



**CEMMATS GROUP LTD**

**WASTE MANAGEMENT PLAN (WMP)**

**Prepared for**

**NIMINI MINING LIMITED**

**VOLUME 2 OF 4**

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## **1.0 INTRODUCTION**

### **1.1 Project Background**

The Waste Management Plan (WMP) is an essential component of the Environmental and Social Impact Assessment for the mining of gold within the Nimini Mining Ltd. concession area.

To implement any mining activity, it is incumbent on the company, according to legislations and regulations of Sierra Leone, to carry out an Environmental and Social Impact Assessment in order to be granted permission to implement the project. It is explicitly stated in the Environment Protection Agency Act 2008 that any company intending to carry out any project as listed in the first schedule of the Act (this is a list that includes mining), should apply for a licence; if however the Agency decides that an impact assessment is necessary for such a project, then the licence would only be issued on approval of an impact assessment report by the Environment Protection Agency. It is for this reason that Nimini Mining Ltd contracted the expertise of CEMMATS Group Ltd.

This document constitutes the WMP for the proposed mining activities in the Nimini Mining Ltd concession area acquired by Nimini Mining Ltd in two chiefdoms in Kono District in Sierra Leone, namely Njaiama Nimikoro and Njaiama Nimiyama.

### **1.2 Waste Management Plan**

The Waste Management Plan (WMP) describes the procedures, systems, equipment, and structures specific to waste management and disposal. The plan also defines who is responsible for its development and implementation, and what records and reporting will be required. Adjustments would need to be made to the plan as changes occur during mining operations. The company will take into account national and international laws, regulations and best industry practice in the design and management of waste containment facilities.

### **1.3 Company Background**

Nimini Mining Ltd is a private Sierra Leone company, which is a wholly-owned subsidiary of Nimini Holdings Ltd (BVI) which in turn is owned 90% by Polo Resources Ltd, an AIM and TSX listed company and 10% by Plinian Guernsey Ltd . Nimini Mining Ltd concentrates on finding and developing mines in Sierra Leone..

The Nimini Mining Ltd. Project area is located in the Nimini West concession within the Nimini Hills in the Nimikoro and Nimiyama Chiefdoms, Kono District in the Eastern Province of Sierra Leone. Nimini East and West licenses are located approximately 330 km or 6 hours' drive east of Freetown, the capital city of Sierra Leone.

### **1.4 Legislation**

This Waste Management Plan has been developed in accordance with national and international regulations and guidelines. The regulations and guidelines are discussed in the following sections.

#### ***1.4.1 Local Legislation - Environment Protection Agency Act of 2008, Sierra Leone***

The Environment Protection Agency Act, 2008 establishes general guidelines for toxic and hazardous substances. These guidelines include the following:

- The Environmental Board may prescribe activities or substances that shall be considered hazardous;
- The Director will take the necessary and appropriate measures to monitor, control, and regulate the manufacture, sale, transportation, handling or disposal of toxic and hazardous substances, including toxic and hazardous wastes;
- The introduction or importation of toxic or hazardous wastes into Sierra Leone for storage or disposal by any means whatsoever is prohibited;
- The possession, introduction, or importation into Sierra Leone of internationally banned chemicals or substances is prohibited;
- The uncontrolled discharge of any toxic or hazardous substances into the air or in, on or under the land and waters of Sierra Leone is prohibited; and the EPA-SL may take investigative and enforcement actions in instances where it has reasonable grounds to believe an offence has been committed against the Act.

## ***1.4.2 International Legislation and Policy***

### **1.4.2.1 International Finance Corporation Guidelines for Waste Facilities**

The operation will also follow International Finance Corporation (IFC) 1998 Environmental, Health and Safety guidelines for waste management facilities. Waste management facility guidelines include the following:

- i. Surface and subsurface investigations of geology, soils, groundwater and surface water resources will be conducted to determine leachate migration potential and the need for additional design requirements;
- ii. Waste management facilities and access routes will be designed to minimize impacts to air, surface water, groundwater, sensitive ecosystems, natural resources, cultural resources, and land-use patterns;
- iii. Waste management facilities will include gas control systems to minimize the potential for explosions or toxic conditions from the accumulation of waste disposal gas and protect soil-stabilizing vegetation (that is, revegetated areas along the facilities); and
- iv. Containment cells will be covered with soil or other suitable material at the end of each working day to minimize odors and prevent scavenging by animals.

