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THE INFLUENCE OF PHOSPHATE ROCK STORAGE ON GROSS ALPHA AND GROSS BETA ACTIVITY CONCENTRATION OF NORM IN SOIL SAMPLES FROM RICHARDS BAY, SOUTH AFRICA

Uranium-238 (^{238}U) and thorium-232 (^{232}Th) are the parent primordial nuclides who along with their progenies are sources of radiation exposure to which humans are exposed directly or indirectly. ^{238}U decay to ^{206}Pb after 14 different alpha or beta decays, while ^{232}Th decay series terminate at ^{208}Pb after 10 successive alpha or beta decays. In this study, gross alpha and beta activity concentration of sixty (60) soil samples collected from 30 sampling sites around a phosphate rock storage facility at Richards Bay were first performed. The samples were further analyzed for ^{238}U and ^{232}Th concentration using neutron activation analysis (NAA). The samples were irradiated by thermal neutrons with a neutron flux of about $7 \times 10^{11} \text{ ncm}^{-2}\text{s}^{-1}$ in NECSA's nuclear research reactor (SAFARI 1). Gross alpha and beta activity measurements were performed using a gas flow proportionality counter to estimate the total activity of each sample without regards to specific nuclides. The maximum and minimum gross alpha activity for the soil samples analyzed were obtained to be 5692 Bq.kg^{-1} and 34 Bq.kg^{-1} respectively with a mean of 597 Bq.kg^{-1} . Similarly, 4072 Bq.kg^{-1} and 24 Bq.kg^{-1} were obtained to be the maximum and minimum values of gross beta activity concentrations respectively with a mean of 518 Bq.kg^{-1} . A correlation coefficient of 0.658 indicating a strong correlation among ^{238}U and ^{232}Th concentration was established. Furthermore, specific activities of ^{238}U and ^{232}Th in a reference phosphate rock samples were analyzed and obtained to be 118 Bq.kg^{-1} and 783 Bq.kg^{-1} respectively. These activity concentrations of these primordial radionuclides (^{238}U and ^{232}Th) in the analyzed samples were found to be below the limits set out by the International Council on Radiation Protection (ICRP).

Apply to be considered for a student award (Yes / No)?

No

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