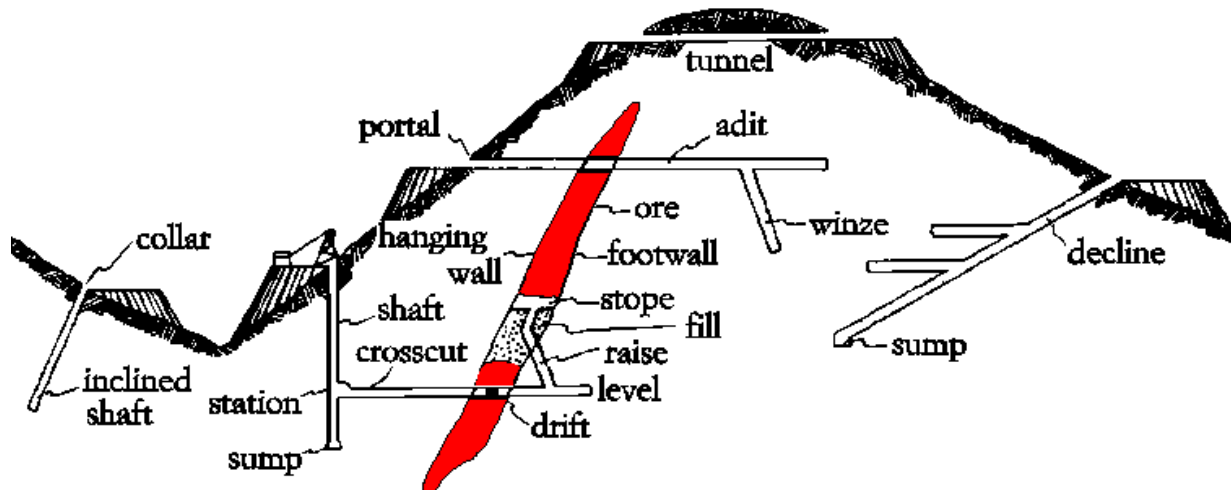


Mining Terminology

There are many terms and expressions unique to mining that characterize the field and identify the user of such terms as a “mining person.” The student of mining is thus advised to become familiar with all the terms used in mining, particularly those that are peculiar to either mines or minerals. Some general terms are best defined at the outset; these are outlined here. For a complete list of mining terminology, see a standard reference (Gregory, 1980; American Geological Institute, 1997). The following three terms are closely related:

- Mine: an excavation made in the earth to extract minerals
- Mining: the activity, occupation, and industry concerned with the extraction of minerals
- Mining engineering: the practice of applying engineering principles to the development, planning, operation, closure, and reclamation of mines



Some terms distinguish various types of mined minerals. Geologically, one can distinguish the following mineral categories:

- *Mineral: a naturally occurring inorganic element or compound having an orderly internal structure and a characteristic chemical composition, crystal form, and physical properties.*
- *Rock: any naturally formed aggregate of one or more types of mineral particles* Economic differences in the nature of mineral deposits is evident in the following terms:
 - ❖ *Ore: a mineral deposit that has sufficient utility and value to be mined at a profit.*
 - ❖ *Gangue: the valueless mineral particles within an ore deposit that must be discarded.*
 - ❖ *Waste: the material associated with an ore deposit that must be mined to get at the ore and must then be discarded. Gangue is a particular type of waste.*

A further subdivision of the types of minerals mined by humankind is also common. These terms are often used in the industry to differentiate between the fuels, metals, and non-metallic minerals. The following are the most common terms used in this differentiation:

- ❑ *Metallic ores: those ores of the ferrous metals (iron, manganese, molybdenum, and tungsten), the base metals (copper, lead, zinc, and tin), the precious metals (gold, silver, the platinum group metals), and the radioactive minerals (uranium, thorium, and radium).*
- ❑ *Non-metallic minerals (also known as industrial minerals): the nonfuel mineral ores that are not associated with the production of metals. These include phosphate, potash, halite, trona, sand, gravel, limestone, sulfur, and many others.*
- ❑ *Fossil fuels (also known as mineral fuels): the organic mineral substances that can be utilized as fuels, such as coal, petroleum, natural gas, coal bed methane, gilsonite, and tar sands.*

Types of Mining

➤ Surface Mining: If the excavation used for mining is entirely open or operated from the surface, it is termed a surface mine.

