

# Mining



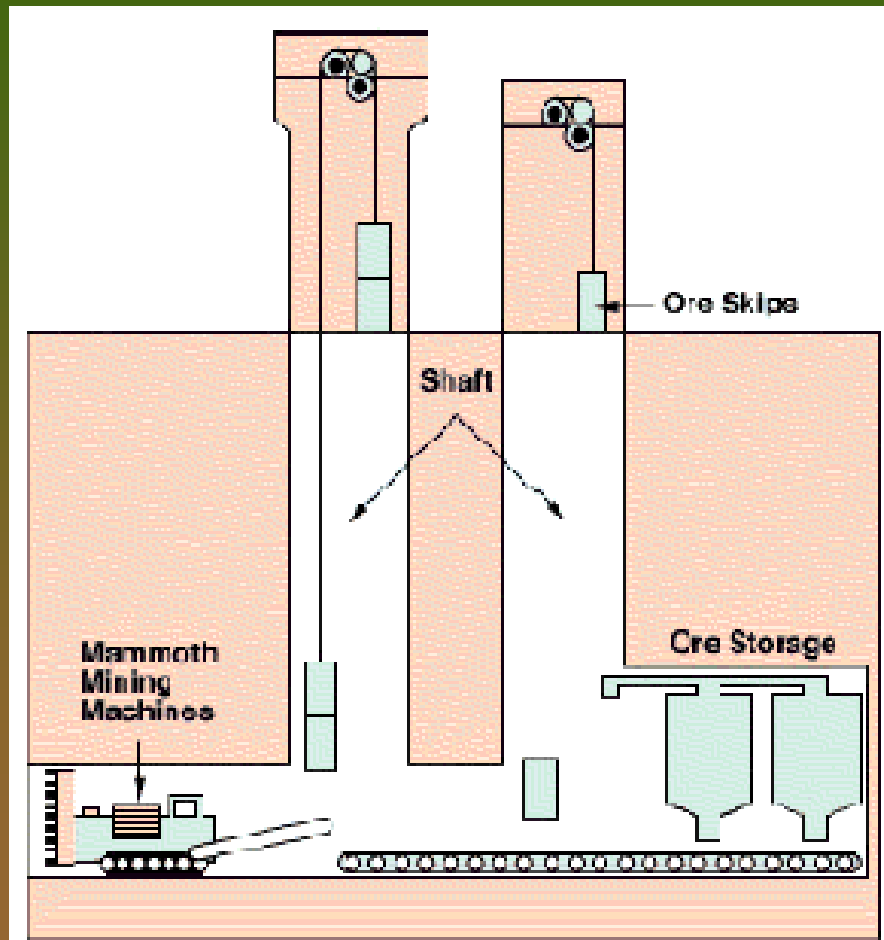
# I. General Info on Minerals

- Nonrenewable
- Energy Source: Uranium, shale, fossil fuels
- Building materials: metal vs. nonmetal
- Jewlery
- Technology
- Examples: silicon, gold, iron, copper, clay, gypsum, salt

## II. How Do You Locate Minerals?

- Aerial photos can aid in the location of particular minerals
- Particular machines can detect changes in the earth's magnetic field when close to metallic mineral resources

# III. Subsurface mining



Definition - A deep vertical shaft is dug, then subsurface tunnels and chambers are blasted to get to the deposit and haul the coal or ore to the surface.

# IV. Surface mining

- Definition- Mechanized equipment strips away the overburden of soil and rock (spoil) and usually discards it.