The company will implement these guidelines during the construction and management of the waste facilities.

### **1.4.2.2 The Stockholm Convention on Persistent Organic Pollutants**

This Convention was adopted on the 22<sup>nd</sup> May 2001 in Stockholm and Sierra Leone became a signatory on the 27<sup>th</sup> August 2001.

Persistent Organic Pollutants (POPs) are chemicals that are persistent bio-accumulates found in fatty tissues. They are bio-magnified through the food chain, and adversely affect health and the environment. This convention recommends the elimination or restriction of production and use of all internationally produced POPs (i.e. Industrial chemicals and pesticides). The chemicals to

be eliminated are Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzen (HCB), Mirixtexaphene, Polychlorinated Biphenyls (PCBs).

The convention also seeks continuing minimization and, where feasible, ultimate elimination of the releases of POPs, such as Dioxins and Furans. Stockpiles and waste containing DPDs, must be managed and disposed of in a safe, efficient and environmentally friendly manner, with regards for international rules, standards and guidelines.

The company is committed to using best practice techniques and strategies in managing any POPs that emerge in its waste stream. Where necessary, competent expertise will be contracted to give professional advice on managing POP waste streams.

### **1.5 Identification of Waste Streams**

Waste streams likely to be generated during the operational phase of the mining operations include the following:

- (i) Mine process wastes (waste dumps of non-mineralised material from mine development and process plant tailings);
- (ii) Hazardous wastes (waste oils, solvents, laboratory wastes, and medical wastes);
- (iii) Domestic wastes (inert wastes such as plastic, glass, and construction materials); and Organic wastes (food and plant material).

Management of each waste stream is discussed in subsequent sections of this plan.

### **1.6 On-Site Disposal Facilities**

According to the Plan, Waste disposal facilities at the Project site will include the following:

- Mining waste dumps and process

- plant Tailings Facilities;
- Hazardous Waste Facility;
- Domestic Waste Facility;

Composting, recycling and the reuse of materials will be done to minimize refuse volumes to be disposed of in waste facilities.

### **1.7 Reuse, Recycling and Minimization of Waste Generation**

The company will establish programs for material recycling and reuse to reduce the volume of materials generated and deposited in the waste facilities. Local communities may be interested in reusing building debris, plant debris such as scrap materials, wood and steel, used tires, used vehicle parts, and other materials, which are no longer required or capable of repair to suit the operation. These materials can be offered to local communities for reuse through public consultation meetings and interviews to identify which materials can and cannot be beneficially used by the communities.

Making waste materials available to local communities is preferred over disposal if such availability does not cause conflict. When materials are determined to be suitable for reuse or salvage, a recycling program will be established to include the following:

- (i) Identification of wastes to be recycled;
- (ii) Provision of cleaning and treatment as needed to make wastes suitable for recycling;
- (iii) Designation of a storage area for recyclable materials, segregated from other waste materials, and located for easy access, and;
- (iv) Identification of local residents who have been authorized to collect, recycle, and salvage materials.

Recycling programs will not be run for profit. Local residents who have been authorized to collect materials from the site will be identified and their roles in the recycling program coordinated through the Community Development Program.



## **1.8 Organizational Responsibilities**

Key Managers have specific duties associated with waste management. Managers that will play a strategic role in the implementation of the Waste Management Plan, include the Safety, Health, Environment and Community Officer; Medical Officer; Engineering Manager; Processing Manager and Mining Manager.

## **2.0 MINING AND PROCESSING WASTES**

### **2.1 Background**

Waste streams from the mining and processing operation include mining and plant wastes.

Waste from the underground mining operation will be brought to the surface and hauled to selected dump sites. The issues that will be considered in the selection of these sites include:

- i. Storage capacity;
- ii. Haul distance and disposal costs;
- iii. Need to minimize visual impact;
- iv. Site access and preparation;
- v. Environmental and heritage issues;
- vi. The existing drainage patterns;
- vii. The geology of the prospective ground; and
- viii. The proposed infrastructure positions.

