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**WASTE MANAGEMENT STRATEGY  
FOR THE HARMONY GROUP**

**January 2008**



**CONFIDENTIAL**

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## 1. INTRODUCTION

The purpose of this Strategy is to establish procedures for the recovery and disposal in an environmentally friendly manner of waste products generated by operations in the Harmony Group. The Strategy is applicable to persons and companies who are involved in the sorting, loading, transportation, recycling, and disposal of waste products originated from the different shafts and regulated by the different Environmental Acts of the Republic of South Africa.

Harmony Gold is one of South Africa's largest gold mining companies and has shafts in the Secunda, Gauteng, Orkney and Free State areas.

Waste products are generated by all Shafts, Plants, Workshops and Offices from housekeeping, maintenance and normal operations. Although every shaft has a waste/salvage area a Central Salvage yard exists in every Geographical Area and from here it services the shafts in the area with management of their waste.

## 2. CURRENT SITUATION

Due to the need for a greater awareness and responsibility towards the environment, an effort to create a sustainable recycling project in the Harmony Group has been identified as a contribution to preserve the environment from general and hazardous waste damage.

The Mining Industry generates various products under the general term "waste". For the purposes of this Strategy the term "waste" doesn't include Process or Mining waste i.e. Rock dumps, Sand/Slime Dumps, Water or other process related products. It specifically refers to products generated by housekeeping and maintenance and includes:

Ferrous and Non-ferrous metals

Wood

Asbestos products

Chemicals

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Plastic, PVC and related products  
Tyres and rubber products  
Electrical equipment  
Paper, cardboard and related products  
Explosives, containers and related equipment  
Oils, Greases and other lubrication material  
Electronic scrap

Currently due to logistical constraints Harmony contracts the handling of Waste to third parties and generally use this area to create BEE initiatives. The Contractors find it reasonably easy to dispose of products with commercial value i.e. scrap steel, electrical products and paper but are not geared or orientated to recycle the commercially non-viable products which lands on the solid waste disposal area. The current contract expires on 29 February 2008 and we are in the tender process for a new contract.

### **3. SERVICE OPTION**

The Central Salvage area would be the point of service to the surrounding mining shafts and the above ground workshops and offices. Here the responsibility lies for the total management of waste or cradle to cradle/ cradle to grave concept for all waste generated in the various areas.

The recycled commodity cycle will be closed and the secondary commodity will be used in other industries as a feed material in the designated supply chain. This will save the country in electricity cost and also clean-up costs for the salvage area. The waste that can not be converted from waste to a viable commodity must be land filled in an environmentally friendly manner.

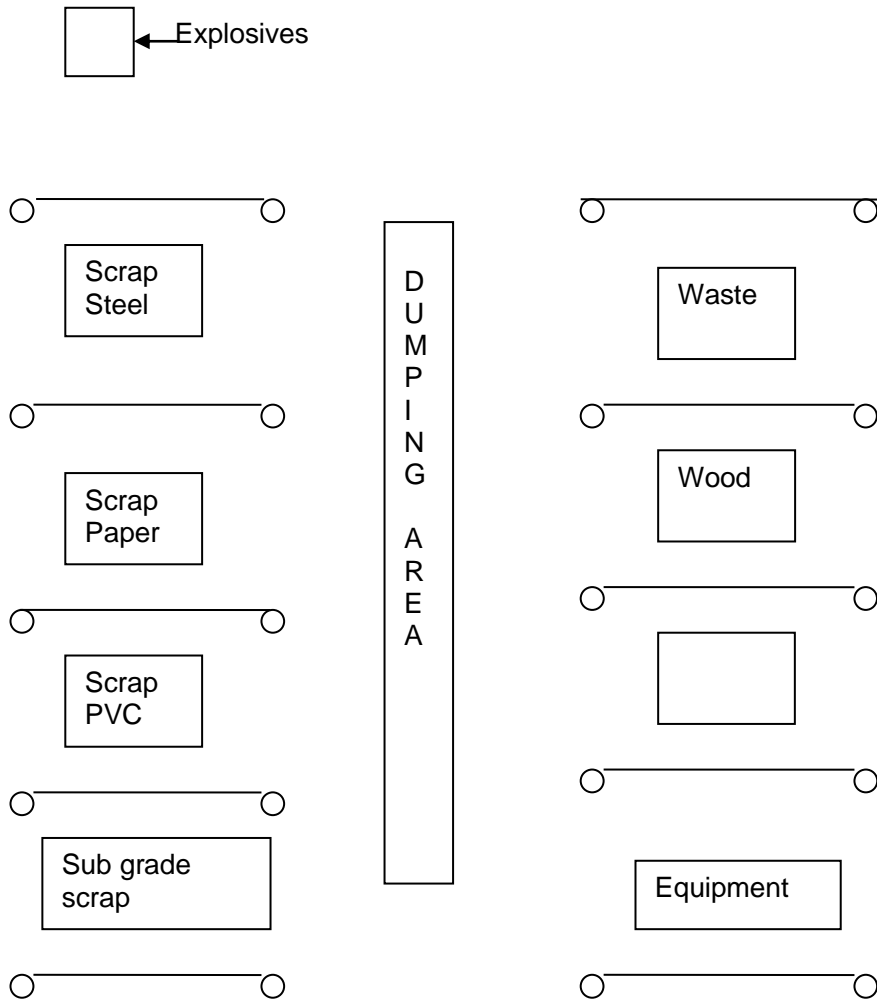
#### **SALVAGE AREA**

The waste/salvage area, approximately an area of 16m x 16m depending on the area available and access routes for vehicles, will be demarcated, concreted and divided into