- Open Pit Mining: Massive stock-work deposits –gold, copper etc.
- Strip Mining: Bedded deposits –coal, phosphates etc.
- Quarry Mining: aggregates, marble, granite etc.
- Placer Mining: minerals in alluvium –Gold, Titanium etc.
- Solution Mining: For any mineral that is in or may be transported in a liquid state oil, copper, sulphur, uranium, salt etc.

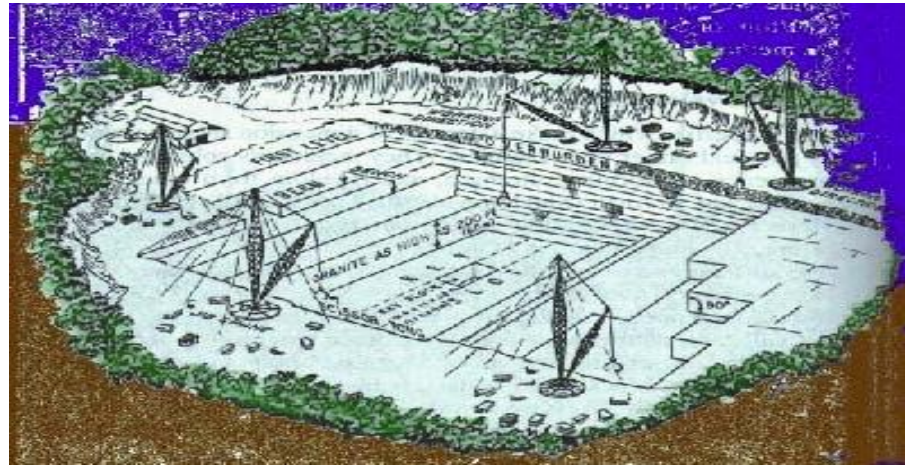
➤ Underground Mining: If the excavation consists of openings for human entry below the earth's surface, it is called an underground mine.

- Conventional Mining: Large veins or massive deposits.
- Continuous Mining: Vein and bedded deposits.

