

UNIT 1

Surface mining: open-pit mining, highwall mining, dredging

Read and translate texts

Surface Mining

Surface mining is a form of mining in which the soil and rock covering the mineral deposits are removed. It is the other way of underground mining, in which the overlying rock is left behind, and the required mineral deposits are removed through shafts or tunnels. Surface mining accounts for two thirds of the world's solid minerals, and is used in obtaining sand, gravel, crushed stone, phosphates, coal, copper, iron and aluminum.

There are 5 main types of surface mining, which are used in various degrees and for different resources.

These mining categories are:

- 1) strip mining
- 2) open-pit mining
- 3) mountaintop removal
- 4) dredging
- 5) high wall mining

All methods of surface mining will remove the waste material, or overburden, above the desired resource. Surface mining is often preferred to sub-surface (underground mining) by mining companies for several reasons. It is less expensive, there are fewer complications in terms of electricity and water, and it is safer [12].

Open-pit mining

Open-pit mining is exactly what the name implies: a big hole (or pit) in the ground. The pit in an open-pit mine is created by blasting with explosives and drilling. This type of mining is typically used to mine gravel and sand and even rock (when open-pit mining is used to extract rock from the earth, the pit is often called a quarry) [12].

High Wall Mining

High wall mining is a combination of surface mining techniques and sub-surface techniques. The basic idea is you start with an open-pit mine, and then drill or bore into those walls to extract more resources. High wall mining is performed remotely by a person in a cabin at the surface who uses a television camera to monitor and control the continuous miner machine [12].

Dredging

Dredging is the process of mining materials from the bottom of a body of water, including rivers, lakes and oceans.

Dredging is underwater excavation of a placer deposits by floating equipment. Dredging systems are classified as mechanical or hydraulic, depending on the method of material transport.

The bucket ladder, bucket-line dredge has been the traditional placer mining tool. It consists of a single hull supporting an excavating and lifting mechanism. The excavation equipment consists of an endless chain of open buckets that travel around a truss or a ladder. The lower end of the ladder rests on the mine face, the bottom of the pond, that is where excavation takes place and the top end is located near the center of the dredge, at the feed hopper of the treatment plant. The chain of the buckets passes around the upper end of ladder at a drive sprocket (called the upper tumbler) and loops downward to an idler sprocket (the lower tumbler) at the bottom. The filled buckets, supported by rollers are pulled up the ladder and dump their load into the hopper. After the valuable material has been removed by the treatment plant, waste is dumped of the back end of the dredge.

The clam shell dredge is characterized by a large single bucket operating at the end of cables. Although it can operate in deeper water than other systems and handles large particles and trash well.

In pure hydraulic dredging systems, the digging and lifting force is either pure suction, suction with hydro-jet assistance, or entirely hydro-jet. They are best suited to digging relatively small-sized loose materials, such as sand, gravel, marine shell deposits and unconsolidated overburden.

Hydraulic dredging has also been applied to mining of deposits containing diamonds, tin, tungsten, niobium, tantalum, titanium, monazite [12].

Vocabulary

Read and learn the words and word combinations:

- ◆ surface mining – открытая добыча, открытая разработка
- ◆ soil – почва
- ◆ rock – порода
- ◆ cover – покрывать
- ◆ to remove – удалять
- ◆ underground mining – подземная добыча
- ◆ overlying rock – вышележащая порода
- ◆ is left behind – остается позади
- ◆ removed through shafts or tunnels – удалены через шахты и тоннели
- ◆ solid minerals – твердые минералы
- ◆ obtain – получать
- ◆ sand – песок
- ◆ gravel – гравий
- ◆ crushed stone – щебень
- ◆ phosphates – фосфаты
- ◆ coal – уголь
- ◆ copper – медь
- ◆ iron – железо
- ◆ aluminum – алюминий
- ◆ in various degrees – в различной степени
- ◆ for different resources – для различных природных ресурсов
- ◆ strip mining – разработка пластов
- ◆ mountaintop removal – удаление горных вершин
- ◆ dredging – выемка грунта
- ◆ high wall mining – добыча с высоких стен
- ◆ waste material / overburden – пустая порода / вскрышная порода, вскрыша
- ◆ complications in terms of electricity and water – сложности с электричеством и водой
- ◆ imply – подразумевать, означать
- ◆ a big hole in the ground – большая яма / карьер в земле