Two types of waste will be produced from the processing operation.

Waste from mine development operations will be transported to storage areas and stacked.

Slurry tails after having gone through the detoxification system will be pumped to a tailings thickener where solid material will settle at the bottom while clarified water exits as overflow and then pumped to the operating process water tank. The thickened underflow will then be pumped to a specified tailings storage facility. Tailings disposal facilities can be hazardous structures which present risks to the public and to the environment. Consequently, their design, construction and operation should follow accepted international best industry practice in order to meet the safety requirements. The tailings impoundment will be designed to perform a number of functions, these include:

- i. Removal of suspended solids by sedimentation;
- ii. Precipitation of heavy metals as hydroxides;
- iii. Permanent containment of settled tailings;

- iv. Equalization of waste water quality;
- v. Stabilization of some oxidizable constituents like cyanides; and
- vi. Storage and stabilization of process recycle water.

A number of chemical reagents, used in the recovery process, result in some chemical residues being sent to the Tailings facility. Chemicals used during mining and processing operations will be kept in suitable storage. Signs will be posted indicating such storage. Copies of Material Safety Data Sheets (MSDS) for the chemicals used for the project will be kept. It will be ensured that there will be no migration of materials from the Tailings facility.

The mine will limit unauthorized access to the Tailings facility to the extent possible. These facilities will be monitored for contaminants in surrounding surface water and groundwater under the supervision of the SHEC Officer, who will also be responsible for overseeing on-going remediation and final closure

## **2.2 Tailings Waste Management**

The Mining Manager will be responsible for the disposal of mining wastes. The Processing Manager is responsible for the management of all process tails. He will make sure wastes generated from the Plant are disposed of in the proper manner and location. As a minimum, the duties of the Processing Manager will include the following:

- i. Provide the manpower and equipment needed to construct, inspect, and maintain tailings facilities in good working order;
- ii. Give clear instructions to the employees on how and why tailings must be managed according to the engineering designs;
- iii. Give clear instructions on what is and is not acceptable for disposal into tailings facilities;
- iv. Confirm that employees charged with managing tailings disposal systems understand why wastes must be disposed of in this manner;

- v. Follow IFC requirements for tailings facilities liquid effluent discharge;
- vi. Enforce a fair but aggressive disciplinary procedure for employees who disregard waste disposal instructions; and
- vii. Prevent public access to the Tailings Facilities.

The Processing Manager will also be responsible for collecting the following information regarding the tailings facilities:

- i. Volume of material being placed in the disposal area;
- ii. Any special handling or treatment processes that are required for the placement of the tailings;
- iii. Observation of the physical condition of the tailings facilities and tailings impoundments, including evidence of seepage, movement or unusual conditions; and
- iv. Identification of any other materials, debris, or chemicals placed into the tailings facilities.

The Processing Manager is responsible to undertake the waste characterization and monitoring program to confirm that current waste management practices are appropriate to contain the waste being generated. The Processing Manager is also responsible for the dam safety inspection program that will be applicable to the tailings facilities. The Processing Manager will be responsible to communicate the results of these monitoring programs to the SHEC Officer so that that Officer is aware of any changes that may be needed due to the characteristics of the waste being generated.

The SHEC Officer will collect the recorded information for reviewing and interpreting purposes and will also be responsible for collaborating monitoring results and mitigation, if necessary, with the Mining Manager and Processing Manager

### 3.0 HAZARDOUS WASTES

This section addresses hazardous waste identification and management.

#### 3.1 Waste Identification

Hazardous wastes are materials considered reactive, flammable, radioactive, corrosive and/or toxic. The use of these materials should be limited to the extent possible. If use of these wastes is unavoidable, the company will adopt procedures for documentation and labeling as well as the safe storage, handling, and disposal of these materials.