# Surface Mining Methods

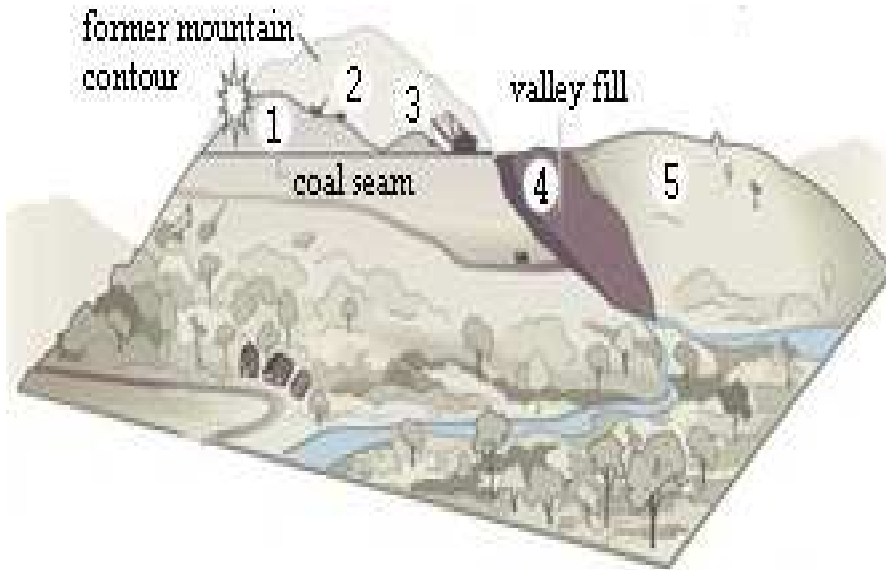
- Open-pit mining (placer “plasser” mining)
- Placer Mining (using a lot of water to extract out minerals. i.e. Gold)
- Strip mining
- Mountaintop removal

# A. Open-pit mining

- Definition- Machines dig holes and remove ores such as iron and copper.



## B. Surface Mining Examples



- Mountaintop Removal



Placer gold winning at Ilavojoki, near Kuttala, in 1888. Photo: Eero Saari, GTK.

- Placer Mining

## C. Strip mining (area strip mining)

- Definition- Same application as surface mining in which bulldozers, power shovels, or stripping wheels remove the overburden in strips.

# Strip Mining

- Flat vs. Contour Strip Mining is dependent upon the topography of the area. Strip mining is common in coal mining in the Appalachian region.

# V. Depletion Time

- The time it takes to use up a certain proportion (usually 80%) of the reserves of a mineral at a given rate of use. Some minerals will become economically depleted where the costs of extracting outweigh the cost of the return.

# Depletion Curve

# VI. Effect of Government Control

- Governments usually provide mining companies subsidization to promote economic growth and national security. This subsidization ultimately comes from the taxpayers. Often, consumers do not lower their consumption since the prices are artificially set low, so this increases the depletion time.

## VII. Effects Of Mining

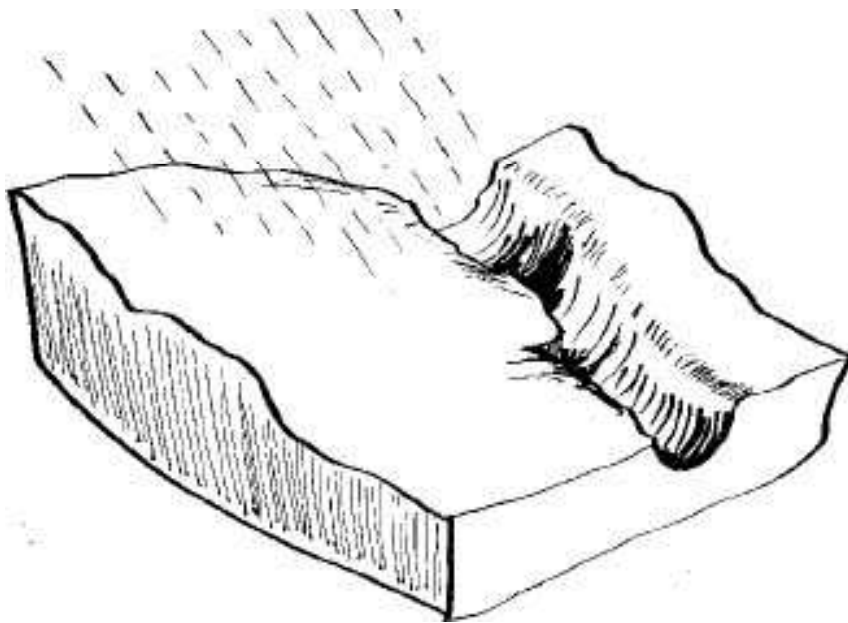
- Mining companies can use **cyanide heap leaching**: a process that is effective in removing the spoil from gold ore.  
Drawback: extremely hazardous and can contaminate nearby water sources.  
Colorado had problems with a Canadian mining company using this method many years ago and then abandoning the area along with the wastes.

