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SOIL METAL POLLUTION RELATED TO ACTIVE BUCHIM COPPER MINE, REPUBLIC OF MACEDONIA

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Abstract

Within this study a total content of 20 elements was determined in 25 soil samples taken from the vicinity of the "Buchim" mine, Republic of Macedonia, covering an area of 14.2 km². The results have been compared to new Dutchlist and NOAA standards and it was concluded that the content of As, Cd, Cu, Pb and Zn in most of the samples is over the corresponding optimal or action values probably due to the anthropogenic activities. Thus As values ranged 13.1-225 mg kg⁻¹ with 20 above the optimum (29 mg kg⁻¹) and 7 above action value (55 mg kg⁻¹), Cd values ranged 0.67-17.9 mg kg⁻¹ with 17 above optimum (0.8 mg kg⁻¹) and 1 over the action value (12 mg kg⁻¹), Cu with range 17.8-1734 mg kg⁻¹ with 16 over optimal (36 mg kg⁻¹) and 3 above action value (190 mg kg⁻¹), Pb with range 46-3456 mg kg⁻¹ with 19 over optimal (85 mg kg⁻¹) and 1 above action value (530 mg kg⁻¹), and Zn with range 88-3438 mg kg⁻¹ with 12 over optimal (140 mg kg⁻¹) and 1 above action value (720 mg kg⁻¹). The multivariate statistical method (R-mode factor analysis) was applied and three geochemical associations of elements were obtained. Factor 1 (Al-Ca-Fe-K-Mg-Co-Cr-Mn-Ni-Sr-V) was estimated as geogenic factor related primarily to the Pleistocene sediments and Precambrian gneises. Factor 2 (As-Cd-Pb-Zn) associates anthropogenic elements related to dusting from ore and flotation tailing dump sites. The occurrence of Factor 3 (Na-Ba-Cu-Sr) is related primarily to the decomposition of rocks (Proterozoic gneises and amphibolites).

Keywords: arsenic, Buchim mine, contamination, copper, pollution, soil

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