Hazardous wastes at the mine site include the following:

- i. Waste oils and solvents;
- ii. Fuel and oil filters;  
Polychlorinated  
biphenyl (PCB);  
Laboratory and  
acidic wastes;  
Batteries;
- iii. Aerosol cans;
- iv. Antifreeze;
- v. Petroleum-  
contaminated  
soils; Medical  
wastes; and  
Emergency  
response wastes.

Of these hazardous wastes, PCB and medical wastes will never be recycled or reused. Hazardous wastes that are not recycled or reused will be disposed of in a hazardous waste

facility. The hazardous waste facility will be designed and maintained to protect groundwater, surface water, and soil resources. The hazardous waste facility will also be constructed to limit impacts and risk to humans, wildlife, and the environment.

### **3.1.1 Waste Oils and Solvents**

Waste oils and spent solvents will be generated by maintenance activities performed in the workshops. Waste oils and solvents will be stored in collection tanks in the vicinity of the facilities. Tank storage areas will be equipped with berms to contain any spillage that may occur from the tanks. Alternative solvents that are less toxic, such as citric acid based solvents, will be used where feasible.

The Engineering Manager's responsibilities include assuring that oil, fuel, and solvent wastes generated are recycled or disposed of in an appropriate manner. The company will recycle as many materials as possible to minimize wastes. Wastes will be collected in the holding tanks either for beneficial use on site or will be removed off site for disposal by a reputable operator.

The Engineering Manager is responsible for the use and disposal of waste oils and solvents. These responsibilities include the following:

- Identify the manpower and equipment needed to inspect and maintain the waste oil and solvent storage tanks and surrounding areas in good working order;
- Explain procedures on proper management, handling, and disposal of waste oils and solvents;
- Explain what is and is not acceptable disposal of waste oils and solvents;
- Explain procedures for managing recycling tanks and proper disposal of used fuels;
- and

- Enforce a fair, but aggressive, disciplinary procedure for employees who disregard the precautionary measures.

The Engineering Manager will also be responsible for collecting the following information regarding the waste oil and solvent recycle tank area:

- Estimating the volume of material inputs and outputs to the recycle tanks;
- Observing the physical condition of the tank storage area and containment structures, including evidence of spills, damage to berms, or tank leakage; and
- Performing a monthly audit of the material inputs and outputs to each storage tank.

Waste oils and solvents not used on site may be offered to the surrounding communities through recommendations resulting from public consultation. These recommendations may include donating the fuels to the local communities.

### ***3.1.2 Fuel and Oil Filters***

Waste fuel filters from mobile equipment will be generated throughout the mine life. Handling of these materials will be the responsibility of the Engineering Manager and will be disposed of by:

- Puncturing the filters and allowing them to drain ;  
collecting the drained fuel or waste oil; and
- Placing waste oil in the waste oil recycling tank for reuse (mine site or surrounding communities) or off site disposal; or
- Properly storing for later removal from the mine site.

Reuse is the preferred method for the recovered fuels and oils. Once puncturing and draining of the filter itself is completed, it will be disposed of in the domestic waste facility. The Engineering Manager will be responsible for reuse, disposal, and record keeping of fuel and oil filters.

### 3.1.3 Polychlorinated Biphenyl (PCB)

All equipment containing PCB in a concentration exceeding 50 parts per million (ppm) should be clearly labeled as a precautionary measure to the users of that equipment. According to the Environmental, Health and Safety guidelines for PCB developed by IFC, PCB should be disposed of in one of three ways:

- High temperature incineration at a minimum temperature of 1,200°Celsius (C) and residence time over two seconds to achieve 99.99 percent destruction;
- Chemical dechlorination to break down PCB by liberating chlorine atoms. Once PCBs are broken down, chlorine is separated into its various salts enabling disposal of all fluids and substances; or
- PCB articles may be disposed of in waste facilities specifically designed to accommodate hazardous waste materials. The United Kingdom Department of Environment (Batstone *et al.*, 1989) indicates that 20 milligrams per kilogram (mg/kg) PCB in waste after deposition, in a mixture with bioactive waste within the body of a waste facility, should be regarded as a maximum concentration.