Some Examples for Surface Mining or Open Cast Mining or Strip Mining



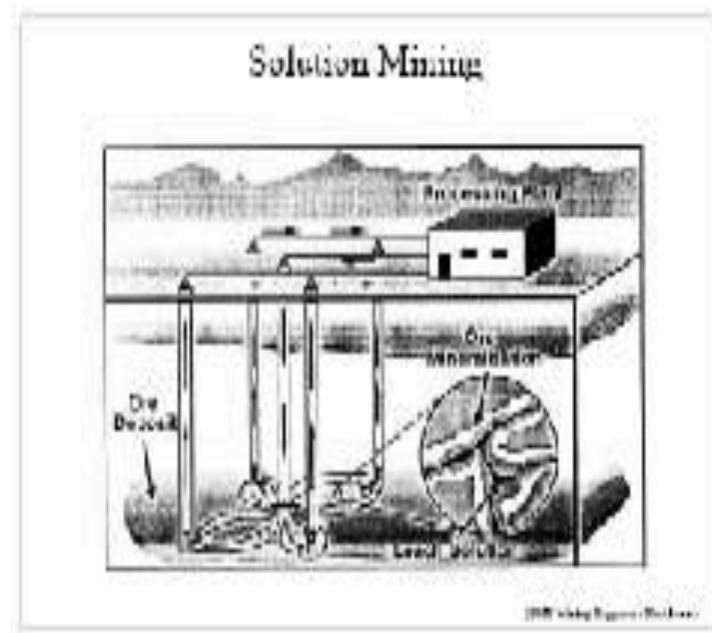
Quarry Mining



Placer Mining

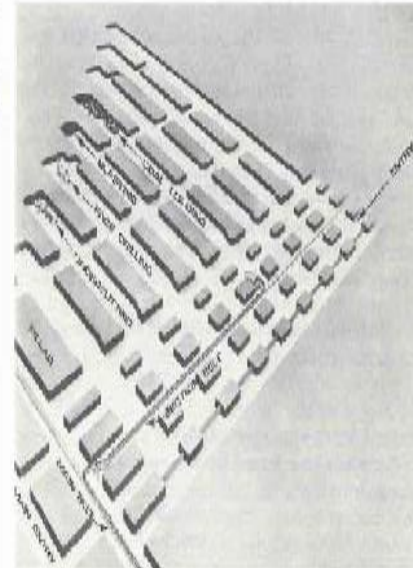
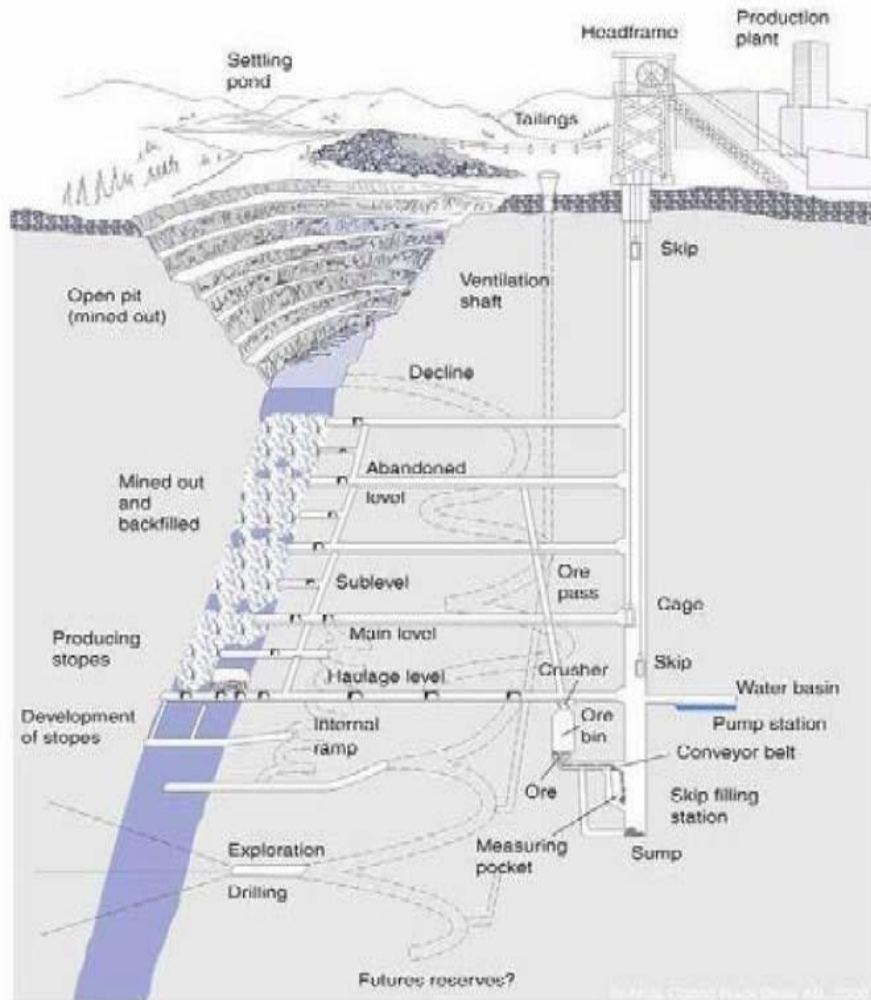


