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BOOK OF ABSTRACTS

THE ASSESSMENT OF THE POTENTIAL RISK TO HUMAN HEALTH DUE TO NATURAL RADIONUCLIDES IN SURFACE SOIL AROUND “NIKOLA TESLA A” COAL-FIRED POWER PLANT, SERBIA

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Increasing trend in overall cancer incidence was identified for Serbia in last decades. Therefore, the assessment of cancer risk (*CR*) is of vital importance, especially for the population in the areas endangered by environmental pollution.

The excess lifetime *CR* for residents in the surroundings of the coal-fired power plant (CFPP) “Nikola Tesla A” (Obrenovac, Serbia) due to natural radionuclides in soil was evaluated. The methodology of US EPA was applied based on specific activities of ⁴⁰K, ²²⁶Ra and ²³²Th in the surface soil. Risk from incidental ingestion of soil, inhalation of soil dust, external exposure to ionizing radiation and consumption of produce (fruits and vegetables) were taken into account. Soil samples were collected from thirty locations up to 10 km distance from the CFPP following radial sampling grid. The total cancer risk (*CR*_{tot}) was calculated as a sum of *CR* from all radionuclides investigated across multiple exposure routes. The specific activities of radionuclides were determined by gamma-ray spectrometry.

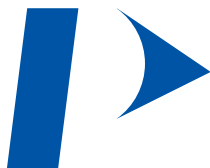
The calculated minimal, mean and maximal values of *CR*_{tot} were 7.02×10^{-4} , 1.16×10^{-3} and 1.65×10^{-3} , respectively. *CR* due to inhalation of soil was negligible and fell in the range from 6.83×10^{-19} to 2.33×10^{-18} . Direct ingestion of soils generates no significant *CR* and varies from 1.98×10^{-6} to 6.08×10^{-6} . Overall *CR* caused by external irradiation was 1.06×10^{-4} to 2.66×10^{-4} with mean of 1.81×10^{-4} . The greatest fraction (approximately 84%) of the *CR*_{tot} came from ingestion of produce, and ranged from 5.95×10^{-4} to 1.37×10^{-3} with mean value of 9.75×10^{-4} . The rural part of the study area is an agricultural region and this pathway had to be considered. Nevertheless, considerable number of people live in Obrenovac and its suburbs, and their dietary is mostly based on groceries from supermarkets supplied by different food retailers, so it is likely they are not exposed to this kind of risk. If this risk was not included, the *CR*_{tot} would be in the range 1.08×10^{-4} to 2.72×10^{-4} with average of 1.08×10^{-4} . ²³²Th should be mostly concerned regarding to direct ingestion of soil and inhalation, while the greatest fraction of *CR* from consumption of agricultural products and external irradiation originating from ⁴⁰K. The Public Health Institute of Belgrade recorded the cancer occurrence rate for adults in Belgrade of 3.3×10^{-3} in 2013. In comparison to this value, the calculated mean *CR*_{tot} for all exposure routes is extremely high and makes 35 % of real cancer occurrence. Nonetheless, *CR*_{tot} excluding the ingestion of farm produce is noticeably smaller and contributes to up to 8% of published values for Belgrade.

The results reflected that exposure to natural radionuclides in soil through direct ingestion and inhalation of soil and external irradiation would not cause serious lifetime *CR*. The *CR* due to ingestion of produce grown on study area was identified as an issue of most concern to the residents.



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