Contaminated oil will be stored in plastic lined sealed drums and stored in a secure place that is equipped with spill containment structures until an acceptable plan for permanent disposal of PCBs is established. The plans will be coordinated and agreed upon with government officials and project lenders as appropriate prior to implementation.

### 3.1.4 Laboratory Acids and Acidic Wastes

Laboratory wastes will be limited to the extent possible, and consequently are expected to be generated in small quantities. These wastes will be disposed of in a manner that is appropriate for the characteristic of the waste.

Liquid wastes must be carefully placed into primary packaging, placed in a secondary



containment drum containing absorbent or desiccating material that is chemically compatible with the waste being disposed. When the waste is a solid, the secondary containment drum need not contain absorbents or desiccating materials, but will need to be adequately padded with compatible interstitial materials sufficient to assure the integrity of the packs. Once the drums are filled, they will be tightly sealed and placed in an upright position into the hazardous waste landfill. Laboratory packs of solid and liquid wastes will not be mixed in a single secondary containment drum (only solids with solids, liquids with liquids). Drums containing compatible liquid and solid waste laboratory packs may be placed in the same landfill cell.

### ***3.1.5 Batteries***

A variety of batteries, vehicle and non-vehicle, will be used throughout the life of the mine. Used batteries will be accumulated and stored in an area that has a concrete floor with toe berms and is sheltered from the weather. The Engineering Manager will be responsible for investigating the availability of off-site recycling options for batteries. If recycling is unavailable, batteries will be permanently disposed of in the hazardous waste facility.

### ***3.1.6 Aerosol Cans***

Aerosol cans containing paints, cleaning agents, and other sprays will be routinely generated by the mine. Aerosol cans should be properly depressurized before being disposed of to prevent harm to area personnel. The empty cans will be disposed of in the following ways:

- i. Crushing/puncturing the cans under non-hazardous conditions prior to disposal;
- ii. Draining any excess contents in the cans into a collection system; and
- iii. Placing crushed cans in the domestic waste facility.

Each department manager will be responsible for arranging the proper disposal of aerosol cans in their area. The SHEC Officer will coordinate the training of personnel on proper disposal techniques.

### **3.1.7 Antifreeze**

Used antifreeze/vehicle cooling water additives will be recycled on site or shipped off site for recycling. The recycling units will be located in the automotive and equipment maintenance facilities. The purification process of filtering and/or distilling the ethylene glycol and water mixture will produce a minor amount of sludge waste. This waste will be disposed of in the hazardous waste facility.

### **3.1.8 Petroleum-Contaminated Soils**

Petroleum-contaminated soils if they occur will be removed and either land-treated on the mine site or placed in the hazardous waste facility.

Land-treatment results in the biological and chemical degradation of organic waste constituents and immobilizes inorganic waste constituents. Land-treatment requirements, in accordance with the Safe Disposal of Hazardous Wastes Volume II (World Bank Group, 1989), include the following:

- i. Diversion of run-on from active portions of the site;
- ii. Collection of runoff from active portions of the site disposal in an environmentally sound manner;
- iii. Periodic analysis of applied waste;
- iv. Records of the application dates, rates, quantities, and location of applied wastes; and
- v. Preparation and implementation of a closure and post-closure plan.

The SHEC Officer will be responsible for designing and maintaining the land-treatment area.

### **3.1.9 Medical Wastes**

Medical wastes associated with physical examinations, routine check-ups, unplanned incidents, and emergency responses will be generated by the medical clinic. Such wastes will be

managed according to their perceived biohazard under the direction of the Medical Officer and their disposal carried out by qualified personnel under the direction of the SHEC Officer. As a minimum, qualified personnel will supervise the following:

- Sterilization of sharp waste objects, infectious materials, and pharmaceuticals using an autoclave or incinerator as appropriate;
- Maintenance of containers for used sharps and other medical wastes;
- Collection of all other medical wastes in color-coded and properly labeled containers and puncture proof containers for sharp waste objects until they are sterilized;
- Storage of color-coded containers and puncture proof containers in drums located in a secure area;
- Burial of non-infectious waste materials in the domestic waste facility; and
- Daily monitoring to ensure that medical wastes are being categorized and disposed of correctly.

