P-1b-50

Radon in Spas in Budapest, Hungary

Szerbin P.[1], Csige I.[2], Köteles Gy.[1],
[1] - "Frédéric Joliot-Curie" National Research Institute for Radiobiology and Radiohygiene, POB 101, 1775 Budapest, Hungary
[2] - Institute of Nuclear Research of Hungarian Academy of Science, POB 51, 4001 Debrecen, Hungary

In Hungary a lot of thermal water occurrences providing mineral water for spas are used for curative therapeutic purposes in cases of locomotor and gastrointestinal diseases. Besides, spas attract many local visitors and tourists as recreational facilities. The geological origin of thermal water sources is different, accordingly the radioactivity levels of the waters vary widely. Treatment by spa water in the special atmosphere of the spa is proven by physicians to be beneficial. In spite of that at spas having high radon in the air particular attention should be payed to the exposure of the workers. Patients and visitors usually spend limited time in spas, therefore less affected by radon exposure, but certainly have to be informed about the potential effects. The aim of the study was to reveal the radon sources and the variation of the radon concentration, and to estimate the dose to the personnel and visitors from inhaled radon daughters.

Sampling was performed in intervals, sufficient to reveal diurnal and seasonal variations of radon concentrations. By simultaneous radon and radon progeny measurements (Pylon Electronics Inc. AB-5 type monitors, CPRD passive radon detector and AEP-47 working level detector) the equilibrium factor was usually about 0.5, this value was used in dose calculations. From the mean radon concentrations cumulative WLM exposures, bronchial dose and effective dose equivalent values were calculated for the staff and visitors.

Systematic diurnal variations of radon concentrations were found in some thermal spas. The diurnal variations of the radon levels were attributed to the technology of operation of the bath. It was shown, that the ventilation can significantly reduce the radon concentration at balneotherapeutic workplaces. The effective dose equivalent values for the spa personnel generally do not exceed the 20 mSv per year limit, recommended for workers by the ICRP 60 publication. In cases when calculated dose was higher, the management of the bath was recommended to introduce a more effective ventilation system or reduce the occupancy in the high radon atmosphere. The doses for visitors and patients were one or two magnitude lower, than that of the personnel.