste and collected for direct incineration. With reduction in camp size, waste has been centralized for easy collection and transfer to the incinerator.

To reduce the potential for attracting wildlife, waste is stored in containers such as sealed sea cans. During the extended care and maintenance period, incineration will be done as and when required, based on volume of waste available for an efficient burn.

A composite sample of the incinerator ash is collected and sent to a laboratory on a quarterly basis and tested for metals, heavy metals, and various organic compounds; with the removed ash land filled at the on-site land fill area within the North Pile, as per the Guidelines for the Management and Operation of Landfill in the Northwest Territories.
The following EMS procedures contain details that pertain to incinerator operation:

- SLM SHE OP 0031 Kitchen Food and Waste Handling and Storage (Appendix V)
- SLM SHE OP 0041 Waste and Incineration (Appendix VI)
- SLM SHE OP 0037 Incinerator Use (Appendix VII)

The incinerator units have been designed and were purchased with the stipulation that if the units are maintained and operated in accordance with the vendor’s procedures the units will be operated in compliance with environmental standards, including the air quality emissions requirements.

Stack testing of the incinerators for dioxin, furans and mercury emissions was conducted in 2007 to confirm whether the incinerators are capable of meeting Canada-Wide Standards for dioxin, furans and mercury emissions. Results were reported to Environment Canada, the Snap Lake Environmental Monitoring Agency, and the Government of the Northwest Territories and as per De Beers EMS, continuous improvement and adaptive management have been used to successfully operate the equipment to-date.

Weight and burn temperatures are automatically recorded on the incinerator Programmable Logic Controller. Burn times are directly proportional to the weight of waste being burned. Training has been provided for the incinerator operators and the standard operating procedure is followed by the operators.

The incinerators are periodically inspected by the equipment manufacturer’s representatives to ensure the units are operating optimally, and recommended maintenance requirements are met.

### 3.2 Burn Pit

The burn pit is located in the Waste Management Area adjacent to the North Pile drainage system. No food wastes or other potential animal attractants are placed in the burn pit. The only materials permitted for disposal include untreated timber and cardboard as per the Government of the Northwest Territories policy on open burning.

The following EMS procedure contains details that pertain to the operation of the burn pit:
3.3 Bulk Sample Pit

The bulk sample pit was approved to be used as a disposal area for shotcrete and concrete by the GNWT Inspector in 2014. The material placed in the bulk sample pit is to be inert and requires a non PAG material cover after disposal to avoid windblown debris.

3.4 Landfill

A new landfill area was established upon Board approval in 2012. The landfill has a volume of approximately 110,000 cubic meters and is currently located in cell 1 of the East Cell (Figure II), whereby waste will be deposited until it is determined that another landfill is required. Items for landfill include the following waste generated at the mine site:

- non-recyclable plastics;
- conveyor belts;
- tires;
- motors, v-belts;
- piping and fittings;
- rebar;
- building and bulk debris (furniture, cladding, carpeting, drywall, insulation);
- incinerator ash;
- scrap metals;
- dewatered sewage sludge; and,
- empty cement and lime bags.

De Beers will endeavour to recycle the above items (i.e., tires, cardboard, paper, etc.) where recycling opportunities exist.

Any seepage produced from the landfill will be directed to catchment in the sumps of the North Pile, as per design. The water quality of the sumps is analyzed as per the Surveillance Network Program (SNP) of Water Licence.
MV2011L2-0004, while water quality assessments are included in the ARD report.

Regular monitoring of the North Pile and sumps are scheduled and conducted. During Designated sump monitors communicate visual observations and are ready to report any field issues immediately. An annual inspection is also conducted by Golder to assess geochemistry and stability.
Figure II  Waste Management Area within the North Pile Footprint
Figure III  Waste Related Locations
3.5 Land Farm

There is a land farm located in the West Cell footprint of the North Pile (Figure III), however, it has never been commissioned for its intended use in treating hydrocarbon impacted soil. Currently, mineral oil, small stockpiles of contaminated soil, and waste oil totes are stored at the land farm.

When a spill events occur involving hydrocarbon impacted soil, the impacted soil is sealed in drums, temporarily stored in an appropriate location, and shipped off site to an accredited waste facility.
4.0 OFF-SITE DISPOSAL

A recycling program for plastic and aluminum beverage containers was implemented in 2006. Beverage containers are collected from recycling bins located throughout the site buildings and stored in a sea can or crates for off-site disposal via the winter road or backhauled by air when possible. These items are then provided to any interested charitable organizations within the Northwest Territories to return to Yellowknife’s Bottle Depot.

Table III lists the items that are shipped offsite and disposed of and those shipped offsite and recycled or items reused on site. Except for the beverage containers all items are recycled or disposed of by KBL Environmental Ltd, a registered Receiver of Hazardous Waste with the Government of the Northwest Territories. The ultimate disposal of hazardous waste is confirmed through the use of hazardous waste movement documents as prescribed in the Guideline for the General Management of Hazardous Waste in the Northwest Territories.

<table>
<thead>
<tr>
<th>OFF-SITE DISPOSAL</th>
<th>Recycle</th>
<th>Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>chemicals - glycol, calcium hydroxide, etc.</td>
<td>Tires</td>
<td>Tires for protection of equipment</td>
</tr>
<tr>
<td>empty fuel drums</td>
<td>steel (structural, non-insulated piping)</td>
<td>Waste oil in furnaces</td>
</tr>
<tr>
<td>dry alkaline batteries and lead acid batteries</td>
<td>empty totes (1000 litre oil / chemical)</td>
<td>Wasted shotcrete for construction</td>
</tr>
<tr>
<td>hydraulic hose</td>
<td>wire - copper and aluminum</td>
<td>Gear oil is reused in gearboxes on fixed equipment</td>
</tr>
<tr>
<td>fluorescent light ballasts</td>
<td>wood</td>
<td>wood</td>
</tr>
<tr>
<td>crushed and drained oil/fuel filters, oily rags</td>
<td>beverage containers (water and pop)</td>
<td>totes</td>
</tr>
<tr>
<td>contaminated water (oil)</td>
<td></td>
<td>Flammable liquids (Jet B, gasoline, solvents) ERT Training</td>
</tr>
<tr>
<td>contaminated rock, soil (heavy oil)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>contaminated vent tubing (oily)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kitchen grease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oil &amp; grease pails / containers / vent tubing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A procedure exists for all materials movement documentation, which describes the steps required to track environmentally hazardous waste from the generator to final disposal. The procedure covers the personnel responsible for tracking and submitting the paperwork to regulators.

The Environment Protection Service of the GNWT monitors movement of hazardous waste through use of a tracking document called a *Movement Document/Manifest*. The *Movement Document/Manifest* form must accompany all regulated (hazardous) waste in transit regardless of the means of transport (air or road).

A detailed process for materials movement is outlined in SHE OOP 0004 (Appendix IX)
5.0 SEWAGE TREATMENT

This plant is an Activated Sludge Treatment plant with one C9 external membrane designed for a maximum capacity of 135 cubic meters per day. The plant with one membrane required the installation of automatic pre-filters, one membrane feed pump, one membrane circulation pump. The modular design allows the plant to be relocated as necessary.

At the final stage of the process, liquid that meets discharge criteria set out in the De Beers Water License MV2011L2-0004 is pumped to the Water Management Pond and onwards to the Water Treatment Plant where it is re-processed prior to being released as effluent to Snap Lake.

The sewage treatment plants include phosphorus removal as part of an overall water management strategy to meet the total phosphorus loading limit set out in the Water License. Management of sewage treatment will be linked with the Aquatic Effects Monitoring Plan (De Beers 2005c), which evaluates the effects of nutrient releases from the mine on productivity in Snap Lake.

The operational parameters are listed below:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Daily Permeate Flow</td>
<td>135 m$^3$/day</td>
</tr>
<tr>
<td>Maximum Operating Temperature</td>
<td>30°C</td>
</tr>
<tr>
<td>Minimum Operating Temperature</td>
<td>4°C</td>
</tr>
<tr>
<td>Bioreactor TSS - Minimum</td>
<td>3000 mg/L (ppm)</td>
</tr>
<tr>
<td>Bioreactor TSS – Optimal Operational Range</td>
<td>10000 mg/L (ppm)</td>
</tr>
<tr>
<td>Membrane Inlet Pressure</td>
<td>448,175 – 517125 pa</td>
</tr>
<tr>
<td>Membrane Outlet Pressure</td>
<td>68,950-103,425 pa</td>
</tr>
<tr>
<td>Maximum Membrane Inlet Pressure</td>
<td>482,650 pa</td>
</tr>
<tr>
<td>Minimum Concentrate Flow Rate Per Train</td>
<td>120 m$^3$/hr</td>
</tr>
</tbody>
</table>
Permeate Flow Rate Per Train | 6.1 m³/hr
--- | ---

Solids produced during sewage treatment are caked, which is basically reducing the water content of the sludge, and pressed in the filter press to remove additional water. Dewatered solids are bagged and sent to the landfill but can be incinerated if necessary.

The following EMS procedures contain details that pertain to the handling and disposal of dewatered sewage solids:

- SLM SHE OP 0026 STP Waste Handling and Maintenance.

5.1 STP3

Due to the reduction in personnel during Care and Maintenance, a smaller Wastewater treatment plant (STP3) has been installed and will be commissioned in 2018. The STP3 is treated with Chlorine only, utilizing an average of 25L per month.

Figure IV Sewage Process Flow Diagram
6.0 WATER TREATMENT

The Water Treatment Plant (WTP) is responsible for processing an average of approximately 28,000 cubic metres daily, with a maximum of 35,000 cubic metres. This is equivalent to 28-35 million litres of water. The water is pumped from the WMP, and is processed before returning to Snap Lake after meeting environmental regulations.

There are five main process steps completed in the WTP in order for the water to be returned to Snap Lake. Chemical aids are added at various steps in the process to assist in settling suspended particles out of the water and balancing the pH. The three chemicals used in this plant currently are:

1. Ferric Sulphate
2. Flocculant
3. Sulphuric Acid

The plant is also equipped with capability to add lime to the process if required, however the chemistry of the water both historically and at present time does not require the addition of lime.

The Ferric Sulphate is the first stage of coagulation. Coagulation is the clumping together of very fine particles into larger particles aided by chemical addition. This process occurs over a very short period of time (several seconds). The Ferric Sulphate solution addition rate and dosage is set by the operator.

The Reactor Tank is the first step in the treatment process. This is where the addition of Ferric Sulphate, a chemical compound, takes place. The Ferric Sulphate is the first stage of coagulation. Coagulation is the clumping together of very fine particles into larger particles aided by chemical addition. This process occurs over a very short period of time (several seconds). The Ferric Sulphate solution addition rate and dosage is set by the operator.

The pH of the Reactor Tank contents is measured by pH meter and the operator maintains a pH between 6-9 by closing a 3/8” manual valve connected to a pH
Adjustment Tank and opening a 1/2" manual valve to divert sulphuric acid to the Reactor Tank.

The Thickener has a retention time based on the flow rates of the water going into the Reactor Tank, allowing TSS in the water to settle out. This process is completed with the help of the ferric sulphate and fluocculant to gather all the particles in chains and settle them to the bottom of the tank, creating slurry.

It is imperative to measure the turbidity before transferring the water to the filter bank because extremely high turbidity can plug the filter media. A high turbidity condition causes an alarm to allow the operator to try and trouble shoot what is causing the condition and an extremely high turbidity condition is interlocked to shut-down the filter feed pumps and prevent the filters from being plugged.

The filters utilized in the WTP are pressure filters with inert media and filter nozzles. This is the last step in the process that helps reduce the TSS of the water before it is discharged from the plant. The filtration controls reside within the plant.
6.1 Potable Water Treatment Plant

Due to the reduction in camp personnel during the Care and Maintenance, a smaller potable water treatment plant was constructed to reduce power consumption whilst providing clean drinking water.

The potable water from Snap Lake is pumped to Main Camp via manual operation. That is, each time treated water in the potable water treatment plant that is stored in the 1000L totes runs close to empty, the Main water pump house electric pump must be switched on to deliver the water for treatment. The water is treated with chlorine only, using an average of 2L per month.

Figure V Potable Water Flow Diagram
Figure VI Potable Water Treatment Flow Diagram

- 10 Micron filter
- .5 Micron filter
- .35 Micron filter
- Flow meter
- Flow switch
- Chlorine injection pump
- Chlorine injection quill
- 2 * expansion tanks
- 2 * pumps
- 6 * 1000 L water storage totes
- Low level floats (switch off pumps)
7.0 MONITORING, MITIGATION, AND REVIEW

Compliance with all environmental laws, regulations, and guidelines, as well as the Snap Lake Mine EMS, will be monitored using the following mechanisms:

- environmental inspections;
- environmental audits (internal and external);
- communication with regulatory authorities (federal, territorial); and,
- communication with De Beers Corporate Legal Department and other De Beers facilities.

To control waste substances from entering the aquatic environment, a number of spill mitigation techniques related to handling of wastes have been implemented. Complete descriptions of spill and containment procedures can be found in the Snap Lake Mine Spill Contingency Plan (De Beers 2017).

The following list describes general practices when handling wastes:

- use of spill mats;
- replacement of leaking, corroded or otherwise deteriorated containers;
- careful unloading or loading wastes to minimize losses;
- weekly checks of storage containers for leaks, proper labels, and lids that are on tight;
- use of plastic tarps to cover waste piles; and,
- installation of runoff berms.

As part of our Environmental Management System waste audits are carried out on site and some of the past recommendations have identified a number of improvements for the handling and disposal of waste and personal safety as it relates to wildlife conservation:

- conduct regular audits of all food and non-food solid waste streams, and use information to modify plans, procedures, and protocols;
• conduct external audits to review success of activities;
• fabricate a burner unit to improve disposal of large volumes of cardboard and wood wastes generated;
• implement a standardized colour-code for various waste streams; and,
• avoid storage of waste for incineration to reduce the potential for attracting wildlife. Incineration should be performed as dictated, by waste volumes generated.
8.0 TRANSPORTATION PLAN

8.1 Introduction

The transportation of hazardous materials to the Snap Lake Mine site will be either by winter ice road or by air. The winter ice road will be the major transportation route for bulk materials. Hazardous materials will require special handling and specific documentation to comply with GNWT and Highway Department regulations.

De Beers and their contractors will ensure that the transporters of hazardous materials are aware of their legal responsibilities. De Beers is currently a member of the Tibbitt to Contwoyto Winter Road Joint Venture and will adhere to the Tibbitt to Contwoyto Joint Venture Spill and Emergency Response Plan, and to the Rules of the Road Manual.

8.2 Contractor Requirements

Materials to be shipped to the mine site will initially be received in Yellowknife or Edmonton by Deton Cho. When possible, the material will be stored indoors in a secure area. Once transported to the site, the originator of the requisition will perform the final material receipt confirmation.

All TDG and WHMIS labelled materials must have accompanying MSDS. The MSDS information is communicated between Deton Cho and De Beers Logistics department.

If materials are spilled while receiving, the receiver will be the first responder and contact the SHE Department and/or Materials Management to initiate the Spill Contingency Plan. A review of the MSDS for the spilled material will determine what personal protective equipment and other precautions may be required. The receiver will ensure spill kits are present at the unloading area in case a spill occurs.
9.0 PETROLEUM, OILS, AND LUBRICANTS

9.1 Introduction

The mine operations will use large amounts of Petroleum, Oils and Lubricants (POLs). These products are transported, stored, handled, and used in compliance with the appropriate legislation and with best management practices. A full year’s supply of POLs is transported to site during the winter road season.

