

— *Alberta's Natural Resources* —

MINING

PROCESSES OF MINING

No matter what resources we are mining there are several steps and many people involved. In exploration, mining operations, mine closure and reclamation, there are dozens of experts who work together to ensure safety, success and minimize environmental impact.

Processes of Mining

By definition mining in Alberta (and anywhere) involves removing natural resources buried underground. If you were looking to mine any *minerals* or *ore* from underground, you wouldn't just start digging random holes and hope you might find something. You'd want to know in advance what was below the surface. In **exploration**, geologists and geophysicists are scientists that study the earth and can give detailed information on what, where and how much of each resource is under the ground.

Once you have determined the best place to mine for the resource, plans are created that outline the full cycle of the project, including what the environment will look like after reclamation is complete - often decades later.

Once a plan is in place, the complicated work of **operations** begins. In Alberta, this mainly involves using giant shovels and trucks to mine the coal or bitumen resources underground. Mining operations usually continue until all the ore is mined - at which time mine closure begins.

Closure is about what you'd expect - it is the closing of the mine. Industrial equipment, materials and other infrastructure is removed so that mine reclamation can begin. **Reclamation** involves all the steps required to put the land back to an environmentally functional landscape, this includes the topography, soils, water and vegetation. The reclamation plan that was devised many years before mining is then implemented.



EXPLORATION

From tools like pick axes and compasses, to helicopter seismic surveys, mine geology is critical to finding ore deposits. Geologists, geophysicists, mining engineers and others work collaboratively to explore for minerals deep underground. Since we can't see underground, sound waves (through seismic surveys) and rock core samples are used to explore for minerals. It is important for these scientists to be precise in their measurements and the creation of geological and mining models, since mining companies want to know exactly where to dig. This is better for their business and for the environment.



OPERATIONS

Mining in Alberta is mainly done in open pit mines. No matter what is being mined, the process is very similar. "Overburden" (the landscape above the ore) is removed and set aside to be returned at reclamation. Trees are also harvested - usually by Alberta forestry companies who turn these trees into wood products like lumber, oriented strandboard and pulp. Large shovels or draglines then scoop up the ore (and surrounding sand/clay/rock) into giant trucks. Mined material is transported to a processing facility where the ore is isolated and sent for refining to final product.



CLOSURE

Mine "closure" is exactly what it sounds like - closing or shutting down a mine. Mines usually are in operation for many years. Workers, equipment, power lines and roads are scattered throughout a working mine site. In preparation for reclaiming the mine, all of these things have to be removed. A very important step in closure - once mining equipment, roads and buildings are removed, the soil that had been set aside when mining began is returned in preparation for reclamation.



RECLAMATION

Mining has a footprint on the landscape - there is no question. Whenever we are moving earth and removing the minerals that we use every day, the land left behind is different from what was there before. It is the responsibility and requirement of mining companies to return the mine to an environmentally productive area. Will it be the same? Not exactly, no.

Reclamation means turning the mine back to nature - so that trees, shrubs, grasses are able to grow. Sometimes wetlands and even lakes are created as part of the reclamation process. Reclamation and environmental sustainability after the mining is complete is considered from the beginning of the mining process.



Geologists

Geologists are scientists who study the earth - especially the rocks, mountains, plates, fault lines and even earthquakes! Whether it is computer modeling, studying core samples, or even just digging for rocks - geologists help direct the mining process as they can predict what minerals should be found underground.

Geophysicists

Geophysicists are scientists who study not only the earth and the rock formations, but also how these formations move and how mining can and should be done along the earth's fault lines and other features to ensure mining is done safely. In seismic studies, geophysicists use sound waves bounced against rock formations to get a good idea of what rock formations are present underground.



Did you know?



Science, technology, computer modelling and GIS mapping (geographic information systems mapping) are all important components of modern mining. 3D imagery, drones and even satellites are used to ensure mining operators, engineers, geologists and other scientists can be precise to the centimetre when they access the 'ore' being mined.