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Investigation of Exposure Level and Radioactivity Content in Bitumen Environment Agbabu, Ondo State of Nigeria

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Abstract

The exposure level and the radioactivity content was investigated in various soil in bituminous environment Agbabu, Ondo state of Nigeria using an advanced survey Gamma scout and a well calibrated sodium iodide NaI(Tl) detector. The result of the exposure rate ranges from 0.11 – 0.18 $\mu\text{Sv yr}^{-1}$. Also a total of twenty-two sampling areas of 1 m² each were randomly mapped out in an undisturbed plot of land of total size 2500 m² within the bituminous site. In each sampling square, five core soil samples were taken (four from all corners and one from the centre) to the depth of 0-30 cm and all the soil samples were oven dried at a room temperature of 105°C, crushed, sieved and sealed for one month before analysis. The specific activity of ²³⁸U ranged from 4.25 \pm 2.14 to 23.63 \pm 9.37 Bq kg⁻¹ with an average of 15.66 \pm 4.34 Bq kg⁻¹, ²³²Th from 2.86 \pm 1.05 to 19.92 \pm 5.24 Bq kg⁻¹ with an average of 13.31 \pm 4.37 Bq kg⁻¹; ⁴⁰K ranged from 20.49 \pm 7.39 to 111.75 \pm 37.98 Bq kg⁻¹ with an average of 63.47 \pm 28.10 Bq kg⁻¹. These values were within the international acceptable limit. A weak correlation ($r = 0.07$, at $p = 0.05$) was established among the radionuclides. Results indicated a slight variation between the in situ and laboratory Measurements due to some factors such as various anthropogenic activities in the environment, different in sampling techniques and soil moisture.

Keyword: radionuclides, exposure rate, Gamma scout, environmental impact

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