MINING
FOR SCHOOLS

LIFE CYCLE
OF GOLD MINING

Formerly the Chamber of Mines of South Africa

MINERALS COUNCIL
SOUTH AFRICA

STEP 1 (SURFACE):
EXPLORATION

- Geochemical and geophysical techniques are used to find gold-bearing ore deposits
- Geologists drill to check mineral quality
- South African government regulates the mining licence process

STEP 2 (SURFACE):
CONSTRUCTION

- The mine site is prepared
- The headgear, shafts and mining, milling and processing infrastructure are constructed

STEP 3 (UNDERGROUND):
GOING UNDERGROUND

- Miners, materials and equipment are transported via a vertical shaft as deep as 3.5km
- Open-pit mining extracts ore via surface excavation

STEP 4 (UNDERGROUND):
PLANNING

Tunnels are established to open up the earth and the stope face so the gold-bearing reef can be accessed

STEP 5 (UNDERGROUND):
DRILLING

Drilling begins in preparation for blasting of the reef

STEP 6 (UNDERGROUND):
BLASTING AND HAULING

- The stope is blasted and the broken up gold-bearing ore is collected
- The ore is transported to the shaft via conveyers and locos and hoisted to surface

STEP 7 (SURFACE):
TRANSPORTING

The ore is conveyed by conveyer, rail or truck to crushing and milling circuits

STEP 8 (SURFACE):
CRUSHING

The ore is fed into a series of crushers and grinding mills to break it down into sand-like particles so the gold can be more easily extracted

STEP 9 (SURFACE):
PROCESSING

- The ore particles are combined with water and cyanide and carbon to dissolve the gold and help with its extraction
- The gold particles attach themselves to the carbon
- The carbon is stripped from the gold
- Most gold mining companies retreat their tailings for gold, uranium and sulphides. DRDGold is a world leader in surface gold tailings retreatment

STEP 10 (SURFACE):
SMELTING

The gold is then heated at high temperature so that it turns to liquid and can be poured to form doré bars

STEP 11 (SURFACE):
REFINING

The doré bars are sent to refineries for refining to a purity of at least 99.5%

STEP 12 (SURFACE):
CLOSURE AND REHABILITATION

Once the gold reserves at a mine have been exhausted, the owner must close and finally rehabilitate the site. Underground tunnels are stabilised and entrances are sealed off

** Environmental management and rehabilitation take place at each stage of the mining process*