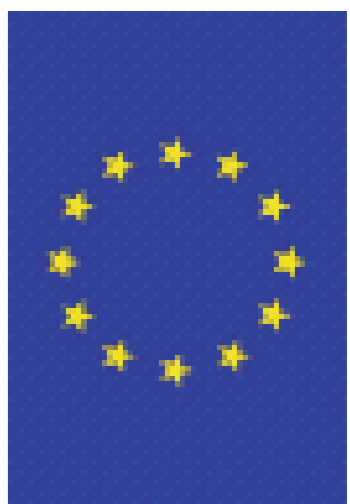


IMPACT OF CONTAMINATED SITES ON ENVIRONMENT, BANSKÁ ŠTIAVNICA MINING AREA, SLOVAKIA



Jozef Kordík, Igor Slaninka

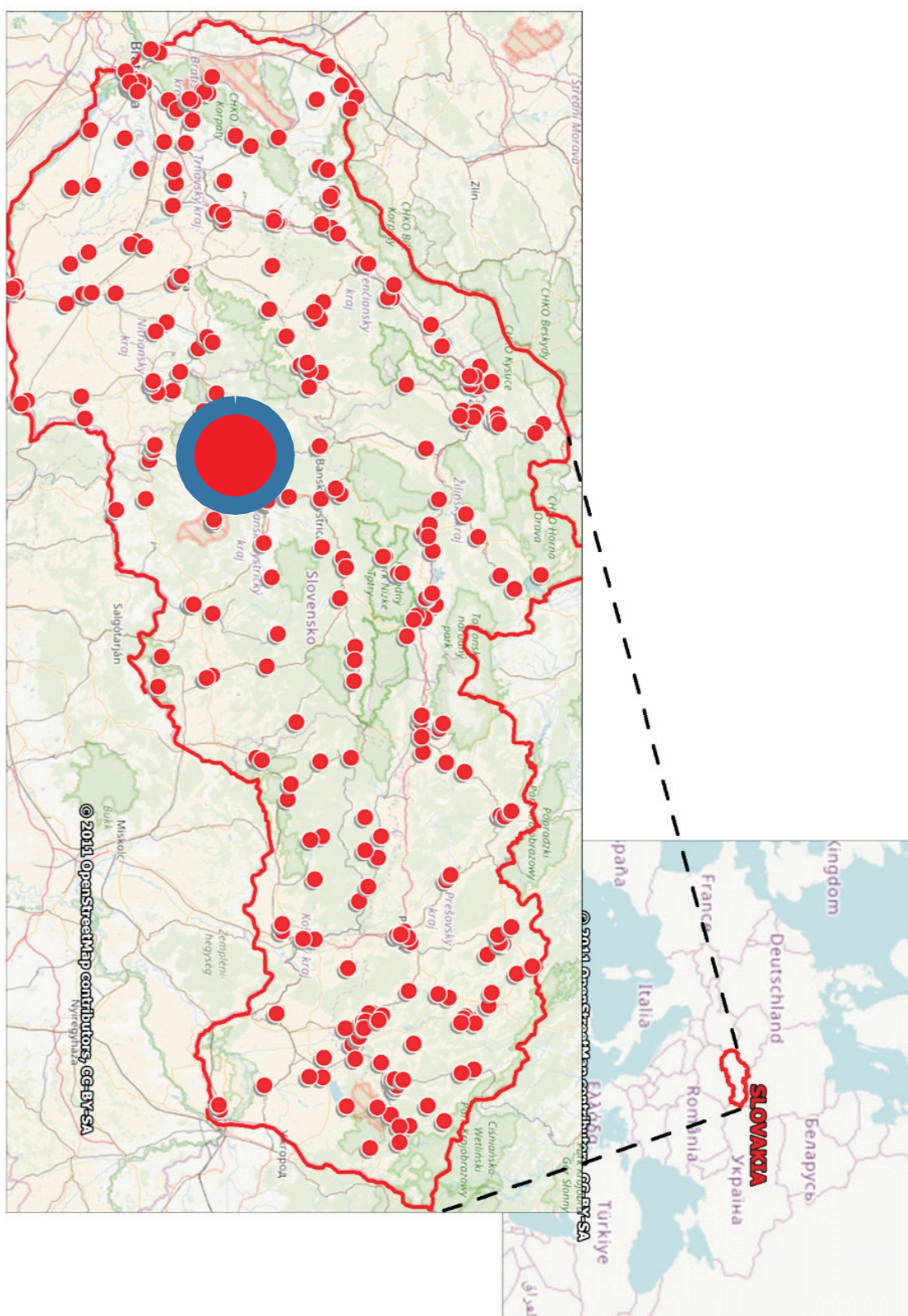
State geological institute of Dionýz Štúr, Mlynská dolina 1, 817 04 Bratislava, Slovakia, jozef.kordik@geology.sk

Since 2012, project „Monitoring of environmental burdens of selected areas in Slovakia“ is carried out

