

Technogenic deposits in the mine Bucim and their potential economic and ecological effects

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The mine for copper and gold Bucim is in exploitation since 1979th, with a temporary closing in the years 2003-2004. The annual production is around 4.000.000 t ore and 4.500.000 t ore dumping. From this amount of sulfide ore a copper concentrate is gained that amounts 30.000 t, the rest is flotation dumping.

The accumulated ore dumping from 120.000.000 t in the waste rock dump no. 1 with an average content of copper of 0.080% and the accumulation flotation dumping of around 80.000.000 t in the hydro dumping "Topolnica" with an average content of 0.040% Cu, < 0.3 g/t Au, present significant technogene findings and in this work an effort has been made to define their economical productivity and ecological effects on the environment (Serafimovski et al., 2011). The valorization of the copper from the sulfide mine dumping in the waste rock dump no. 1 with the help the hydrometallurgical process with a method of leaching, enables solving the ecology problem with the mining water which drain in the waste rock dump, and at the same time an additional annual production of 2.800 t cathode copper will be added in technological complex for reproduction of the solutions rich with copper located under the postponement no. 1 of the mine Bucim.

From the up to date studies on the flotation tailing dump "Topolnica" it is stated that secondary enrichments of gold appear in some levels, where the content is in the frame of 0.1 - 0.7 g/t. The rhythmical separation of the levels rich with gold is a result of cyclic processing of ore with different content of gold. From the phase analysis turns out that the gold can be found in the pyrite, the rest of the chalcopyrite, and it can also be found as natural small grained disperse, included in the free silica. In the frames of this work results and findings from the performed researches for determining the pollution with heavy metals around the technogene deposits in the mine Bucim are also given, as well as strategies for solving the problems with the pollution. After the analyses and the interpretation of the data the assumptions for increased values of the following heavy metals were confirmed: Cu, Fe, Zn, Pb, Mn, Cd, As and Co. because the mine Bucim is a mine for exploitation of copper, the results of Cu were especially interesting and which reached values of 0.01-704.7 mg/l in the water, 17.8-1734 mg/kg in the soil, 2854 mg/kg in a collective sample of green algae from the Bucim lake and its leak, 55-875 mg/kg in the roots and young brunches of acacia. The increased concentration of metal was determined in all the analyzed mediums: water, soil and plants. The increased concentrations of metals are often several times higher than maximum allowed standards.

The increasing of Cu in the water samples is very distinctive nearby the waste rock dump no. 1, today with the beginning of the work of the plant for producing cathode copper that problem with the drainage mining water is solved (). The concentration of the metals in the soil is highest in the surrounding area of the waste rock dump no. 1 and the flotation hydro dumping "Topolnica". This work is focused on the transfer factor (TF) for the system technogene soil-plant in the flotation tailing dump "Topolnica". The plant acacia (lat. *Robina Pseudoacacia*) which is used for biological reclamation of the dam of the hydro damping and the nearby surrounding of the mine Bucim has a transfer factor that surmounts the hyper accumulation criterion > 1 for Mo (TF = 1.54 – 3.56).

Reference:

- Serafimovski, T., Mihajlov, M., Siderovski, K., Tasev, G. and Konzulov, G., 2011. Anthropogenic influence of the Buchim mine waste dump and hydrotailing to the surface and ground waters in the Lakavica basin, Macedonia. Proceedings of the 1st Workshop on the UNESCO-IGCP Project "Anthropogenic effects on the human environment in the Neogene basins in the SE Europe", Eds. T. Serafimovski & B. Boev, pp. 39-52.
- Lottermoser BG, 2010: Mine Wastes: Characterization, Treatment and Environmental Impacts. 3rd edition. Springer-Verlag, Berlin Heidelberg, 400 pp.