eight bays marked with the relevant commodity, in which bins can be placed for easy collection of material. The central area will be the dumping area where the relevant shafts/plant will dump waste as generated from underground/process. A team of two or three (depending on the volume) sorters will sort the items on a daily basis into the bins.

At the Central Salvage yard a logistic backup will be maintained to service these areas and the filled bins will be taken to the Central Yard where the processing of waste will take place. The Central area will also be demarcated in the different commodities and here the maximum recycling of commodities will take place.

**SALVAGE YARD LAYOUT**



## 4. HANDLING OF COMMODITIES

### 4.1 Ferrous Metals

#### Background

The commercial viability of steel recycling has never been questioned as the ever increasing demand for steel products and the looming energy crisis drove the scrap price to an all time high of R2300 per ton based on the LME price for Rotterdam (an indicator used to determine local scrap prices)

#### Disposal

Heavy steel scrap. This is material of thicker than 3mm in thickness and has a higher commercial value than other grades. The heavy scrap recovered from waste generally will be cut (processed) by cutting torch into the sizes generally required by the end-users i.e. Scaw Metals, Mittal etc where the steel scrap is used for re-melting as a resource in manufacturing prime steel products.

Sub-grade steel scrap. This material is less than 3mm in thickness and uneconomical to process with cutting torch. It is normally taken to larger processing plants where it is either baled (compressed) or shredded into economically viable commodities used by the Smelters

Other Ferrous products. Various other materials like wiring material and hoist ropes used in the mining environment is of lower commercial value but can be disposed of successfully.

### 4.2 Non Ferrous Metals

#### Background

Electrical and other equipment contains Non-ferrous metals which are generated when this equipment is scrapped. These metals generated include aluminium, copper, lead and brass in its pure form or contaminated with steel and other products like PVC etc. The worldwide commodity price boom as increased the prices for non-ferrous metals to all time high levels and copper currently trades at R55 000.00 per ton.

#### Disposal

##### Electrical cable (Contains copper, aluminium and lead)

All electrical cables are fully recycled and either re-used or stripped to sell the commodities i.e. copper, aluminium, lead, PVC and steel wire.

##### Electrical motors and switchgear (Contains copper)

Due to the small content of non ferrous metals these products are sold to third parties as is without further reclaiming the metals

#### Batteries (Contains lead)

Due to the small content of non ferrous metals these products are sold to third parties as is without further reclaiming the metals

#### Gears/Valves (Contains Brass)

Due to the small content of non ferrous metals these products are sold to third parties as is without further reclaiming the metals

#### Air legs (Contains Aluminium)

Due to the small content of non ferrous metals these products are sold to third parties as is without further reclaiming the metals

### **4.3 Wood**

#### **Background**

Timber is widely used in the mining industry for underground support structures. Once the products ends in the salvage yard usable items will be identified and removed to be re-used to manufacture or repair items to be used in the mine.

#### **Disposal**

Currently all wood products are disposed of to local communities for their energy needs. This is purely seasonal and in summer times some accumulation of wood products is experienced.

### **4.4 Asbestos**

#### **Background**

In the Mining environment Asbestos has a wide range of uses. It may still be found in wall cladding, ceiling tiles, fire doors, behind radiators, inside night storage heaters, in linings to gas central heating cupboards and in ducts of central heating systems. One study has estimated that 3,000 different types of commercial product contain asbestos (EPA 1999).

The use and management of asbestos is highly regulated in South Africa. Regulations tightly constrain asbestos management, transportation and disposal. The classification of asbestos



as special waste requires that a specialist asbestos contractor must be used, except in strictly defined circumstances.

### **Disposal**

The regulations also stipulate that asbestos waste can only be transported by carriers licensed to transport special waste and disposal must take place at designated sites. All regulations are followed on founding Asbestos waste.

## **4.5 Plastics**

### **Background**

Plastic is a wonder-material. Derived from oil, natural gas, coal or salt, there are around 50 different types of plastic with a wide range of characteristics and qualities. Plastics are lightweight and durable. They are resistant to moisture and decay. The range of products and uses in the mining environment is vast. A key environmental objection to the incineration of households waste is based on the presence of PVC, which in some circumstances can release dioxins.

