PP-11

Estimation of Radiation Risk on Worker & Public from Radiological Facility using Thermoluminescent Dosimeter

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Objective:

The aim of present study is to monitor the indoor radiation continuously in 20 selected locations of Atomic Energy Centre Dhaka Campus using Thermoluminescent Dosimeter (TLD) and estimation of radiological hazard based on annual effective dose.

Introduction:

Application of radiation in the Research & Development (R&D) facility like Atomic Energy Centre Dhaka (AECD) gives tremendous benefit to mankind. But there is a probability of getting cancer, if people received low level of radiation during long time. Five divisions of AECD are being used radioactive materials and radiation generating equipments for service, training and Research & Development (R & D) purposes. Non-Destructive Testing Division of AECD has high activity industrial radiography sources. Health Physics Division (HPD) has radioactive materials storage room where various kinds of radioactive materials stored since establishment of AECD.

Materials and Methods:

Calibrated Harshaw TLD cards are used for the monitoring of indoor radiation of AECD. 20 indoor locations were selected for monitoring of radiation from 01-31 October 2019. The TLD cards were read out using manual Harshaw TLD reader (Model 4500) in the Health Physics Division (HPD), Atomic Energy Center Dhaka (AECD). The WinREMS software was used in the TLD Reader for evaluation of the dose in the indoor environment. The dose measurement system of the TLD Laboratory of HPD is an international standard as per PT certificate organized by IAEA in 2018.

Results and Discussion:

The indoor radiation dose rates in the twenty locations of AECD campus varied from 188.90-298.30 µSv/month with an average of 229.19 ± 26.91 µSv/month. The annual effective dose to the population from indoor radiation was varied from 1.81 mSv to 2.86 mSv and the mean was found to be 2.20 ± 0.26 mSv. The excess life-time cancer risk factor (ELCR) to population in and around of AECD campus was calculated based on annual effective dose. The ELCR values ranged from 7.21 X 10^{-3} to 1.14 X 10^{-2}.

Fig. 1 TLD system (Model 4500) for Individual Monitoring

Fig. 2 TLD Card, Holder and ring dosimeter

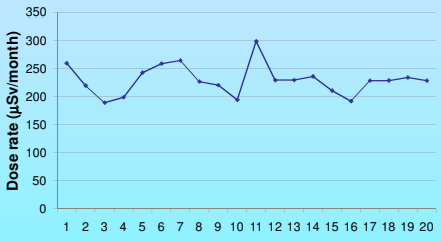

Fig. 3 Dose rate in 20 indoor locations of AECD

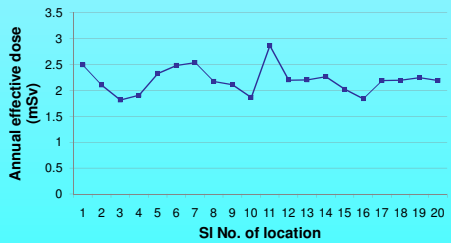

Fig. 4 Annual effective Dose in 20 indoor locations of AECD

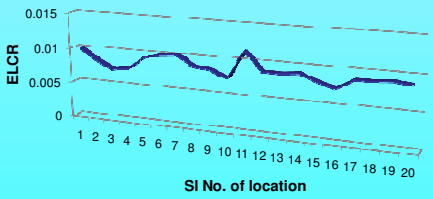

Fig. 5 ELCR for 20 indoor locations of AECD campus.

Conclusion:

The mean annual effective dose to population was well below the prescribed limit of the Nuclear Safety and Radiation Control Rules-1997 of Bangladesh. Monitoring of these indoor places would help in maintaining a record of safe working procedures while handling radioisotopes. This type of study is required for the safety of radiation workers, public and the environment in and around AECD campus from unnecessary radiological hazard.

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