9.2 Types and Quantities

The types and quantities of POLs to be stored and used are summarized in Table II.

9.3 Design and Location of POL Storage Facilities

All single-walled fuel storage tanks are contained within a perimeter berm lined with high-density polyethylene (HDPE) geo-membrane. The berm has been designed as required by the NFCC, API-650, and NWT Public Works and Services design standards.

The berms provide secondary containment for all fuel storage tanks and the capacity of the secondary containment has the equivalent to the volume of 110% of the largest tank, as per the NFCC.

Currently in the Extended Care and Maintenance phase there is seven million liters (7,000,000L) of diesel on site with re-supply occurring in 2019.

9.4 Inspection and Monitoring

Site personnel are responsible for formal inspection of fuel storage, dispensing pumps, and pipelines. Visual Inspections of all tanks and associated pipelines are monthly or more frequent if deemed necessary. The inspection frequency will be determined by the regulatory requirements.
Any release of hazardous materials will be reported immediately and appropriate measures will be taken to remediate the situation. Details of reporting protocol, procedures, and remedial measures are specified in the Snap Lake Mine Spill Contingency Plan.

9.5 Records Keeping

Inventory control and reconciliation records are kept on site in an acceptable manner and format and maintained for a period of one year. Training of Personnel

WHMIS training is provided to all personnel working on-site. The Emergency Response Team will be trained in the following fields, regardless of previous training and experience: transporting, handling, and transferring petroleum products; emergency response; and WHMIS.
10.0 EXPLOSIVES

In 2017 all explosive material were either detonated underground or removed from site for responsible disposal and/or reuse. There are currently no explosives on site.
11.0 REFERENCES


Appendix I  Snap Lake Mine Operating Procedure
SLM SHE OP Storage and Handling of Hazardous Material
1.0 PURPOSE

To provide personnel with safe storage practices for all hazardous materials used on site. The handling practices outlined below comply with territorial and federal legislation, including Transportation of Dangerous Goods (TDG) Regulations, Workplace Hazardous Material Information System (WHMIS) regulations, and De Beers Canada Safety, Health and Environmental (SHE) policies.

2.0 SCOPE

This procedure applies to all employees including independent contractors, working at the Snap Lake Mine (SLM) and designated sites.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or designate is responsible for:

3.1.1. Ensuring that a system and all its components

3.2. Safety, Health and Environment (SHE) Manager is responsible for:

3.2.1. Ensuring the implementation of this procedure is monitored.
3.2.2. Initiating the Spill Response Plan.
3.2.3. Transport and removal of hazardous waste.

3.3. Human Resources Manager is responsible for:

3.3.1. Ensuring on-site personnel have up-to-date WHMIS training, and where applicable, TDG training.

3.4. SHE Coordinator is responsible for:

3.4.1. Monitoring the implementation of this procedure.

3.5. Supervisors are responsible for:

3.5.1. Implementing this procedure.

3.6. Environmental Coordinator/Environmental Technician is responsible for:

3.6.1. Working with the On-Scene Coordinator or designate to react to spills using the Spill Response Plan.
3.6.2. Inspecting hazardous materials storage.
3.6.3. Helping the Emergency Response Team Coordinator or designate plan and conduct spill response activities.
3.6.4. Arranging transport and removal of hazardous waste from the site.
3.7. **All on-site personnel who handle hazardous materials and wastes** are responsible for:

3.7.1. Having proper WHMIS and TDG training.

3.7.2. Complying with these procedures and relevant WHMIS and TDG regulations.

3.7.3. Ensuring all hazardous materials is stored in a safe and organised manner, which minimises or eliminates the potential for spills, accidents, incidents or hazards.

3.7.4. Consulting their supervisor or designate with any questions about storage or handling of hazardous materials.

3.7.5. Informing their supervisor or designate immediately when a spill occurs.

3.7.6. If it is safe to do so and appropriate personal protective equipment (PPE) is worn, beginning immediate cleanup of a spill with absorbent material.

4.0 **PROCEDURE**

It is of the utmost importance that personnel handling waste products are aware of what they are handling and wear appropriate PPE as outlined by WHMIS regulations and SLM SHEOP 0067 (PPE) Personnel must always be certain of PPE requirements, so check with the supervisor and review the Material Safety Data Sheet (MSDS) for the products handled before work begins.

Smoking is not permitted when handling flammable waste products. The following categories identify hazardous materials with similar handling and storage requirements:

4.1. **BATTERIES**

4.1.1. Batteries will be stored in acid-resistant secondary containment trays to catch leaks.

4.1.2. Where practical, batteries must be kept from freezing to prevent cracking of the outer casing.

4.2. **EXPLOSIVES**

4.2.1. Immediately upon arrival, explosives and detonators must be transferred into existing separate approved surface magazines or underground storage areas.

4.2.2. Magazines shall be kept locked. Only authorised persons shall have access.

4.2.3. No smoking or open flame is permitted within 20 m (60 ft) of magazines.

4.2.4. Handling and transportation of explosives from the magazine shall comply with the federal, provincial, and territorial acts and regulations.

4.2.5. If for any reason explosives must be discarded, (i.e. expired) they shall be kept in a separate location, clearly labelled and returned to the supplier.
4.3. **COMPRESSED GAS CYLINDERS**

4.3.1. Upon delivery to the site all compressed gas cylinders must be stored in the area designated specifically for compressed gas cylinders.

4.3.2. The storage area must be well marked to clearly identify the storage of compressed gases. “NO SMOKING” signs will also be posted.

4.3.3. Full cylinders in the storage area must be grouped according to the types of gas they contain and stored separately from empty cylinders.

4.3.4. Cylinders emptied on site must be marked “MT” with white chalk and returned to the area designated for empty cylinder storage.

4.3.5. All full and empty cylinders must be securely fastened by a chain to the wall and kept upright at all times.

4.3.6. Acetylene and oxygen must be stored separately.

4.3.7. All cylinders must be equipped with protective valve caps.

4.4. **WATER TREATMENT PLANT CHEMICALS**

4.4.1. Upon delivery to the site all water treatment plant chemicals will be stored in the chemical storage area by the water treatment plant. During winter months some chemicals will be stored in the warming containers.

4.4.2. Chemicals must be separated from each other and rotated so old stock is used first.

4.4.3. The storage area must be well marked to clearly identify the storage of hazardous caustics and acids. “NO SMOKING” signs will also be posted.

4.4.4. Empty totes will be returned to the original supplier where possible.

4.4.5. Cutting or welding is not permitted in a reagent mixing or storage area without the prior approval of the Plant Superintendent or the Maintenance Superintendent. The SLM SHE OP 0096 (Hot Work Permit Programme) and SLM SHE OP 0097 (Welding, Burning and Cutting Safety) must be followed.

4.5. **PROCESS PLANT REAGENTS:**

4.5.1. All plant reagents must be stored and labelled in the appropriate bulk container, the designated reagent storage yard, or inside the plant.

4.5.2. As compatibility and reactivity of reagents are fundamental to safe work practices, only approved reagents will be permitted on site. Any additional reagents will be subject to review by SHE before their arrival as per the Operational procedure for Purchasing.

4.5.3. The inventory of reagents stored inside the plant, excluding volume in mix and stock tanks, is limited to a maximum 7-day supply, or one container, when in operation.
4.5.4. Cutting or welding is not permitted in a reagent mixing or storage area without the prior approval of the Plant Superintendent or the Maintenance Superintendent. The SLM SHEOP 0096 (Hot Work Permit Programme) and SLM SHEOP 0097 (Welding, Burning and Cutting Safety) must be followed.

4.5.5. Reagents stored in barrels must be kept on pallets and secured during delivery.

4.6. LUBRICANTS AND FUEL

4.6.1. Storage of lubricants underground is only permitted in areas that have been approved in accordance with provincial or territorial regulations. Consult the supervisor and the Environmental Coordinator before storing lubricants underground.

4.6.2. Lubricants stored in the plant are limited to one container of each product, or a 7-day supply, when in operation.

4.6.3. Lubricants must remain stored in containers supplied by the product manufacturer or distributor, or may be transferred to appropriate containers bearing appropriate workplace labels in accordance with WHMIS regulations.

4.6.4. The storage of bulk fuel and lubricants is approved under permit. Each tank must be registered and approved before arriving on site. There are a number of above ground single-wall tanks located within lined and bermed tank farms (4), with capacities of 300,000 litres, 500,000 litres, 12 million litres, and 10 million litres.

4.7. HAZARDOUS WASTE

4.7.1. All hazardous waste containers must be properly labelled according to WHMIS requirements.

4.7.2. Contractors are responsible for proper storage in designated areas and must advise Site Services personnel and the Environmental Technician when material is moved to the Hazardous Waste (HW) laydown area.

All hazardous waste products listed below marked with an asterisk (*) will be stored in barrels or crates in accordance with SLM SHE OP 0038 (Waste Management Log).

If a spill occurs, ensure it is cleaned up safely and immediately with absorbent pads or other appropriate material, and safely disposed of as hazardous waste. Notify your supervisor so a Spill Report Accident Incident Report Form can be filled out.

*Note: All barrels and drums must be stored upright on pallets unless otherwise noted.*

4.7.3. All Full or Partially-Full Barrels or Drums: will be palletised and strapped before being moved by mechanical means per the SLM SHEOP 0046 (Material Handling at Snap Lake).
4.7.4. **Reagent Containers**: All empty barrels or bags must be thoroughly flushed with water in the plant to remove any residuals. The residual water is then placed back into the process water. Rinsed metal or plastic barrels should be stored upside-down at the waste management area.

4.7.5. **Glycol Containers**: Empty glycol barrels must be used for waste glycol storage. The containers must be numbered per the Waste Products Log.

4.7.6. **Waste Oil***: Waste oil shall be contained in barrels and/or cubes that have been inspected to determine that they are leak-free, and labelled identifying its contents. The containers of oil will be stored at the Hazardous Waste Cell at the waste management area pending results of samples to determine acceptability for burning in the on-site waste oil furnaces. Oil that is deemed acceptable will be transferred into the tankage associated with the waste oil furnaces. Oil that does not meet the criteria for burning on-site, will be manifested for off-site disposal and held in the hazardous waste cell at waste management area until shipped.

4.7.7. **Waste Solvents***: Are to be placed in clean barrels and stored in the Hazardous Waste Cell located at the waste management area.

4.7.8. **Waste Glycol***: Must be placed in empty glycol barrels and stored in the Hazardous Waste Cell located at the waste management area.

4.7.9. **Incinerator Ash***: Partial barrels of incinerator ash will be stored at the incinerator until they are full. Full barrels must have the tops covered and be moved to the landfill. The contents of the barrels will be dumped and backfilled. Barrels can be re-used for incinerator ash.

4.7.10. **Lubricating Grease***: Full barrels must have the tops covered and be stored at the Hazardous Waste Cell at the waste management area.

4.7.11. **Used Oil Filters***: After draining, place filters in enviro-drums, complete with snap ring lid, and store at the maintenance shop until full. The filters are then crushed using the filter press and placed in a separate enviro-drum which will be labelled and shipped to the waste management area for subsequent off-site disposal.

4.7.12. **Corrosives, Caustics, and Oxidisers***: These are stored in bunged barrels or totes according to WHMIS requirements in the Hazardous Waste Cell at the waste management area. Note that these materials are incompatible and must be stored separately and at a safe distance from each other as specified on the associated MSDS.

4.7.13. **Contaminated Soil – Hydrocarbons and Waste Water***: are stored in enviro-drums, complete with snap ring lid, and stored at the waste management area.

4.7.14. **Contaminated Fuel (Diesel and Jet-B)**: are stored in bunged barrels at the Hazardous Waste Cell at the waste management area. Where possible, it will be used to supplement fuel in the on-site waste oil furnaces.
4.7.15. Contaminated Fuel (Diesel and Jet-B)*: are stored in bunged barrels at the Hazardous Waste Cell at the waste management area. Where possible, it will be used to supplement fuel in the on-site waste oil furnaces.

4.7.16. Printer/Copier Toner Cartridges: are returned to the supplier in the packaging recovered from the newly installed cartridge.

4.7.17. Wet Cell Batteries: Used batteries must be delivered to the waste management area where they will be stored in a labelled poly-lined crate, pending off-site disposal.

4.7.18. Asbestos Products (brake linings)*: Where possible, these will be returned to the supplier. If suppliers will not take asbestos parts, they are stored in an enviro-drum at the maintenance shop. When the enviro-drum is full it will be stored at the waste management area pending off-site disposal.

4.7.19. Empty Hydrocarbon (fuels, lubricants, etc) Barrels: These are stored by positioning them lying on their sides, with bungs at 3 and 9 o’clock, at a designated area at Lay down 1.

4.7.20. Fluorescent Tubes: are crushed at site in a fluorescent tube crusher. The remnants of the crushed bulbs are bagged within the tube crusher system. When these bags are full they are shipped off-site to an approved hazardous waste material handler for disposal.

4.7.21. Small Dry Cell Batteries: are consolidated for shipment to appropriate off-site facilities.

Hazardous waste is stored for shipment to appropriate facilities and will receive a Waste Management Log Number, as described in SLM SHEOP 0038 (Waste Management Log), and will be affixed to the container.

5.0 DEFINITIONS

Hazardous Material is defined as any material identified in the TDGR or WHMIS, including:

- Explosives (e.g., caps, ANFO, Emulsion, stick powder)
- Compressed Gases (e.g., acetylene, oxygen)
- Flammable Liquids (e.g. gasoline, diesel)
- Flammable Solids (e.g., calcium carbide)
- Oxidisers (e.g., peroxide)
- Poisonous and infectious substances (e.g., cyanide)
- Radioactive material (e.g., Cesium-137 (nuclear density gauges))
- Corrosive material (e.g., caustic soda, acids)
- Environmentally hazardous material (e.g., PCBs)
- Hazardous wastes (e.g., used oil, vehicle batteries, empty barrels)
- Miscellaneous dangerous goods (e.g., asbestos).
6.0 REVIEW AND APPROVAL

6.1. This is a Tier 3 document.

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7.0 APPENDICES

Not applicable.

8.0 REVISION HISTORY

Noted below is the revision history of this document.

