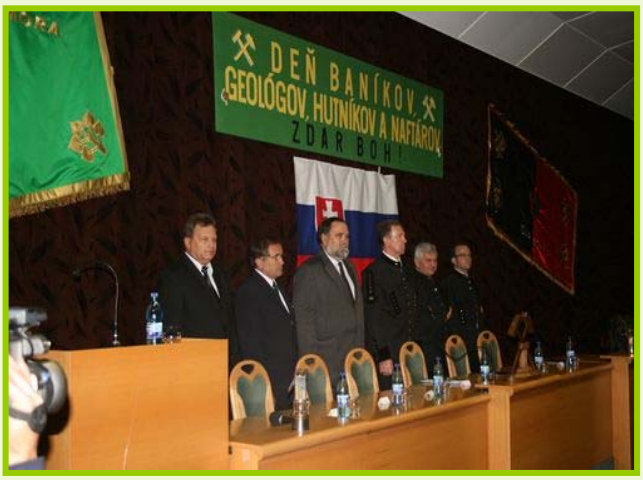
MINISTRY OF THE ENVIRONMENT OF THE SLOVAK REPUBLIC

STATE OF THE ENVIRONMENT REPORT

SLOVAK REPUBLIC 2006



The purpose of this law is to establish the principles ***of protection and rational exploitation of mineral resources,*** *especially by carrying out geological researches, openings, preparation and breaking of mineral deposits, enrichment and refining of minerals, performed in relation with their extraction, as well as providing for security of operations and environment protections during these operations.*

§ 1 of the Act on Protection and Exploitation of the Mineral Resources No. 44/1988 Coll. (Mining Act) as subsequently amended

• ROCKS

Geological environmental factors

Partial Monitoring System - Geological Factors (PMS - GF) as part of environmental monitoring in Slovakia, is focused mainly on so-called geological hazards or harmful natural or anthropogenic geological processes that threaten the natural environment and eventually the humans.

From 1.1.2006 data are monitored:

01: Landslides and other slope deformation

02: Tectonic and seismic activity of the territory

03: Anthropogenic sediments of environmental loads sediments

04: Influence of mineral exploitation upon environment

05: Monitoring of the volume activity of Radon in the geological environment

06: Stability of massifs underlying historic objects

07: Monitoring of stream sediments

04: Volume unstable soils

Summary of the major outcomes from the monitoring activities in 2006:

In 2006, monitoring of three basic types of **slope movements** was carried out – slides, creep, and signs of activated falling movements. Measurements were for in 15 selected sites.

Tectonic movements were observed within a testing operation of the Slovak spatial observing servise for the usage of satelite GPS equipment. Reports from seismic stations supplied for intepretation more than 6 140 teleseismic, regional, or local seismic phenomena. About 70 micro temblors were localized (earthquakes with no macro-seismic impacts) with their epicenter in the studied area of Slovakia. In 2006, there were in Slovakia 5 earthquakes observed as macro-seismic. Epicenters of 4 of these zones

were in the Slovak territory (2 in the source area of Dobrá voda, and 2 in the source area of Považský Inovec). Furthermore, there was in Slovakia 1 observed earthquake with its epicenter in Ukraine.

Of all **anthropogenic sediments of the character of environmental loads** in 2006, there were 145 report cards processed from *abandoned landfills.*

Processed abandoned landfills

District	Number of processed loads	Monitoring of loads
Liptovský Mikuláš	44	2
Poprad	10	-
Rožňava	36	1)
Michalovce	14	3
Sobrance	17	2
Trebišov	19	5
Prievidza	5	-
Total	145	13

Source: SGI DS

In 2006, the following sites of *tailings dumps* were monitored: Nováky – ENO (Electric power plants of Nováky) temporary, Nováky – ENO original, Nováky – ENO definite, Banská Štiavnica – Lintich, and Sedem žien (sampled and analysed 10 non-damaged and 20 damaged samples of floating sludge), Duslo Šaľa - Amerika 1, Duslo Šaľa - RSTO (Operated solid waste landfill).

A way of relative **environmental impact assessment of mineral exploitation** and risk potential of individual sites was suggested, along with processing of information on the existing monitoring and demolition activities at sites that pose most risks. The following sites were proposed for further monitoring:

- Area of brown coal extraction (Upper Nitra region – Handlová, Cígeľ, Nováky)
- Area of magnesite and talc extraction (Jelšava - Lubeník – Hnúšťa, Košice – Bankov)
- Areas of ore deposits (Middle Spiš – Rudňany, Slovinky, Smolník, Novoveská Huta, Rožňava-Nižná Slaná, Banská Štiavnica – Hodruša – Kremnica. Špania Dolina, Dábrava – Magurka, Pezinok).

Monitoring of the volume Radon activity was done in 2006 at six sites that showed medium to high Radon risk (Bratislava – Vajnory, Banská Bystrica – podlavice, Novoveská Huta, Teplička, Hnilec a Košice).

Total number of **radon** monitoring activities **in water** includes 28 in-field monitoring days per year, and 56 extracted ground water samples.