# Effects of Mining

- Subsidence
- Air Pollution: Burning of Fossil Fuels to extract minerals, particulates from the extraction process
- Soil Erosion: Sheet, Rill, and gully. This can lead to further environmental problems like loss of biodiversity and desertification.

# Soil Erosion

**Gully**



**Sheet**



## VIII. Solutions

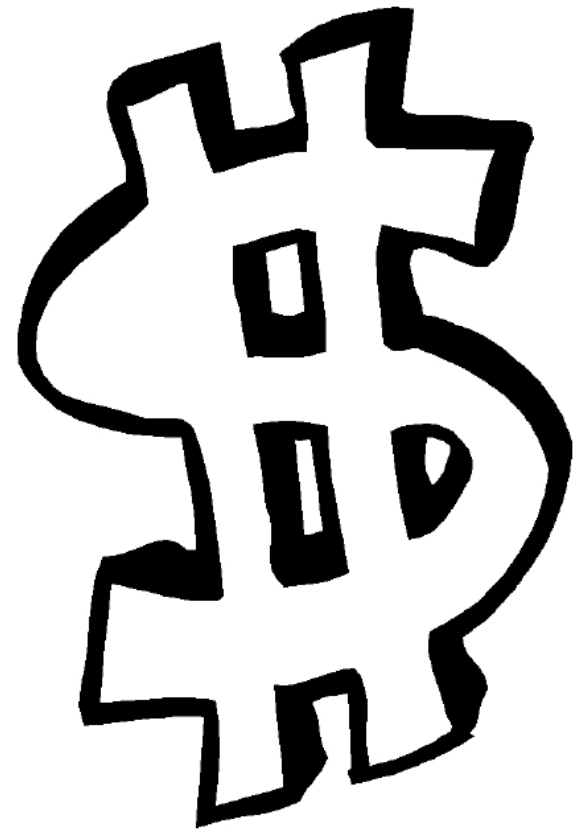
- Force Mining companies to pay for hazardous wastes
- Mining Incentives for more environmentally friendly practices
- Government will only rent land to mining companies to increase control.
- Reduce, Reuse, Recycle to minimize the amount of mining.
- Use of microbes to digest the spoil
- Mining the Ocean Floor

# Legislation

- 1872 Mining Law - Says that a person or corporation can assume legal ownership of any public land, not classified as wilderness or park, simply by patenting it. They then have to pay a fee of \$2.50-\$5.00 per acre and they have to improve the land by \$500.
- The law has been altered slightly so that it makes it harder to mine the land, and the fees are higher, but the environmental damage is still done.

# Legislation Cont'd

- In 1993 the Manville Corporation paid \$10,000 for federal land in Montana that contains an estimated \$32 billion of platinum and other precious metals.



# Legislation

- CERCLA (Comprehensive Environmental Response, Compensation & Liability Act) enacted in 1980 taxed petroleum and chemical industries to clean up hazardous waste sites. This act will target preexisting sites that have been left abandoned

# Legislation

- RCRA (Resource Conservation & Recovery Act) is also known as the cradle-to-grave act. This act sets standards to existing sites and they must be responsible for the treatment of hazardous waste from the creation, to transport, to disposal of.

# Possible Legislation

- Future legislation may require mining companies to pay an eight percent royalty on the metal they extract, create a fund for abandoned mine cleanup, implement specific reclamation standards, prohibit mines that would require perpetual water treatment and put treasured places off-limits to mining.