Radon measurements in workplaces of the Slovak Republic

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Legal framework - history

- Regulation of the Ministry of Health of the Slovak Republic No. 406/1992 Coll. on the establishment of circumstances for the limitation of radon and the others naturally occurring ionizing radiation sources
  - Reference levels for the natural radionuclides in building products
  - Reference levels for the average annual equilibrium equivalent activity concentration for radon in new dwellings and new buildings with public access 100 Bq/m³ and old dwellings and old buildings with public access 200 Bq/m³
Legal framework - history

  - Regulation of the Ministry of Health of the Slovak Republic No. 12/2001 Coll. on the establishment of circumstances for the radiation protection
    - Reference level for the average annual radon concentration in dwellings and buildings with public access 500 Bq/m³
    - Reference level for the average annual radon concentration in indoor air in workplaces 1000 Bq/m³
Legal framework – current situation


- Decree of the government of the SR No. 345/2006 Coll. Laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation

- **Guidance level for the average annual radon concentration in indoor air in workplaces 400 Bq/m³ and the effective dose 1mSv/y**

- **Reference level for the average annual radon concentration in indoor air in workplaces 1000 Bq/m³**
  - When the Reference level exceeds more than 1.5 times personal monitoring is necessary
Scheme for the control of radon levels in workplaces

Collect information

Are the workplace survey or measurement screening needed?

- Yes
  - Detailed measurements of radon and dose rate
    - >400 Bq/m³
      - Remedial actions
        - Retest the workplace by detail measurements, calculation of effective doses
          - >1000 Bq/m³
            - Establishment of radiation protection control system, if > 1500Bq/m³ personal monitoring
  - No further action

- No
  - No further action
    - Detailed measurements of radon and dose rate
      - <400 Bq/m³
        - Periodic retesting
      - >400 Bq/m³
        - Remedial actions
Radon in spas

- During the years 1992 – 1994 employees of the State Health Institute in Banska Bystrica carried out the radon concentration measurements (equilibrium equivalent activity concentration of radon) in 12 spas by the Working Level Monitor, WLM-30 (Scintrex, Canada)
Radon in spas

Radon in Spas (Bq/m³)
Radon measurements in underground workplaces of the Slovak Republic

- Radon concentration (equilibrium equivalent activity concentration) and personal dose measurements were conducted by Vičanová et al. during the years 1995 – 1996 in underground workplaces, e.g. mines and caves.

- During the year 1997 the workgroup (the employees of State Health Institute in Bratislava and State Health Institute in Banska Bystrica) was established to carry out the radon concentration measurements in four ore mines and twelve show caves.

  - The grab sampling method (1 liter Lucas cells) was combined with parallel continuous monitoring (Silena Prasi 5S) in months intervals since February till August 1997.
Guided show caves in the Slovak Republic operated under the Slovak Caves Administration.
Radon in Gombasecká show cave 1996
Radon in Važecká show cave (Bq/m³)

- Zrútený dóm
- Húsková hala
- Galéria

- June 1997
- August 2007

Values:
- 0
- 5000
- 10000
- 15000
- 20000
- 25000
Caves in the Slovak Republic

- The Slovak Caves Administration
  - 12 guided show caves
    - 4 show caves within the world natural heritage
    - 2 ice show caves
    - 10 show caves – personal dosimetry
Radon measurements in underground workplaces of the Slovak Republic

- From 1998, The Slovak Caves Administration started to monitor exposure of radon (personal dosimetry) its underground employees, e.g. guiders by using etched track detector.
Personal dosimeter used in show caves
Average effective doses mSv/year/employee in show caves of the Slovak Republic

![Graph showing average effective doses in mSv/year/employee for different caves in the Slovak Republic. The graph compares permanent staff and part-time employees across 2006, 2008, and 2009.]
Average effective doses in the Slovak Republic 2000-2008

[Bar chart showing various categories such as Nuclear industry, Medical uses, Natural sources, Industrial sources, Research, education, Civil defence, and Army, with data for each year from 2000 to 2008.]
Collective effective dose from occupational exposure to ionizing radiation of the Slovak Republic in 2008

Man.mSv

Medical uses

Industrial sources

Research, education

Natural sources

The Armed sources of the Slovak Republic

Nuclear Industry

Civil defence

8220.60 / 72.57%

818.01 / 7.22%

292.47 / 2.58%

202.73 / 1.79%

33.12 / 0.29%

15.71 / 0.14%

1745.34 / 15.41%
Thank you for your attention