Wastes containing blood and other body fluids must be carefully handled and disposed by trained professionals operating under an Exposure Control Plan (OSHA, 1992) that prescribes, among other things, the management of special medical wastes and contaminated laundry. To the extent possible, special medical wastes will be sterilized and the residue disposed as appropriate in the domestic or hazardous waste facilities. The Medical Officer will be responsible to prepare and implement the Exposure Control Plan. Hospital personnel will be trained by the Medical Officer on plan implementation with regard to the proper handling, management and temporary storage procedures for special medical wastes. The Medical Officer and SHEC Officer will work cooperatively to assure the safe and appropriate disposal of medical wastes.

### **3.2 Hazardous Waste Handling Procedures**

To ensure the safety of mine employees and local communities, hazardous waste handling and management procedures and other pertinent information will be placed in mine site areas or

buildings where hazardous materials are found. Employees will appropriately trained. The SHEC Officer will be responsible for a training program for the following hazardous waste procedures:

- Posting emergency contact information in all necessary buildings in case of a fire or hazardous waste spill;
- Posting MSDSs in local languages and English in areas where these materials are used or stored;
- Performance of regular inspections for container leaks, corrosion, rupture, or other failures;
- Proper handling procedures for hazardous wastes;
- Proper storage of hazardous materials so they do not react with one another; and
- Proper disposal of hazardous waste materials.

All new employees will be required to submit to training programs and annual refresher courses will also be required for the relevant mine employees. In addition, each department will be responsible for implementing its own safety training program.

### **3.3 Hazardous Waste Facility**

Those hazardous wastes that result from operations, following efforts to minimize their volumes and neutralize/stabilize their hazardous characteristics, must be disposed in a safe manner consistent with long-term protection of the human population and the environment in general. The most common method of disposal is placement into an engineered secure chemical landfill

designed specifically for the subject hazardous wastes and local conditions. This facility will provide for sub-surface containment of packaged (e.g., drummed) wastes in reinforced concrete vaults that will, upon filling, be securely capped with concrete and buried.

### **3.3.1 Site Selection**

Selecting a suitable site is important to the successful performance of the facility. Site selection criteria will include:

- Proximity of Groundwater – Groundwater table elevation fluctuations at the selected site must not allow the saturated zone to contact the hazardous waste disposal facility under reasonably foreseeable scenarios;
- Proximity to Population Centers – A location will be sought that is relatively remote from population centers and heavily traveled routes, yet sufficiently convenient to waste-generating locations to assure utilization of the disposal facility;
- Hydrologic Relationship to Groundwater Users – Acceptable locations for a storage facility will not be directly up-gradient of groundwater users; and
- Soil/Bedrock Stability – Soil and bedrock conditions must be suitable to support the anticipated load of the concrete structures that will comprise the secondary containment facility.

### **3.3.2 Responsibility**

The SHEC Officer will be responsible for the siting, design, construction, operation, monitoring and closure of the hazardous waste storage facility. He will also be responsible for coordinating the siting and design information with appropriate government agencies to assure that the design conforms to applicable laws and guidelines prior to construction. The SHEC Officer will be responsible for maintaining operational and post-operational records, arranging for post-operational monitoring and initiating actions if leaks are detected.

## **4.0 DOMESTIC WASTES**

The mine will compost and recycle, when possible, domestic wastes to reduce the volume of waste that reports to the domestic waste facility. Domestic wastes not suitable for composting or recycling will be collected and placed directly into the domestic waste facility under the direction of the SHEC Officer.

### **4.1 Domestic Waste Materials**

A variety of domestic waste materials may be generated at the mine site. These materials include, but are not limited to the following:

Aluminum, glass, plastic, paper, wire, light bulbs and cardboard;

Benign filtrates from water treatment systems or other mining processes; Latex painting wastes;

Rubber from conveyer belts, vehicles, or other process parts;

Spray cans and fuel/oil filters which have been punctured, drained, and segregated from other solid waste;

Shredded tires (to reduce waste facility space) from mobile equipment and vehicles;  
and

Putrescible materials that cannot be composted such as meat, bones, and food wastes cooked with oils.

