RADIOMETRIC INTERNAL AND EXTERNAL INDEXES FOR SOME GRANITES WITH GEOLOGICAL OCCURRENCE IN THE PARANÁ STATE, BRAZIL

A. O. Ferreira, B. R. S. Pecequilo

Radiometry Laboratory, Institute of Nuclear and Energy Research, Sao Paulo 05508-000,

Brazil; aoferreira@ipen.br, brigitte@ipen.br

Granites are buildings materials widely used as ornamental rocks or coating tiles in kitchens, bathrooms and even in sitting rooms and bedrooms, than the knowledge of the granites activities concentrations is very important to assess any potential radiological hazard. In Paraná state, Brazil, 87% of granites used as decorative building materials are mostly from the crystalline basement. The aim of this work is measure the ^{226}Ra, ^{232}Th and ^{40}K activities concentrations by high-resolution gamma-ray spectrometry for commercially-used granites from crystalline basement of Paraná state in order to estimate the potential radiological hazard. This radiological hazard will be estimate by assessing the radium equivalent activity (Ra_{eq}), the internal gamma index (I_γ□ and the external index (H_{EX}). Sixteen different commercial granites samples were collected directly from hardware stores. All samples were pulverized and sealed in standard 100 mL HDPE flat-bottom cylindrical flask with screw cap and bubble spigot. The samples were measured in triplicate, after a 4 weeks ingrowth period for radioactive equilibrium in the ^{238}U and ^{232}Th series, and the activities were corrected for self-attenuation factors. The results show radium equivalent activities varying from 36 Bq·kg^{-1} to 411 Bq·kg^{-1} and the external index (H_{EX}) values varying from 0.10 to 1.11. Comparing with the maximum values of 373 Bq·kg^{-1} for radium equivalent and 1 for H_{EX}, recommended by the OECD (1979), only one sample presents higher values, which means that its use as building material is not recommended. For the gamma index, the results varied from 0.14 to 1.51. All values are below the criteria for dose exemption, $I \leq 2$, for materials with restricted superficial use and the values for six samples are higher than the control criteria for materials structural use, $I \leq 1$. The results are within the range of data found in literature for similar Brazilian rocks.