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<td>October 5, 2002</td>
<td>Responsibilities changed. Page 6. Changed by KGL</td>
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<td>January 23, 2003</td>
<td>Remove typos, add to banding and add section on fluorescent tubes. Pgs. 3, 4, &amp; 5. Changed by KGL</td>
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<td>May 29, 2003</td>
<td>Reference OP-46 and link. Reference pg 4 and link on pg 8. Changed by KGL</td>
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<td>Terms and typos. All pages. Changed by KGL</td>
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<td>February 12, 2015</td>
<td>Changes to 4.6.1 &amp; 4.6.4 - added 9.21 by Michelle Peters. Reviewed and approved by D. Raymond.</td>
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9.0 REFERENCES and RELATED DOCUMENTS

9.1. De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6
9.2. De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLM SH SYS 4.4.6
9.3. Mine Health and Safety Regulations NWT Sections 9.01 – 9.18, Sections 9.28 – 9.42, Sections 9.61 and 15.05•Xx
<table>
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<th>Storage and Handling of Hazardous Materials</th>
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9.5. Explosives Act. R.S., c. E-15, s. 1
9.7. Snap Lake Mine Spill and General Contingency Plan
9.9. SLM SHE OP 0003 (Workplace Hazardous Materials Information System (WHMIS))
9.10. SLM SHE OP 0006 (Disposal of Empty Aerosol or Pressurized Containers and Dry Cell Batteries).
9.11. SLM SHE OP 0011 (Purchasing)
9.12. SHE 8500 OP 0021 (Transportation and Disposal of Hazardous Wastes)
9.13. SHE 8603 OP 0023 (Solid Waste Handling & Disposal)
9.14. SHE 8603 OP 0038 (Waste Storage Labelling)
9.15. SHE 8500 OP 0046 (Materials Handling at Snap Lake)
9.16. SHE 8500 OP 0053 (Compressed Gas Cylinders)
9.17. SHE 8500 OP 0060 (Fire Protection)
9.18. SHE 8500 OP 0067 (PPE)
9.19. SHE 8500 OP 0096 (Hot Work Permit Programme)
9.20. SHE 8500 OP 0097 (Welding, Burning and Cutting Safety)

10.0 **AUTHORIZED SIGNATURE**

![Signature]

Darren Raymond  
SH/R Manager

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All printed copies are considered uncontrolled documents.
Refer to Pavilion (Snap Lake Intranet) for current version.
Appendix II  Snap Lake Mine Operating Procedure
SLM SHE OP Workplace Hazardous Materials Information System (WHMIS)
1.0 PURPOSE
To describe methods for implementing, maintaining and ensuring compliance with Workplace Hazardous Materials Information System (WHMIS) legislation.

2.0 SCOPE
This procedure applies to all employees including independent contractors, working at the Snap Lake Mine (SLM) and designated sites.

3.0 RESPONSIBILITIES

3.1. Mine Manager or designate is responsible for:
   3.1.1. Ensuring the Material Safety data Sheets (MSDS) master file catalogue is maintained.

3.2. Safety, Health and Risk Manager is responsible for:
   3.2.1. Ensuring the implementation of this procedure is monitored.
   3.2.2. Ensuring all contractors present on site have been checked for possession of valid WHMIS certification.
   3.2.3. Ensuring all contractors are storing and using chemicals and hazardous materials in compliance with WHMIS and Transportation of Dangerous Goods (TDG) regulations.
   3.2.4. Ensuring the individual product MSDSs are tracked and replaced as necessary. Each controlled product must be updated as required in the regulations based in the expiry date of the MSDS product information sheets.

3.3. SHE Coordinator is responsible for:
   3.3.1. Monitoring the implementation of this procedure.

3.4. All on-site personnel must:
   3.4.1. Adhere to WHMIS and TDG regulations, including proper storage, labeling and use.

3.5. Supervisors and Contractors are responsible for:
   3.5.1. Ensuring all workers are trained to understand and use all elements of WHMIS. The effectiveness of personnel training in WHMIS is evaluated through spot-checks conducted in the workplace.
   3.5.2. Ensuring the possession of a valid WHMIS certification is a condition of continued employment.
3.5.3. Ensuring up-to-date MADAs are provided prior to placing an order for any materials requiring MSDSs.

4.0 PROCEDURE

4.1. Description

4.1.1. Under federal, provincial and territorial legislation, employers are required to accommodate all workers’ “Right to Know” about hazards in their workplaces.

4.1.2. WHMIS is intended to ensure all personnel at a workplace have access to, and the ability to use, information regarding controlled products in their workplaces.

4.1.3. This information includes hazards, safe handling procedures, and emergency response procedures to protect workers safety and health, and that of their co-workers.

4.2. Labels

4.2.1. All employees and contractor personnel will ensure containers of hazardous materials and controlled products received at the site are adequately identified with Supplier Labels.

4.2.2. These labels identify, the product contained, the risk of exposure, the personal protective equipment (PPE) which must be worn for safely handling the product, basic first aid and emergency procedures, and reference to the availability of MSDSs.

4.2.3. Suppliers are required to affix adequate labels to containers. The DBC employees and contractors receiving hazardous goods are responsible for ensuring that all containers received are properly labeled.

4.2.4. Each employee and contractor will also provide, and ensure the use of, Workplace Labels as required under WHMIS.

4.2.5. Workplace Labels provide the same information as Supplier Labels and are affixed to containers in the local workplace. Workplace labels are used for the identification of containers into which a hazardous material or controlled product has been transferred from an original, supplier labeled container.

4.2.6. Workplace Labels are also used to replace Supplier Labels that have been lost or defaced on the original container. Workplace labels or instructions are available from your supervisor or the warehouse supplies blank workplace labels.

4.2.7. WHMIS also requires the clear identification of process piping, as well as storage and process vessels.

4.2.8. The identification must indicate the controlled product contained, and in the case of piping, the directions of product flow.

4.2.9. Tanks, and related piping and accessories, are labeled such that the content identifier is visible from all routes of approach. This is to avoid confusion at exit values, fittings and bends and in locations where piping passes through walls or floors.
4.2.10. WHMIS legislation requires that each facility adopt a consistent, distinctive labeling protocol for any given workplace.

4.3. Material Safety Data Sheets (MSDS)

4.3.1. MSDS are provided by suppliers of controlled substance, and contain much more complete and detailed information than shown on a Supplier or Workplace Label.

4.3.2. Each employee and contractor must ensure valid MSDSs are received from all suppliers for all controlled products.

4.3.3. No product will be accepted unless MSDSs are pre-approved by SHE personnel.

4.3.4. De Beers Canada SLM has an obligation to produce suitable MSDSs for all intermediate and final products produced at the site that fall under WHMIS regulation.

4.3.5. De Beers Canada SLM and all contractors must ensure that MSDS are available for use by all employees and contractors. At Snap Lake Mine all workers will have awareness of the MSDS online electronic database for all hazardous materials that are used on site.

4.3.6. Workers will be readily able to access the on-line information prior to working with these materials.

4.4. Worker Education

4.4.1. SLM will ensure every worker who works with, or is in proximity of; a hazardous or controlled product is trained in procedures for the safe use, storage, handling and disposal of hazardous material.

4.4.2. This includes material that is contained or transferred in a pipe or piping system, valves, tank truck, conveyor belt or spill of hazardous material.

4.5. Storage

4.5.1. All hazardous materials must be stored in compliance with precautions listed on the respective MSDS and the Hazardous Materials and Handling procedures.

4.5.2. All flammable and explosive materials must be stored in compliance with appropriate legislation.

4.6. Disposal

4.6.1. All hazardous waste must be collected in compliance with the original MSDS and the Storage and Handling of Hazardous Materials Procedures.

5.0 DEFINITIONS

5.1. TDG (Transportation of Dangerous Goods):

5.1.1. A set of regulations governing the transportation of materials, chemicals, and substances that are recognized as being hazardous to people, animals or the environment.
5.2. WHMIS (Workplace Hazardous Materials Information System):
5.2.1. A standardized system of identifying and providing information for recognized hazardous materials.

5.3. MSDS (Material Safety Data Sheet):
5.4. A standard form outlining the characteristics and related safety and hazard information for a particular hazardous substance.

6.0 REVIEW AND APPROVAL

6.1. This is a Tier 3 document.
6.2. Review Schedule: Every two years

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7.0 APPENDICES

7.1. N/A

8.0 REVISION HISTORY

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<td>January 1, 2004</td>
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<td>May 24, 2006</td>
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<td>February 4, 2009</td>
<td>Update logos, reference to MSDS online database</td>
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<td>6</td>
<td>November 13, 2009</td>
<td>Update template and minor edits by M. Peters. Reviewed and approved by D. Raymond</td>
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<td>January 23, 2015</td>
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9.1. De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6.

9.2. De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLM SH SYS 4.4.6.


9.7. SHE 8500 OP 0021 Transportation and Disposal of Hazardous Waste.

9.8. SHE 8500 OP 0032 Cleaning Material Use and Disposal.


10.0 AUTHORIZED SIGNATURE

Darren Raymond
SH/R Manager
Appendix III  Incinerator Specifications
## CY-100-CA-D Specifications

### Description

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<td>Incinerator Type</td>
<td>Batch Type/ Intermittent Feed</td>
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<tr>
<td>Fuel Type</td>
<td>Diesel Fired Burners</td>
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<tr>
<td>Burning Capacity, kg/h or kg/day</td>
<td>Intermittent feeding: 100kg/h</td>
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<tr>
<td></td>
<td>Batch feeding: 3 batches @ 550kg/day</td>
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<tr>
<td>Cycle Time, hours</td>
<td>Intermittent 100kg/hour</td>
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<td></td>
<td>3 Batches @ 4-5 hrs. per Batch</td>
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<td>Number of Batches/ 24 hr.</td>
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<td>Burn Time, hour</td>
<td>4-5 hours per Batch</td>
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<tr>
<td>Cool Time, hour</td>
<td>8 hours</td>
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<tr>
<td>Load &amp; De-ash Time, hour</td>
<td>30 Minutes Each, Manual</td>
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<tr>
<td>Approximate Weight, kg</td>
<td>17,000kg (37,400lbs)</td>
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<tr>
<td>Incinerator Transportation Measurement, m</td>
<td>Mounted on skid: 6.1m L x 2.44 m W x 2.25m H</td>
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### Control System

- PLC Controller
- "Load-and-Go", One-Button operation for batch operation
- Temperature Controllers in Primary and Secondary
- Real Time data Logging

### Primary Chamber

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<td>Effective Volume, m³</td>
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<tr>
<td>Burner Capacity, BTU/h</td>
<td>2 Burners @ 500,000 BTU/hr. each</td>
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<td>*Approx. Diesel Consumption, L/s</td>
<td>7 gal/hr. or 0.007 L/s (Depending on BTU value of waste)</td>
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<tr>
<td>Motor Type, Voltage</td>
<td>115 V 60 Hz Single Phase</td>
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<tr>
<td>Operating Temperature, ºC</td>
<td>Temperature Controlled: 650 ºC</td>
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<td>Design Temperature, ºC</td>
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<td>Load/De-Ash Door Size, mm</td>
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<td>Sight Glass Size, mm</td>
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<tr>
<td>Insulation Lining Thickness, mm</td>
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<td>Refractory Lining Material</td>
<td>Cast-able Refractory</td>
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### Primary Burner

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</tr>
<tr>
<td>Make/Model</td>
<td>Beckett WIC 201 burner</td>
</tr>
</tbody>
</table>
**Diesel fuel Pump**  
Component of the Burner  
(Beckett WIC 201 burner)

### Secondary Chamber

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Volume, m³</td>
<td>2.73 m³</td>
</tr>
<tr>
<td>Residence Time, s</td>
<td>2 Seconds</td>
</tr>
<tr>
<td>Burner Capacity, BTU/hr.</td>
<td>1,600,000 BTU/hr</td>
</tr>
<tr>
<td>Diesel Consumption, L/s</td>
<td>13 Gal/hr. or 0.014 L/s</td>
</tr>
<tr>
<td>Blower Model</td>
<td>Blower-Dayton 4C108</td>
</tr>
<tr>
<td>Blower Motor, RPM</td>
<td>3450 RPM</td>
</tr>
<tr>
<td>Blower CFM</td>
<td>700 CFM</td>
</tr>
<tr>
<td>Motor Type/Voltage</td>
<td>115 V 60 Hz Single Phase</td>
</tr>
<tr>
<td>Operating Temperature, °C</td>
<td>Temperature Controlled: 1000 °C</td>
</tr>
<tr>
<td>Design Temperature, °C</td>
<td>1000 °C-1100 °C</td>
</tr>
<tr>
<td>Insulation Lining Thickness, mm</td>
<td>102mm (4 inches)</td>
</tr>
<tr>
<td>Refractory Lining Material</td>
<td>Cast-able Refractory</td>
</tr>
<tr>
<td>Refractory Lining Thickness, mm</td>
<td>102mm (4 inches)</td>
</tr>
<tr>
<td>Refractory Temperature Rating, °C</td>
<td>1538 °C</td>
</tr>
<tr>
<td>Flue Gas Outlet Diameter, mm</td>
<td>406mm</td>
</tr>
</tbody>
</table>

### Secondary Burner

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Burner</td>
<td>Diesel Fired Burner</td>
</tr>
<tr>
<td>Make/Model</td>
<td>Beckett WIC 304 burner</td>
</tr>
</tbody>
</table>
| **Diesel fuel Pump**                           | Component of the Burner  
(Beckett WIC 304 burner) |

### Main Stack

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Stack Diameter, mm</td>
<td>406mm</td>
</tr>
<tr>
<td>Main Stack Height, m</td>
<td>With spark arrester 4.24 m; Without spark arrester 3.7m</td>
</tr>
<tr>
<td>Main Stack Shell Thickness, mm</td>
<td>2.05mm (12 Gauge)</td>
</tr>
<tr>
<td>Installation Thickness, mm</td>
<td>50.8 mm (2 inches)</td>
</tr>
<tr>
<td>Refractory Lining Material</td>
<td>Cast-able Refractory</td>
</tr>
<tr>
<td>Refractory Lining Thickness, mm</td>
<td>50.8 mm (2 inches)</td>
</tr>
<tr>
<td>Refractory Temperature Rating, °C</td>
<td>1538 °C</td>
</tr>
</tbody>
</table>

### Diesel Tank

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Diesel Tank Capacity, L</td>
<td>4500L</td>
</tr>
<tr>
<td>Diesel Tank L x D, mm</td>
<td>3658 mm L x 1270 mm D</td>
</tr>
<tr>
<td>Diesel Tank Material</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Approx. Diesel Tank Weight Empty, kg</td>
<td>680 kg (1500bs.)</td>
</tr>
<tr>
<td>Overfill Protection</td>
<td>Visual Indicator (Fuel Gauge)</td>
</tr>
<tr>
<td>Double Wall Construction</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Scrubber Required**  
No

*Maybe subject to change based on Clients requests or regulations  
** Please see attached Part components
Appendix IV   Incinerator Operating Manual
Model CY-100-CA-D Dual Chamber Controlled Air Incinerator System

General Operation Plan and Standard Operating Procedure
Incinerator: General Operation Plan & Standard Operating Procedure

Document Review Frequency: One Year

DRAFT

Prepared by:
Westland Consulting
KETEK Group Inc.
20204 – 110 Avenue, NW
Edmonton, Alberta Canada T5S 1X8
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<td>12.0</td>
<td>Recommended PPE and safety considerations</td>
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APPENDIX A – Ketek Manufacturing (Westland). CY100-CA-D Incinerator Manual
APPENDIX B – Checklists and Incinerator Operation Log for record maintenance(page 26-34)
1.0 Scope of the Document

De Beers Canada Inc. (De Beers) owns and operates the Snap Lake Mine (Mine). The method of waste disposal on site is waste incineration. The landfill on site will be used for disposal of inert materials and incinerator ashes.

De Beers is using CY100-CA-D incinerator manufactured by Ketek Group Inc.(KETEK), Edmonton, AB, Canada (Westland) for incineration of putrescible waste / camp waste at De Beers, Snap Lake. The incinerator is a double chamber, controlled air incineration system designed to incinerate non hazardous camp solid waste comprising of food waste, paper, cardboard and other general domestic waste. The key components of the incinerator are shown in the incinerator’s pictures on page number 23 and 24 of this document. This Incinerator Operation Plan is intended to provide general guidance and Standard Operating Procedure for operating the incinerator and follow good environmental practices related to waste management.

