ORESOME RESOURCES
Minerals and Energy Education

An overview of Underground Mining

What is underground mining?

Every day millions of items are used that have been made from minerals. From an iPod to computers to electric cars these items are made by mining and processing minerals into metals and other materials.

Underground mining is one method used to extract these minerals from the earth.

Where the ore is too deep for open-cut or strip mining, an underground mine is built. Entry to the mine is via a tunnel called a decline. This allows access to vehicles such as trucks or a mine railway to the underground mineralised area. Alternatively a lift or 'cage' can be used to transport miners and equipment to the various levels underground.

How is equipment maintained?

Large workrooms are blasted out of the rock underground and as much maintenance of equipment as possible is conducted in these underground workshops. Miners' lunch rooms can also be carved out of the rock.

What is stope mining?

In hard rock mining used to extract ores such as copper, silver, lead and zinc, stope mining is used. Stopes are large openings or rooms connected by tunnels in which miners drill and blast the ore. A pillar or wall of ore is left in place between each stope to prevent the mine from collapsing. After each blast the material is removed using in a number of cases remote controlled vehicles or boggers. After mining this area can be filled with waste rock or tailings which is the waste material left behind after processing minerals. The ore can be either crushed underground or transported out of the mine by conveyor belts and trains for processing on the surface.

What is block caving?

Block caving is used when mining low grade ore bodies underground. It involves an underground tunnel leading to draw points where the overlying rock, broken by gravity or helped along by drilling more or less flows to a number of draw points, where it is gathered and taken away for processing.

How is coal mined underground?

Coal is mined underground using a type of stope mining referred to as the room and pillar mining, which involves building tunnels in the coal seam to form roadways. These are then connected into each other to form rooms in a square or rectangular pattern. Pillars of coal are left behind to support the roof of the mine. These can be be extracted at a later stage.

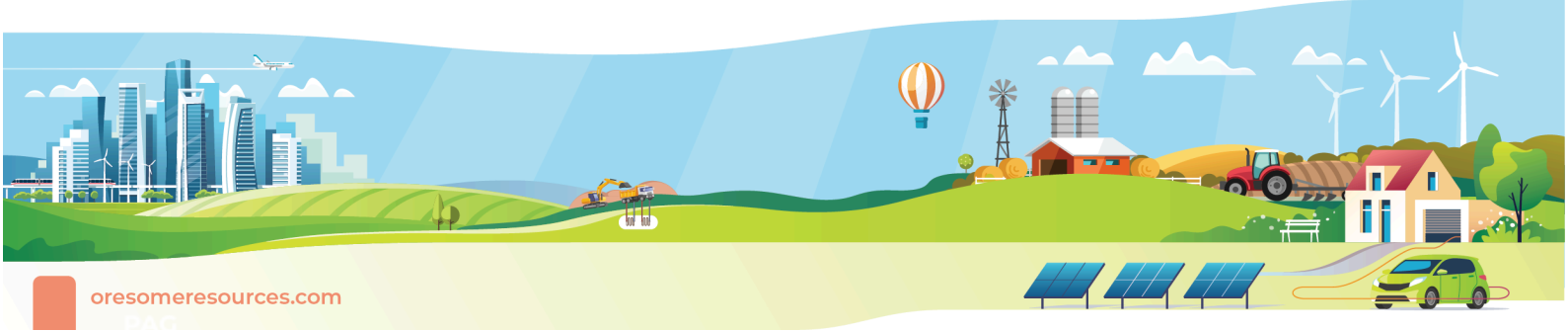
One of the main pieces of equipment used in the room and pillar mining method is a continuous miner, which breaks the coal mechanically by using a long rotating drum which has picks around the outside. Coal is loaded onto shuttle cars and then onto conveyor belts which transport it to the surface.

What is Longwall Mining?

Coal is also more commonly mined using the long wall mining technique, continuous miners are used to prepare the tunnels or roadways for the longwall miners, which can remove large blocks of coal in a single pass or strip.

This technique uses tunnels which are about 1500m long, and 250m apart. To make sure the workers and machines are safe, large hydraulic jacks connected to the long wall miner are used to support the roof around the area where coal is mined.

The unit moves along the coal face allowing the roof over the area behind the face to collapse. After the longwall equipment has mined the 1500m block, it is moved to a new location to start over again. Remote controlled long wall miners are now used in Australian mines.

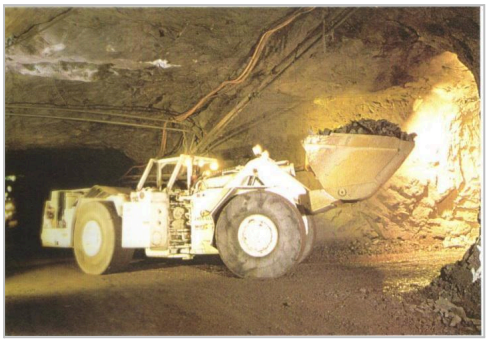


How are the impacts of underground mining managed?

Impact	Steps taken to reduce impacts
Surface areas can be disturbed and land cleared to make way for construction of buildings and processing equipment.	After mining buildings are dismantled and removed to another site and the area is planted with vegetation.
Underground mining can cause land subsidence.	In hard rock mining underground areas are backfilled with waste from the mining operations. Miners submit a plan to the government before mining that details how subsidence will be managed by underground engineering techniques and the re-contouring of disturbed areas.
Waste rock is generated from underground mining.	Waste rock is used to back fill mined areas underground.
Tailings or waste from mineral processing is collected in tailings dams.	Tailings dams can eventually be covered with clay, topsoil and revegetated. Monitoring of the tailings occurs post mining.
Dust is emitted from tailings dams, ore stockpiles and trucks or conveyor belts carrying ore.	Water trucks using recycled water whenever possible are used on mine sites to suppress the dust. These are also used underground. Covered conveyor belts can be used.
Vehicles on mine sites emit greenhouse gases.	Vehicles with more efficient engines that use less fuel can be used.

Links

Find out about careers in open-cut coal mining industry http://www.miningcareers.com.au/



Remote controlled underground bogger
Source: Xstrata Copper

Longwall Mining
Source: Queensland Resources Council