CHARACTERISTICS OF HEAVY METAL CONTAMINATION OF SURFACE WATERS FROM ABANDONED SULFIDE MINES AND THEIR TAILINGS IN AROUND OF ESPIYE (GIRESUN, TURKEY)

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The investigated area in the west of the Eastern Pontides, NE Turkey represents the eastern part of the metallogenic province of the Black Sea. This province contains over 400 massive and vein-type Cu–Zn–Pb deposits and occurrences. The chemical properties of effluent from mine sites were characterized by very low pH of <2.0 and high levels of TDS and EC. Furthermore, the waters contained elevated levels especially of Cd, Cu, Fe, Mn, Pb, Zn, As, Ni, Al and SO_4^{2-}. The lowest concentrations were measured for Be, Cs, Mo, Ga, Cr, V, Cl, Be and most of REEs. Increases in As, Cu, Pb, Cd, Zn and Fe concentrations where noticed at and around the mine areas. These metals are continuously dispersed downstream and downslope from the tailings and mines by clastic movement through wind and water. Because of the existence of sulfides in the tailings, water samples from the tailings site and around the mines were very acidic with a pH of 2.60, have high total dissolved solids (TDS) of 1870 mg/L and misured electric conductivity (EC) at about 2.550 µS/cm. These samples also have up to 58, 29.500, 18.7, 13.153, 181, 27 mg/L and 513, 63, 1.707 g/L of Cd, Cu, Pb, Zn, As, Ni, and Fe, Al (g/L) and SO_4^{2-}, respectively. In the main river at 200m away from interference, the pH is 8.10 and EC is 277 µS/cm, and the element concentrations are 5.5, 17, 1.9, 13.7, 1.8, 0.3 658, 1.9 and 51. The results obtained from this study show that all the spring and almost stream water sources had one or more trace metal level in concentration above the acceptable limits set by the WHO for drinking water. The stream and main river waters have been used as drinking water in the region. Cd, As, Fe and partially Pb and Zn content are above the WHO permissible limits for drinking water. And also, the stream water have been used in agriculture and animal husbandry. This suggests a risk to the population given the toxicity of these metals and the fact that especially the stream and partially river waters are the only sources of potable water in this environment. Precautionary actions should be considered in order to prevent the dispersion of pollutants and avoid population exposures.

Keywords: NE Turkey, heavy metal, contamination