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AN EVALUATION OF DOSE INTENSITY DUE TO NATURAL RADIOACTIVITY IN THE SOIL IN THE SURROUNDING OF SKOPJE

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The measurement of radioactivity in soil provides information about natural resources, hence the measurement of the radiation dose is important for the general population and for observation of radiation. It turned out that the understanding of the behavior of natural radionuclides in the environment is very important, because natural radiation has most contribution for the external dose in world population.

The objective of this study was to provide preliminary evaluation of absorbed dose of terrestrial exposure of the population in the surrounding of Skopje, and to estimate the potential hazard of radiation for the population that lives in the research areas.

The soil samples were collected from 14 locations in the surrounding of Skopje in June 2012, divided in groups of 3-4 samples of treated soil according to the recommendations of IAEA (IAEA 295, 198).

The measurements of the activity concentrations of ^{226}Ra , ^{232}Th and ^{40}K in the collected soil samples have been determined by using HPGe gamma spectrometer and the fission track registration technique.

The estimation of absorbed dose rate for each location was done using the Beck et al. formula in equation 1 as follows:

$$D \text{ (nGy/h)} = 0.462A_{\text{Ra}} + 0.604A_{\text{Th}} + 0.042A_{\text{K}} \quad (1)$$

In the current study it has been noticed that the specific activity of these radionuclides in the soil is not uniform, but it differs in different soils depending on the geological or the topographical features of the area. In addition, it also depends on the type of past agricultural activities and different minerals which are present in soil. The total absorbed gamma dose rate due to these radionuclides varied from 55.47 to 79.14 nGy h⁻¹, with a mean of 69.39 nGy h⁻¹.

The contribution of the separate radionuclides in the total gamma radiation dose varies between locations and represents a consequence of the difference of the geological origin of the analyzed soil samples.

According to UNSCEAR, 2008, the intensity of the air dose after primordial gamma radiation in normal conditions is about 58 nGy/h, and the values in countries vary from 2 to 1300 nGy/h. The mean value of the total dose intensity obtained in this research is 69.39 nGy/h and approximately it corresponds to the world average value.

From the histogram and after the performed statistic test Shapiro-Wilk (which tests the hypothesis of normal distribution) that gave the following result $P=0.524 > 0.05$, a conclusion is made that the frequencies of the total dose intensity in all analyzed samples follow normal distribution. The results of this study are useful as a data baseline for preparing a radiological map of the studied area as well as for enrichment of the world's data bank.