

Impact of Mining Activities on Water Resources in the Vicinity of the Obuasi mine

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Abstract

Surface and groundwater samples within the catchment area of the Obuasi mine were analysed to assess the impact of mining activities on water resources. The concentration of Fe, Mn, Cu, Zn, Pb, Cd, Hg, As and selected major ions in water samples were analysed to assess their role in the contamination of both surface and ground water. The mineralogical composition of various mine spoil and rock samples was investigated by microprobe analysis to ascertain the possible sources of the metals in drainage and ground water. The hydrochemical analytical study, using standard methods, shows that streams in the study area have higher trace and major ions loading than ground water with iron and arsenic concentrations ranging from 0.025 mg/l to 17.19 mg/l and < 0.001 mg/l to 18.91 mg/l, respectively. Hydrochemical modeling of water types showed varied composition for both ground and surface water, but with strong indication of mixed waters from a variety of sources. The microprobe results showed that waste rocks and related mine spoil contain a variety of Fe, Cu, As, Sb, Zn and co-bearing sulphides with strong compositional variations, and account for the augmented levels of these metals in drainage proximal to mining and processing facilities. The probe results did not show Hg in mine spoil, and very high Hg values observed in the vicinity of areas of intense illegal small-scale mining are attributed to the use of this chemical by miners in gold amalgamation.