Monitoring of stability of rock massifs below historic objects was carried out on selected castles. In June 2006, a measuring devise was also installed at the Trenčín castle.

48 reference sampling sites for **alluvial sediments monitoring** were analysed. Strong contamination of alluvial sediments was found at the following sampling sites: Nitra – Chalmová, Nitra – Lužianky, Nitra – pod Šuranmi, Štiavnica – river mouth, Hornád, and Hnilec. **Monitoring of quality of solid precipitations** was carried out at 43 sampling sites. Highest pH values were found at Bratislava –

Slovnaft site, highest arsenic content was found at Horná Nitra, highest Pb content was found at Bratislava – Slovnaft, and highest Al content was found at Lehôtka pod Brehy.

During monitoring of **volume volatile soils** on the territory of the Poddunajská lowland, there were 94 damaged objects documented in towns and villages, while such objects were found in 58 towns and villages of the Východoslovenská lowland.

Geothermal energy

Geothermal energy represents a significant, thermo-energetic potential of Slovakia. At present, there are 26 designated hydro-thermal areas in Slovakia, taking up 27 % of the state's territory. Rocks that function as thermal water collectors outside the spring areas are found in the depth of 200-500 m and contain geothermal water with the temperature of 20 – 150 ^{o}C.

Summary **thermo-energetic potential of geothermal water** of all prospective areas represents 5 538 MW_t. Monitoring wells carried out to date documented 1 787 l/s of water with the outflow temperature of 18-129ºC. Their heat output represents 306.8 MWt (when used at the reference temperature of 15ºC).

Register of geological mapping

Registers of geological mapping (as of December 31, 2006)

Registers of	Accumulation in 2006	Total number
surveyed territories	39	467
surveyed territories drafts	61	420
landslides	2	11 395
wells	2 201	735 157
hydro-geological wells	186	22 981
landfills	1	8 450
map drawing and purpose mapping	249	9 617
geophysical mapping	765	4 382
abandoned mining works	52	16 569

Source: SGI DS

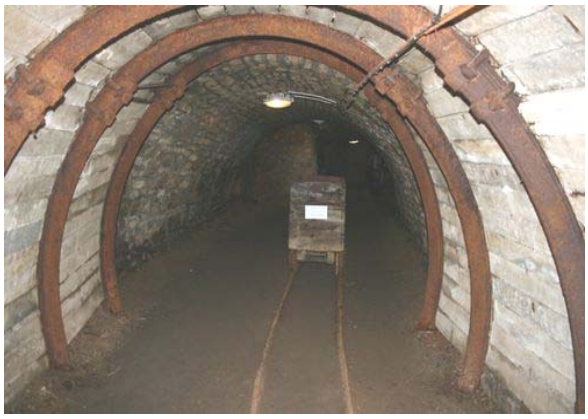
Abandoned mining works

Pursuant to **Act No. 44/1988 Coll. on protection and exploitation of mineral deposits (Mining Act),** as amended, MoE SR also ensures searching for abandoned mining works. The State Geological Institute of Dionyz Stur in Bratislava was commissioned to maintain the Register.

Abandoned mining works as of December 31, 2006

Type of abandoned mine	Number
Mining shaft	4873
Pit (hole)	517
Chute	63
Cut, excavation	88
Pingo	3 987
Pingo field	109
Pingo draw	128
Dump	6 125
Old randing	205
Sink mark	292
Placer	20
Tailings dump	10
Other	152
Total	**16 569**

Source: SGI DS



Survey territories

Under the geology legislation and pursuant to the GS SR status - the GEOFOND department keeps the register of survey areas for selected geological activities. In 2006, there were 39 survey areas and 61 registered proposals to designate a survey area. As of December 31, 2006, there were 108 recognised areas.

Overview of deposits in Slovakia

Energy deposits (state to the date 31st December 2006)

Raw material	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining in 2005	Unit	Balance deposits free	Geological deposits
Anthracite	1	1	0	thous. t	2 008	8 006
Bitumen sediments	1	1	0	thous. t	9 780	10 797
Brown coal	11	6	4	thous. t	145 068	468 382
Flammable natural gas – gasoline gas	8	6	2	thous. t	202	399
Lignite	8	3	1	thous. t	112 235	619 810
Non-resinous gases	1	0	0	mil. m^3	0	6 360
Underground stores of natural gas	8	0	0	mil. m^3	0	2 151
Crude oil non-paraffinic	3	3	0	thous. t	1 632	3 422
Crude oil - semi-paraffinic	8	4	4	thous. t	140	6 435
Uranium ores	2	1	0	thous. t	1 396	5 272
Natural gas	39	22	11	mil. m^3	8 824	27 059
Total	**90**	**47**	**22**		**281 285**	**1 158 093**

Ore deposits (state to the date 31st December 2006)