Solution Mining

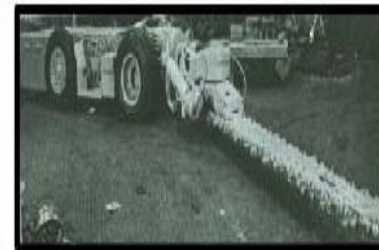


Underground Mining Examples

Conventional Mining

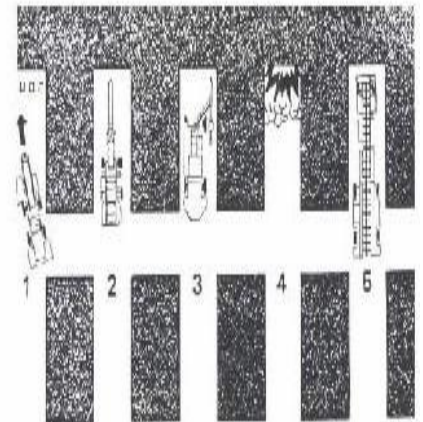


Conventional mining method. Courtesy: Joy Manufacturing Co.

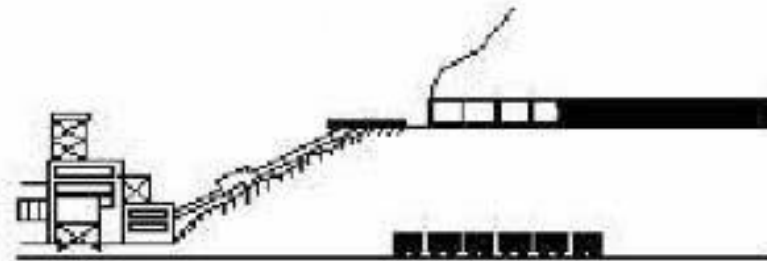


Mining Cycle:

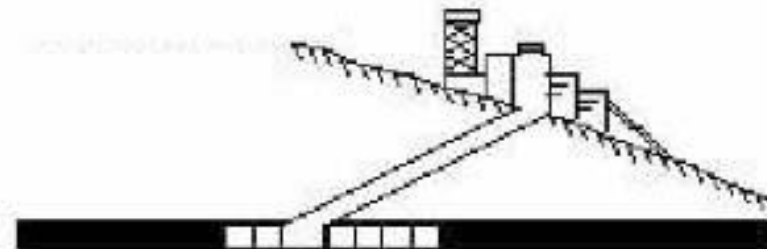
1. Roof bolting
2. Undercutting
3. Drilling
4. Blasting
5. Loading



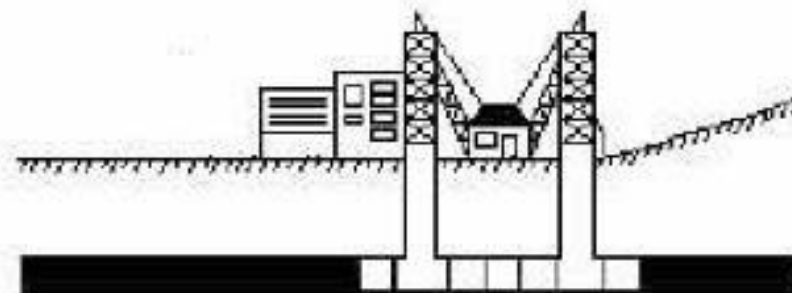
Types of Underground Coal Mining by Access



Slope Mine



Drift Mine



Shaft Mine

Important Terms of Mining:

Bench: is a ledge which forms a single level of operation where ore and waste are excavated.

Berm: is a horizontal shelf or ledge built in to a sloping wall of an open pit or quarry for protection under level.

High Wall: is an unexcavated face or slope of rock between benches.

Overburden: is non-valuable minerals above ore which must be removed to extract the ore.

Pit Limit: is the maximum vertical and lateral extent which may be excavated economically in an open pit mine.

