

# Prospecting and Mining



# Looking for gems and precious metals is called prospecting

- Prospecting goes on everyday.
- Any earth material may be the subject of prospecting.
- It is hard work and can be dangerous
- The work is often done in inhospitable places
- You could get rich



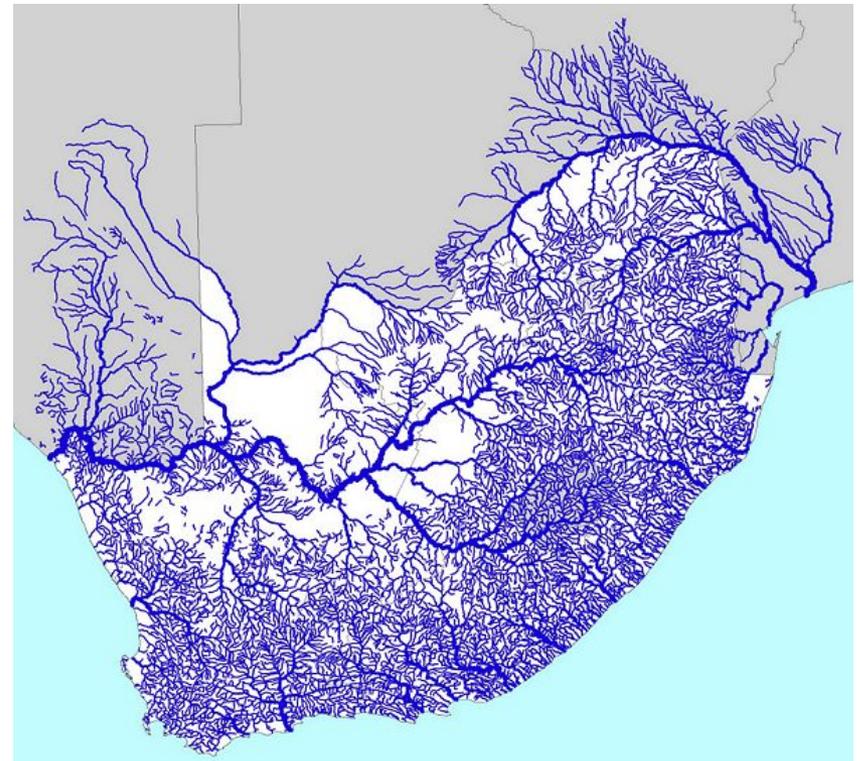
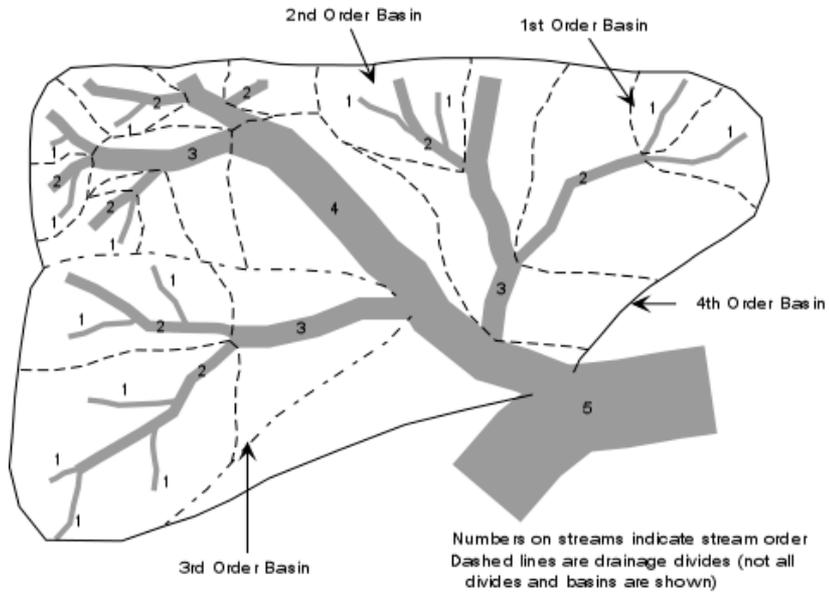
# Alluvial Prospecting

