

Radioactivity in drilled and dug well drinking water of Ogun state Southwestern Nigeria and consequent dose estimates.

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Abstract

Activity concentrations of (40)K, (226)Ra, (228)Ac and (235)U were measured in 11 dug and 9 drilled well water samples from 3 large cities in Ogun state, Southwestern Nigeria, consumed by the population living in the cities. The measurement was done using co-axial type high-purity germanium (HPGe) detector (Canberra Industries Inc.). The measured activity concentrations in the water samples ranged from 1.74 +/- 1.83 to 4.69 +/- 0.17 Bq l(-1); 2.89 +/- 0.62 to 7.79 +/- 7.22 Bq l(-1); 0.35 +/- 0.07 to 1.17 +/- 0.40 Bq l(-1) and 0.18 +/- 0.05 to 4.77 +/- 0.34 Bq l(-1) for (40)K, (226)Ra, (228)Ac and (235)U, respectively. Total annual effective dose rates from the ingestion of these radionuclides in the untreated wells were estimated using measured activity concentrations in the radionuclides and their ingested dose conversion factors. Estimated annual effective dose rates ranged from 0.04 to 6.82; 0.01 to 1.36 and 0.01 to 1.49 mSv y(-1) for age groups <1, 2-7 and > or =17 y, respectively. Committed dose for age group > or =17 y ranged from 8.8 x 10(-4) to 8.9 x 10(-2) Sv. The calculated annual effective dose values due to the ingestion of (226)Ra in the Awujale, Ake, Saboab, Alagbon, Alapora and Totoro samples exceeded International Commission on Radiological Protection limit of 1.0 mSv y(-1) for individual public exposure. These wells are recommended for treatment that would remove radium from their waters.