

Assessment of radon concentration levels in some dwellings in Serule area.

A discovery of huge uranium deposits in the Serule area in Botswana leading to the prospects of mining explorations has since opened up various studies to be undertaken in the area. This study assesses the indoor radon concentration levels in Serule area and the radiological risk associated with it. ^{222}Rn is of interest since it is a daughter radionuclide of ^{226}Ra from the ^{238}U decay series and can cause adverse health problems such as lung cancer when inhaled. The radon concentration in the sampled houses was measured using special detectors called Electret Passive Environmental Radon Monitors (E-PERMs). The weighted mean average indoor radon concentration found to be $23.4 \pm 2.1 \text{ Bq/m}^3$. Soil samples from the vicinity of the sampled houses were collected and gamma-ray counted using a High Purity Germanium (HPGe) detector at iThemba LABS. This was done to determine the activity concentration of ^{238}U , ^{232}Th and ^{40}K . Higher activity concentrations of ^{238}U were found in areas within the mining area. The activity concentrations of ^{232}Th were generally low and higher activity concentrations of ^{40}K were found in areas outside the mining area. The highest radium equivalent (Ra_{eq}) value calculated was from an area within the mining area but all the calculated Ra_{eq} values were well below the 370 Bq.kg^{-1} limit set by IAEA. Heavy metal concentrations in the soil samples were determined using the Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) from the Central Analytical Facilities in Stellenbosch University. Nickel and cadmium concentrations from a dwelling outside the mining area were found to have values higher than the maximum allowable limit according to WHO/FAO guidelines. Ni and Cd were found to have concentration values of 109.282 mg/kg and 158.213 mg/kg respectively.

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