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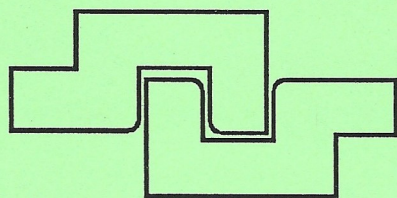
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DEPOSIT AND GEOENVIRONMENTAL MODELS FOR RESOURCE EXPLOITATION AND ENVIRONMENTAL SECURITY

Abstracts



Hungarian Geological Survey, Geological Institute of Hungary



SOIL CONTAMINATION WITH HEAVY METALS: CASE STUDY: OLD MINING AT SV. JAKOB, MT. MEDVEDNICA, CROATIA

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Old mining site at Sv. Jakob is situated on Mt. Medvednica in north-west Croatia near Zagreb. Mineral deposit (Pb-Zn mineralization) is situated in dolomites of Triassic age (?). In 17th century it was mined for Pb and Ag. The brown forest soil is developed above deposit.

Pb, Zn, Cu, Cd and Hg total soil concentration and content of mercury in soil gas were determined in 100 samples (area of 7500 square m). Also, the sequential chemical extraction and X-ray powder diffraction (Phillips diffractometer with a proportional counter and graphite monochromator using CuK α radiation) have been made in ten soil samples with both, background and high trace metal values. Sequential chemical extraction is made to delineate partitioning of particular trace metals into five fractions exchangeable bound to carbonate, Fe-Mn oxides, organic matter and residual.

Mercury was determined by a modified flameless atomic absorption spectrophotometer (AGP-1). Lead and cadmium were determined by atomic absorption spectrophotometer (Pye Unicam 9), while the other elements by inductively-coupled plasma spectrometry (ICP AES).

Pb, Zn, Cu and Cd concentration vary in the range of 9 -18000 ppm; 12 - 9000 ppm; 5 -370 ppm and B.D.I. - 180 ppm. Content of mercury vary from 0,1 ppm to 1,8 ppm in soil and from 2 ngm³ to 443 ngm³ in soil gas. The average contents of Pb, Zn and Cd highly exceed known background values. Concentration of these metals are considered toxic in the area investigated. The distribution of Pb, Zn, Cd and Hg in soil indicates their inherited and undisturbed geochemical relationship to the Pb-Zn sulphide mineralization. The secondary mercury dispersion halo is also related to the Pb-Zn sulphide mineralization. The content of mercury in soil gas is probably sensitive to meteorological factors, topographic position of a sampling site and thickness and structure of soil profile, which can explain very weak positive correlation with Pb, Zn, Cd and Hg in soil, respectively. The highest Cu soil concentrations are considered related to chalcopyrite occurrences situated near the southeastern part of the investigated area and are probably not connected with Pb-Zn mineralization.

The results of sequential chemical extraction indicates that lead is bound to carbonates and Fe-Mn oxides, zinc to organic matter and less to Fe-Mn oxides, and cadmium is bound in all fraction moreover residual. Copper is bound to organic matter but it does not exceed maximal permission value. The greater part of V, Sr, Cr, and Ti is bound to residual. Mn is bound to Mn-Fe oxides in all samples, while iron is bound also to organic matter and residual. Ni and Cr are bound to exchangeable fraction, Fe-Mn oxides and residual and in pollutant samples to organic matter.

All global samples content great part of quartz and micas. Some samples content high picks of dolomite, so in those samples were leached carbonates to strengthen another picks. There are kaolinite, pyrite, goethite, hidrargilite, plagioclase, K-feldspar, chlorite and vermiculite in samples too. In one sample there is cerusite and possibly pyromorphite.

