STUDY OF OCCUPATIONAL RADIATION EXPOSURE IN THE SLOVAK REPUBLIC 2000 – 2007

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Slovak Ministry of Health is responsible for the implementation of legislation in the area of radiation protection. The Public Health Authority of the Slovak Republic is responsible for controlling of compliance with the existing regulations in the area of radiation protection in whole country.

The legal provisions for the protection of persons from the harmful effects of ionizing radiation are currently treated within the framework of act No. 355/2007 on the protection, support and development of public health, which came into force on September 1st, 2007. Essential supplementary legislation concerning the use of ionizing radiation are included in Slovak government decree No. 345/2006 and in Ministry of Health regulation No. 545/2007.

The Public Health Authority of the Slovak Republic has supervisory functions in the area of radiation protection for all nuclear facilities and for all facilities working with ionizing radiation in medicine, industry, agriculture, research or education. Furthermore, it is responsible for the licensing of dosimetry services and for the controlling of these activities. The Public Health Authority of the Slovak Republic also co-operated with European institutions and international institutions and organizations such as WHO, ICRP, UNSCEAR etc.

A) DOSE LIMITS, DOSE QUANTITIES, DOSE LEVELS

The system of restricting exposure to occupationally exposed workers and the population is included in Slovak government decree No. 345/2006. The dose limits follow the recommendations of ICRP 60 and International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources of the IAEA.

The operational quantities used for doses received due to external exposure are the personal doses Hp(10) and Hp(0.07). In the case of internal exposure the committed effective dose (E50), is calculated.

The minimum detectable level (MDL) of the personal doses is 0.1 mSv for the dosimetry services in the two nuclear power plants for a monitoring period of one month, and 0.2 mSv for a period of three months. At the dosimetry service of the Laboratory of personal dosimetry, Slovak Legal Metrology in Bratislava the permitted MDL is also 0.1 mSv.

B) MONITORING OF INDIVIDUAL OCCUPATIONAL EXPOSURE

Who is monitored?

Radiation workers, who may receive doses greater than 3/10 of the annual dose limits, are classified as category A workers. Each worker category A and person entering a controlled area must wear an individual dosimeter. Only for workers from category A is individual monitoring of occupational doses obligatory.

About half of all occupationally exposed workers are employed in nuclear power plants. However, the contribution to the collective dose is here not so high (about 20%). The average annual dose in the NPP is relatively low, compared with that in the medicine, well logging or in industrial radiography.

Occupational exposure due to natural sources - persons employed at workplaces with volume activity of radon higher than 1000 Bq/m3 are considered to be occupationally exposed

workers. About 160 workers employed in caves are considered as occupationally exposed workers in the Slovak Republic. Individual monitoring is carried out for these workers.

Monitoring intervals

The monitoring intervals for evaluation of the doses from external exposure can vary between one and three months. In practice the duration takes one month for workers in nuclear power plants and three months for those in the area of medical diagnostics, for example classic X-ray diagnostics. For nuclear medicine diagnostics, interventional radiology and cardiology, radiotherapy and industrial radiography the duration takes one month. For other occupational groups the period is specified with respect to exposure level and risk.

Dosimetry services

Only a licensed organisation can provide service for the monitoring of individual doses. The licence is issued by the Public Health Authority of the Slovak Republic after approval procedure, which includes tests of the quality and accuracy of the measurements, carried out by the Slovak Office of Standards, Metrology and Testing. There are four dosimetry services in the Slovak republic:

- The Slovak Legal Metrology in Bratislava, Laboratory of Personal Dosimetry, who started working in year 1996; occupational dosimetry is based on TLD personal dosemeters;
- The Dosimetric Department at the Nuclear Power Plant Bohunice, started work in september 1977, occupational dosimetry is based on film and TLD personal dosemeters;
- The Dosimetric Department at the Nuclear Power Plant Mochovce, established in year 1998, occupational dosimetry is based on TLD personal dosemeters;
- The Slovak Health University in Bratislava, Department of the Radiation Protection, provided personal dosimetry at underground workplaces with risk of radon.

C) REPORTING OF DOSE INFORMATION, REGISTRATION OF RADIATION DOSES

The dosimetry services send the information on the individual doses, after every evaluation of the dosemeters, to the CROD - Central Register of Occupational Doses of Slovak Republic which is administrated by the Public Health Authority of the Slovak Republic in Bratislava. At present, all data from individual monitoring - external and internal dosimetry are stored in electronic files.

