

ESTIMATES OF THE EXPECTED AVERAGE ANNUAL EFFECTIVE DOSE OF NATURAL RADIATION BACKGROUND OF EMPLOYEES IN THE ADMINISTRATIVE BUILDING, TAKING INTO ACCOUNT THE DISTRIBUTION OF RADON AND ITS DECAY PRODUCTS

Wednesday, 13 July 2022 10:00 (20 minutes)

Radium is the most radiotoxic natural radionuclide, since small amounts of it can accumulate in bone tissue, damaging the bone marrow and mutating bone cells [1]. Radon is a decay product of radium and is ubiquitous in the biosphere and present in soils and building materials. Most people are most exposed to radon in residential and industrial buildings. It accounts for about half of the total human exposure dose from natural sources. Radon can damage the DNA of the respiratory epithelium, and radon exposure is suspected to be the cause of lung cancer [2]. Significant health effects have been observed among uranium mine workers exposed to high levels of radon. They found a link between exposure to radon and its decay products and an increased risk of developing lung cancer. Despite this, it remains unclear what impact household exposure to radon has on the development of lung cancer.

The purpose of this work was to estimate the dose load from natural sources of radiation based on monitoring measurements of the topology of the distribution of radon isotopes in a building located near a tectonic fault. The measurement was carried out using a radon radiometer "Ramon-02" in an administrative building located near a tectonic fault from February 2021 to February 2022 in Almaty. The experiments were carried out in rooms with a volume of 128.38 m^3 with a ceiling height of 2.6 m and located in the basement, on the third and fifth floors. During the experiment, the concentration of radon activity averaged $189.59 \text{ Bq} \cdot \text{m}^{-3}$ for the basement, $23.78 \text{ Bq} \cdot \text{m}^{-3}$ for the third floor and $35.01 \text{ Bq} \cdot \text{m}^{-3}$ for the fifth floor. In addition, fluctuations were observed in the range from 59.9 to $568.9 \text{ Bq} \cdot \text{m}^{-3}$ for the basement, from 12.2 to $33.6 \text{ Bq} \cdot \text{m}^{-3}$ for the third floor and from 16.2 to $71.8 \text{ Bq} \cdot \text{m}^{-3}$ for the fifth floor.

Based on the data obtained, the doses from radon and its decay products received by students and faculty members who are in classrooms during the day, month and year were calculated. Calculations showed that the annual effective dose in this administrative building (working time-2000 hours/year) ranged from 0.5 mSv/year (for the fifth floor) to 2.2 mSv/year (for the basement).

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1. M. Jankovic, D. Todorovic, and J. Nikolov, Appl. Radiat. Isot. 70, 2703 (2012).
2. R. Hubaux, K. Enfield, S. Lam, W. Lam, V. Martinez, Environ. Health. 11, 89 (2012).

The speaker is a student or young scientist

Yes

Section

1. Nuclear technology and methods in medicine, radioecology

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