Type of ore	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining in 2005	Unit	Balance deposits free	Geological deposits
Sb ores	9	1	0	thous. t	85	3 276
Complex Fe ores	7	2	0	thous. t	5 751	57 762
Cu ores	10	0	0	thous. t	0	44 350
Hg ores	1	0	0	thous. t	0	2 426
Poly-metallic ores	4	1	0	thous. t	1 623	23 671
Wolfram ores	1	0	0	thous. t	0	2 846
Gold and silver ores	11	5	0	thous. t	26 480	31 960
Fe ores	2	2	1	thous. t	15 909	20 262
Total	**45**	**11**	**1**		**49 848**	**186 553**

Source: SGI DS

Non-metallics deposits (state to the date 31st December 2006)

Raw material	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining in 2005	Unit	Balance deposits free	Geological deposits
Anhydride	7	6	2	thous.t	806 497	1 250 527
Asbestos and aspestos rock	4	1	1	thous. t	3 710	26 904
Baryte	6	2	2	thous. t	9 556	12 741
Bentonite	23	17	6	thous.t	28 912	42 192
Cast basalt	4	4	1	thous. t	22 906	40 081
Decorative rock	19	16	2	thous. m^3	19 907	25 465
Diatomite	2	1	0	thous. t	3 342	4 955
Dolomite	20	20	11	thous. t	610 723	637 190
Precious stones	1	1	0	ct	1 205 168	2 515 866
Graphite	1	0	0	thous. t	0	294
Halloysite	1	0	0	thous. t	0	2 249
Rock salt	4	4	1	thous. t	839 633	1 350 615
Kaolin	14	13	3	thous. t	54 602	59 884
Ceramic clays	36	33	6	thous. t	115 767	190 358
Quartz	7	7	0	thous. t	310	327
Quartzite	15	13	1	thous. t	18 352	26 951
Magnesite	11	6	3	thous. t	748 198	1 128 121
Talc	5	2	0	thous. t	86 637	235 201
Mineralized I - Br waters	1	1	0	thous. m^3	3 658	3 658
Pearl stone	5	5	1	thous. t	30 265	30 585
Pyrite	3	0	0	thous. t	0	18 717
Gypsum	6	5	2	thous. t	62 768	93 528
Sialitic raw material	5	5	2	thous. t	82 802	96 165
Glass sands	4	4	1	thous. t	411 657	590 383
Mica	1	1	0	thous. t	14 073	14 073
Building rock	129	123	77	thous. m^3	632 613	746 715
Gravel sands and sands	26	24	18	thous. m^3	164 444	186 185
Brick clay	32	29	11	thous. m^3	96 319	120 690
Technically usable mineral crystals	3	1	0	thous. t	253	2 103
Limestone – unspecified	29	26	13	thous. t	1 870 562	2 207 526
High-content limestone	10	10	4	thous. t	3 198 368	3 362 290

Zeolite	6	6	2	thous. t	106 160	111 384
Foundry sands	14	14	1	thous. t	294 311	509 347
Refractory clays	7	6	0	thous. t	3 105	3 263
Feldspars	6	6	0	thous. t	10 402	11 640
Total	**475**	**419**	**173**		**11 722 671**	**15 827 116**

Source: SGI DS

Classification of mineral deposits by state of extraction (state to the date 31st December 2006)

Extraction symbol	Characteristics	Number of deposits
1	*Deposits with developed extraction activity* include exclusive mineral deposits sufficiently open and technically apt for extraction of industrial deposit.	**208**
2	*Deposits with fading extraction activity* include extraction mineral deposits where extraction activity will cease in a near future (within 10 years)	**29**
3	*Deposits before completion* include exclusive mineral deposits with documented deposits that give basis to one of the construction phases (starting with the projection phase)	**29**
4	*Deposits with ceased extraction* include exclusive mineral deposits with definitely or temporarily stopped extraction activity.	**96**
5	*Non-extracted deposits* include documented exclusive mineral deposits soon **to be** constructed and extracted.	**50**
6	*Non-extracted deposits* include documented exclusive mineral deposits **with no plans** for their extraction.	**184**
7	*Surveyed deposits* include deposits of exclusive and non-exclusive minerals with various degree of mapping.	**13**

Source: SGI DS

Non-limited mineral deposits (as of December 31, 2006)

Raw material	Number of listed deposit sites	Number of sites with extraction activities
shale	3	1
floating sand	1	0
tailings, waste	6	0
clays	1	0
building stone	144	40
ballast and sand	194	81
brick raw material	57	0
tuff	1	0
dried sludge – brucit	1	1
Total	**408**	**123**

Source: SGI DS

♦ **Ground water volumes**

Ground waters deposits in the SR (state to the date December 31, 2006)

Category	A	B	C	Total
Efficient deposits of the ground waters (l.s-1)	-	96.06	2 841.10	2 937.16
Efficient amounts of the ground waters (l.s-1)	-	-	9 851.76	9 851.76

Source: SGI DS

Legend:
C calculated on the basis of assessment of the existing hydrogeological mapping
B calculated on the basis of hydrogeological mapping with long-term extraction test
A calculated on the basis of hydrogeological mapping with semi-operational test