National Register of Occupational Doses

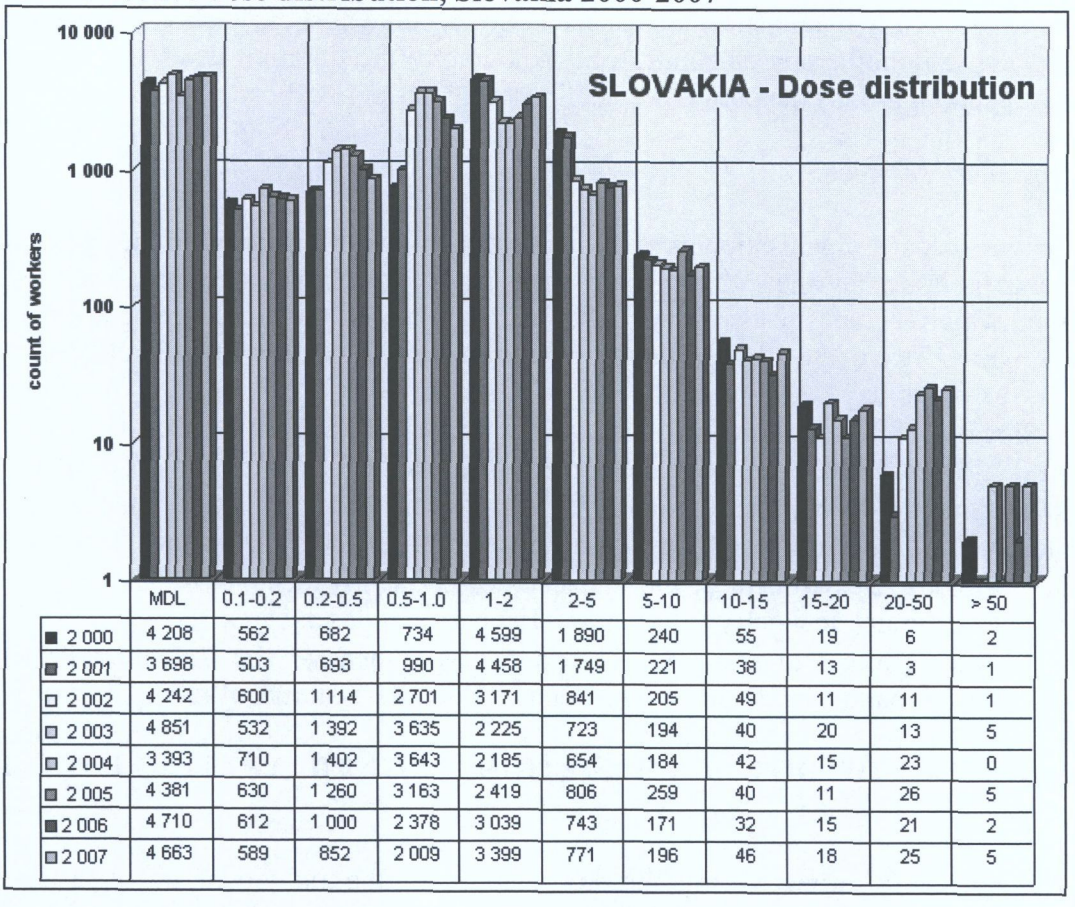
CROD - Central Register of Occupational Doses of Slovak Republic, which is administrated by Radiation protection Section of the Public Health Regulatory Authority of the Slovak Republic in Bratislava, was established in year 2001. CROD keeps the evidence of personal doses and archives them until the time, when the worker of the category A is (or would be) 75 years old.

Records about occupational exposure contain: personal data A category worker, type of workplace, length of the observation period, date of beginning and termination of work with radiation sources, number of used dosimeters and their registration numbers, measurements results for each observed period, annual effective dose, annual effective dose from external exposure, annual committed effective dose from internal exposure, effective dose during last five years, cumulative effective dose for whole period of work with radiation sources, effective dose accepted during radiation accident and radiation emergency.