Plastics are generally divided into two groups (*thermoplastics and thermo sets*) according to their physical properties. Thermoplastics make up more than 80% of the plastics used and can be remoulded many times when heated. Thermo sets are less widely used and once the material has set it cannot be remoulded.

### **Disposal**

The plastic scrap reaching the Central Salvage yard will be separated between recyclable products i.e. gumboots, hoses and pipes and non recyclable products which end up in the waste stream to be disposed of at the landfill site.

## **4.6 Tyres and other rubber products**

**Background (Tyres).** Designed to last and are therefore difficult to break down and separate into their constituent parts. Adding to this problem, disposal releases potentially harmful compounds into the environment, e.g. polyaromatic hydrocarbons (PAHs), benzene and phenol which have suspected carcinogenic properties.

## **Disposal**

In the Mining Industry we generate vast amounts of tyres. We dispose tyres to third parties for use as

- Go-kart tracks, swings and general recreation purposes.
- Protection for boats in docks.
- Weighting down silage heaps on farms.
- Dust prevention on sand dumps on mines

**Background (Conveyor Belting).** Generated by the conveyances use in the mining operations and have frequently more uses depending the lengths and condition when removed.

## **Disposal**

Conveyor belting can be used as truck linings, floor covering, cattle and game farming and at schools for athletic field applications.

### **4.7 Electric and Electronic**

#### **Background**

Electrical equipment covers a wide variety of complex products making it a difficult waste stream to manage. Many items of electrical equipment contain toxic or hazardous substances including arsenic, bromine, cadmium, halogenated flame retardants, HCFCs, lead, mercury and polychlorinated biphenyls. All of these substances have the potential to pollute the environment if they are not treated effectively. If disposed of to landfill, they may contribute to groundwater pollution through leaching.

#### **Disposal**

Some mechanical recycling, granulation and shredding techniques exist but are done by third parties to which these products are disposed.

### **4.8 Paper**

#### **Background**

Paper is a renewable and plentiful resource historically treated as a cheap and disposable commodity.

For the sake of recovery and recycling the waste categories can be split into 4 main groups as described below:

- Primary pulp substitute grades.
- De-inking grades.
- Kraft grades

**Disposal.** Office paper recycling schemes are another important recycling source. Office paper is suitable to be recycled into higher grade papers such as printing and office papers. Office paper is generally divided into high and low quality. High-quality paper such as printing paper, letterhead and memos are higher in value than newsprint so a recycling scheme may be viable.

In order for an office paper recycling scheme to be successful and sustainable, it is vital that it is part of a 'green office initiative' and simple to adopt.

Bins will be provided to start an office recycling scheme.

#### **4.9 Explosives**

##### **Background**

Explosives and related explosive equipment is generated and dumped in the salvage yard. A special training and awareness project was launched to make people aware about the danger and implications of dumped explosives.

##### **Disposal**

A separate policy and procedure on the handling of explosives exist but nevertheless we installed explosive boxes on the sites where explosives can be dumped into daily and removed and exposed according to the prescribed procedure.

#### **4.10 Oils, Greases and lubricating material**

## **Background**

Oils and Grease are generated from normal maintenance and special rebuild or re-lubrication programmes for major equipment.

## **Disposal**

Most of the used oils generated on surface are collected by recycling companies such as Oilkol. Where large quantities of oil are generated bulk holding facilities exist which are emptied on a regular basis. Recycling companies however only take clean oil with limited water content and no grease. The market for grease is non-existent and hazardous waste companies like Wastetech is contracted to remove such contaminated oils and greases.

# **5. IMPLEMENTATION TASKS AND DATES**

The following tasks were identified in the process:

- This project plan must be forwarded and communicated to the Harmony Group and to existing and future clientele; April 2008
- Issue tenders, adjudicate, award and appoint contractors April 2008
- The waste/salvage area at each shaft must be erected and supplied with equipment and personnel; June 2008
- The Central Salvage area must be equipped to handle all categories of commodities to be handled including bonded walls and containers to contain drums and thus stop future spillages; July 2008
- The polluted areas must be rehabilitated; June 2009
- Salvage area personnel and mining personnel must be educated in how to handle waste and salvage it to gain maximum profits from these commodities and; June 2009

# **6. MONITORING AND REVIEW SYSTEM**

## **6.1 Record Keeping**

Recording keeping for the recycling and safe disposable scheme is essential to continually gauge the success.

## **6.2 Ongoing Education and Awareness raising**

The Department of Environmental Affairs & Tourism is responsible for conducting programmes for recycling which create awareness and promote the benefits of source separation.

The users of the scheme will need to know how to obtain updates on the prices paid for materials and be trained in the operating procedures for the project.

Ongoing company education and awareness programmes will be needed to optimise the popularity of the recycling schemes.

Once this recycling centre (salvage area) is in place, it should be publicised thoroughly with the local and wider community and potential users of the scheme. A door-to-door publicity exercise for the company in the waste generation and usage area will be useful. This will show the public that the product (waste) being sold is environmentally friendlier and that Harmony is committed to closing the loop of recycling.