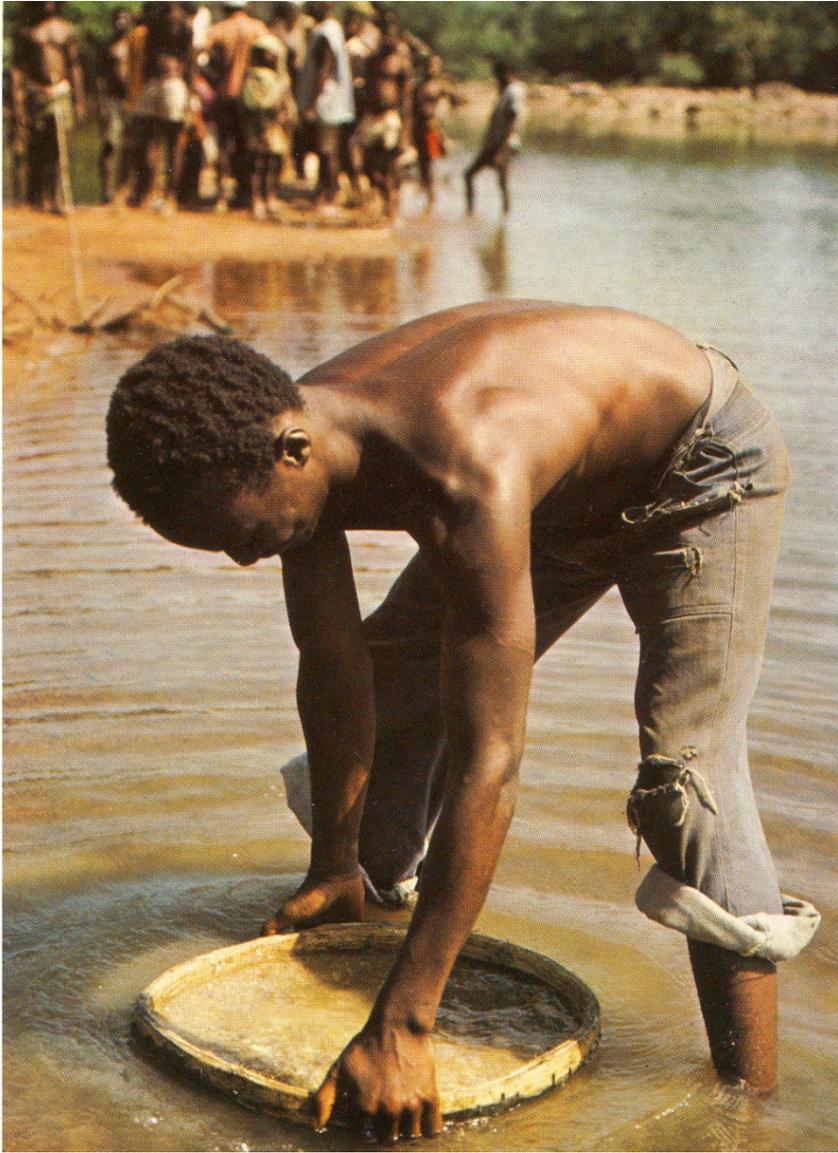
- Alluvial prospecting is done in streams & rivers.
- Alluvium is the material moved by streams and rivers.
- Water can transport material for great distances down the water's course

# Drainage of River Systems USA



# River Basins





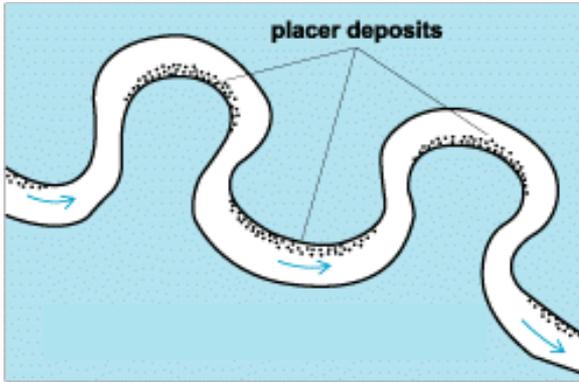
# Diamond Octahedron



# Placers

- Gems and precious metals usually accumulate in placer deposit because of their specific gravity ( $G$ ).
- Placers form on the inside bend in a river as water slows on a curve.
- Rivers change their course, old channels are abandoned and covered. Some placers are thus not in the river any more.

