

Results of the last list of gold reserves in the world have appeared recently, according to which Macedonia is on a decent second place in the Balkans with 6.9 tons. A question rises why there is so much interest in this noble metal. Gold is the most valuable and sought noble metal in the world. It is estimated that more than 186,700 tons of gold have been dug since 2015, totalling USD 8.2 trillion. In addition to being used as jewellery, gold is used in the production of electronic equipment, automotive and airline industry, gold coins are used as stock and foreign exchange reserves of central banks, etc. This shows that gold has a major impact on human activities. For comparison, the US gold reserves amount to 8.133 tons of gold, while 20.800 tons are used in industrial manufacturing processes.

But this precious metal has the other side, and the public is not sufficiently familiar with it, except those involved in the process of gold mining. Gold mining process has a great impact on the environment, because it is complex, it requires a lot of time, great financial resources and experts from various fields, geology, geography, chemistry, metallurgy. Archaeological sites indicate that gold is one of the first metals the man used about 6,000 to 7,000 years ago. In the past, gold mining was simple, with the help of primitive techniques and without the use of chemicals. Gold is mined in two ways - by direct exploitation and as an intermediate in the process of copper and lead mining.

Gold is contained in the earth's crust in the amount of about 5 mg/t, which is about 20 times less than silver. It can be found at the surface of the earth, near mountain rivers and streams, as well as at the bottom of the lakes and oceans. Only about 10% of gold deposits that were discovered so far contained sufficient quantities of gold for excavation. For economic exploitation, there should be at least 5 to 15 grams of gold per ton of ore. It is necessary to dig out 66,000 tons of ore for a ton of gold with a concentration of 15 grams of gold per ton, and if it contains 5 grams per ton of ore, it is necessary to dig 200,000 tons. Methods for obtaining gold from gold veins are relatively safe, because no chemical blends are used but a mechanical digging process. Afterwards, the ore is crushed and ground and then it is washed with a strong jet through the gratings where the gold is kept.

Since gold veins and deposits have been completely extracted, chemical processes of gold extraction have been applied in recent decades. They consist of total extraction of gold from the obtained ore. These processes include the use of mercury, cyanide, sulphur and other acids.

One of the procedures involves the use of mercury in the extraction of gold, in order to form amalgam with mercury. Then, the amalgam is purified through a canvas or other material, thus obtaining gold. Other metals contained in the ore are obtained in the same way.

In addition to mercury, cyanidation method for the extraction of gold is even more harmful.

Macedonia: How gold is being mined and is there a danger to the environment?

It has been used since 1890 and it is based on the solubility of gold in cyanide salt. Cyanide is used in 90% of total gold production worldwide. Gold ore and cyanide solution are added to large leaching devices. Gold is extracted by the process of zinc and aluminium cementation, which leads to accumulation of gold, i.e. making of pulp. After that, pulp filtering follows, which leads to a sediment containing 20% to 50% of gold with zinc and silver. Sulphuric acid is used to extract zinc, when gold and silver remain insoluble. The resulting silver and gold sediment is melted and a semi pure alloy of gold and silver is obtained called a dore bar, which is transported to factories, where it is refined and purified into pure gold.

In addition to these two processes, other, less harmful processes are used for gold extraction, with the use of chlorine and nitric acid, royal water and chloric acid as the reagents. For all these processes, a large amount of water is needed, which is then released into nature, and in the case of Macedonia it would be released into the Vardar River.

The harmfulness of the cyanidation process is reflected in the pollution of water and soil. Although the aqueous cyanide solution is quickly neutralized by the sun's light, other by-products can remain in the soil for several years, making it unusable, while the animal species gradually extinct. In case of leakage of cyanide into surface and ground waters ecological disasters are created as was the case near the Romanian town of Baia Mare, where in 2000 there was a large amount of cyanide in the Samos river, and then in Tisa and the Danube, causing environmental disaster. In recent years, the replacement of cyanide with less toxic and harmful substances has been considered, but due to the low price of cyanide, these efforts will not be productive in the near future.

Although gold is a noble metal, its extraction has not been so noble lately, neither for the environment nor for the people involved in the process. This must be taken into consideration when giving concessions for the exploitation of gold in Macedonia.