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Air Pollution with Radon in Schools of Smolyan district (Bulgaria)

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ABSTRACT

The major part of the radiation dose, which humans receive from natural radioactive sources, originate due to radon and its decay products inhalation. The health risk increases with the duration of radon exposure and it is also proportional to the radon concentration. Radon in buildings is considered to be the most important indoor air pollutant, with harmful effects on the health of the population. The aim of this study was to analyze the influence of the heating system and energy source on the indoor radon variation in the school buildings. The survey of 340 premises in 46 buildings was conducted from November/December 2019 to April/May 2020. A passive measurement method with detectors consisting of a CR-39 chip was used. The obtained geometric mean and geometric standard deviation of the radon concentrations have been found to be 170 Bq/m^3 and 2.09 respectively. Statistically significant differences of the radon concentration for the factors: location of the schools by municipalities (KW, $p < 0.0001$), types of school premises (KW, $p<0.0001$); location by floors (KW, $p<0.0001$) were found. The presence of heating system and type of used energy sources for heating influenced to the radon concentration variations ($p <0.0001$). The highest radon concentration is found in school buildings, where there is a common heating system, using the wood and coal as an energy source, while in the buildings where pellets is used the concentration is lowest. In school buildings with high radon concentration, the corrective measures should be taken to reduce the level.

Keywords: air pollutant; natural radioactive source; radon concentration