



MINISTRY OF THE ENVIRONMENT OF THE SLOVAK REPUBLIC



**STATE OF THE ENVIRONMENT REPORT
SLOVAK REPUBLIC 2006**





Exploitation of nuclear energy must be justified by the contribution, which would counterbalance eventual risks originating from such activities, especially in comparison with other ways, which can be used to reach the same goal.

§ 3 par. 3 of the Act No. 541/2004 Coll. on Peaceful Exploitation of Nuclear Energy (Nuclear Act)

ENVIRONMENTAL RISK FACTORS

• PHYSICAL RISK FACTORS

Radiation protection

In February 2006, **Act 126/2006 Coll. on public health and amendments to other laws** was adopted. Provisions of the Act include among the responsibilities the implementation of the radiation situation and collection of data on the Slovak territory with the objective to assess the impact of radiation on public health. The implementing agency is the Public Health Authority of the Slovak Republic (PHA SR) in cooperation with the following ministries: Construction, Defense, Environment, Education, Agriculture, and Economy. PHA SR ensures and oversees activities of the central office for radiation and monitoring network, set forth in the SR Government Resolution no.347/2006 Coll.

◆ **Air dose equivalent rate**

Input of the external photon dose equivalent in air H ($\text{nSv}\cdot\text{h}^{-1}$) in 2006 in the early alarm networks of in the whole SR territory reached the average value of $107.1 \text{ nSv}\cdot\text{h}^{-1}$. Average annual effective dose E (μSv) for the whole SR territory was $937 \mu\text{Sv}$ in 2006.

◆ **Air Contamination**

Air contamination has continually been monitored by measuring the volume activity of individual radio nuclides in **aerosols** extracted in the ground atmospheric level. Their ^{137}Cs concentration in Slovakia in 2006 reached average value $5 \mu\text{Bq}\cdot\text{m}^{-3}$.

In 2006, no major air contamination by man-made radionuclides was detected, ^{137}Cs radionuclide concentration in **radioactive fallout**, originating in the upper atmospheric layers as a result of nuclear weapons tests, was about $3.5 \text{ Bq}\cdot\text{m}^{-2}$ in Slovakia.

◆ **Contamination of other environmental compounds**

Average soil contamination by the ^{137}Cs radionuclide in 2006 was about $2.8 \text{ Bq}\cdot\text{kg}^{-1}$. Average activity of the ^{137}Cs radionuclide **in water** in 2006 was below $0.01 \text{ mBq}\cdot\text{l}^{-1}$. Average tritium activity **in water** was at the level of $2.2 \text{ Bq}\cdot\text{l}^{-1}$.

◆ **Contamination of foodstuff and agricultural products**

Of all man-made radionuclides, in 2006, just like in the previous years, it was possible to detect in food samples only the ^{137}Cs radionuclide. Its contents in all measured commodities – excluding grasses and fungi – were around the level of units of $\text{Bq}\cdot\text{kg}^{-1}$, or rather $\text{Bq}\cdot\text{l}^{-1}$.

◆ **Radon and its radioactive decay products**

The basic public health legislation on protection against the adverse effects of ionizing radiation is Act 126/2006 on **public health and amendments to other laws**, which superseded the former Act and Resolution.

Source of radiation	Radiation load	
	Person (mSv)	Population (10^5 manSv)
Natural background together. from that:	2.94	650
- cosmic radiation	0.39	
- terrestrial gama radiation	0.46	
- radio-nuclides in body	0.29	
- radon and the products of mutation	1.80	
Medical exposure together. from that:		
- diagnostics	0.8 – 1.0	
- radiotherapy	-	
Atmospheric testing of nuclear weapons	-	30
Radio-nuclides outlet	-	2

Source: PHA SR

Nuclear institutions

State Inspection of Nuclear Safety with handling radioactive waste and burnt nuclear fuel is carried out by the **Office of Nuclear Supervisions of the SR** (NRA SR). The Act No. 541/2004 Coll. on peaceful exploitation of nuclear energy (“**Atomic Act**”) is the basic instrument for peaceful use of nuclear energy. In 2006, 13 new executing resolutions were published, building on the atomic act. The

resolutions are fully in compliance with the EU legislation in the given area. Slovakia is a signatory to all major international agreements and conventions in the area of peaceful exploitation of nuclear energy.

In Slovakia, there are altogether 6 operated blocks of nuclear power plants (NPP) with nuclear reactors of the VVER-440 type.

List of operated nuclear power plants in the SR

Nuclear Power Plant (NPP)	Start of operation	Reactor type	Operator
NPP Bohunice V-1	1978, 1980	VVER 440/230	SE
NPP Bohunice V-2	1984, 1985	VVER 440/213	SE
NPP Mochovce 1,2	1998, 1999	VVER 440/213	SE

Source: SE

♦ Activity of nuclear institutions in SR

NPP V-1 Bohunice

With both NPP – EBO V-1 blocks in operation in 2006, there were 11 occurrences, 8 of them within the INES 0 degree, and none in the INES 1 degree.

NPP V-2 Bohunice

In 2006, planned shutdowns were implemented at the NPP V-2 blocks for fuel-changing purposes together with overhauls, with the objective to carry out modernisation and ensure a better safety. The most critical role of the NPP V-2 modernization in the area of control and management systems is to replace and improve the original systems of block safety, as well as the automatic shutdown of reactors in order to introduce new, programmable computer systems. This year, both NPP V-2 blocks switched to a new nuclear fuel type.