This guidance document provides information on how to operate the incinerator safely, handle waste to prevent wildlife interactions, avoid improper burning of solid waste, and to comply with federal, territorial and permit requirements. This procedure applies to the burning of domestic, non-hazardous wastes on site in the waste incinerator. It also applies to the site services personnel authorized to operate the incinerator.

Waste not suitable for the incinerators will be disposed of as per the Domestic Waste and Sewage Management Plan using the burn pit, landfill or through off-site disposal.

The incinerator operator is to refer to the KETEK’s Incinerator Operator Manual for specific instructions and optimal operating conditions for the CY100-CA-D incinerator.
1.1 Reference Documents:

This procedure is to be read and applied in conjunction with the following documents:

- KETEK CY100-CA-D Incinerator Manual (provided separately)
- De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6
- De Beers Canada SLP Safety and Health Management System SLM SH SYS 4.3.4 and SLM SH SYS 4.4.6
- SLM SHE OP 0014 (Wildlife Encounters)
- SLM SHE OP 0015 (Mobile Fuel Transfer)
- SLM SHE OP 0023 (Solid Waste Handling and Disposal)
- SLM SHE OP 0031 (Kitchen Food and Waste Handling and Storage)
- SLM SHE OP 0038 (Waste Management Log)
- SLM SHE OP 0041 (Incineration at Snap Lake)
- SLM SHE OP 0002 Storage and Handling of Hazardous Materials
- SLM SHE OP 0003, WHMIS
- SLM SHE OP 0006, Disposal of Empty Aerosol or Pressurized Containers
- SLM SHE OP 0021, Transportation and Disposal of Hazardous Waste
- SLM SHE OP 0026, Sewage Treatment Plant Waste Handling & Maintenance
- SLM SHE OP 0036, Burn Pit
- SLM SHE OP 0037, Incinerator Use, Incinerator Waste Handling & Storage

2.0 Applicable Regulations/Guidelines

- CCME Canada Wide Standards for Dioxins and Furans
- CCME Canada Wide Standards for Mercury
- Technical Document for Batch Waste Incineration
- Mackenzie Valley Resource Management Act
3.0 Waste Incineration and General Guidelines for Waste Management

Incineration of waste is recognized as an effective and environmentally sound disposal method for a wide range of wastes, provided the incinerator is properly operated and maintained. However, waste segregation, recycle and reuse shall be considered before the final waste is sent for waste incineration. Examine the waste to determine the opportunities that exist for:

- reducing the overall quantity of waste generated,
- reusing materials; and
- recycling as much as possible before disposal.

Incineration of wastes can lead to the emission of pollutants. Polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDF), commonly known as dioxins/furans can be generated from incomplete combustion resulting from the use of inefficient operation of incineration system. Dioxins and furans are toxic, persistent, and bio-accumulative and therefore must be controlled in the final emission from the incinerator. Mercury is another high priority potential contaminant released from incinerators. Mercury is toxic and bioaccumulates in the environment. Mercury is not emitted unless the waste items incinerated contain mercury. The best method to control mercury is therefore waste segregation to limit the amount of mercury in the waste fed into the incinerator.
4.0 Role and Responsibilities

4.1 Roles and Responsibilities of Waste Management In charge / Site Services Supervisor

- Ensure that relevant waste handling training is provided to all waste management personnel at site and only properly trained individuals (Qualified Incinerator Operators) operate the incinerator.
- Ensure that the Incinerator Operator follows the requirements of the Incinerator Operational Plan, Operation Manual and other relevant guidelines of the company.
- Ensure that all checklists and data logs are filled up, and the records required by this guidance document are collected and maintained.
- Ensure adequate re-training is provided to the operators are regular interval.
- Ensure the safety of all personnel and the site.
- Carryout periodic inspections and record observations in Supervision checklist appended in this document
- Providing support and supervision to Site Services personnel as and when needed.

4.2 Roles and Responsibilities of Incinerator Operator/Site Services Personnel/Environmental Technician

- Ensure the safe operation of the incinerator and the associated work and storage area.
- Ensure the operation and maintenance of the incinerator is carried out in accordance with the Equipment Operation Manual.
- Ensure that only appropriate wastes are incinerated, and all other inappropriate wastes including plastics, aerosol cans, metallic containers or cans filled with waste oil are removed and handled accordingly.
- Document and maintain the required logs and records as appended in the document (pre operational checklist, operational checklist and waste incineration log).
- Taking samples of ash when ash is emptied from the incinerator
Notify the supervisor or waste management In charge of any incinerator upsets, malfunctions or required repairs.

Wear proper Personal Protective Equipment at all times while working at incinerator or waste yard.

4.3 **Roles and Responsibilities of Maintenance Personnel**

- Carry out timely Inspections and maintain the records
- Carry out preventive maintenance at scheduled intervals and record and report any unusual observations on the equipment.
- Do not alter the electrical wirings and incinerator components.
- Consult KETEK / Westland for any clarifications or guidance related to maintenance of the equipment
- Fill and record the inspection and maintenance checklist and follow the checklist for weekly, monthly and annual inspection and maintenance
- Make sure to lock out/tag out the unit as per the company’s existing procedures if there is a problem

4.4 **Safety, Health and Environment (SHE) Manager/Superintendent or designate**

- Taking action if there are fuel leaks or spills;
- Ensuring that maintenance checks are performed as recommended by Westland
- Ensuring implementation of this guidance document is monitored and documented

5.0 **Preparation of Waste Batch for Incinerator**

Only trained and authorized Site Services personnel shall operate the incinerator.

Only solid waste from camp operations, kitchen / food waste, paper, cardboard / packaging wastes are to be incinerated. All wastes are segregated at source and are to be
placed in specifically identified waste containers with transparent bags and in bins located throughout the Facility.

Prior to loading the waste batches in the incinerator, the feed material will be visually inspected by the incinerator operator to ensure it does not contain inappropriate waste materials. General classes of inappropriate wastes include, but are not limited to:

- Mercury containing materials / waste (e.g. fluorescent lamps, thermometers, thermostats, batteries). Limiting the quantity of mercury placed in the incinerator is the most effective way to limit mercury emissions
- Asbestos waste.
- Liquid wastes including petroleum hydrocarbons and sewage.
- Metal and glass. These materials absorb energy from the incinerator and increase the wear and tear on various incinerator components.
- Materials / wastes containing heavy metals (e.g. mercury-containing wastes, pressure or chemically treated wood
- Uncontaminated plastics, including chlorinated plastics.
- Bulky materials such as machinery parts or large metal goods such as appliances.
- Radioactive materials such as smoke detectors.
- Potentially explosive materials such as pressurized vessels, unused or ineffective explosives.
- Other hazardous materials such as organic chemicals (PCBs, pesticides).
- Electronics, Batteries, Fluorescent light bulbs, tires, coveralls, rubber boots, etc

When encountered, all inappropriate waste material shall be removed from the incinerator feed, where possible. If the inappropriate waste is too intermixed with the incinerator feed, the batch should be rejected and not incinerated. Removed inappropriate wastes and rejected batches shall be stored and handled in accordance with the Hazardous Waste Management Plan. The waste feed inspections shall be recorded on the incineration log sheet (Appendix).
Prior to loading the incinerator, the following steps will need to be followed:

- Bags of waste are weighed on a trolley before being placed into the incinerator.
- Weights of each load of waste are recorded.
- Only food waste and on site garbage may be incinerated
- Determine the source of the waste i.e. kitchen or food waste, paper or cardboard.
- Record the source and amount of waste placed in the incinerator.
- Wear disposable latex or rubber gloves when loading bags of sludge into the incinerator and wash hands after handling bags of sludge.
- Carry a radio (in the event of a wildlife encounter or other emergency) when carrying kitchen waste to the incinerator or operating the incinerator

The CY100-CA-D incinerator is designed with a maximum capacity of up to one ton per day for a typical Type-3 waste (based on a 10-12 hr operation per day and intermittent feed). The incinerator should be operated according to the Operation and Maintenance Manual (Appendix A / provided separately). It is recommended to operate the incinerator on a ‘batch feed’ mode (instead of ‘intermittent feed’) unless necessary to minimize environment, health and safety exposures.

The operator shall ensure that every batch can go through the waste charging door easily, regardless to its weight. If others prepare the batches, the operator shall tell them about the maximum batch sizes. However, the operator shall not open the batches and “rearrange” the contents of the batch.

When the incinerator is loaded with the appropriate mix and quantity of waste, close and lock the door, and start the burn cycle. The incinerator operator should observe the burn for at least 15-30 minutes after ignition of the primary chamber burner to ensure the volatility of the waste charged is not creating too much gas for the secondary chamber to handle. The primary chamber should be operated in the temperature range specified by the manufacturer. When satisfied that the burn is proceeding in a controlled manner, the incinerator operator may leave the incinerator area while the equipment completes the burn cycle. Do not overload the incinerator. The burn cycle should not be interrupted by
opening the charging door until after the burn is complete and the unit has cooled down. No additional waste is to be added to the primary chamber while in operation (batch feed).

6.0 Disposal of Incinerator Ash

When the burn is complete and the unit has cooled, the incinerator operator shall open the door only when wearing protective equipment (see Section 4 in the Operating and Maintenance Manual, Appendix A).

The incinerator operator must remove the ash from the previous burn cycle before reloading the incinerator. However, he shall make sure that the combustion chamber is sufficiently cool for safe handling of the ash. Spraying water in the chamber for cooling is not recommended as it may result in fume generation and also damage the refractory. The operator shall ensure that while ash removal, the burner tip and the thermocouple is not damaged. The ash should be removed once every day (after sufficient cool down period) before the start of first batch every day.

Any unburned combustible materials found in the ash will be recharged to the primary chamber after the incinerator operator has cleaned the chamber, and before putting a fresh charge into the incinerator. Non-combustible materials such as residuals metal pieces will be disposed of with the ash.

Ash from the primary chamber of the incinerator can contain materials deleterious to the incinerator operator’s health and the environment. Incinerator operators must use personal protective equipment when handling this material (see Section 4.1, Appendix A). Wear gloves whenever shoveling ash, handling steel from the ash, or handling bags of garbage. Wear goggles whenever shoveling ash, handling steel from the ash or otherwise handling uncovered containers of ash.
The ash material will be removed from the incinerator and placed in watertight, covered metal containers/drums and clearly marked “Incinerator Ash” (or in the provided Ash Bins/Enviro-drums). Ash from previous burns must be allowed to cool and the large steel pieces from shall be separated. The waste ash containers will be subsequently moved and stored in a dry area pending eventual disposal as per the regulatory requirements. The environmental assistant will take samples when ash is emptied from the incinerator.

The incinerator operator will weigh, and maintain records of, the quantity of ash produced.

7.0 Standard Operating Procedures

To ensure good operation of the incinerator, the following standard operating procedures should be followed. See also Section 4 of the Operating and Maintenance Manual (Appendix A).
### 7.1 Description of Control Panel

Figure below, Overview of Control Panel, Showing the Main Sections shows a photograph of the whole control panel, which has been divided into sub-sections marked A, B, C, and D.

Table: Components in the Control Panel Section

<table>
<thead>
<tr>
<th>Code</th>
<th>Label</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-Section A: Indicator LEDs (ON_OFF).</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP_A</td>
<td>Primary Blower (2)</td>
<td>Green PC_B</td>
</tr>
<tr>
<td></td>
<td>Secondary Blower</td>
<td>Green SC_B</td>
</tr>
<tr>
<td></td>
<td>Flame-port Blower</td>
<td>Green FP_B</td>
</tr>
<tr>
<td>CP_A</td>
<td>Primary Burner (2)</td>
<td>Red PC_B</td>
</tr>
<tr>
<td></td>
<td>Secondary Burner</td>
<td>Red SC_B</td>
</tr>
<tr>
<td><strong>Sub-Section B: Burn Timer.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP_B</td>
<td>Burn Timer</td>
<td>Set burn-cycle duration to the specified time. (Start switch resets timer).</td>
</tr>
<tr>
<td><strong>Sub-Sections B and C: Main Controller and Controllers for Burners and Blowers.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP_C</td>
<td>Start Switch</td>
<td>Initiate Pre-Purge, Burn, Burn-down, Cool-down automatic cycles. Emergency use only. For normal stop, set burn timer to 0.</td>
</tr>
<tr>
<td></td>
<td>Emergency STOP</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-Section D: Omron Temperature Controllers and Indicators.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP_D</td>
<td>Primary Chamber T.C.</td>
<td>Temperature displays and control of minimum temperatures in primary and secondary chambers by setting adjustable set points (OMRON E5CN). Primary Burner is enabled when Secondary Trigger reaches its specified temperature set point.</td>
</tr>
<tr>
<td></td>
<td>Secondary Chamber T.C.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secondary Trigger T.C.</td>
<td></td>
</tr>
<tr>
<td>CP_E</td>
<td>Primary Chamber Pressure.</td>
<td>Displays pressure in the Primary Chamber.</td>
</tr>
</tbody>
</table>

NOTE: This panel has been configured with Burner Protection which ensures that if the primary and/or secondary chamber is hot, the corresponding burner-blower will run even if the cool-down period has elapsed, or if there has been a power disruption.
Figure: Overview of Control Panel, Showing the Main Sections
7.2 Key Operational Steps

The operation of the incinerator can be described by distinct sequential steps as shown in Figure below. In addition there are additional necessary steps which involve safety, routine inspection and waste batch preparation, which have been described in other sections of this document.

Figure: Steps in the Operation of the Incinerator
7.3 Ash Removal, Cleaning and Waste Charging

i. Turn OFF all power to the incinerator before opening the primary chamber door.

ii. The primary chamber should be cleaned of all ash before any new charge is introduced. Incinerator operators should check to ensure that the previous cycle is complete and that the primary chamber has cooled to “safe” temperature before commencing clean out.

iii. Inspect ash for complete combustion. If combustion is not complete, initiate a second incineration.

iv. Wear personal protective equipment (see Section 4.1 of the incinerator Operating and Maintenance Manual) and use appropriate equipment to remove the ash. Rake and shovel the ash from the incinerator and place it in a metal container.

v. Inspect the incinerator as per Section 4.2 of the Operating and Maintenance Manual and record your observation in the pre-operational checklist (Annexure-B).

vi. Measure and record the weight of the materials to be combusted on the next burn cycle in the waste incineration log (provided in Annexure-B).

vii. Procedure for “Batch Waste Charging” and “Intermittent Waste Charging” is described below:
a. For Batch feeding (recommended) see Figure: Procedure for Batch Waste Charging below

b. For Intermittent feeding (very wet waste) see Figure: Procedure for Intermittent Waste Charging below

---

**Figure: Procedure for Batch Waste Charging**

1. Size of any Waste Charge depends on its composition. Volatiles must be balanced with non-volatiles, or reduced in quantity. Refer to training notes and operating experience.
2. Ensure Burn Timer is set to 4-5 hours, depending on waste composition. Pressing Start button begins a new cycle.
3. Load First Waste Charge cold, after de-ashing. Primary burner will start once secondary chamber is at trigger temperature (TC3).
4. After 4-5 hours, open door, check state of ash, rake if needed, then reload PC with Second Waste Charge. Press Start button.
5. After 4-5 hours, open door, check state of ash, rake if needed, then reload PC with Third Waste Charge. Press Start button.