- ◆ to blast – взрывать
- ◆ explosives – взрывчатые вещества
- ◆ drilling – бурение
- ◆ a quarry – карьер, каменоломня
- ◆ surface mining techniques – методы открытой добычи
- ◆ sub-surface techniques – методы подземной добычи
- ◆ to bore – бурить
- ◆ extract more resources – добывать больше природных ресурсов
- ◆ is performed remotely – производится удаленно
- ◆ to monitor – следить, проверять, наблюдать
- ◆ continuous miner machine – непрерывно работающее горное оборудование
- ◆ dredging – выемка грунта
- ◆ a body of water – водоем
- ◆ underwater extraction – подводная выемка
- ◆ a placer deposits – месторождения сыпучих пород
- ◆ floating equipment – плавучее оборудование
- ◆ dredging systems – системы выемки грунта, системы дноуглубления
- ◆ mechanical or hydraulic – механический или гидравлический
- ◆ the bucket ladder – конвейер с ковшами
- ◆ bucket-line dredge – драга ковшевого конвейера
- ◆ tool – инструмент
- ◆ single hull – одиночный корпус
- ◆ supporting – поддерживающий
- ◆ excavating and lifting mechanism – экскаваторный и подъемный механизм
- ◆ an endless chain of open buckets – бесконечная цепь открытых ковшей
- ◆ travel around a truss or ladder – перемещаются по фермам и лестницам
- ◆ the lower end of a ladder rests on mine face – нижний конец конвейера находится на поверхности шахты
- ◆ the bottom on the pond – на дне водоема
- ◆ the feed hopper – загрузочный бункер

Tasks

Exercise 1

Match columns A and B:

A	B
1) soil and rock covering the mineral deposit	a) удаляются через шахты и тоннели
2) the overlying rock is left behind	b) выемка грунта
3) the required mineral deposit	c) разработка пластов
4) are removed through shafts or tunnels	d) требуемое месторождение минерала
5) two thirds of the world's solid minerals	e) вышележащая порода остается позади
6) is used in obtaining	f) используется для добычи
7) dredging	g) две трети твердых минералов в мире
8) strip-mining	h) удаление горных вершин
9) overburden	i) почва и породы, покрывающие месторождение минерала
10) mountaintop removal	j) пустая горная порода (вскрыша)

Exercise 2

Match the words and their definitions:

1) methods of extracting minerals near the surface of Earth	a) copper
2) naturally occurring accumulations or concentrations of minerals	b) aluminum
3) rock or soil overlying a mineral deposit	c) surface mining
4) get, acquire	d) phosphate
5) a red-brown metal	e) overburden
6) a chemical compound that contains phosphorus	f) obtain
7) a long, narrow, typically vertical hole that gives access to a mine	g) mineral deposit
8) a light silvery-grey metal	h) shaft

9) a series of buckets that move in a continuous chain, used to dredge riverbeds, ponds to excavate land	i) placer deposit
10) a method of mining, in which the waste and ore are completely removed from the sides and bottom of a pit which gradually becomes enormous canyon-like hole	j) to blast
11) a wheel with teeth around the outer edge that fit into the holes in a chain	k) bucket-ladder
12) to blow up or break apart something solid with explosives	l) open pit mining
13) an accumulation of valuable minerals formed by gravity separation from a specific source rock during sedimentary processes	m) to extract
14) to take something out or put it out	n) a sprocket

Exercise 3

Read the texts and decide if the statements are true or false ones. Correct the false statements:

1. Surface mining is a form of mining in which the soil and rock covering the mineral deposits are dug in.
2. Surface mining is the other way of sub-surface mining.
3. The overlying rock is left behind and the required mineral deposits are removed through shafts and tunnels.
4. Surface mining is used in obtaining sand, gravel, crushed stone, phosphates, coal, copper, iron and aluminum.
5. All methods of surface mining will remove the waste material or overburden above the desired resource.
6. Surface mining is not preferred to sub-surface by mining companies because it is rather dangerous method of mining.