These materials will be taken to the domestic waste facility if recycling or reuse is not practical. Hazardous wastes will not be allowed in the domestic waste facility.

## **4.2 Domestic Waste Handling Procedures**

The following handling procedures, developed based on IFC's guidelines for Waste Management Facilities (1998), will be adopted as part of the Project's waste management program. Waste collection, handling, and transport guidelines include the following:

A routine schedule will be established for domestic waste collection and disposal;

Waste generators will be provided with appropriate waste disposal containers;

Enclosed refuse vehicles or vehicles equipped with tarps will be used for the domestic waste collection;

Waste handling will be minimized during operations;  
and

Waste containment will be maximized during operations.

Odours and the loss of wastes will be minimized at all waste loading and unloading facilities. Fugitive refuse (for example, plastic bags and paper) around the waste facility will be picked up, disposed of in the waste facility, and properly covered.

## **4.3 Domestic Waste Facility**

The domestic waste facility will include putrescible materials and non-degradable wastes generated throughout the area. These wastes may include paper, cardboard, plastic, rubber, and food refuse. Some of these materials can be recycled to reduce wastes in the facility. The SHEC Officer will be responsible for the supervision of the domestic waste facility. The SHEC Officer, with assistance from the Engineering Manager, will also be responsible for developing and implementing recycling programs (except waste oil and solvent recycling, which is the responsibility of the Engineering Manager). The general guidelines for the waste facility design and operation will include the following:

- i. The domestic waste facility will be designed to minimize impacts to air and water;
- ii. The domestic waste facility design will include a compacted soil cover as part of final closure.

The final cover will be vegetated and shaped to promote drainage of surface run-off;

- iii. The domestic waste facility design will include a gas control and monitoring system to minimize the potential for the accumulation or incompatible reaction of toxic gases;
- iv. A separate receiving area will be established for domestic wastes. This area will be separated from the hazardous wastes to avoid accidental mixing of wastes;
- v. Air quality control measures will be used to control fugitive dust and odors;
- vi. An adequate area will be constructed for wastes that require temporary storage prior to disposal;
- vii. All containment cells will be covered with soil or other suitable material at the end of each working day to minimize odors; and
- viii. An appropriate monitoring program will be established to detect any fugitive solutions from gas migration.

The monitoring program, including recommendations for sampling and analytical profiles will be included with the engineering siting and design study for the facility. The mine will coordinate with the appropriate government agencies to assure that the applicable laws and guidelines are addressed by the design prior to construction. The SHEC Officer will be responsible for the siting, design, construction and day-to-day operation of the domestic waste facility and for inspecting the facility on a regular basis to confirm its performance relative to the design. Repairs will be performed in a timely manner to minimize potential risks and to maintain the integrity of the facility.

#### **4.4 Sanitary Wastes**

The systems will consist of a sewage treatment plant. The Engineering Manager will be responsible for the construction, commissioning, operation, maintenance and ongoing monitoring of this system which will be constructed in such a way that it will minimize impacts to surrounding surface waters or groundwater. The project sewage treatment systems will operate within the



limits of IFC's liquid effluent guidelines. The Engineering manager will be responsible to collect effluent samples according a schedule established.

The SHEC Officer will maintain records and report on any significant environmental matters, including monitoring data, accidents, and occupational illnesses related to waste management. The records and report will be reviewed by a senior management member to improve the effectiveness of the Waste Management Plan.

#### **4.5 Waste Facility Record Keeping**

The SHEC Officer will be responsible for maintaining records regarding active and inactive cells for the domestic waste facility and the hazardous waste facility. That Officer will be responsible for maintaining records on the inactive and active compost cells. These records will include the following:

- Volume estimates of material inputs and outputs to the cell;

- Types of materials placed in the storage cell;

- Observation of volume and quality information of leachate emanating from the collection system;

- Observation of the physical condition of the system, noting olfactory conditions associated with the gas emission system; and

- Any deterioration of the hazardous waste facility embankments, liners, and cap, as well as the measures taken to correct these deteriorations.

