

Groundwater Quality in the Wassa West District of the Western Region of Ghana

B. K. Kortatsi

CSIR-Water Research Institute, P. O. Box M.32, Accra, Ghana

Abstract

Reconnaissance hydrochemical survey of 56 wells was conducted in the Wassa West District with the objective of providing baseline data for the establishment of groundwater quality monitoring stations. The data acquired is used in this paper to assess the quality of groundwater in the District. Groundwaters are mainly mildly aggressive with pH values in the range 4.5–6.9. However, a few of the boreholes show strong acidic character (pH range 3.7–4.0). The conductivity values are in the range 37–780 $\mu S\ cm^{-1}$ with a mean 246.4 $\mu S\ cm^{-1}$ suggesting the groundwaters are generally fresh and have short residence time. The groundwaters are moderately hard to very hard with only 40% of the samples representing soft waters. Groundwater quality is excellent with respect to major ions (Ca^{2+} , Mg^{2+} , Na^+ , HCO_3^- , SO_4^{2-} , Cl^-) as they fall below their respective WHO guideline limits for water potability. Uncharacteristic of mining areas, trace metals loading of the groundwaters are generally low. All except aluminum, arsenic, barium, iron, manganese, mercury and nickel have concentrations well below the WHO guideline limits for water potability. Aluminum (0.0–2.5 $mg\ l^{-1}$), iron (0.0–18.3 $mg\ l^{-1}$) and manganese (0.0–2.41 $mg\ l^{-1}$) are higher than WHO guideline limits of 0.2 $mg\ l^{-1}$, 0.3 $mg\ l^{-1}$ and 0.5 $mg\ l^{-1}$ in more than 20%, 40% and 25% of the wells, respectively, and, therefore, pose significant aesthetic quality problems to groundwater quality. Mercury concentration exceeds the WHO guideline limit of 0.001 $mg\ l^{-1}$ in all the wells during the rainy season and, thus, poses the greatest physiological threat for groundwater usage for drinking purposes in the District. Arsenic and barium exceeded the WHO guideline limit in less than 5% of the wells. Aesthetic problems can be eliminated using iron removal plants or aerators. These will induce the co-precipitation of trace metals with ferric oxyhydroxide. Limiting mercury usage in mining will curtail physiological problems.