E1 – 06

Radiation exposure in a typical room constructed with locally available bricks

The presence of radioactivity in building materials can be a potential heath hazard, both from external exposure to gamma and beta radiation and internal exposure resulting from inhalation of radon. Indoor radiation comes mainly from the activity concentration of the natural radionuclides of ^{238} U series, ^{232} Th series and ^{40} K in the building materials. This work presents a theoretical calculation of the radiation exposure due to natural radionuclides in bricks used to construct a standard room.

Activity concentrations of the natural radionuclides (reported in El o4, page 183) in sixteen clay and four cement brick samples collected from different areas in Sri Lanka were used for the dose calculations.

The annual equivalent dose received by a person exposed to gamma radiation at lm height from the ground level in the middle point of a room, lined with brick walls was calculated using factors such as mean linear absorption coefficient per unit mass for air, relative geometry, densities and activity concentrations of bricks.

Assumption in this study were that the exposed individual spends one year at the point of exposure (indoor occupancy factor of l), that all radionuclides in the series are present in the bricks and contribute to the gamma radiation producing the exposure and that there is no attenuation in the bricks or in air. Calculated exposure from bricks for a standard size room in this study ranged from 0.16 – 3.57 mSv/ y. considering an occupancy factor of one the estimated absorbed dose rate in air within typical masonry is given as 80 nGy/ y (0.56 mSv y.)

Exposure values in a room from bricks fabricated in three areas Ampitiya, Anuradhapura and Nikaweratiya had calculated values less than 0.56 mSv/ y indicating the greater presence of the natural radionuclides in the raw materials such as clay and sand. There will be a reduction in the dose estimates due to the presence of doors and windows and considering the average occupancy to be less than one. Thus these results can be regarded as an upper limit on the expected exposure.