The SHEC Officer will be responsible to assure regular compaction and covering activities of the domestic waste facilities.

#### 4.6 Management Training Responsibilities

Properly trained employees are necessary for the safe and effective operation of any facility. Training programs will reflect the level and type of expertise necessary for a given position. Safety precautions will also include protective clothing pertinent to the work activity, area, and schedule. Clothing may include such items as hard hats, hard-toe boots, safety glasses, reflective outerwear, and hearing protection. General safety rules will be posted in strategic locations at the mine site to describe general safety requirements for waste disposal facilities and equipment.

The SHEC Officer will be responsible for the training of waste disposal employees on the safe and proper disposal of wastes generated at the mine site. As a minimum, the SHEC Officer will:

- i. Provide the manpower and equipment needed for waste disposal;
- ii. Give clear instructions to employees on how and where to dispose of waste materials, along with any special handling that may be required;
- iii. Confirm that employees charged with waste placement understand why waste must be disposed of in this manner;
- iv. Prevent unauthorized personnel from entering dangerous or restricted areas through signs, fences or guards;
- v. Enforce a fair but aggressive disciplinary procedure for employees who disregard waste disposal instructions.
- vi. Put in place new employee training programs and annual refresher courses on proper waste management and disposal for the relevant mine employees .

#### **4.7 Employee Training Courses**

The mine employees will be trained in the following safety topics before employment commences and will also be reminded in at least annual refresher courses to limit the potential for accidents. These courses will be developed and implemented by the SHEC Officer.

- i. Safe job practices and procedures;
- ii. Accident prevention;
- iii. Differences between waste streams and an overview of incompatible wastes;
  
- iv. Safe lifting practices;
  
- v. How to read and understand Material Safety and Data Sheets (MSDS);
- vi. Safe material and waste handling practices; and
- vii. Proper control and maintenance of equipment and waste facilities.

All employees will undergo a medical examination when they are hired and any employee who works at the hazardous waste facility or with hazardous chemicals will be required to submit to a follow-up examination at least every two years thereafter in order to track health performance.

The Medical Officer is responsible for the development, coordination and implementation of the medical monitoring program for employees exposed to workplace exposure risks as needed.

#### **4.8 Requirements of Personal Protective Equipment (PPE) for Medical Waste Disposal**

Waste management personnel collecting and disposing medical waste must wear appropriate PPEs. The required PPEs are:

- i. Neoprene chemical resistant gloves or better quality gloves
- ii. Safety boots
- iii. Coveralls

- iv. Respirators (preferably chemical respirators)
- v. Hard hats
- vi. Safety glasses

## **5.0 MONITORING AND SECURITY**

### **5.1 Monitoring**

A waste disposal monitoring program will be developed for environmental and non-environmental features during the start up of the mine, operations, closure, and post-closure phases of mining operations. The following monitoring will be accomplished and appropriate records kept for:

- i. Refuse quantity and material delivered to the domestic waste facility, hazardous waste facility, and composting facility;
- ii. Surface water and groundwater monitoring;
- iii. Waste facility gas control devices;
- iv. Surrounding vegetation and soils around waste facilities and waste tailings; and
- v. Non-environmental features, such as, fences, roads, and signs.

Signs and notices should be placed around the domestic waste facility and the hazardous waste facility to promote worker and resident safety. These signs will include identification of waste categories and disposal sites. The SHEC Officer will be responsible for distributing and maintaining these signs.

### **5.2 Waste Facility Security**

Waste facilities will be maintained with security to prevent unauthorized access to the site. The perimeters of the domestic waste facility, hazardous waste facility, and composting facility will be delineated with a wire or wooden fence with a lockable access gate. Security may also include a guard for the waste facilities if vandalism or scavenging develops. The three main reasons for maintaining security at the waste facilities include:

- (i) Prevention of people from wandering into the waste facility and becoming harmed by wastes or equipment;
- (ii) Protection of equipment from damage; and
- (iii) Prevention of scavengers from carrying off contaminated materials.

Personnel who notice security issues related to waste disposal practices will immediately report these findings to the SHEC Officer and mine security.

## References

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