C) RESULTS

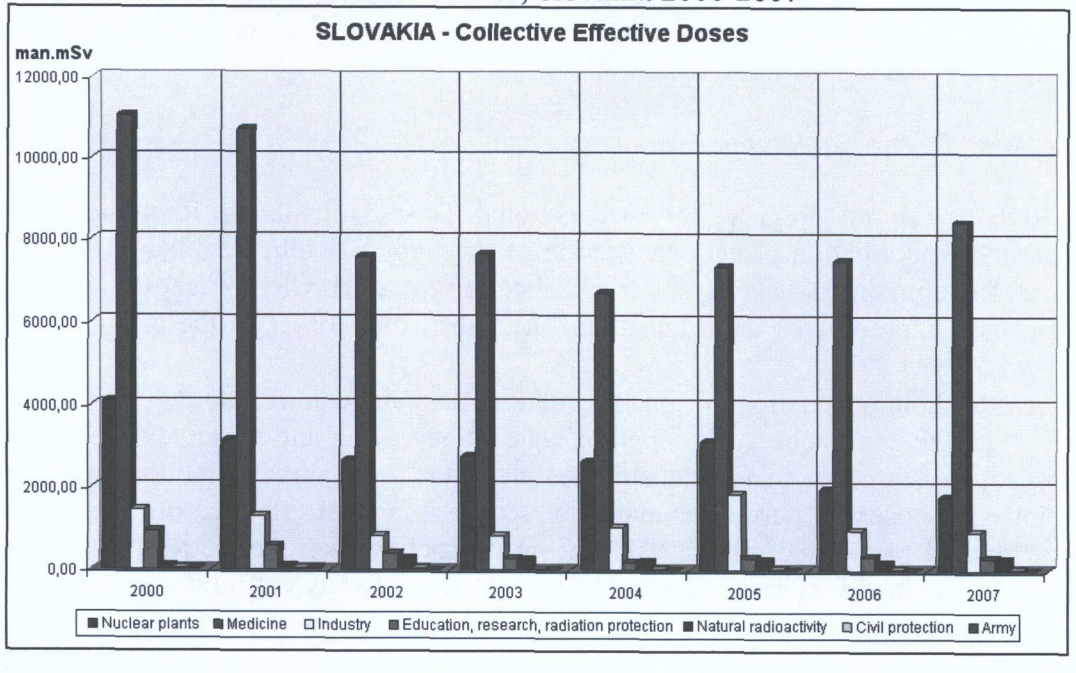
Individual effective doses distribution is show on picture 1. The next picture demonstrates distribution of the collective doses in various areas of use the ionizing radiation. The high annual effective doses were at medical applications of ionizing sources, mainly in diagnostic and interventional radiology.

