

Investigation of Radionuclide Contents and Radiological Implications of Groundwater in Mining Areas of Plateau State, North Central of Nigeria

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Abstract

The investigation of the Radionuclide Concentrations in Water from Mining Areas of Plateau State and their Radiological Implications was carried out. Twenty five samples were drawn randomly in two litre of plastic containers and acidified with 0.2ml of concentrated nitric acid for preservation. The samples were analysed using ICP-MS technique to determine trace to ultra- trace concentrations of radioactive elements in the samples. The results showed that the concentration of ^{238}U ranged from 7.41×10^{-4} to 2.09 Bq/kg with an average value of $1.1 \times 10^{-1} \text{ Bq/kg}$, ^{232}Th ranged from 2.05×10^{-4} to $9.89 \times 10^{-4} \text{ Bq/kg}$ with a mean value of $2.51 \times 10^{-4} \text{ Bq/kg}$, and ^{40}K ranged from 3.34×10^2 to $7.67 \times 10^3 \text{ Bq/kg}$ with a mean value of $1.256 \times 10^3 \text{ Bq/kg}$. The results of the evaluation of Ra_{eq} , AEDE, AGDE and ELCR were calculated, it was below the world average of 370 Bq/kg , 0.1 mSv/yr , $300 \text{ } \mu\text{Sv/yr}$ and $0.29 \times 10^{-3} \text{ mSv/yr}$ in some locations and exceed the allowable limit in some of the areas respectively. The results were found to be comparable to reported data internationally for some locations and above the permissible limit in some areas. Hence, the investigation of groundwater can be considered to have some radiological hazard indices of causing cancer and toxicity of the kidney over a long period of exposure.

Key words: Investigation, groundwater, radiological, Radionuclide, ICP-MS technique.