---

**Figure: Procedure for Intermittent Waste Charging.**

(Time in Step 4 would vary depending on type and quantity of waste)
Additional Notes to “Waste Charging”:

**: The main danger is from exposure to heat radiation, and from waste catching fire before it is inside the primary chamber. Precautionary steps include:

(a) Wear proper PPE,

(b) Make sure waste batch can go through the charge door easily,

(c) Open door, charge waste and close door as quickly as possible.

***: The time for complete combustion varies, depending on batch size, weight and composition. More than 30 minutes would be unusual. Check burning conditions from charge door. Rake if necessary [Note Step 5 above].

viii. Ensure waste loaded to the primary chamber does not block the burner. Follow the KETEK / Westland’s instructions concerning the mass or volume of waste that can be loaded (Operating and Maintenance Manual). Wastes with high moisture content shall be placed in front of the burner and wastes with high volatility shall be placed towards the back (away) from direct flame.

7.4 Starting the Incineration: Standard Operating Procedure for the Equipment

i. Follow the Pre-operational checks in Section 4.4 of the Operating and Maintenance Manual and record the information in the Pre-operation checklist (Annexure-B).

ii. Under no circumstances should the incinerator operator attempt to open the primary chamber doors when the system is operating. This practice can cause flashbacks that
can injure personnel. The extra air entering the primary chamber will disrupt the combustion process, possibly leading to increased emissions.

iii. Occasional raking may be done following safe practices if required. The burner in the primary chamber will shut off when the door is opened. However, the operator may be exposed to fumes, high heat and other associated hazards.

**Operation Procedure**

1. Maintain proper housekeeping around incinerator to avoid slips, trips and falls.
2. Complete the pre-operational checklist. Make sure all ash is taken out from the previous burn.
3. Record the weight of ash on checklist
4. Have the operational checklist ready and keep filling it out with required information throughout the day
5. Load the incinerator as described in 7.1(vii and viii) above.
6. Turn the timer to 12 hours (or as required) and press the Green “Start” button.
7. Go around the incinerator and make sure all burner blowers (2 burners in primary chamber and 1 in secondary chamber) are running.
8. After 5 minutes primary burner motor will shut off and the secondary burner (Flame) should be running and you will see the temp going up in the temperature display “Secondary Chamber”.
9. The secondary burner heats up to the specified temperature in “Secondary Temp Trigger”.

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Of NITC GROUP
10. At this point primary burner (Flame and blower) and flame port blower would come on and you will see the temperature going up in the temperature display “Primary Chamber” as well.

11. The temperature will keep rising until it goes up to the set point and after that burners will go on and off depending on the control system’s call for heat.

12. After about 2-3 hours into the burning process, open the door and check the status of the waste and rake if necessary. Always rake from the ash door side.

13. After about approximately 1 hour after the rake, check the waste status again, if not burned then rake it and close the door. If waste seems burned and you do not need to burn another batch then manually run the burn timer to zero, if you need to burn more batches then lower the set point on “Primary Chamber T.C” to 0 by pressing the “✓” down arrow. Give about 30-60 minutes for the primary chamber to cool down.

14. Load the next batch in the primary chamber and turn the timer to 12 hours and increase the set point on “Primary Chamber T.C” to 600 by pressing the “✓” up arrow.

15. Repeat steps 12 and 14 for other batches of the day.

16. For the last batch of the day turn the timer to about 5-6 hours. Rake in between if required.

17. After the Burn timer runs out, the primary burner will no longer produce flame, but the blower will still keep running. At this time the secondary chamber burner will still keep running for another half hour.

18. After secondary burners shuts down all the blowers will keep running for another 5-6 hours to give enough time for the incinerator to cool down and prevent any damage to the burners.

19. If after the cool down process the temperature in the chambers is still above 250C then the blowers would keep running until the temperature drops below this value.

20. Hand over the pre-operational checklist and Operational checklist to your supervisor.

21. A summary of above steps is presented below:
Notes:

a) Do not operate the incinerator if something is not working right, immediately tell your supervisors.

b) Wear all required PPE.

c) Primary and Secondary burner blowers will not shut off if the temperatures in the chambers are above 250°C even if the cool down timer runs out.

d) If flame detection control locks out try resetting it by pressing red button on the burner control, if it keeps resetting again and again, let your supervisor know immediately.

e) Always ask if unsure about something.

Figure: Summary of Operation Steps

Note: Temperatures in Steps 8 and 9 may be governed by regulations:
If so, SET TEMPERATURES TO THE REGULATORY VALUES
8.0 Training and Re-training of Incinerator Operators

Only specifically trained and competent incinerator operators will be allowed to operate the incinerator. Incinerator operators are to be properly trained by a competent person at De Beers or by Westland. The operators shall be provided with periodic refresher trainings (every six month by the supervisor) and a re-training once a year for operation, inspection and maintenance of the incinerator.

The training course will include, as a minimum, the following elements:
- Basics of waste incineration
- Waste characterisation and how waste composition can affect operation.
- Loading limitations, including materials that should NOT be charged to the incinerator, and the allowable quantities of different types of wastes that can be charged.
- Start-up procedures for the incinerator and the normal operation cycle.
- Operation and maintenance of the incinerator to maximise performance.
- Clean out and ash handling procedures at the end of the cycle.
- Minor troubleshooting procedures.
- Inspection and Maintenance schedule.
- Record keeping and reporting.

9.0 Routine Inspection and Maintenance

Routine inspections and preventative maintenance will be carried out in accordance with the manufacturer’s specifications (Operating and Maintenance Manual). Record of all inspections shall be maintained in the inspection and maintenance checklist (Annexure-B).
A quarterly, six monthly and annual inspections and maintenance program will be established with the incinerator manufacturer. The six monthly and annual maintenance program shall also include re-training of the operators.

Some daily/routine inspections requirements include:

- Check fuel lines for leaks and check connections.
- Check spark arrestor to ensure no plugging.
- During ash removal
  - Inspect refractory for large cracks (not expansion cracks).
  - Inspect door gaskets for damages.

10.0 Waste Incineration Records

To demonstrate appropriate operation and maintenance of the incinerator, the facility will maintain records containing at least the following information:

- A list of all staff who have been trained to operate the incinerator; type of training conducted and by whom; dates of the training; dates of the refresher courses.
- All preventative maintenance activities undertaken on the equipment.
- Records of operation of the incinerator.
- Records of quantities of waste incinerated
- Summarized annual auxiliary fuel usage.
- A list of all shipments/disposal of incinerator residues, including the weight transported and disposed of by type if necessary, and the location of the disposal site.
- Results of any stack emission monitoring and ash sampling information.

All raw data records from the operation of the incinerator will be retained for inspection by the appropriate authorities for a period of 3 years (or any other time period as deemed necessary).
11.0 Regulatory Compliance and Reporting

The facility shall be monitoring its waste generation and incineration data for any regulatory compliance related requirements. In general, following information shall be recorded and documented:

- quantity of waste incinerated (waste incineration log, Appendix-B);
- date, description, and weight of each load (waste incineration log, Appendix-B);
- relevant operating data (dates, and burner operating times);
- volume or weight of ash produced;
- names of the incinerator operator for any particular load along with notes on observations or problems experienced with the load;
- training received by the staff (who conducted the training and when);
- any changes in operation, and the reason for the changes made; and
- Results of any testing on the ash or stack emissions.

12.0 Recommended PPE and safety considerations

It is recommended that the site conducts a hazard and risk assessment for waste collection, transportation, incineration and ash disposal. The standard PPEs required for the job shall be based on the related hazards and risks. Standard recommended PPEs are listed below. However, additional PPEs may be used as directed by the site’s safety officer.

List of recommended PPEs:

The following personal protective equipment should be used while operating the incinerator system:

- Long sleeved shirt and long pants;
- Long cuffed, puncture resistant gloves;
- CSA approved, Grade 1 safety footwear;
- CSA/ANSI approved safety glasses.
The personal protective equipment related to specific tasks is listed below:

- Ash removal and handling: NIOSH N85 respirator
- Waste charging: (i) heat protective clothing and gloves, and (2) CSA/ANSI approved full face shield.

The hazards that could be encountered arise from the following (not in any order of importance):

- Contact with waste (infectious or toxic components, or sharps);
- Exposure to heat, from contact with hot surface or radiation from the primary combustion chamber when the waste charging door or ash removal door is opened.
- Physical injury and ergonomic issues

Therefore, the general precautionary actions include:

- Not opening waste batches
- Not touching hot surfaces, and minimum exposure to heat radiation through open doors (charging / ash doors while combustion is taking place).
- Wearing appropriate personal protective equipment (PPE) for charging waste and raking the primary chamber, AND minimizing the time for those tasks.
Figure: Components in the Primary and Secondary Chamber Sections (1)
Figure: Components in the Primary and Secondary Chamber Sections (2)
APPENDIX - A

KETEK Group Inc (Ketek Manufacturing) CY100-CA-D
Incinerator Operation and Maintenance Manual

*Please consult manual supplied with the incinerator*
APPENDIX - B

Waste Incineration Checklists and Logs for Record Maintenance

Checklists may be modified in accordance with the site’s existing EHS procedures and documentation requirements.
Pre – operational Checklist

Date: _____________________ Name of Operator(s): ___________________________

Amount of ash collected from the previous burn: __________ □ Kg □ lb

Check the following:

☐ Area around incinerator Clean.
☐ No physical damage including stack and spark arrestor.
☐ Thermocouples ok.
☐ Limit/Contact switch ok.
☐ Blowers inlets Clean.
☐ Doors and seals are ok.
☐ Visually check the refractory:
  ☐ Any new bigger cracks. □ Yes □ No.
  ☐ Pieces fell out of the refractory into the chamber. □ Yes □ No.
☐ Primary chamber is clean.
☐ Fuel tank has sufficient fuel.
☐ Check there are no leaks in fuel lines.
☐ Check all fuel valves are open.
☐ Make sure there is power to the panel (See temperature control, if they are displaying numbers means power is there).

Any Other Observations :

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
## Operational Checklist

### First Batch of the day.

Amount of Waste added. Units -  □ Kg  □ lbs.  Time ________.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Food Waste (wt)</th>
<th>Paper &amp; Cardboard (wt)</th>
<th>Other (Specify) (wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<td>9</td>
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<tr>
<td>10</td>
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</tr>
</tbody>
</table>

- □ Burner timer set at ……….. Hours. State time you started the incinerator ____________.
- □ All Burner blowers are working.
- □ Secondary chamber burner fired. Please state the time it fired ______________.
- □ Primary chamber burner and flame port blower fired. Please state the time they fired ______________.

Take reading of Temperature of primary and secondary Chambers every hour after primary was fired.

<table>
<thead>
<tr>
<th>Time</th>
<th>Primary chamber temperature</th>
<th>Secondary chamber temperature</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

- □ Burn down timer set to Zero (0) at ____________.

### Any Other Observations:

_____________________________________________________________________________________
_____________________________________________________________________________________
Second Batch of the Day.

Amount of Waste added. Units - Kg lbs. Time ________.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Food Waste(wt)</th>
<th>Paper &amp; Cardboard(wt)</th>
<th>Other (Specify) (wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

Burner timer set at ………… Hours. State time ________.

Take reading of Temperature of primary and secondary Chambers every hour after primary was fired.

<table>
<thead>
<tr>
<th>Time</th>
<th>Primary chamber temperature</th>
<th>Secondary chamber temperature</th>
<th>Comments</th>
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</thead>
<tbody>
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</tbody>
</table>

Burn down timer set to Zero (0) at ________.

Any Other Observations:
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

Print Full Name: ________________________________

Signatures: ________________________________
# Monthly Waste Incineration Log

Record for waste incinerated

<table>
<thead>
<tr>
<th>Date</th>
<th>Amount of Waste</th>
<th>Amount of fuel</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight (Kg)</td>
<td>No. of bags</td>
<td>(Quantity; L)</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**TOTAL**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
</table>

Waste problems or incidents:

Equipment problems / Observations:

Comments:

*NB: To be totalled monthly*
Recommended Inspection and Maintenance Checklist

Daily Maintenance

✓ Check for evidence of cracks on the refractory
✓ Keep the area clean
✓ Carefully sweep the area around the incinerator
✓ Clean tools and equipment
✓ Maintain fuel stock levels
✓ Inspect for any visible damage to the equipment

Weekly Maintenance

✓ Maintain good housekeeping of the incinerator ash disposal site
✓ Ensure the fencing to the ash disposal site is intact (to avoid its exposure to wildlife, if applicable)

Monthly Maintenance

✓ Check the vertical fixings of the stack
✓ Check the doors seals
✓ Check the external body for evidence of thermal damage
✓ Check the feed / ash door for corrosion
✓ Check the feed / ash door for damaged hinges
✓ Check the feed and ash door for latch blockage in the doorframe
✓ Take an inventory of condition of tools and equipment

Yearly Maintenance

✓ Inspect and replace metal parts and consumable parts (e.g. blowers, burners, etc)
✓ Overhaul the incinerator (to be carried out by incinerator manufacturer)
✓ Check the status of the ash management system
✓ Perform annual audit
✓ Ensure environmental audits, necessary permits and licenses are obtained
# Maintenance and Inspection Log

<table>
<thead>
<tr>
<th>Component</th>
<th>Maintenance &amp; Inspection</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checks when incinerator is not operational.</td>
<td></td>
<td>Date: ______________________</td>
</tr>
<tr>
<td>Electrical Panel</td>
<td>No physical Damage.</td>
<td></td>
</tr>
<tr>
<td>Incinerator Body</td>
<td>No physical Damage.</td>
<td></td>
</tr>
<tr>
<td>Primary Chamber Burners</td>
<td>No blockage at air inlet (e.g. Snow or Leaves), No Physical damage. Burner tip not damaged</td>
<td></td>
</tr>
<tr>
<td>Primary Chamber</td>
<td>Refractory not damaged.</td>
<td></td>
</tr>
<tr>
<td>Feed Door &amp; Ash Door</td>
<td>Check movement. Inspect gasket (repair/replace as needed)</td>
<td></td>
</tr>
<tr>
<td>Secondary Chamber Burner</td>
<td>No blockage at air inlet (e.g. Snow or Leaves), Physical damage</td>
<td></td>
</tr>
<tr>
<td>Fuel tank, Fuel lines &amp; Valves.</td>
<td>No leaks, no cracks in hose.</td>
<td></td>
</tr>
<tr>
<td>Stack and Spark Arrestor</td>
<td>No physical damage, no blockage (Spark Arrestor)</td>
<td></td>
</tr>
<tr>
<td>Grease door bearings</td>
<td>Bearings inspected and greased properly</td>
<td></td>
</tr>
<tr>
<td>Checks when incinerator is in operation.</td>
<td></td>
<td>Date: ______________________</td>
</tr>
<tr>
<td>Primary Burners</td>
<td>Check if working.</td>
<td></td>
</tr>
<tr>
<td>Secondary Burner</td>
<td>Check if working.</td>
<td></td>
</tr>
<tr>
<td>Electrical Panel</td>
<td>Check all components are functional.</td>
<td></td>
</tr>
</tbody>
</table>

Additional Observations:

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

Print Full Name: _____________________________

Signatures: ________________________________
# Inspection Checklist for Environment Health & Safety / Supervisors

Facility: Date:

Name / model of incinerator: CY-100-CA-D

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Is there adequate personal protective equipment (PPE)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Is the PPE being used?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Is the PPE in good condition?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Is there restricted entry to the waste incineration / ash disposal site?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Is there functional fire safety equipment?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Do the operators know how to use the equipment?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Is there adequate first aid kit?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Are the operators conversant with use of the kit?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Is flammable material stored away from the incinerator?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Are warning signs distinctly displayed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additional comments on safety:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B Operation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Is there a sufficient supply of fuel?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Is the procedure for preparation of waste for incineration being followed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Is the incinerator cleaned daily?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Is the waste weighed upon reception?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Is the waste temporarily stored neatly?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Is the loading of incinerator done in the right way?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Is the temperature regulated adequately during the burn?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Is the incinerator allowed to burn down and cool before cleaned?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Is the ash properly disposed as specified by compliance procedures?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Are the following tools and equipment available?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Ash rakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Shovel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Hand brush / dustpan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Hard broom</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**WESTLAND CONSULTING**

MEMBER OF AVATAN GROUP INC.
e. Non combustible ash disposal drums
f. Weighing scales
g. Fire extinguishers
h. Fire retardant gloves
i. Eye protection / face mask
j. Coveralls or suitable clothing to cover the upper body, including the lower arms
k. Safety first aid kit

Additional comments on operation:

<table>
<thead>
<tr>
<th>C</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Yes</td>
</tr>
<tr>
<td>1</td>
<td>Is there evidence of cracks in the refractory?</td>
</tr>
<tr>
<td>2</td>
<td>Is there good housekeeping?</td>
</tr>
<tr>
<td>3</td>
<td>Is the status of the ash handling and disposal system good?</td>
</tr>
</tbody>
</table>

Additional comments on maintenance:

<table>
<thead>
<tr>
<th>D</th>
<th>Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Yes</td>
</tr>
<tr>
<td>1</td>
<td>Are the relevant forms available?</td>
</tr>
<tr>
<td>2</td>
<td>Are the forms filled accurately and completely?</td>
</tr>
<tr>
<td>3</td>
<td>Are incidents recorded?</td>
</tr>
<tr>
<td>4</td>
<td>Are reports of the waste incinerated done on time?</td>
</tr>
</tbody>
</table>

Additional comments on records:

| Name of supervisor: | Signature: | Designation: |
Appendix V    Snap Lake Mine Operating Procedure
              SLM SHE OP Kitchen Food, Waste Handling, and Storage
1.0 PURPOSE
To promote healthy handling and storage of food, and the environmentally favorable handling of food wastes at the Snap Lake Mine.

2.0 SCOPE
These procedures apply to all employees including independent contractors, working at the Snap Lake Mine and designated sites that handle food and food waste.

3.0 RESPONSIBILITIES
3.1 Mine General Manager or designate are responsible for:
Ensuring that these procedures are implemented and maintained.

3.2 Safety, Health and Environment (SHE) Manager is responsible for:
Ensuring that implementation of these procedures is monitored.

3.3 SHE Coordinator is responsible for:
Ensuring that these procedures are implemented and maintained.

3.4 Camp Manager/Chef or designate are responsible for:
Ensuring food products are stored as soon as they arrive.  
Ensuring that waste is collected and stored for incineration as necessary. 
Ensuring that kitchen staff are appropriately trained in this procedure. 
Implementing these procedures as they apply to the kitchen staff.

3.5 Kitchen Staff are responsible for:
Following these procedures.
Moving kitchen wastes to the appropriate designated storage area in the back of the kitchen.

3.6 Site Services personnel are responsible for:
Ensuring that the incinerator is cleaned out on a regular basis and ensuring the proper disposal of non-burnables and ash. (see SHEOP 0037)
Carrying a radio when moving kitchen waste to the incinerator and operating the incinerator in the event of a wildlife encounter or other emergency.

4.0 PROCEDURE

4.1 RECEIVING FOOD PRODUCTS
4.1.1 Unload food goods from the aircraft and transport them to the kitchen as quickly as possible.

4.1.2 Store all food goods as soon as they arrive. Store fresh foods first, then frozen foods and lastly dried and canned goods, in that order if possible.

All printed copies are considered uncontrolled documents.
Refer to Pavilion (Snap Lake intranet) for current version.
4.1.3 Remember to rotate items – “First in must be First out” (unless expiry date on incoming goods is before present stock expiry dates).

4.2 FOOD WASTES

4.2.1 Food wastes and other domestic garbage from all areas of the accommodations complex and lunchrooms within the work areas, is incinerated in the on-site incinerators located adjacent to the campsite.

4.2.2 Waste from the kitchen and kitchen storage area is to be collected several times daily and taken to the incinerator for incineration. The frequency of collection depends on the number of people in the camp. All personnel moving kitchen waste to the incinerator and operating the incinerator must carry a radio in the event of a wildlife encounter or other emergency.

4.2.3 The incinerator building should be used only for short-term storage and amounts stored there must be minimized so as to reduce the possibility of attracting wildlife. The building must be cleaned on a regular basis to minimize the possibility of attracting wildlife.

4.2.4 Grease from grills and grease traps will be stored in drums and when full, will be immediately burned in the Westland incinerator (located at the waste management area), or shipped off-site for disposal.

4.2.5 Each time that the cooking oil in the deep fryers is changed ~ 23 litres of used oil will be produced. This is too large a volume to be mixed with the regular kitchen wastes at any one time and presents a serious fire hazard if not disposed of properly.

4.2.6 Consideration is given to combining used cooking oil with the waste motor oil and burned in the on-site waste oil furnaces. Until it is collected for disposal (either off-site or utilized on-site), it is to be kept in the kitchen away from outside doors.

4.3 PACKAGING WASTE

4.3.1 The kitchen generates substantial amounts of cardboard from food packages. All cardboard boxes must be broken down to ensure that no traces of food are left inside.

4.3.2 Cardboard will be separated into two piles

4.3.3 Cardboard packaging that contained fresh food and may contain food smells must be separated and piled separately for the incinerator (i.e. boxes from meats and produce)

4.3.4 Cardboard that is free from food smells can be piled in another pile that will be burned at the burn pit (i.e. boxes from canned and dry goods). Opportunities to recycle clean cardboard will be investigated.

4.3.5 All other food packaging will be placed in the normal garbage stream for incineration.

4.4 SPECIAL WASTE

4.4.1 Waste aerosol cans, pressurized containers and batteries are disposed of and handled separately. See SHE OP 0006: Disposal of Empty Aerosol or Pressurized Containers and Dry Cell Batteries.
4.5 TRAINING

4.5.1 Read and understand the Accommodations Maintenance Manual (see references and related documentation)

5.0 REFERENCES

This procedure is to be read and applied in conjunction with the following documents:

5.1 De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6.

5.2 De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLP SH SYS 4.4.6.

5.3 SLM SHE OP 0006 (Disposal of Empty Aerosol or Pressurized Containers and Dry Cell Batteries).

5.4 SLM SHE OP 0014 (Wildlife Encounters).

5.5 SLM SHE OP 0037 (Incinerator - Use and Waste Handling and Storage).


6.0 REVISION HISTORY

Noted below is the revision history of this document.

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>October 5, 2002</td>
<td>Nature of change – responsibility. Pg. 3. Changed by KGL</td>
</tr>
<tr>
<td>2</td>
<td>June 15, 2004</td>
<td>Remove references to Care and Maintenance and expand to cover current operations. All pages. Changed by KGL</td>
</tr>
<tr>
<td>3</td>
<td>July 20, 2004</td>
<td>Addition of designated kitchen staff operating the incinerator in the evening and additions to References and Related Documents. All pages. Changed by KGL</td>
</tr>
<tr>
<td>4</td>
<td>March 7, 2005</td>
<td>Changes as suggested by JOSHEC review to section 2 (bullets 1, 2, 5, &amp; 7). Reduced amount of kitchen cooking oil to 3 litres in a coffee can. Added requirement for staff to carry a radio when</td>
</tr>
</tbody>
</table>

All printed copies are considered uncontrolled documents. Refer to Pavilion (Snap Lake intranet) for current version.
### 7. AUTHORIZED SIGNATURE

**Name:** Lana Larocque  
**Position:** Human Resource Manager

---

All printed copies are considered uncontrolled documents. Refer to Pavilion (Snap Lake intranet) for current version.
Appendix VI  Snap Lake Mine Operating Procedure
SLM SHE OP *Waste and Incineration*
1.0 PURPOSE
To ensure only appropriate products are burned in the incinerator and to identify appropriate precautions to be taken with regard to provincial or territorial legislation.

2.0 SCOPE
This procedure applies to all employees, including independent contractors working at the Snap Lake Mine (SLM) and designated sites.

3.0 RESPONSIBILITIES
3.1. Mine Manager or designate is responsible for:
   3.1.1. Ensuring compliance with these procedures by all personnel.

3.2. Safety, Health and Environment (SHE) Manager/Superintendent is responsible for:
   3.2.1. Ensuring implementation of this procedure is monitored.

3.3. SHE Coordinators are responsible for:
   3.3.1. Monitoring implementation of this procedure.

3.4. Site Services Personnel who are authorized to operate the incinerator are responsible for:
   3.4.1. Following these procedures.

3.5. Site Services Personnel are responsible for:
   3.5.1. Ensuring all food, food-contaminated waste and biohazardous waste to be burned in the incinerator is packaged in clear plastic bag;
   3.5.2. Ensuring no sharp objects are added to normal garbage;
   3.5.3. Ensuring hazardous wastes as identified in the Waste Management Plan are segregated from waste to be incinerated;
   3.5.4. Ensuring that oily rags are packaged in clear plastic bags;
   3.5.5. Reporting improper packaging of waste for incineration to the SHE Superintendent/Coordinator.

4.0 PROCEDURE
4.1. All waste for incineration must be contained in clear plastic garbage bags.

4.2. Only authorized Site Services personnel may fire the incinerator or add waste products to the incinerator.

4.3. Site Services personnel must wear gloves when handling garbage.
4.4. **Burnable Items**

4.4.1. Camp food waste;

4.4.2. Camp garbage from offices, rooms, etc.;

4.4.3. Rags used for cleaning purposes;

4.4.4. Old clothes;

4.4.5. Grease from the kitchen grease traps (burned with camp food waste garbage bags).

4.5. **Burnable Items with Specific Restrictions or Precautions**

4.5.1. Absorbent pad used to clean up spills of gasoline; Jet-B, solvents, diesel fuel or hydraulic fluid may be burned with special safety precautions (see below).

4.5.2. Oily or greasy rags from drilling operations with special safety precautions (see below).

4.5.3. Solid waste gathered in garbage cans in the STP, the Enviro-lab and First Aid room, must be collected and burned weekly to avoid large loads of latex/rubber gloves.

4.5.4. Absorbent pads or snow from clean up of anti-freeze in small quantities (i.e. not to exceed one normal size garbage bag at a time.

4.5.5. An animal carcass remnant after permission is granted by North Slave Region ENR Wildlife Officers.

4.6. **Special Safety Precautions for Items on 4.5.1. and 4.5.2. (Above)**

4.6.1. No more than one half of a normal size garbage bag at a time may be added to the incinerator.

4.6.2. Items must be added as the first load into a cold incinerator (i.e., incinerator must not have been burned in last 10 hours- normally the first load is added in the morning).

4.6.3. After items are loaded into the incinerator, the door must be closed and the incinerator fired immediately to avoid build-up of vapors.

4.6.4. Products stored for burning, must be placed in enviro-drums located away from any flammables, due to the possibility of spontaneous combustion.

4.7. **NON Burnable Items**

4.7.1. Aerosol or other pressurized containers;

4.7.2. Dry cell batteries;

4.7.3. First Aid Room sharps, such as, needles or glass;

4.7.4. Rubber products, such as, rubber boots, rubber hoses, fan belts or tires;
4.7.5. Snow contaminated with gasoline, jet-B, solvent, diesel fuel or hydraulic fluids with special safety precautions;
4.7.6. Raw sewage contaminated insulation (disinfect with lime & dispose in landfill)
4.7.7. Sewage sludge

5.0 DEFINITIONS

N/A

6.0 REVIEW AND APPROVAL

6.1. This is a Tier 3 document.
6.2. Review Schedule: Every two years

7.0 REVISION HISTORY

Noted below is the revision history of this document.

<table>
<thead>
<tr>
<th>Revision</th>
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<th>Comments</th>
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<td>0</td>
<td>October 10, 2002</td>
<td>Initial Release (KGL)</td>
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<tr>
<td>1</td>
<td>January 1, 2004</td>
<td>Terms and typos. (KGL)</td>
</tr>
<tr>
<td>2</td>
<td>November 29, 2004</td>
<td>Changed amounts of waste cooking oil in 2(f) to be consistent with OP 0031 Kitchen Food and Waste Handling (AT)</td>
</tr>
<tr>
<td>3</td>
<td>December 20, 2005</td>
<td>Logo chg, chg Oper Mgr to Mine Mgr, remove reference to SLDP, chg approver, chg camp services to site services, chg RWED to ENR (KGL)</td>
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<tr>
<td>4</td>
<td>December 29, 2005</td>
<td>Chg: no longer allowed to burn contaminated snow in the incinerator (KGL)</td>
</tr>
<tr>
<td>5</td>
<td>January 5, 2006</td>
<td>Section 3 bullet 5- removed &quot;(see below)&quot; as no longer applies (KGL)</td>
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<tr>
<td>6</td>
<td>September 2, 2009</td>
<td>Procedure: section 2. Items that may be burned with specific restrictions or precaution. Remove- Waste cooking oil in quantities not exceeding 6-7 L per burn. Pg. 2. Reviewed by Ekati Service.</td>
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<tr>
<td>7</td>
<td>November 2009</td>
<td>New logo and new format.</td>
</tr>
<tr>
<td>8</td>
<td>December 8, 2009</td>
<td>E. Tardif, Maintenance</td>
</tr>
</tbody>
</table>
8.0 REFERENCES and RELATED DOCUMENTS

This procedure is to be read and applied in conjunction with the following documents:

8.1. 2014 Waste Management Plan
8.2. De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6
8.3. De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLM SH SYS 4.4.6
8.5. SLM SHE OP 0002 Storage and Handling of Hazardous Materials
8.6. SLM SHE OP 0003, WHMIS
8.7. SLM SHE OP 0006, Disposal of Empty Aerosol or Pressurized Containers
8.8. SLM SHE OP 0018, Encountering Wildlife Carcasses
8.9. SLM SHE OP 0021, Transportation and Disposal of Hazardous Waste
8.10. SLM SHE OP 0023, Solid Waste Handling and Disposal
8.11. SLM SHE OP 0026, Sewage Treatment Plant Waste Handling & Maintenance
8.12. SLM SHE OP 0031, Kitchen Food, Waste Handling & Storage
8.13. SLM SHE OP 0033, Mobile Fuel Delivery
8.14. SLM SHE OP 0034, Vehicle Maintenance
8.15. SLM SHE OP 0035, Airstrip and Helipad Maintenance
8.16. SLM SHE OP 0036, Burn Pit
8.17. SLM SHE OP 0037, Incinerator Use, Incinerator Waste Handling & Storage

9.0 AUTHORIZED SIGNATURE

[Signature]
Erica Bonhomme
Environment Manager
Appendix VII  Incineration Use
1.0 PURPOSE

To describe how to operate the incinerator safely, handle waste to prevent wildlife interactions, avoid improper burning of solid waste, and to meet permit requirements.