# Meandering Stream





# 1.8 Billion year old pebbles and diamond



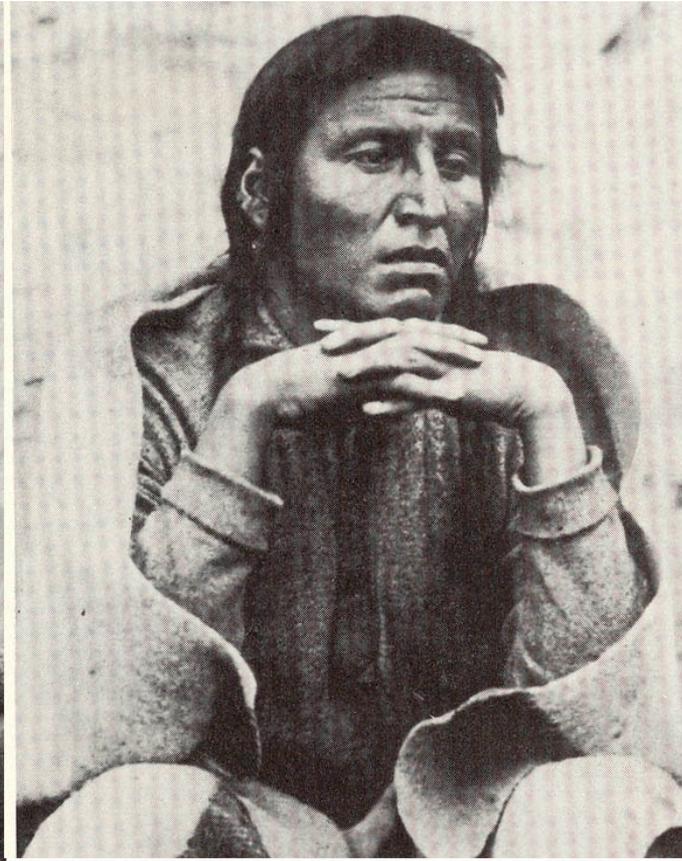
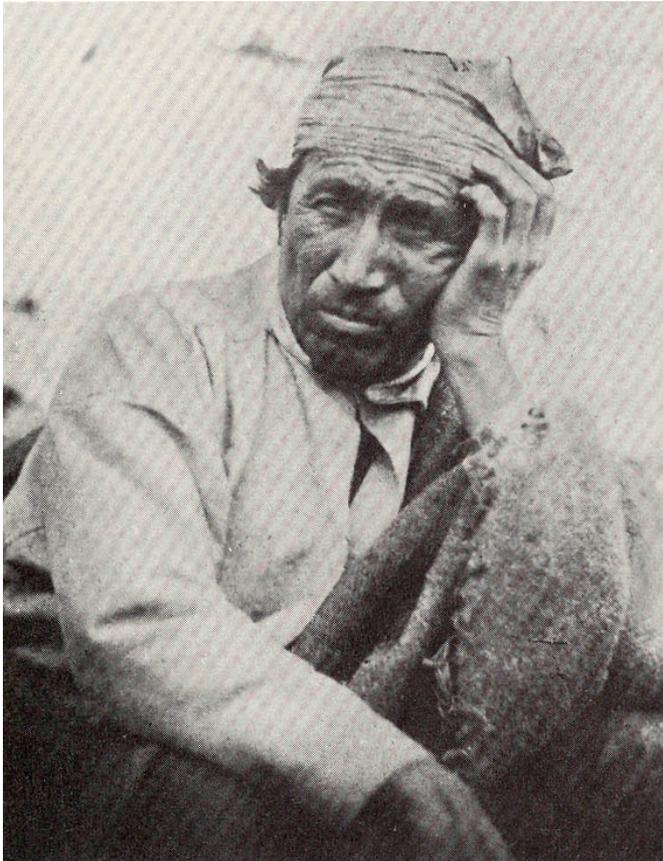


# You May Need to Dig



# The consequence may be negative for the environment.

- Your neighbors may not like you.



