MEASUREMENT OF NATURAL RADIOACTIVITY IN SOIL SAMPLES ALONG ROADWAYS IN HIGH COMMERCIAL AREAS OF THE KETU SOUTH DISTRICT OF THE VOLTA REGION, GHANA

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Abstract

The concentration of soil radioactivity an active matter of concern in providing a baseline value for the dose contribution from radionuclides in road materials. The system was equipped with a high-resolution gamma ray spectrometry using HPGe detector and a four-volume software. 100 g of the homogenous soil samples were then packed into marenelli beaker, weighed and carefully sealed and stored for at least 4 weeks before analysis. The gamma-ray background around the detector inside the shielding was determined using an empty container under shielding. The results were used to determine the level of gamma radiation hazard associated with natural radioactivity in the urban areas in the south of Jordan. The calculated values of radioactive index of soil samples from various roadways were lower than the maximum safe limit of 370 Bq/kg set by UNSCEAR. The activity concentration of radioactivity was obtained by using the following equation: [4]:

\[
A_{\text{eq}} = \frac{A_{\text{Ra}} + 0.139 A_{\text{U}} + 0.139 A_{\text{Th}}}{\epsilon}
\]

Where \(A_{\text{eq}}\) is the equivalent activity of a sample, \(A_{\text{Ra}}\) is the activity concentration of Ra-226, \(A_{\text{U}}\) is the activity concentration of U-238, \(A_{\text{Th}}\) is the activity concentration of Th-232, and \(\epsilon\) is the efficiency of the detector.

Conclusions

The level and distribution of anthropogenic and natural radionuclides in roadside soils is a significant concern for public safety and environmental health. The results of this study provide important insights into the radioactive index of roadside soil samples in the Ketu South District of Ghana. The radioactive index values for all samples were found to be lower than the maximum safe limit of 370 Bq/kg set by UNSCEAR. This indicates that soils from the various roadways are safe for any social use.

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