2.0 SCOPE

This procedure applies to the burning of domestic, non-hazardous wastes on site in the waste incinerator. It also applies to the site services personnel authorized to operate the incinerator.

3.0 RESPONSIBILITIES

Mine Manager or designate is responsible for:
- Ensuring that this procedure is implemented and maintained.

Safety, Health and Environment (SHE) Manager/Superintendent or designate are responsible for:
- Ensuring implementation of this procedure is monitored

Site Services Supervisors are responsible for:
- Implementing this procedure
- Carrying out the activities specified in this procedure and operating the incinerators
- Carrying a radio (in the event of wildlife encounter or other emergency) when carrying kitchen waste to the incinerator or operating the incinerator

Environmental Technician or designate is responsible for:
- Updating the Waste Management Log
- Taking samples of ash when ash is emptied from the incinerators

4.0 PROCEDURE

4.1 Incinerator Operation

- Only trained and authorized Site Services personnel will operate the incinerator. Wear gloves whenever shovelling ash, handling steel from the ash, or handling bags of garbage.
Wear face shield whenever shovelling ash, handling steel from the ash or otherwise handling uncovered containers of ash. Wear disposable latex or rubber gloves when loading bags of sludge into the incinerator and wash hands after handling bags of sludge. Carry a radio in the event of a wildlife encounter or other emergency when carrying kitchen waste to the incinerator or operating the incinerator.

- Clean out incinerator ash before using the incinerator by shovelling out the ash and placing it in a properly labelled enviro-drum. Be careful not to damage the interior surface of the incinerator. Close the incinerator door once the ash is emptied from the incinerator.
- Separate large steel pieces from the ash into pails.
- Inspect the contents of the clear garbage bags carefully to ensure there are no unauthorized substances (i.e. aerosol containers, plastics, sharps). If unauthorized substances are present, carefully remove the substances and discard or store appropriately.
- After inspection put the bags in the incinerator and lock the incinerator door.
- Specific details on the operation, loading maintenance of the incinerator are found in the vendor Operations and Maintenance Manuals and must be followed.

4.2 Incinerator Waste Handling and Storage

- When ash drums are at approximately 90% capacity, close the lid and seal it with a snap-ring.
- Using the zoom-boom or Hy-Ab with the barrel lift attachment, take the drum to the landfill area and store it on a pallet. It will be dumped into the landfill just before the cover is pushed over. Advise the environmental technician of the new location of the enviro-drum so they can update the waste management log.
- Minimize storage of food waste in the kitchen as much as possible to reduce the wildlife attractant. Run the incinerator as often as required to minimize storage requirements. Keep dry separate from wet and no more than 15 lbs per bag.
- Collect metal, glass, aerosols and plastic garbage pails when full. Dump them in the metal or plastic waste collection bins in the laydown area.

5.0 References & Related Documents

5.1.1 This procedure is to be read and applied in conjunction with the following documents:

- De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6
- De Beers Canada SLP Safety and Health Management System SLM SH SYS 4.3.4 and SLM SH SYS 4.4.6
- SLM SHE OP 0014 (Wildlife Encounters)
- SLM SHE OP 0015 (Mobile Fuel Transfer)
- SLM SHE OP 0023 (Solid Waste Handling and Disposal)
- SLM SHE OP 0031 (Kitchen Food and Waste Handling and Storage)
All staff members are responsible for ensuring that they are using the latest version of this document.

Date: Nov 3, 2010
Revision: 10
Appendix VIII  Snap Lake Mine Operating Procedure
SLM SHE OP *Burn Pit*
1.0 PURPOSE
To ensure safe and responsible burning of materials is carried out by Snap Lake Mine (SLM) personnel according to the mine’s land use permit. It is important that burning activities be carried out in a safe manner that prevents injuries and prevents fires from spreading to surrounding structures and tundra. This procedure is also intended to minimise air pollution by ensuring only permitted products are burned.

2.0 SCOPE
This procedure applies to all designated Site Services personnel, as they are the only personnel authorized to light fires in the SLM permitted burn pit. It also applies to all personnel who may deposit waste for burning in the burn pit.

3.0 RESPONSIBILITIES

3.1. Mine General Manager or designate is responsible for:
   3.1.1. Ensuring this procedure is implemented and maintained.

3.2. Site Services Supervisor is responsible for:
   3.2.1. Implementing this procedure.
   3.2.2. Approving lighting of the burn pit by Site Services personnel after giving full consideration to wind, tundra and other considerations that may present danger to safety, health or the environment. Wind speed information is obtained from the Airport Technician.

3.3. Airport Technician is responsible for:
   3.3.1. Providing wind speeds to the Site Services Supervisor.

3.4. Safety, Health and Environment (SHE) Manager or designate is responsible for:
   3.4.1. Ensuring implementation of this procedure is monitored.

3.5. Environmental Technician is responsible for:
   3.5.1. Monitoring the implementation of this procedure.

3.6. Authorized Site Services personnel are responsible for:
   3.6.1. Conducting burns in the burn pit according to this procedure.
   3.6.2. Ensuring only appropriate materials are deposited in the burn pit.
   3.6.3. Ensuring the burn pit is emptied of ash and residual non-combustible materials after burning.
4.0 PROCEDURE

The SLM operates a burn pit in compliance with all applicable legislation.

The only materials approved for burning in the pit are unpainted and untreated scrap wood, pallets, and cardboard. The site is not authorised to burn paper, plastics of any kind, food contaminated waste, rubber products, pressure treated wood or camp garbage such as juice containers in this pit. The following procedure outlines the conditions under which the burn pit must be operated:

4.1. Only authorised Site Services personnel are permitted to start fires in the pit after receiving approval from the Site Services Supervisor. Certain conditions apply to starting fires.

4.2. Before starting a fire in the pit, Site Services personnel must inspect all contents of the pit to ensure the pit contains only clean wood or cardboard. Other materials must be removed for appropriate disposal and stored according to SLM SHE OP Storage of Hazardous Materials and SLM SHE OP Solid Waste Handling and Disposal.

4.3. All cardboard boxes from the mine must be broken down by Site Services and individually inspected before placing at the burn pit to ensure no explosives, food waste or other unauthorised wastes were inadvertently left in them.

4.4. When the authorised Site Services personnel remove inappropriate materials from the burn pit, they must advise their supervisor for follow-up with the parties concerned.

4.5. The immediate area surrounding the pit must also be inspected to ensure no flammable products that could present a fire hazard are located outside of the pit.

4.6. Only Site Services personnel are authorised to add materials to the burn pit.

4.7. Site Services personnel will pick up clean wood and cardboard when requested.

4.8. Site Services personnel must obtain approval from the Site Services Supervisor before lighting the burn pit. The Site Services Supervisor will consider wind speed, tundra conditions and other conditions that may have an impact on safety, health or the environment. During hot dry summer months’s special precautions may have to be taken to minimize the risk of tundra fires (see next bullet of this procedure). The pit must not be lit if winds may carry burning embers onto buildings or tundra. The pit must not be lit when wind speeds are 8 knots or more.

4.9. If the risk of fires spreading is high during hot dry summer months, the area immediately surrounding the burn pit may have to be wetted down before starting the fire. The contents of the burn pit may have to be reduced before lighting to control the size of the fire, and additions made only as the contents burn down. The water truck and fire hoses may have to be kept at the burn pit area until the controlled burn is complete. In such conditions, it may be advisable to delay the burn until the high fire risk subsides.

4.10. Site Services personnel must stay at the pit until the bulk of the contents are burned. Approximately ½ hour after leaving, he/she must inspect the area again for possible embers on the tundra.

4.11. If Site Services personnel feel at any time during the burning that the wind speed has changed sufficiently that there is danger of embers spreading onto buildings or
the tundra, they must call their supervisor by radio. The Emergency Response Team (ERT) may be called out to extinguish the fire.

4.12. Routine inspections by Site Services and Environment will be conducted to ensure unauthorised material is removed.

5.0 DEFINITIONS

N/A

6.0 REVIEW AND APPROVAL

6.1. This is a Tier 3 document.
6.2. Review Schedule: Every two years

7.0 APPENDICES

N/A

8.0 REVISION HISTORY

Noted below is the revision history of this document.

<table>
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<th>Comments</th>
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<td>0</td>
<td>July 16, 2002</td>
<td>Terms and typos. (KGL)</td>
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<td>1</td>
<td>August 7, 2002</td>
<td>Terms and typos. (KGL)</td>
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<tr>
<td>2</td>
<td>January 1, 2004</td>
<td>Typo and bullet 3 pg 2 added cardboard boxes from mine to be broken down &amp; added bullet 4. (KGL)</td>
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<tr>
<td>3</td>
<td>November 29, 2004</td>
<td>Addition - Camp services must request permission to light burn pit from Site Supervisor or designate. (AT)</td>
</tr>
<tr>
<td>4</td>
<td>May 22, 2005</td>
<td>Permission to light burn pit granted by Amec Site Supervisor and wind direction no longer a concern as new burn pit location is removed from the camp. Camp services changed to Site Services (CO).</td>
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<td>5</td>
<td>November 18, 2005</td>
<td>Chg OP Mgr to Mine Mgr or designate and Site Spvsr to Site Services Spvsr. (KGL)</td>
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<tr>
<td>6</td>
<td>March 27, 2009</td>
<td>General procedure review. (Gs)</td>
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<tr>
<td>7</td>
<td>April 6, 2009</td>
<td>Final review and editing. (DAV)</td>
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<td>8</td>
<td>November 11, 2009</td>
<td>SHE-PR</td>
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<tr>
<td>9</td>
<td>June 28, 2011</td>
<td>Removed responsibilities for all site personnel. (JL)</td>
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<td>10</td>
<td>January 14, 2015</td>
<td>Minor edits for clarification throughout. (EB) Environment</td>
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</table>
9.0 REFERENCES and RELATED DOCUMENTS

This procedure is to be read and applied in conjunction with the following documents:

9.1.  De Beers Canada Corporate Safety and Health Management System Elements CORP SH SYS 4.3.4 and CORP SH SYS 4.4.6
9.2.  De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLP SH SYS 4.4.6.
9.3.  NWT Land Use Permit No. N1999C0081, issued by Indian and Northern Affairs Canada, December 20, 1999
9.5.  SLM SHE OP 0002 (Storage and Handling of Hazardous Materials).
9.6.  SLM SHE OP 0023 (Solid Waste Handling and Disposal).

10.0 AUTHORIZED SIGNATURE

Erica Bonhomme
Environment Manager
Appendix IX  Snap Lake Mine Operating Procedure
SLM SHE OP  *Materials Movement*
1.0 PURPOSE

This procedure describes the steps required to track environmentally hazardous waste from generator to final disposal.

2.0 SCOPE

The procedure covers all personnel responsible for tracking and submitting the paperwork to regulators.

3.0 SAFETY, HEALTH & ENVIRONMENT HAZARDS & ASPECTS

Not applicable

4.0 RESPONSIBILITIES

4.1. Environmental Officer
   4.1.1. Follow up on waste shipments off-site and obtain paperwork.

4.2. Environmental Supervisor
   4.2.1. Ensure that paperwork has been sent and follow-up paperwork from waste handler has been received.

5.0 PROCEDURE

Hazardous waste requires special handling and disposal to prevent impact on human health and the environment. The following was developed to establish a "cradle-to-grave" monitoring system for hazardous waste from generation to final disposal.

The Environmental Protection Service of the GNWT monitors movement of hazardous waste from generator to final disposal through use of a tracking document called a Movement Document/Manifest.

The Movement Document/Manifest form must accompany all regulated (hazardous) waste (they are identified on the top of the waste label as REGULATED WASTE) in transit regardless of the means of transport (air or road).

All printed copies are considered uncontrolled documents.
Refer to Pavilion (Snap Lake Intranet) for current version
Waste Management Operator

5.1. The Waste Management Operator (WMO) will communicate waste available to Logistics for shipment (include waste ID numbers).

5.2. Provide the drum identification number to Environment so the waste shipment can be cross-referenced to the manifest and the date the waste was shipped off-site.

Logistics

5.3. The responsibility to ship the waste off-site will reside with Logistics which includes load make-up (regulated, non-regulated and other materials) and preparation of the documentation (Shipping Order and manifest).

5.4. Movement Document/Manifest documents are available from NWT Environmental Protection Division or have YK Office pick up documents for shipment to site.

5.5. For environmentally hazardous waste, an additional form called the Material Movement/Document must be completed. Examples of regulated waste are identified in Appendix I. Additional waste will be added to the list as required.

5.6. Logistics: fill in Part A of the Waste Manifest in the area bracketed in green:

<table>
<thead>
<tr>
<th>Registration #</th>
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<tr>
<td>Company Name</td>
<td>De Beers Canada</td>
</tr>
<tr>
<td>Mailing Address</td>
<td>300 - 5120 - 49th Avenue</td>
</tr>
<tr>
<td>City / Prov.</td>
<td>Yellowknife, NT.</td>
</tr>
<tr>
<td>Postal Code</td>
<td>X1A 1P8</td>
</tr>
<tr>
<td>Telephone No.</td>
<td>867-766-7300</td>
</tr>
<tr>
<td>Shipping Address</td>
<td>Snap Lake Mine</td>
</tr>
<tr>
<td>City</td>
<td>Snap Lake, NT.</td>
</tr>
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5.7. Fill in the section highlighted in red for the Intended Receiver:

<table>
<thead>
<tr>
<th>Intended Receiver</th>
<th>KBL Environmental Ltd.</th>
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<tbody>
<tr>
<td>Registration #</td>
<td>NTR00123</td>
</tr>
<tr>
<td>Mailing Address</td>
<td>17 Cameron Road</td>
</tr>
<tr>
<td>P.O. Box</td>
<td>1108</td>
</tr>
<tr>
<td>City / Prov</td>
<td>Yellowknife, NT.</td>
</tr>
<tr>
<td>Postal Code</td>
<td>X1A 2N8</td>
</tr>
<tr>
<td>Telephone No.</td>
<td>867-873-5263</td>
</tr>
</tbody>
</table>
5.8. Fill in Part B (Vehicle and/or Trailer Number). Obtain date and signature of carrier
transporting waste.

5.9. Fill in the type of hazardous waste in the section highlight in pink (Appendix I). Use the
appropriate Shipping Name for the waste.

5.10. There are only 4 lines available on the form for waste. If more than 4 environmentally
hazardous wastes are to be shipped to KBL, additional forms are to be completed.

5.11. **Sign and date** the bottom of the manifest area highlighted in blue. PRESS HARD –
THERE ARE 6 COPIES.

5.12. Provide the container ID # on waste to be shipped out for Environment tracking
purposes.

5.13. If a mistake is made on the manifest form, strike out form. **Do not discard.** Write VOID
on the sheet and provide to Environment to be sent to Environmental Protection.

5.14. Place copies 3-6 in the green semi-transparent envelope with “KBL Environmental”
exposed. “Snap Lake Logistics is on the opposite side for KBL to return to site with
Copy 6 signed off. Deliver Copy 1, 2 and 6 to Environment.

5.15. Contact Environment for any new environmentally hazardous waste not on the list
(Appendix II).

**Carrier**

5.16. Transporter/carrier will sign in Part B.

5.17. Carrier hands over the green envelope to Det’on Cho Logistics along with the rest of the
backhaul paperwork.

**Waste Handler**

5.18. KBL Environmental will fill in Part C and returns to Snap Lake in the return envelope as
well as any Bill of Lading (BoL) or Certificates of Disposal (CoD).