You might strike it rich!



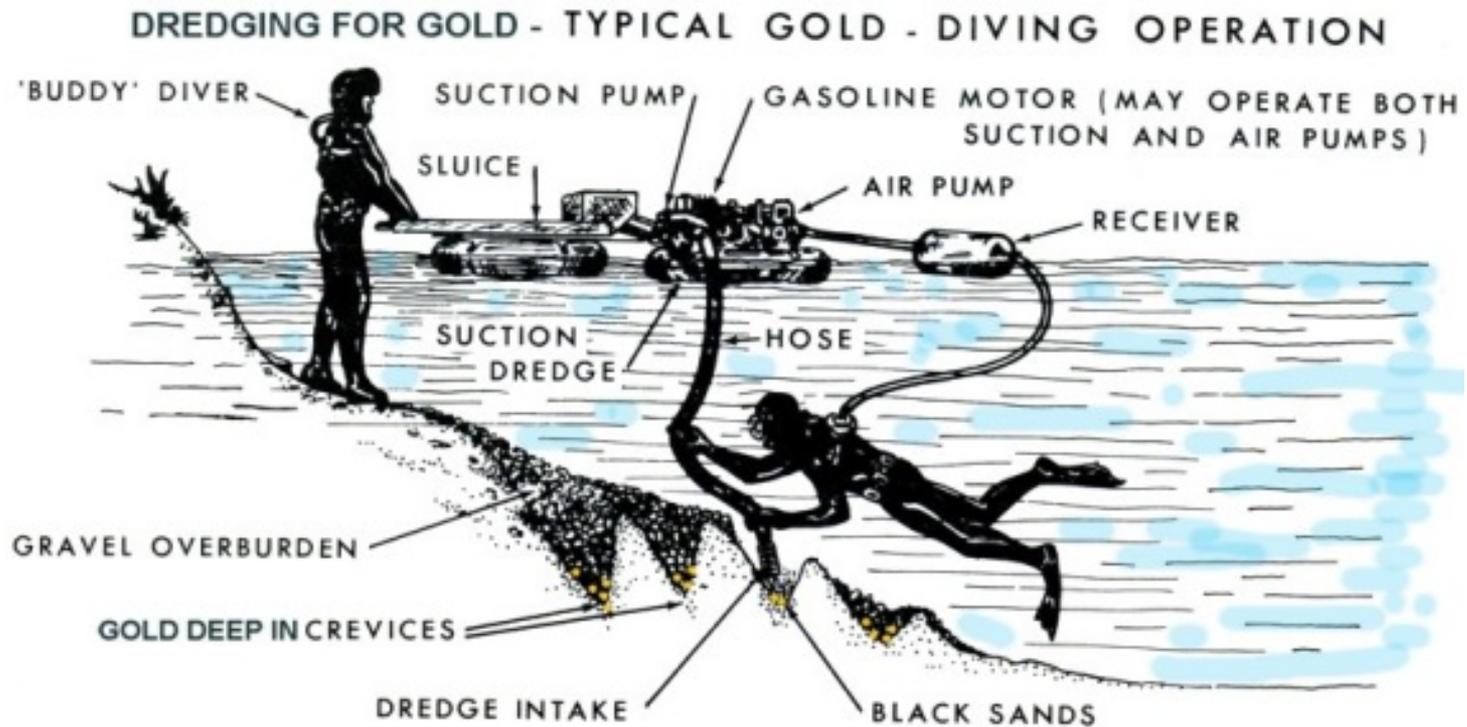


# Dredging

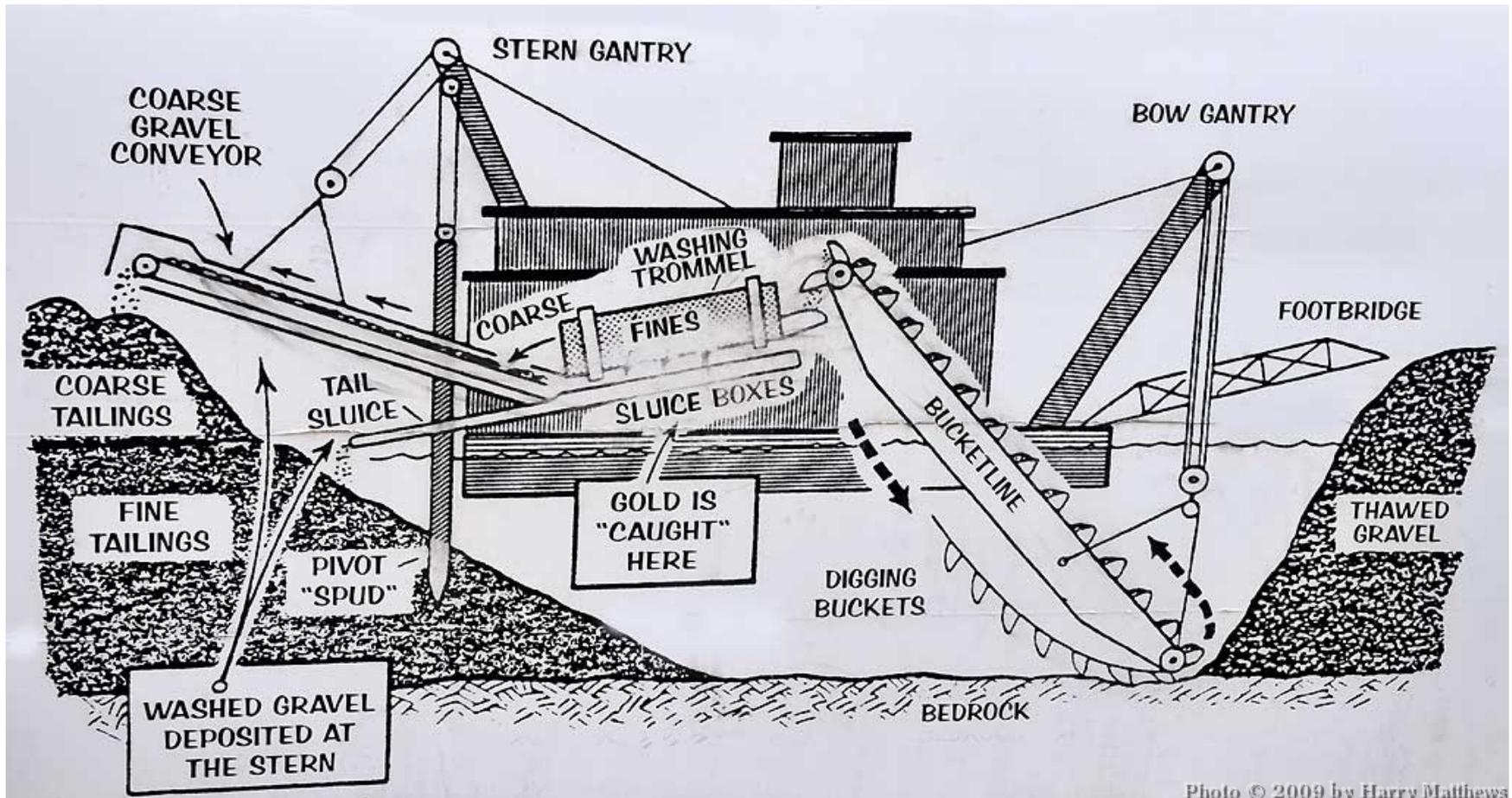
- Valuable minerals can settle and be covered by rocks. Dredges move rocks on the bottom.



# Dredge underwater portion (probably at a placer)



# Dredge Diagram



# Sluicing

- When you dredge up gravel, you run it through a screen to stop the large pieces.
- A sluice is then used. It catches the heavy gold and allows lighter quartz, etc. to wash away.







