

SOURCES OF "HIGHER" RADON LEVELS IN HOUSES,  
THE RESULTING RADIATION EXPOSURE AND ESTIMATE OF RISK

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ABSTRACT

The result of the "German study on radon" shows a median radon level of about  $40 \text{ Bq/m}^3$  in dwellings with a measured mean equilibrium factor of  $F = 0,3$ . The resulting median equilibrium equivalent concentration amounts to about  $13 \text{ Bq/m}^3$  corresponding to an annual exposure of  $0,14 \text{ WLM}$  for the population. The frequency distribution of the measured radon concentrations indicates that about more than five percent ( $\sim 13000$  dwellings) of the buildings investigated show concentrations exceeding  $300 \text{ Bq/m}^3$ . This means that in the Federal Republic of Germany about  $40000 - 50000$  persons live in dwellings with radon concentrations exceeding this value. The maximum value of radon concentrations was found to be about  $1250 \text{ Bq/m}^3$ . Special investigations in dwellings with comparable high radon levels showed that the exhalation from the soil is the decisive indoor radon source. It was established that the way of entry is mainly determined by specific construction parameters. The resulting mean annual radiation exposure by inhalation of short lived radon daughters for persons living in dwellings with radon concentrations of more than  $300 \text{ Bq/m}^3$  amounts, therefore, to more than  $1 \text{ WLM}$ . This means an enhancement of the radiation exposure of about a factor of ten compared to the corresponding mean exposure of the whole population. This results in an effective dose equivalent of about  $7 \text{ mSv/a}$  for this small group of the population. Applying a mean risk factor for lung cancer of  $0,01$  per  $\text{WLM/a}$  (modified relative risk model) a life time risk for this subgroup of the population of about 1 percent could be estimated.

Based on our investigations on diffusion and exhalation of radon and the results of the experiments in dwellings with high radon levels, ways and measures will be shown, to decrease the radon concentrations in existing houses and to prevent excessive exhalation from the soil into living rooms in "critical" regions.