ASSEESSMENT OF ARSENIC LEVELS IN GROUNDWATERS IN AND AROUND OBUASI MUNICIPALITY

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ABSTRACT

Gold mining in Ghana has a long history. Before the advent of the Biological Oxidation (BIOX) technology to extract, many mining companies extract and process gold through grinding, dissolution and precipitation of the free gold. Subsequent burning of the crude product releases oxides of sulfur and arsenic trioxide into the environment. The tailings are heaped, and also kept in dams. Because of these, it is hypothesized that, the mining of gold from Birimiam rock rich in arsenopyrite ore leads to the release of arsenic (As) and therefore could contaminate groundwater resources in and around the Obuasi Municipality. Ground water samples totalling two hundred (200) samples were collected from locations within and outside the municipality during the rainy and dry periods through 2005 to 2006. Collected samples were: (1) analyzed for As and other trace elements and (2) other water quality parameters. Measured total As ranged from 1.32 to 12.27 µg L^{-1} in the samples collected in rainy season and 0.30 to 20.90 µg L^{-1} in those collected in the dry season. The high concentrations in the wet period is the result of flooding carrying As contaminated particles infiltrating and permeating through the rock layers into the low water table. This further suggested that the observed levels of As in the water is coming from both human activities (mining) and natural sources. The dry season value is the result of As mineral dissolution. However, As co-varied very weakly with the determined concentrations of other trace elements (Fe, Cu, Pb, and Zn) as well as some water quality parameters with the exception of pH, alkalinity and hardness. This indicated many of these parameters had little influence on the ambient levels of As in the groundwater. Additionally, the recorded numbers in the study except site 9 [12.27 (wet), 20.90 (dry)] do not exceed the WHO guideline maximum value of 10 µg L^{-1} for drinking water. Further, in contrasting with well-known As contaminated environment like Bangladesh and West Bengal in India where As ranges from <0.5 to 3200 µg L^{-1}, the measured dissolved As in the groundwater is very low which is supposedly believed to be due to the removal of As from the water by iron oxide unlike these nations where As is re-mobilized in solution.

Finally, the study revealed that the inhabitants in the Obuasi municipality and its environs are not at risk of As poisoning. Though As concentrations are low in the wells except site nine (9), yet the fear

of long term accumulation can result in an epidemic with time as boreholes/wells are not regularly monitored.

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