Picture 1. Effective dose distribution, Slovakia 2000-2007

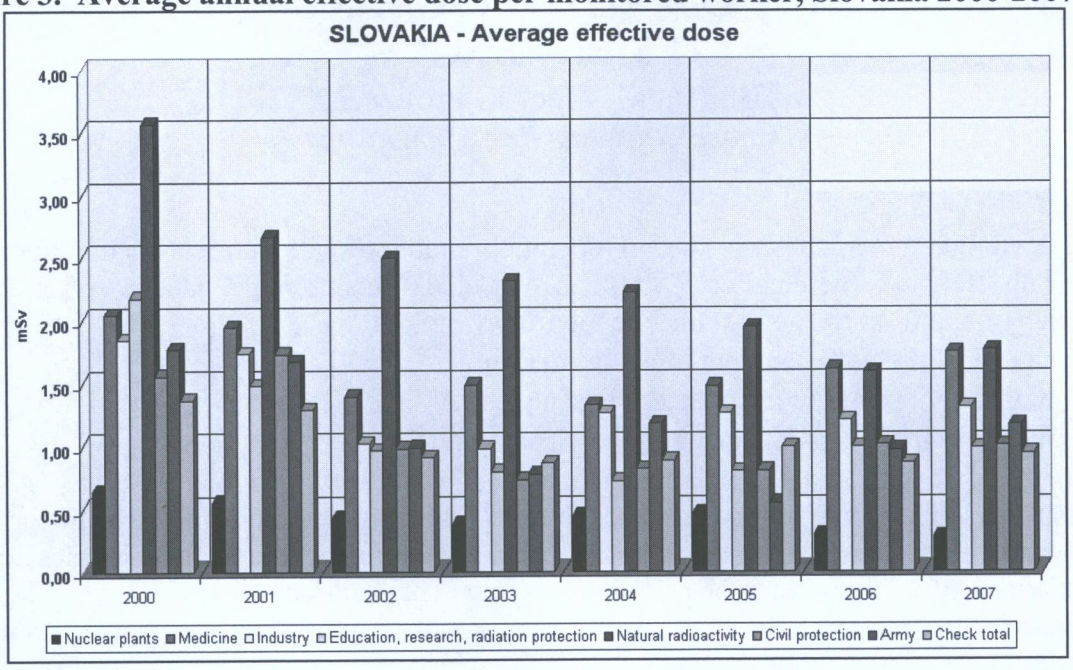


	MDL	0.1-0.2	0.2-0.5	0.5-1.0	1-2	2-5	5-10	10-15	15-20	20-50	> 50
2 000	4 208	562	682	734	4 599	1 890	240	55	19	6	2
2 001	3 698	503	693	990	4 458	1 749	221	38	13	3	1
2 002	4 242	600	1 114	2 701	3 171	841	205	49	11	11	1
2 003	4 851	532	1 392	3 635	2 225	723	194	40	20	13	5
2 004	3 393	710	1 402	3 643	2 185	654	184	42	15	23	0
2 005	4 381	630	1 260	3 163	2 419	806	259	40	11	26	5
2 006	4 710	612	1 000	2 378	3 039	743	171	32	15	21	2
2 007	4 663	589	852	2 009	3 399	771	196	46	18	25	5

Picture 2. Annual collective effective doses, Slovakia 2000-2007

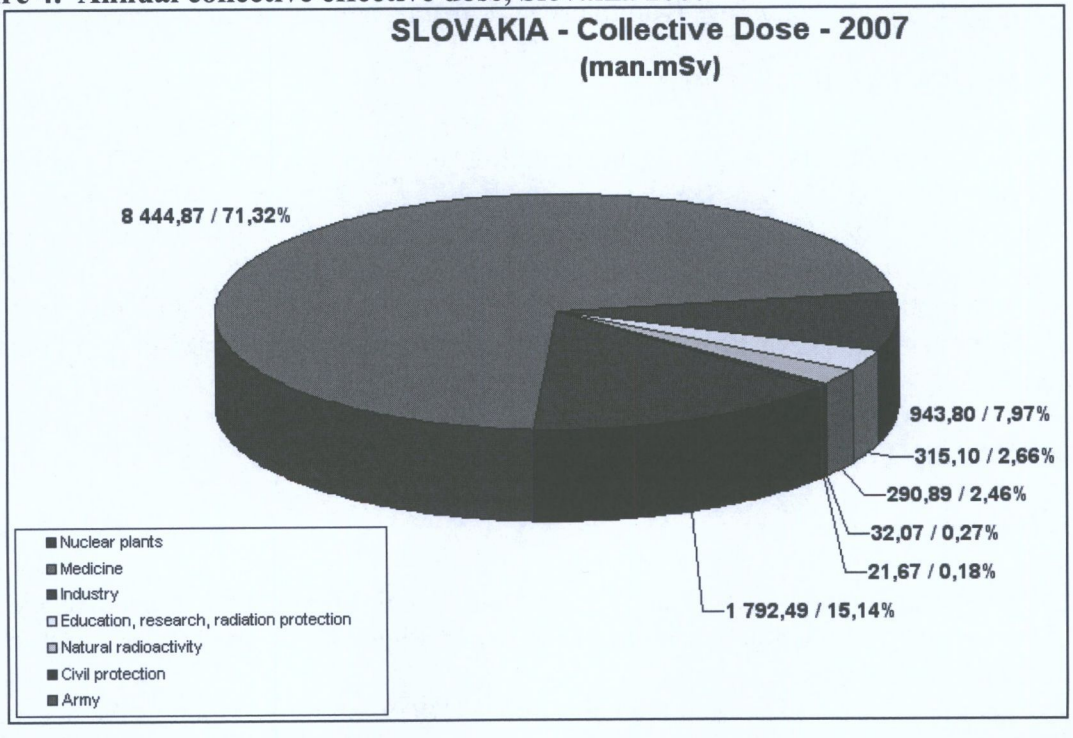


Picture 3. Average annual effective dose per monitored worker, Slovakia 2000-2007



The annual collective effective doses of the medical staff were from 60 to 70 percent of the total occupational collective effective dose in the Slovak republic (for example the collective doses last year are show on picture 4).

Picture 4. Annual collective effective dose, Slovakia 2007



REFERENCES

[1.] Karol Böhm: Radiačná záťaž zdravotníckych pracovníkov v Slovenskej republike, XXVIII. Dny radiační ochrany, Luhačovice 2006, Sborník rozšířených abstraktů, Praha 2006

[2.] Karol Böhm: Central Register of Occupational Doses of the Slovak Republik, 2nd Workshop of European Study on Occupational Radiation Exposure – ESOREX, Praha 2004

[3.] D. Nikodémová, K. Böhm, D. Šalát, D. Drábová: Radiačná záťaž personálu pri intervenčných rádiologických vyšetreniach, XXVIII. Dny radiační ochrany, Luhačovice 2006, Sborník rozšířených abstraktů, Praha 2006