- This all-plastic sluice box features an aggressive riffle design that is extremely efficient on fine gold. The flared riffle design causes the water flow to slow as it passes through the sluice, resulting in optimum recovery characteristics. An ideal sluice for times when weight must be kept to a minimum. Size 12" x 48".



# A big sluice







# Rounded and water worn



# Open Pit Mining



# Open pit exposing diamond gravel



# Oranjemund diamond mine S.



# Miners Search for Ore

- A rock containing valuable minerals



# Ore may not be obvious

- Not all ore is high grade
- Sometimes nothing of value is visible
- You may still be sitting on a fortune
- Geochemical testing and an understand of what rock could potentially have ore are important for exploration

# CYANIDE HEAP LEACH MINING

1 The ore is dug out of the pit by blasting and crane shovels. Some of these pits are so large that when fully excavated they are more than 300 metres across and 1.5 km deep.

2 Approximately 200 tons of rock will yield 1 ounce of gold. Huge piles of waste rock can leach toxic metals and acids.

200 tons waste rock

40 tons ore

1 ounce of gold

WASTE ROCK

PIT

3 The ore is driven to the top of the pit and dumped on open heaps, and flattened out by a bulldozer.

4 A weak cyanide solution is sprinkled on top of the heap and seeps through the pile, leaching the gold out of the ore.

HEAP

HEAP

MAKEUP TANK

7 Once the gold is extracted, the cyanide solution returns to the makeup tank to be reused.

DAM

DAM

DAM

5 The gold-bearing cyanide, called the 'pregnant solution' reaches a sloping rubber pad under the heap and runs into dams and from there runs into a rubber lined reservoir.

PREGNANT SOLUTION RESERVOIR

6 The pregnant solution is pumped into the processing plant.

PROCESSING PLANT

8 After purification, the gold is poured into molds to make bars and traded. More than 80% of gold is used in jewellery, the rest is bought by investors or used in electronics.



# Cyanide disaster Baia Mare, northern Romania, Feb. 2000



## Spread of the Cyanide Spill, 2000

- 1 30 January  
Cyanide spill occurs at Baia Mare, Romania
- 2 1 February  
Spill plume reaches Romanian-Hungarian border
- 3 5 February  
Cyanide registers in tests at Tiszalök
- 4 9 February  
Spill plume reaches Szolnok
- 5 11 February  
Crosses the Hungarian-Yugoslavian border
- 6 13 February  
Plume reaches Belgrade, (Perlez), Yugoslavia
- 7 15 February  
It meets the Romanian border again, at Ram
- 8 17 February  
Cyanide shows up in tests at Iron Gate, Romania
- 9 25-28 February  
The plume reaches the Danube Delta



