

AIM: How do we find and remove mineral resources?

MINERAL RESOURCES	
<p><u>Identified</u> - known location and quantity</p> <p><u>Reserves</u> - identified resources that can be extracted</p>	<p><u>Undiscovered</u> -</p> <p>potential supplies assumed to exist</p>

TYPES OF MINERAL RESOURCES		
<u>Energy Resources</u>	<u>Nonmetallic Resources</u>	<u>Metallic Resources</u>
<ol style="list-style-type: none"> 1. coal 2. oil 3. natural gas 4. uranium 	<ol style="list-style-type: none"> 1. building stone granite, limestone, marble, slate 2. sand and gravel construction 3. clay cement, bricks, pottery 4. salt road deicer, food additive 5. gypsum plaster, wallboard, fertilizer 6. phosphates fertilizers 	<p>ores– metal-yielding minerals or rocks mined for economic value</p> <ol style="list-style-type: none"> 1. copper (chalcopyrite) - construction, electronics 2. iron (magnetite, hematite) - steel production 3. aluminum (bauxite) - transportation - food and beverage packaging - construction

TYPES OF MINES

subsurface - drilling vertically to create underground access tunnels

surface - top layers of soil & rock (**overburden**) are removed to access minerals

- **spoils** - waste material removed from area being mined

open-pit mining

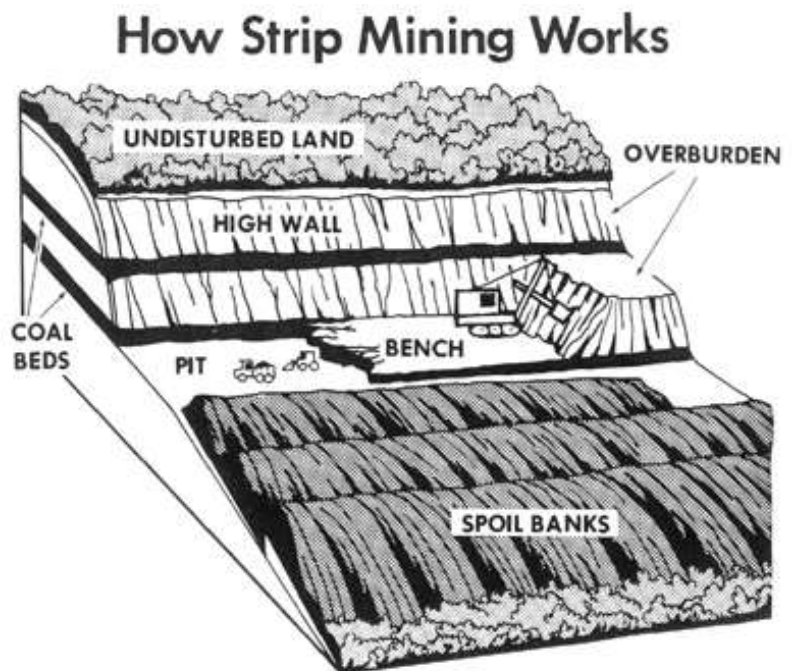
- large hole is dug to extract minerals
- ex. copper and iron

strip mining

- overburden and minerals removed in strips or sections
- ex. coal and phosphates

mountaintop removal

- removal of mountaintop or ridgeline using explosives and heavy machinery



Strip mining operations begin with the clearing of trees, brush and topsoil, called the "overburden," by bulldozers or power shovels. Explosive charges loosen the coal deposits, and power shovels or auger drills remove the mineral and load it into trucks in the stripping pit. Strip mining exposes cross-sections of the earth's crust, called "highwalls," and the discarded overburden is piled in long rows called "spoil banks." There are two basic kinds of strip mining: "area" stripping, which is conducted on flat or rolling terrain, and "contour" stripping, done in hilly or mountainous areas.

NEGATIVE EFFECTS OF MINING

1. disrupts great amounts of surface ecosystems (trees, vegetation, and soils are all removed)
2. increased soil erosion (loose soil from spoils can be picked up by wind and water)
3. altered stream drainage → flooding (landform shapes change, dumping of spoils change landscape)
4. machinery energy use → air pollution (burning of fossil fuels and other particulate matter)
5. surface and groundwater pollution rainwater contacts mine waste (from runoff and percolating water – toxins leach downward)
 - **tailings** - leftover material after ore has been extracted
6. acid mine drainage – subsurface rocks exposed to air and water → sulfuric acid
7. processing of ore
 - smelting** produces sulfur dioxide (acid rain)

heap-leach extraction

– chemical process to separate metal from rock → water contamination

8. subsurface - dangerous
 - chronic health effects
 - CWP - coal-workers pneumoconiosis (black lung)
 - COPD - chronic obstructive pulmonary disease
 - hypertension
 - kidney disease

MINING LAWS AND REGULATIONS

1. **National Environmental Policy Act of 1970 (NEPA)**
 - Environmental Impact Statement (EIS) must be created before mining is approved
2. **Surface Mining Control and Reclamation Act of 1977**
 - regulate active mines
 - mine reclamation - restoration of mined land to a natural state
 - established OSM (Office of Surface Mining)
3. **Environmental Performance Bonds & Pollution Prevention Bonds** (upfront insurance payments)
 - hold mining companies legally and financially responsible for environmental clean-up / restoration