**Environment**

5.19. Environment will follow up with Logistics weekly to obtain Material Movement/Manifest
Copy 1, 2, 6 and any voided forms. Environment to verify that the form is signed on the
bottom. Copy 1 will be sent to:

Northwest Territories Environmental Protection Division
Department of Environment and Natural Resources
P.O. Box 1320
Yellowknife, NT.
X2A 2L9
5.20. Environment will file Copy 2 and follow up with KBL Environment to ensure that Copy 6 is returned within 30 days. Include all other reference documents such Bill of Lading and Certificate of disposal and attach to Copy 2 and file.

5.21. Copy 2 will be held by Environment until Copy 6, Bill of Lading (BoL), Certificates of Disposal (CoD) have been received from KBL Environment.

5.22. Follow up with KBL Environmental if documentation has not been received within 30 days. Once received, attach Copy 6, BOL and CoD to the appropriate Material Movement Manifest form and filed in the appropriate binder.

5.23. Environment will follow up with Logistics / KBL Environment for any new waste not on the list to develop the appropriate label.

5.24. Environment will scan Copy 1 and email to the following:
- Deton Cho Logistics (snaplake@detoncho.com)
- Troy Broman (troy@detoncho.com)
- Jeff Bembridge (j bembridge@kblenv.com)
- Rod Langlois (rod.langlois@debeersgroup.com)
- Wendy Eggenberger (wendy.eggenberger@debeersgroup.com)

6.0 DEFINITIONS

6.1. Carrier - Any person engaged in the transport of hazardous waste whether or not for hire or reward.

6.2. Consignor - A person who offers a consignment of hazardous waste for transport.

6.3. Hazardous Waste - Any substance where discharged may endanger the health, safety or welfare of persons, interferes with normal enjoyment of life or property, endangers the health of animal life, or causes or is likely to cause damage to plant life or property. Material which is a dangerous good for recycling, treatment, disposal or storage.

6.4. Generator - Owner or person in charge, management or control of a hazardous waste at the time it is generated or a facility that generates hazardous waste.

6.5. Receiver or Consignee - A person to whom a quantity of hazardous waste is being or intended to be transported.
8.0 REVIEW AND APPROVAL

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<td>8.2. Owner:</td>
<td>Environmental Monitoring Superintendent</td>
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<tr>
<td>8.3. Reviewer:</td>
<td>Environmental Officer</td>
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<td>8.4. Reviewer:</td>
<td>Logistics General Supervisor</td>
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9.0 REVISION HISTORY

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10.0 REFERENCES and RELATED DOCUMENTS

10.1. Appendix I: Movement Document/ Manifest Form

10.2. Appendix II: Regulated Waste Reference Sheet

10.3. Guideline for the General Management of Hazardous Waste in the NWT

http://www.enr.gov.nt.ca/sites/default/files/guidelines/general_management.pdf

11.0 AUTHORIZED SIGNATURE

Environmental & Monitoring Superintendent
All printed copies are considered uncontrolled documents.
Refer to Pavilion (Snap Lake Intranet) for current version.
## APPENDIX II: ENVIRONMENTALLY HAZARDOUS SUBSTANCES

<table>
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<tr>
<th>COMMENT / GENERIC NAME</th>
<th>SHIPPING NAME</th>
<th>CLASS</th>
<th>UN #</th>
<th>PACKING/RISK</th>
<th>QUANTITY SHIPPED</th>
<th>UNITS (L or Kg)</th>
<th>PACKAGING NO.</th>
<th>CODES</th>
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<td>unpunctured aerosol cans</td>
<td>Aerosols, Flammable</td>
<td>2.1</td>
<td>1950</td>
<td>II</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>01</td>
<td>L/S</td>
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<tr>
<td>Soil contaminated with hydrocarbon</td>
<td>Contaminated Soil</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>01</td>
<td>S</td>
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<tr>
<td>Water contaminated with hydrocarbon</td>
<td>Contaminated Water</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>01</td>
<td>S</td>
</tr>
<tr>
<td>Crush may contain mercury</td>
<td>Crushed Fluorescent Bulbs</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>01</td>
<td>S</td>
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<tr>
<td></td>
<td>Floor Dry</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
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<tr>
<td>stench gas</td>
<td>Methyl Mercaptan</td>
<td>2.3 (2.1)</td>
<td>1064</td>
<td>n/a</td>
<td>volume</td>
<td>L</td>
<td>canister #</td>
<td>07</td>
<td>G</td>
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<tr>
<td></td>
<td>Non-Regulated Solid, Lokset Resin</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>NR</td>
<td>S</td>
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<tr>
<td>Uncrushed oil filters</td>
<td>Oil/Fuel Filters</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>weight</td>
<td>kg</td>
<td>drum or container count</td>
<td>01</td>
<td>S</td>
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<tr>
<td>Waste Flammable Liquid NOS, Waste Jet A</td>
<td>Waste Flammable Liquid NOS, Diesel</td>
<td>3</td>
<td>1993</td>
<td>II</td>
<td>volume</td>
<td>L</td>
<td>drum or container count</td>
<td>01</td>
<td>L</td>
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<tr>
<td>Waste Flammable Liquids, NOS, Diesel</td>
<td>Waste Flammable Liquid NOS, Diesel</td>
<td>3</td>
<td>1993</td>
<td>II</td>
<td>volume</td>
<td>L</td>
<td>drum or container count</td>
<td>03</td>
<td>L</td>
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<tr>
<td>antifreeze</td>
<td>Waste Leachate - Glycol</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>volume</td>
<td>L</td>
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<td>L</td>
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<td>waste oil (not to be used for waste oil burners)</td>
<td>Waste Leachate - Oil</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>volume</td>
<td>L</td>
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<td>L</td>
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<tr>
<td>full cans of paint</td>
<td>Waste Paint Related Material</td>
<td>3</td>
<td>1263</td>
<td>III</td>
<td>volume</td>
<td>L</td>
<td>drum or container count</td>
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Appendix X  Snap Lake Mine Operating Procedure
SLM SHE OP STP *Waste Handling and Maintenance*
1.0 PURPOSE
To promote safe procedures for the Membrane Bioreactor (MBR) Sewage Treatment Plant Maintenance and Waste Handling.

2.0 SCOPE
These procedures apply to all employees including independent contractors, working at the Snap Lake Mine (SLM) who works at the MBR sewage treatment plant (STP).

3.0 RESPONSIBILITIES
STP Operator is responsible for:

- Carry out day-to-day activities.

Designated Environmental personnel is responsible for:

- Overall monitoring of the performance of the STP

4.0 PROCEDURE
1.0 DESCRIPTION OF SYSTEM
All skid camp sewage and gray water reports to the MBR – STP. This plant is a membrane bioreactor (MBR). The main component of the MBR is the reactor tank. Sewage is treated when the accumulated biomass breaks down the solids. This treated sewage then passes through a special membrane that filters out suspended solids and fecal bacteria. After treatment, the liquid is discharged to the outflow pipe.
2.0 MBR – STP Safety
1. Sewage is a biohazard. ANY small cuts or scrapes that occur in the MBR – STP must be reported and treated by the site First Aid attendant.

2. STP operators must be provided with and wear latex/rubber disposable gloves when sampling, handling samples, or performing work on parts of the STP and must wash their hands before leaving the STP. Remember not to touch your face or other parts of your body while wearing gloves. In areas or during activities where splashing with wastewater is likely, safety glasses and/or face shields are to be worn.

3. It is a requirement that all personnel that work in the STP are vaccinated for Hepatitis “A & B” and Tetanus.

4. Dust masks must be worn when handling any chemicals in powder form.

5. Consult the MSD sheets for all products handled in the STP and follow the recommended PPE requirements.

6. All potable water feeds to the STP must have a back flow prevention valve (air brake) installed to prevent contamination of the potable water supply.

7. Smoking is not allowed anywhere in the MBR – STP building. Operators must wash their hands before they exit the building to have a cigarette.

8. Food and drink is not allowed to be consumed in the MBR – STP.

9. If the methane warning light (red light on north side of building) is on do not enter the STP. Call a Code One for ERT assistance to deal with the situation.

10. Dangers from falls are dealt with under other documents (see Working at Heights & Fall Protection and Working Around Open Holes and Dangerous Opening)

3.0 WASTE HANDLING
Once there is an excess amount of sludge built up in the reactor it will be pumped into the vacuum tank. This sludge is then taken to the main STP for processing in the digester.

4.0 SAMPLING AND TESTING
Effluent sampling and control testing is described in Operational Procedure – Sewage Treatment Plant – Sampling, Testing and Monitoring.

5.0 MAINTENANCE
A detailed description of the operation of the MBR and each of its components is given in the Sanitherm Operations Manual. The following items are the most common steps for the maintenance of the MBR.

- Visually check all pieces of equipment daily.
- Check blowers weekly.
- Preventative maintenance must be maintained on all mechanical equipment.

All staff members are responsible for ensuring that they are using the latest version of this document.
6.0 TRAINING

- Train with Sanitherm representative,
- The MBR – STP operation has become site specific, therefore train with one of the current operations for a period of time.
- Read and understand Operation Manual.

DEFINITIONS

STP:
Sewage Treatment Plant

MBR:
Membrane Bioreactor

5.0 REFERENCES & RELATED DOCUMENTS

This procedure is to be read and applied in conjunction with the following documents:

- De Beers Canada Corporation Safety and Health Management System Elements COPR SH SYS 4.3.4 and CORP SH SYS 4.4.6
- De Beers Canada SLM Safety and Health Management System Elements SLM SH SYS 4.3.4 and SLM SHE SH SYS 4.4.6
- SLM SHE OP 0095 (Working at Height & Fall Protection)
- Installation, Operation and Maintenance Manual for De Beers Canada Mining Inc. – AMEC E&C Services Ltd.

6.0 REVISION HISTORY

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All staff members are responsible for ensuring that they are using the latest version of this document.
Appendix XI Snap Lake Mine Camp Wastewater Treatment Plant
SNAP LAKE MINE CAMP
WASTEWATER TREATMENT PLANT
ISSUED FOR CONSTRUCTION

October 2, 2017
PROJECT:  Snap Lake Mine Camp Wastewater Treatment Plant

DRAWINGS LIST:
2017-0516-000 - General Notes & Equipment List
2017-0516-001 - Process Flow Diagram
2017-0516-002 - Process & Instrumentation Diagram
2017-0516-101 - Wastewater Treatment Plant Layout
2017-0516-102 - Biofilters Arrangement on Top of Recirculation Tank
2017-0516-103 - Hydraulic Profile
2017-0516-104 - Piping Layout for AX20 Pods
General Notes:

Please refer to the following manufacturer manuals for installation of certain components:

1. AX20 Installation Manual (nim-atx-ax-1.pdf)
2. AX100 Installation Manual (nim-atx-ax-2.pdf) pages 5,6 for installing the Recirculating Splitter Ball Valve, page 9 for installing the Vent Fan Assembly (above ground fan assembly, AXVFACF), & page 13 for installing the Air Vent inlet (AXVFACF-VENT)
3. MM Recirculating Ball Valve Installation Instructions (nin-mm-frp-1-prn.pdf) for the Recirculating splitter ball valve (MM4-FRP)
4. Pump and Discharge Plumbing Installation Instructions (nin-hv-1.pdf) for the pump plumbing
5. Vent Fan Assembly Installation, Wiring, & Maintenance Instructions (NIN-ATX-VFA-1.pdf) for the AX above ground fan assembly (AXVFACF)
6. Biotube Pump Vault Installation (nin-pvu-1-prn.pdf) for the biotube/PVU
7. Float Switch Assembly Installation Instructions (NIN-MF-1.pdf) for the float tree assemblies
8. WPMSeries Plastic-bodied Magmeter Instructions (WPMS instructions.pdf) for the flow meter piping involved. It is recommended that unistrut be used.

Additionally the following manufacturer data sheets offer additional information about some of the components:

1. AdvanTex Vent Fan Assembly Technical Data Sheet (ntd-axvfacf-1-prn.pdf) for the AX above ground fan assembly
2. Flow Inducer Towers Technical Data Sheet (ntd-fi-fit-1.pdf) for the flow inducer towers
3. PF Series 60-Hz, 4-inch (100mm) Submersible Efficient Pumps Technical Data Sheets (ntd-pu-pf-1.pdf) for the Orenco pumps

The AX20 pods and above ground fan assembly will need to be raised to accommodate the piping involved. It is recommended that unistrut be used.

Per manufacturer recommendations, to ensure a constant flow through all four the AX20 biotube pods they should all be installed on the same elevation/level.

Key Point

A minimum fall of 1/4" per 1’ (20mm per 1m) or 2% slope is required:
from the invert of the AX20 filtrate outlet’s common line to the invert of the recirculating splitter ball valve’s (RSV) inlet

For proper drainage, the vent line from the Air Vent inlet on the filter is to slope back toward the filter at a minimum of 1/4" per 1' (20mm per 1m or 2% slope)

Abbreviations

Compl.: Compartment
FIT Flow Inducer Towers
FM Flow Meter
PVI Pump Vault Unit
RSV Recirculating Splitter Ball Valve, also known as MM4-FRP
UV Ultraviolet
Typical Pipe Configuration

**Elevation**

Filter Inlet & Air Vent

Active Air Vent Line

Transport Line

Filter Outlet

Filtrate Return Line

**Plan**

Filter Outlet

2"Ø (50mm) Filter Outlet

2"Ø (50mm) Air Vent

1"Ø (25mm) Filter Inlet

1. Proposed configuration is for when the filter inlet and outlets located on opposite sides
2. Tee connection at filter outlet (shown in yellow)
3. 2" from the filter outlet to the 3" tee connection
4. Top running line is Active Air Vent line that goes to the Fan Assembly
5. Bottom running line is the Filtrate Return line that goes to the MM4 recirculating splitter ball valve
6. Common line for Active Air Vent is 3"Ø (75mm)
7. Common line for Filtrate Return is 3"Ø (75mm)
8. The Filtrate Return lines should be sloped a minimum 2" per 1' (20mm per 1m or 2% slope)
9. Be sure the Filtrate Return line is continuously sloped. Do not allow any bowed, sagged, or flat sections, as this will impair proper drainage and air movement
10. The Filtrate Return common line bushes up to 4" before going into MM4 recirculating splitter ball valve (RSV)
11. 2" Transport line (from pumps) reduces to 1" before entering filter inlet
12. 2" Air Vent line from filter bushes up to 3" common line
13. 3" common Air Vent line bushes up to 4" to connect to AXFA-Vent Air vent inlet
14. For proper drainage, Air Vent line is to slope back toward the filter at a minimum of 1.4" per 1' (20mm per 1m or 2% slope)
15. Install the AX20 pods at the same elevation, to ensure there is as much consistent flow among all four pods.

**Pipe Legend**

- Red - Recirc. Transport Line
- Green - Filtrate Return Line
- Cyan - Air Vent Line
- Magenta - Active Air Vent Line
- Yellow - Filter Outlet Tee Fitting

**Filter Air Vent Lines - Plan View**

Air Vent Line - from Single Common AXFA Air Vent to Air Vent Inlet on AX20

Active Air Vent Line - from Tee connection at Filter Outlet to Fan Assembly (AXVFCAF)

**General Notes:**

- Inlet
- Compartment A (Secondary Settling)
- Compartment B (Recirculation)
- Compartment C (Transfer)
- Recirculation Tank [4550-TK-002]