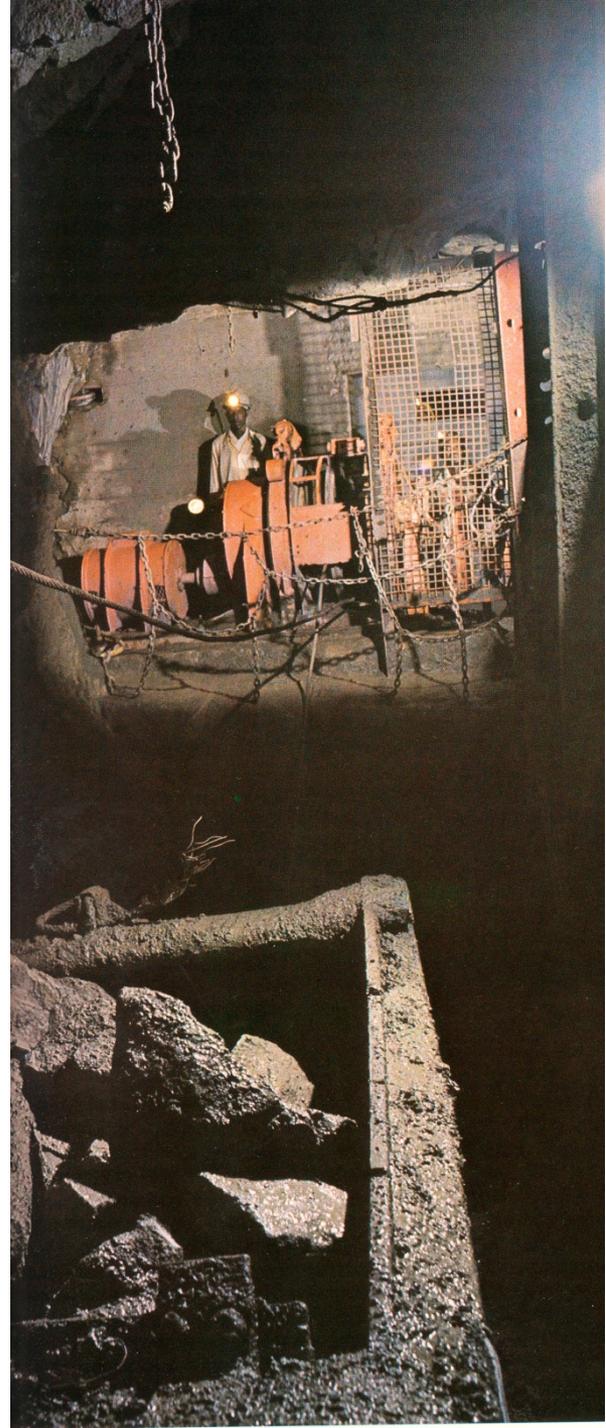
Illustration by Christina Nicholas

# Underground Mining

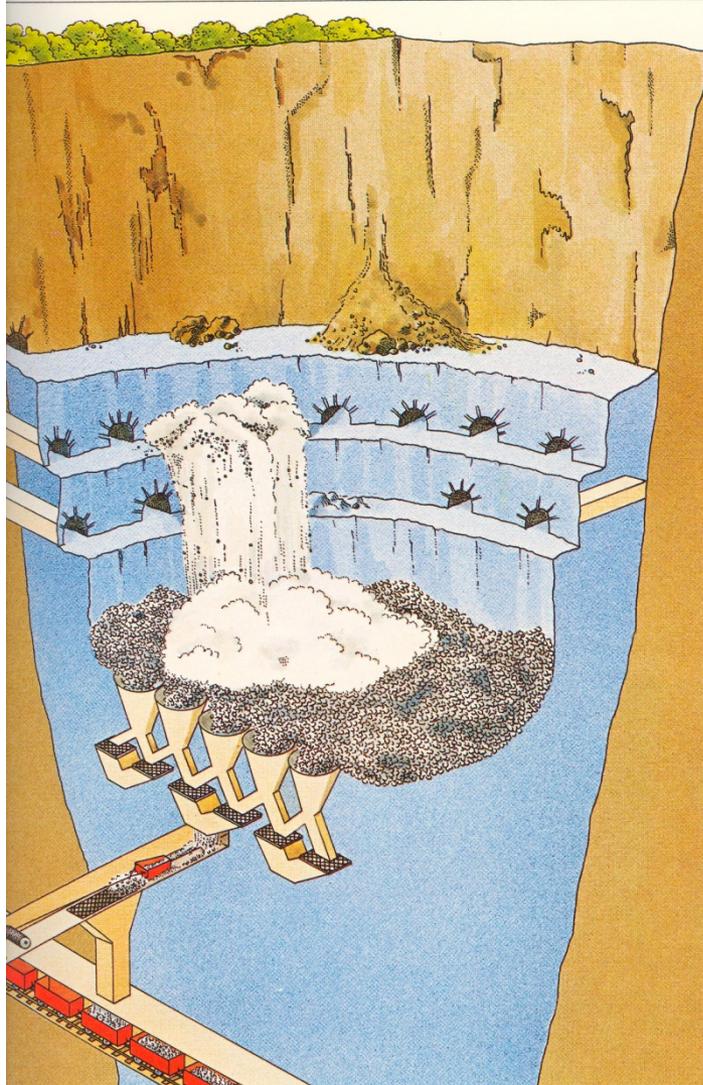


# Dangers

- Mine Collapse
- Rock blasts
- Suffocation
- Heat exhaustion
- Silicosis
- flooding



# Why underground?



# Getting the ore

