

Title: Radiological hazards assessment associated with granitoid rocks in Egypt

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Abstract: The present study aimed to assess the radioactive hazards associated with the application of [granitoid](#) rocks in building materials. An HPGe spectrometer was used to detect the levels of the [radioactive elements](#) uranium-238, thorium-232, and potassium-40 in the granitoid rocks. The results showed that the levels of these elements were lower ($38.32 < 33 \text{ Bq kg}^{-1}$), comparable ($47.19\text{--}45 \text{ Bq kg}^{-1}$) and higher ($992.26 \gg 412 \text{ Bq kg}^{-1}$) than the worldwide limits for ^{238}U , ^{232}Th , and ^{40}K concentration, respectively. The exposure to gamma radiation of granitoid rocks was studied by various radiological hazard variables like the absorbed dose rate (D_{air}), the outdoor and indoor annual effective dose (AED_{out} and AED_{in}), and excess lifetime cancer risk (ELCR). A variety of statistical methods, including Pearson correlation, principal component analysis (PCA), and hierarchical cluster analysis (HCA) was used, to study the relationship between the radioactive elements and the radiological hazards. According to statistical analysis, the main radioactive risk of granitoid rocks is contributed to by the elements uranium-238, thorium-232, and potassium-40. Granitoid rocks can be applied in building materials, but under control to prevent risk to the public.

Key words: Granitoid rocks Building materials Radioactive concentration Hazards variables

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