Definition: mining from Collins English Dictionary

n
1 the act, process, or industry of extracting coal, ores, etc, from the earth

2 military the process of laying mines

Summary Article: mining From The Columbia Encyclopedia

extraction of solid mineral resources from the earth. These resources include ores, which contain commercially valuable amounts of metals, such as iron and aluminum; precious stones, such as diamonds; building stones, such as granite; and solid fuels, such as coal and oil shale. The search for and discovery of mineral deposits is called prospecting, or exploration. When a mineral deposit is found, it is studied to determine if it can be mined profitably. If so, the deposit can be worked or extracted by a variety of mining methods.

Surface Mining Methods
Strip mining (see coal mining), open-pit (or open-cut) mining, and quarrying are the most common mining methods that start from the earth's surface and maintain exposure to the surface throughout the extraction period. The excavation usually has stepped, or benched, side slopes and can reach depths as low as 1,500 ft (460 m). In strip mining, the soft overburden, or waste soil, overlying the ore or coal is easily removed. In open-pit mining the barren rock material over the ore body normally requires drilling and blasting to break it up for removal. A typical mining cycle consists of drilling holes into the rock in a pattern, loading the holes with explosives, or blasting agents, and blasting the rock in order to break it into a size suitable for loading and hauling to the mill, concentrator, or treatment plant. There the metals or other desired substances are extracted from the rocks (see metallurgy).

Underground Mining Methods
Under certain circumstances surface mining can become prohibitively expensive and underground mining may be considered. A major factor in the decision to operate by underground mining rather than surface mining is the strip ratio, or the number of units of waste material in a surface mine that must be removed in order to extract one unit of ore. Once this ratio becomes large, surface mining is no longer attractive. The objective of underground mining is to extract the ore below the surface of the earth safely, economically, and with as little waste as possible. The entry from the surface to an underground mine may be through an adit, or horizontal tunnel, a shaft (see shaft sinking), or vertical tunnel, or a declined shaft. A typical underground mine has a number of roughly horizontal levels at various depths below the surface, and these spread out from the access to the surface. Ore is mined in stopes, or rooms. Material left in place to support the ceiling is called a pillar and can sometimes be recovered afterward. A vertical internal connection between two levels of a mine is called a winze if it was made by driving downward and a raise if it was made by driving upward.

A modern underground mine is a highly mechanized operation requiring little work with pick and shovel. Rubber-tired vehicles, rail haulage, and multiple drill units are commonplace. In order to protect miners
and their equipment much attention is paid to mine safety. Mine ventilation provides fresh air underground and at the same time removes noxious gases as well as dangerous dusts that might cause lung disease, e.g., silicosis. Roof support is accomplished with timber, concrete, or steel supports or, most commonly, with roof bolts, which are long steel rods used to bind the exposed roof surface to the rock behind it.

Other Methods
Although surface and underground mining are the most common techniques, there are a number of other mining methods. In solution mining the valuable mineral is brought into a liquid solution by some chemical or bacteria. The resultant liquid is pumped to the surface, where the mineral or metal is taken out of solution by precipitation or by ion exchange (e.g., the Frasch process). In glory-hole mining a steep-sided, funnel-shaped surface excavation is connected to tunnels below it. Rocks blasted off the sides of the excavation fall into the tunnels, from which they are then removed. Gopher mining is an old-fashioned method still used in very small mines. Narrow, small holes are driven in order to extract the ore (e.g., gold) as cheaply as possible. In placer mining no excavation is involved; instead, gravel, sand, or talus (rock debris) is removed from deposits by hand, hydraulic nozzles, or dredging. The ore is separated from the waste by panning or sluicing.

Environmental and Legal Concerns
Associated with mining are many environmental concerns. Large-scale excavation is often necessary to extract a small amount of ore. Ore extraction disrupts the topsoil and can displace local animals and plants, and sometimes native human populations. Runoff can contaminate nearby water sources with pollutants such as the mercury and sodium cyanide used in gold mining. Waste materials and smelters can cause sulfurous dust clouds that result in acid rain. Abandoned strip mines have often been used as unregulated landfills for hazardous wastes. Several pieces of legislation in the United States, the Surface Mining Control and Reclamation Act (1977) and the Comprehensive Environmental Response, Compensation, and Liability Act, or Superfund Act (1986), address these issues, but enforcement has been difficult.

Another act that affects mining in the United States is the 1872 Mining Act. This now controversial act, which was originally designed to encourage settlement of the West, allows mining companies to purchase land for $2.50 per acre. In the late 20th cent., despite many efforts at reform, the law and the $2.50 per acre price still stood, despite the fact that the ore contained in the land could be worth billions of dollars.

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