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EVALUATION OF GAMMA RADIATION DOSES IN SOIL USING THE MONTE CARLO SIMULATION

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Abstract

The present work reports the results of a study performed by gamma spectral analysis, on different soil samples collected from Petroșani - Romanian city placed in an important coal mining area. The purpose of this research is to estimate the gamma dose rate in the out-door air (at a height of 1 m above the ground), in order to compare the results obtained to the annual effective limit dose value received by the population, which is 1 mSv/year. A modern statistical method – Monte Carlo simulation – was used to perform the study. By estimating the mean activity concentrations for the primordial decay chains (those of Radium-226 and Thorium-232), as well as the mean activity concentration for the Potassium-40 radioisotope, the gamma dose rate received by the public in Petroșani was evaluated; this is proved to be lower than the maximum admitted value, so the study leads to the conclusion that the inhabitants are not dangerously exposed to gamma radiation caused by radioisotopes present in soil.

Key words: gamma dose rate, gamma spectral analysis, Monte Carlo simulation, Petroșani (Romania), soil radioactivity

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