In 2006, both NPP V-2 blocks detected 17 operation occurrences, 12 of them assessed under the INES 0 degree. This year, most attention was directed to launching of the 4th block, after a change in fuel.

Based on the results of control activities and assessment of the safety indicators, together with inspection activities, NRA SR evaluated the operation of both NPP V-2 blocks as safe and reliable.

NPP Mochovce 1,2

In 2006, both blocks were subject to planned shutdowns due to overhauls and fuel changes. Meanwhile, investment projects were carried out with the objective to continually increase the nuclear safety, building on the experience from operating the blocks. Maintenance works were carried out at both blocks. The hermetic zone of the blocks was subject to maintenance, in order to ensure high tightness of spaces and prevent the leak of radioactive substances into the environment.

Number and type of occurrences in 2006 did not show any unusual technical malfunctions. In 2006, there were 24 occurrences in NPP Mochovce, 9 of which were classified under the INES 0 degree.

In terms of nuclear safety, systems and devices functioned reliably the whole year long.

Nuclear power plants under construction

NPP Mochovce 3,4 consists of two VVER 440 blocks with the V-213 type reactors with increased safety. Slovak Electric Power Plants, Ltd. is the owner of the power plant under construction. After the construction of both of its blocks ceased in 1994, the plant was conserved. Nowadays, there are undergoing conservation, protection, and evaluation works to assess the their usefulness for the **process of completion**.

Nuclear power plants to be phased out

The nuclear power plant A-1 of Jaslovské Bohunice that uses natural uranium and a heavy water reactor cooled by carbon dioxide (HWGCR – 150MW) was shut down in 1977 after an INES 4 accident. Currently, the plant is in its **first phaseout stage**.

Operated nuclear facilities

Jaslovské Bohunice temporary storage of burnt fuel stores burnt fuel from the NPP V-1, NPP V – 2, and NPP Mochovce 1,2, before its transport to the re-processing plant or before its permanent storage.

Technology of processing and treatment of radioactive nuclear waste (RAW), Jaslovské Bohunice includes two bitumen lines, cement line, and the Bohunické RAW processing centre. Bitumen lines with the capacity of 120 l/h are designed to process RAW concentrates from the operation of nuclear power plants. RAW is processed into 200 litre barrels placed into fiber-concrete containers before its final storage.

National discharge site of radioactive waste Mochovce is a multi-barrier discharge site of the surface type, designed for final storage of solid and solidified RAW generated at the operation and phaseout of NPP, at research institutes, in laboratories, and in hospitals in Slovakia. As of the end of 2006, there were more than 1200 pcs of fiber-concrete containers for low to medium-active radioactive waste stored in this facility.

Nuclear facilities under construction

Construction of the centre for processing and treatment of liquid RAW from the operation of NPP blocks in Mochovce 1.2 continued in 2006. Each NPP implements a Coplex programme of minimization of RAW generation. The programme is evaluated through annual reports.

Nuclear facilities to be phased out

In 2006, NRA SR issued a permit to initiate the I. phaseout stage of the radioactive waste incinerator and bitumen line.

◆ Handling with radioactive waste

During 2006, RAW was transported from the site of its generation or storage to the individual processing technologies. More than 200 pcs of fiber-concrete containers were transported to the national discharge storage site of radioactive waste. During the year 2006, major occurrences that would lead to accidents or malfunctions did not occur at the radioactive waste handling or transport facilities.

Storage is the final step in the process of radioactive waste handling. Packaged forms of radioactive waste are permanently placed at the site of radioactive waste discharge storage. National RAW discharge storage site in Mochove stores and discharges RAW generated in Slovakia. Recent calculations show that the blocks of individual power plants will produce 2 500 t of burnt nuclear fuel and 3 700 t of radioactive waste over their projected lifetime. Current effective legislation does not allow these volumes to be placed at the National discharge storage site of radioactive waste. It is assumed that spent nuclear fuel and this type of RAW will be stored into a subterranean storage site. Its construction is currently in the engineering stage since 1996. SR also contributes to the cooperation among countries in the development of the regional subterranean storage site within the 6th framework EU programme.



Noise and vibrations

In December 2005, the Act No. 2/2005 on assessment and control of noise in the exterior and on amendment to the NR SR Act No. 272/1994 Coll. on public health protection as amended, was adopted. Acceptable noise levels are determined by the SR Government Decree no. 339/2006 Coll., which sets forth details on the acceptable noise values, infrasound values, and vibration, and on requirements for objective assessment of noise, infrasound, and vibrations.

Systematic monitoring of public noise load has not been carried out since 2006. Available are only the results from monitoring activities implemented at random sites (within investigation proceedings following public complaints, etc.).

Road transport is the major source of environmental noise in the SR. Recently, this noise source has shown a growing trend, especially due to an increasing intensity of individual road transport – the least environmentally-friendly option. Increase in this type of noise in larger cities is 40 % over the last decade. Truck transport also contributes to the overall noise load from transport.

Railway transport is also a major noise source, due mainly to the lack of up-to-date technical level and insufficient maintenance of railways located in the vicinity of residential homes, with no adequate noise-surpressing measures.

Air transport is a major source of noise load for the eastern part of Bratislava and the adjacent viallages. Situation in the cities of Košice, Trenčín, Zvolen, and Sliach is also problematic. The military airport in the district of Malacky is a significant source of noise, especially during military air trainings.

Recently, technical infrastructure components of buildings, including heating houses, cooling, air-conditioning, and pneumatic facilities, have also been among the stationary noise sources. These also include production facilities and large shopping centres.