Gamma-ray energy buildup factor calculations and shielding effects of some Jordanian building structures

Abstract

The shielding properties of three different construction styles, and building materials, commonly used in Jordan, were evaluated using parameters such as attenuation coefficients, equivalent atomic number, penetration depth and energy buildup factor. Geometric progression (GP) method was used to calculate gamma-ray energy buildup factors of limestone, concrete, bricks, cement plaster and air for the energy range 0.05-3. MeV, and penetration depths up to 40 mfp. It has been observed that among the examined building materials, limestone offers highest value for equivalent atomic number and linear attenuation coefficient and the lowest values for penetration depth and energy buildup factor. The obtained buildup factors were used as basic data to establish the total equivalent energy buildup factors for three different multilayer construction styles using an iterative method. The three styles were then compared in terms of fractional transmission of photons at different incident photon energies. It is concluded that, in case of any nuclear accident, large multistory buildings with five layers exterior walls, style A, could effectively attenuate radiation more than small dwellings of any construction style. © 2015 .