Pit Slope: is the angle from the horizontal which the wall of a open pit stands as measured from crest to toe.

Spoil: is the overburden or non-ore material removed in gaining access to the ore.

Stripping: is the removal of overburden.

Stripping Ratio: is the ratio of a unit of waste material removed per similar unit of ore material removed.

Toe: is the base of a bank bench or a slope.

Waste Dump: is a place where waste materials are piled.

Adit: A horizontal or nearly horizontal passage driven into a hill or mountain. It does not go completely through the hill or mountain.

Apex: The upper most terminal edge of the vein on the surface or its nearest point to the surface.

Collar: The support devices around the opening or top of a shaft.

Country Rock: Rock in which the ore deposit is enclosed.

Crosscut: A horizontal opening driven across the course of a vein structure.

Decline: A slightly inclined opening which usually starts at the surface. It may be traveled by foot or rubber wheeled vehicle.

Draw Point: A rock loading station which is at the bottom of a vertical or sub-vertical opening.

Drift: A horizontal opening which starts from another horizontal opening such as a adit or tunnel.

Dump: A pile of waste rock from a mine.

Entry: A horizontal opening in a bedded mineral deposit (ex. coal).

Face: The rock surface which excavation techniques are being performed upon to advance a horizontal opening.

Float: Loose pieces of ore which have weathered and moved from an outcrop.

Foot Wall: The wall rock under a vein or bedded deposit. This applies to a non-vertical vein.

Gangue: Non-valuable minerals which are associated with the valuable minerals. The ore is made up of both of these.

Hanging Wall: The wall rock on the upper side of an inclined vein or bedded deposit.

Head frame: A structure above a shaft used to house cable guiding systems and rock transferring systems.

Level: All of the horizontal openings which connect to a shaft at a specific point.

Outcrop: The part of a mineral deposit which intercepts the surface.

Pillar: A mass of ore or waste not excavated for the purpose of ground support.

Portal: The supporting structures at the entry point of a tunnel, adit or decline.

Raise: A vertical or inclined opening driven upward from a level or other horizontal openings.

Ramp: An inclined rubber wheeled access opening between horizontal openings at different elevations.

Shaft: A vertical or steeply inclined excavation extending downward from the surface.

Shoot: A device for loading ore and waste rock into a haulage device from a vertical opening.

Stope: An underground opening from which ore has been excavated.

Sub-Level: A set of horizontal openings immediately above the main horizontal access openings.

Sump: An excavation for the purpose of collecting water so that it may be transferred to a pump. This often is the bottom most portion of a shaft.

Tailings: Any material that has been through a mineral processing plant and has been rejected as waste.

Tunnel: A horizontal or nearly horizontal opening which intercepts the surface at two points.

Vein: A mineralized zone having a tabular form. Its depth and length are much greater than its width. Often the zone is steeply dipping.

Waste: The barren rock in a mine which is too low grade to be of economic value.

Winze: A vertical or sub-vertical opening that is driven downward from a horizontal opening.

The Life Of A Mining Term

The overall sequence of activities in modern mining is often compared with the five stages in the life of a mine: *prospecting, exploration, development, exploitation, and reclamation*. *Prospecting and exploration, precursors to actual mining*, are linked and sometimes combined. Geologists and mining engineers often share responsibility for these two stages—geologists more involved with the former, mining engineers more with the latter. Likewise, development and exploitation are closely related stages; they are usually considered to constitute mining proper and are the main province of the mining engineer. Reclamation has been added to these stages since the first edition, to reflect the times. Closure and reclamation of the mine site has become a necessary part of the mine life cycle because of the demands of society for a cleaner environment and stricter laws regulating the abandonment of a mine. The overall process of developing a mine with the future uses of the land in mind is termed *sustainable development*. *This concept was defined in a book entitled Our Common Future* (World Commission on Environment and Development, 1987) as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”