World Environment Day, which is observed annually on June 5, is one of the main ways for the United Nations to draw the attention of the world public to environmental problems, as well as to stimulate political interest and action. Such an event as the celebration of this Day is designed to bring the human factor into the issue of environmental protection. [4]

Today it is very important for people to understand that nature is the only source of all the wealth that man needs for existence. Only a rational, thrifty and reproducible attitude towards nature can save humanity. To preserve life on Earth, man must protect nature. [5]

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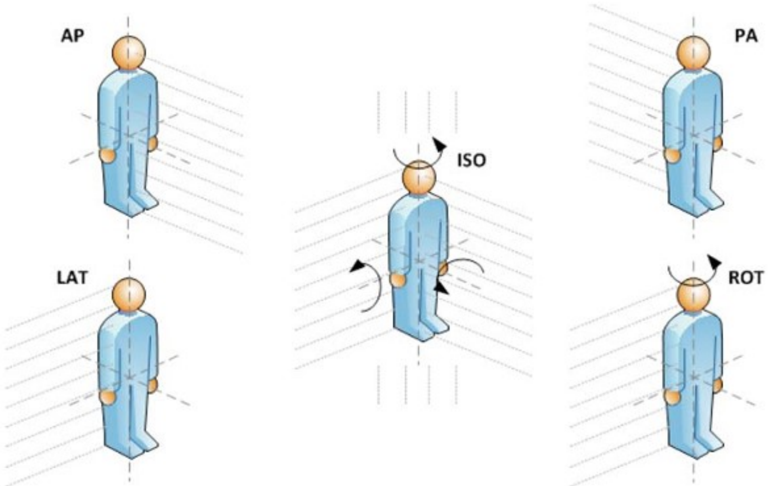
DISCHARGE OF PERSONNEL IRRADIATION DEPENDING ON THE CONDITIONS OF THE LOCATION OF SOURCES OF IONIZING RADIATION

The management of stochastic effects in radiological protection relies on the concept of effective dose (E), established by the International Commission on Radiological Protection (ICRP). Effective dose, derived from equivalent doses to risk organs and tissues, serves as a fundamental parameter for implementing radiation protection principles. However, effective dose cannot be directly measured and requires estimation through dose distribution in the human body, often facilitated by conversion coefficients (CCs). These coefficients relate physical, measurable quantities to protection quantities and are essential for assessing radiation risks in various exposure scenarios.

Conversion coefficients bridge operational quantities defined by regulatory bodies like ICRP and International Commission on Radiation Units and Measurements (ICRU) with physical quantities characterizing radiation fields. Commonly employed physical quantities include kerma free-in-air (Ka), tissue-absorbed dose (DT), and particle fluence (Φ). Conversion coefficients are crucial for evaluating health risks to populations in specific exposure situations and assessing the potential benefits of relocation from high-exposure areas.

This study utilized the Alderson RANDO phantom, an anthropomorphic model widely used in radiation dosimetry experiments. The phantom's organ positions and mass fractions were meticulously determined through a combination of published data and expert consultation. Experimental setups involved exposures on open surfaces using various radionuclides to investigate energy-dependent conversion coefficients. Dosimeters, including thermoluminescent detectors (TLDs) and optically stimulated luminescence dosemeters (OSLDs), were strategically positioned within the phantom to measure radiation doses accurately.

The results obtained from the experimental investigations shed light on the complexities inherent in radiation dosimetry and its implications for radiation protection strategies. One of the key findings of this study is the significant variation in organ absorbed doses across different exposure geometries.



For instance, in the AP-PA exposures, it was observed that anterior organs received higher doses in the AP-geometry, while posterior organs received higher doses in the PA-geometry, as anticipated. This differential distribution of absorbed doses underscores the importance of considering exposure geometry in assessing radiation risks to specific organs and tissues.

Moreover, the observed differences in effective doses between AP and PA geometries highlight the need for accurate conversion coefficients to translate physical quantities into protection quantities. The factor of more than 2 observed in the conversion coefficients for HP(10) to effective dose (Eeff) between AP and PA exposures underscores the influence of organ proximity to the radiation source and shielding effects on dose distribution. These findings emphasize the importance of considering not only the magnitude of radiation exposure but also its spatial distribution and shielding conditions in assessing radiation risks to individuals.

Another significant aspect of this study is the investigation of a special exposure situation involving the placement of the radiation source in a pocket, which simulates scenarios where individuals inadvertently carry radioactive materials close to their bodies. The results revealed notable differences in organ absorbed doses depending on the location of organs relative to the source, with organs in the lower part of the phantom receiving significantly higher doses compared to those in the upper regions. This stresses the importance of considering the specific anatomical distribution of organs and tissues in assessing radiation risks in real-life scenarios.

Furthermore, the establishment of a specific conversion coefficient for pocket exposure situations provides valuable insights for estimating effective doses in scenarios where individuals come into close contact with radioactive materials. This conversion coefficient, with a value of CC(pocket, ^{137}Cs): 2.5 µSv MBq^{-1}, can serve as a useful tool for assessing the potential radiation risks associated with such exposure scenarios and informing appropriate risk mitigation measures.

Overall, the findings of this study highlight the complexities involved in assessing radiation risks in various exposure scenarios and underscore the importance of accurate conversion coefficients in translating physical measurements into meaningful indicators of radiation exposure and risk. Further research in this area is warranted to refine dosimetric methodologies, improve our understanding of radiation dosimetry in complex exposure situations, and enhance radiation protection practices to safeguard public health and safety.

In conclusion, this study represents a significant contribution to the field of radiation dosimetry by providing experimental data on conversion coefficients for different exposure scenarios. The results obtained emphasize the importance of accurate conversion coefficients in assessing radiation risks and informing radiation protection strategies.

The meticulous experimental design and analysis employed in this study have provided valuable insights into the complexities of radiation dosimetry and its implications for radiation protection. By investigating various exposure geometries and scenarios, including special situations such as pocket exposure, this study has advanced our understanding of the factors influencing radiation dose distribution and effective dose estimation.

Moving forward, further research is needed to refine dosimetric methodologies, improve the accuracy of conversion coefficients, and enhance our understanding of radiation dosimetry in complex exposure scenarios. By continuing to advance our knowledge in this area, we can better protect individuals and population from the potential harmful effects of ionizing radiation and ensure the safe use of radioactive materials in various applications.

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ECOLOGICALLY SAFE SYSTEMS OF BUILDING MICROCLIMATE PREMISES

Functioning of life-support systems of buildings is connected with the consumption of heat, electric and other types of energy. It is a well-known fact that production of different types of energy is connected with technological processes. Any technological process leads to the deterioration of environmental situation. Therefore, the main environmental task in the functioning of technological process is to reduce its negative impact on the environment. [2]

At the current stage of development of the construction industry, namely, the installation of life-support systems for buildings, the question of environmental cleanliness inside the premises of the building also raises. Therefore, along with global solutions for the protection of the environment, it is also necessary to address this challenge. [1]

The ways of solving the problems of ensuring indoor climate in buildings by reducing environmental pollution and indoor cleanliness can be achieved by the following methods:

–reducing of the consumption of non-renewable energy (gas, coal, liquid fuels) through the use of renewable energy (solar, wind, etc.);

–reducing of the amount of energy consumed;

–improvement of microclimate technology in order to improve the indoor comfort in buildings. [5]

The amount of non-renewable energy consumption can be reduced by using renewable energy (sun, wind, etc.). One of the promising areas of modern energy development is the use of renewable energy for heat and cold supply of life support systems in buildings on the basis of heat-used installations of combined heat and cold production, absorption heat transformers (AHT). These heat transformers