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Natural and artificial radioactivity in soils from Romanian sites determined by γ -ray spectrometry

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This paper presents the radioactivity levels of ^{137}Cs man-made and naturally occurring radionuclides (^{40}K , ^{235}U , ^{238}U -decay series, and ^{232}Th -decay series) in Romanian soils from several industrial sites, determined by low background gamma-ray spectrometry.

Agricultural soil samples were collected from the vicinity of the phosphate fertilizer plant at Turnu Magurele, as well as from non-ferrous and chemical industry sites at Copsa Mica and Pitesti. Control samples from agriculture and non-specific industry locations were considered (Crevedia and Magurele).

Surface soil samples were collected from six locations with different degrees and types of industrial activity (Baia Mare, Copșa Mică, Deva, Galați, Oradea, Afumati), and a background site with relatively clean air in the Carpathian Mountains (Fundata).

This method makes it possible to assess U, Th, and K concentrations in soil samples by measuring ^{238}U and ^{232}Th (in equilibrium with their radioactive daughters), and ^{40}K specific activities. Their values were found to be in agreement with those determined by Instrumental Neutron Activation Analysis (INAA), through neutron irradiation of soil samples and appropriate standards at TRIGA reactor of the Institute of Nuclear Researches in Pitesti.

The radioactivity levels in the investigated soils were compared with Romanian norms for the environmental radioactivity and literature data.

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