

Second International
Conference on
Radiation and Dosimetry in
Various Fields of Research



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May 27 - 30, 2014 | Faculty of Electronic Engineering | Niš | Serbia



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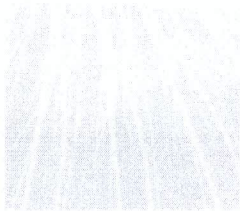
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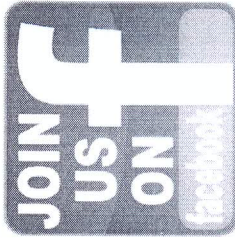
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NATURAL RADIONUCLIDES IN SOIL SAMPLES IN THE SURROUNDING OF THE CITY OF SKOPJE, MACEDONIA

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Soil acts as a potential source of radionuclides through which they can enter the food chain and end up in people. Radioactive materials that naturally occur in soil are one of the components of the external exposure to gamma rays to which people are regularly exposed. So the soil acts as a potential source of the radionuclides, through which they can enter the food chain and up in people. The natural radioactivity of the environment and the related external exposure due to gamma radiation primarily depends on the geological and geographical conditions and they exist at different levels in the soils from every region of the world. Taking into consideration the importance of the distribution and the transfer of radionuclides in the soil, an attempt was made in this work, to determine the concentration of ^{226}Ra , ^{232}Th , ^{40}K and ^{137}Cs in the same.

In order to determine the activities of the natural and the artificial radionuclides in the soil, samples of uncultivated soil were taken, from locations in the surrounding of Skopje. The sampling from the soil was performed in the months of May and June in 2013. The area was divided into 14 locations. The sampling was performed from 0-15cm with an increment of 5cm. The locations selected for sampling were flat land where the vegetation was removed. The homogenized samples of the soil were packed in plastic containers which had the same geometry as the one for the reference materials and upon ensuring time balance between the successors of ^{238}U and ^{232}Th series (60 days), these sealed samples were prepared for an analysis. The radiometric analysis of these samples was performed by using a system based on a personal computer, with gamma spectrometry with high resolution that consists of germanium with high purity (HPGe), coaxial detector (relative efficiency: 30%, active volume: 180 cubic centimeters with a beryllium window in the end and FWHM: 2.0 keV at 1332 KeV for ^{60}Co). The calculation was performed for 65000 seconds for the reference materials and the soil samples. The spectrums were analyzed by a commercially available software GENIE-2000 obtained from Canberra Packard, which provides identification of radionuclides and assessment of their activity.

It was determined that the activity levels follow the recorded normal distribution.

The values are between 19,20Bq/kg to 40,00Bq/kg for ^{226}Ra , from 25,49Bq/kg to 25,49Bq/kg and from 399,02Bq/kg to 666,10Bq/kg, respectively. The concentrations of these radionuclides are compared with the available data from the other countries. Data shows that the average value of activity of ^{232}Th is higher than the one of ^{226}Ra which may be due to the longer half-life of ^{232}Th in relation to ^{226}Ra . The concentration of activity of ^{40}K in the soil has a value that is higher than the one of ^{232}Th and ^{226}Ra for all soils. Also the measured values of concentration of activity of the radionuclides ^{40}K , ^{226}Ra and ^{232}Th in all soils that are being examined, are within the global range specified by the international organizations.

Key words: Radioactivity, soils, analysis, gamma spectrometry, results