Project financed by the EU Cohesion Fund and the Slovak Government has following main objectives:

- to design/implement monitoring program for more than 300 environmental burdens in Slovakia
- to identify leakage of pollutants into the environment and their extent
- to assess the trends in concentrations of pollutants

In this contribution an environmental impact of two tailings on environment is described on the basis of the ongoing monitoring: Banská Belá – „Seven women“ tailings and Banská Štiavnica – “Lintich” tailings



	mean	median	st.dev	min	max
pH	7,36	7,18	0,66	6,54	9,3
conductivity (ms/m)	84,6	72,7	54,1	8,47	241
Na (mg/l)	14,02	11,1	9,49	4,30	40,3
K (mg/l)	6,33	4,80	5,34	0,23	19,5
Ca (mg/l)	101	68,7	85,0	8,46	374
Mg (mg/l)	17,5	19,4	10,9	1,93	42,9
Fe (mg/l)	0,21	0,08	0,55	0,004	3,11
Mn (mg/l)	0,95	0,41	1,12	0,003	4,48
NH ₄ (mg/l)	0,28	0,12	0,56	0,025	3,42
Cl (mg/l)	20,4	3,61	32,7	0,50	130
SO ₄ (mg/l)	219	128	220	18,4	886
NO ₃ (mg/l)	13,2	5,60	27,7	0,30	170
HCO ₃ (mg/l)	152	177	73,4	14,0	253
SiO ₂ (mg/l)	21,3	21,6	5,08	9,52	30,2
As (μg/l)	1,50	0,80	2,53	0,25	12,6
Sb (μg/l)	1,58	0,50	2,38	0,25	10,8
Cd (μg/l)	33,0	2,15	76,8	0,05	253
Pb (μg/l)	13,1	4,10	26,5	0,25	158
Zn (μg/l)	5695	339	11783	5,10	38300



Elevated values of chemical indicators of mining activities in **groundwaters** were found - primarily higher conductivity values and high contents of the basic chemical components (Na, Ca, Mg, Cl, SO₄ and HCO₃) and some toxic elements (Cd, Pb, Zn)

Negative influence of the tailings was also found in the **drainage waters** of the tailings - limits exceeding the general quality of surface water according to Government Decree 269/2010 were found for conductivity, pH, SO₄, Ca, Mn, Cd and Zn

Tailings **drainage water** appears to be the **most important transport medium** in terms of the possible spread of contamination to longer distance

Exceeding the indicative and intervention criteria according to Regulation of the Ministry of the Environment of the Slovak Republic no. 1/2015-7 was also found in **soils, stream sediments and borehole core samples** for several chemical parameters (especially Cd, Cu, Pb, Zn)



Impact of pollution to the vegetation around the “Seven women” tailings and the direction of spread of surface contamination



Drainage water from the “Seven women”tailings



Soil erosion in the vicinity of the tailings



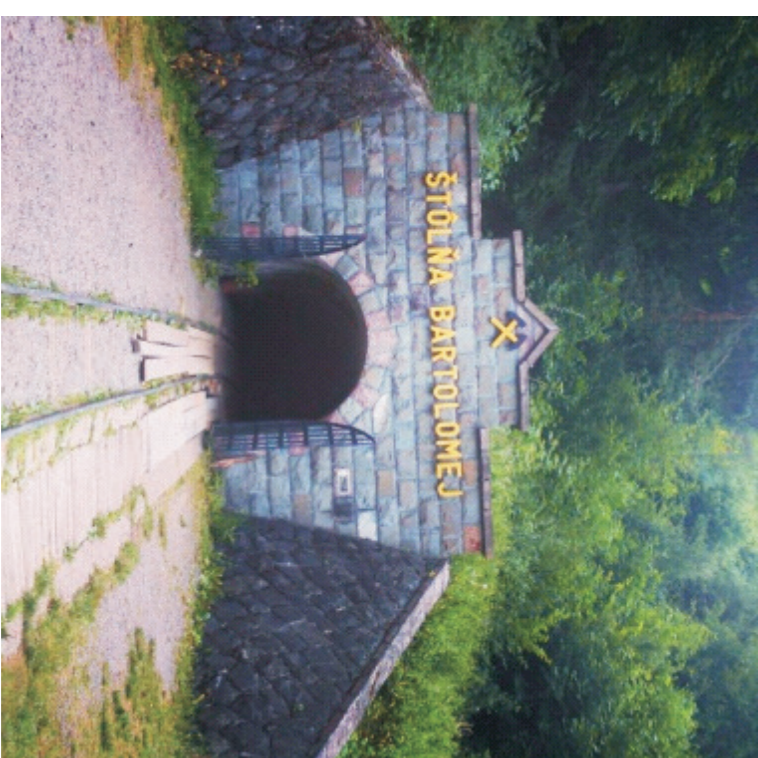
Lagoon of the “Lintich” tailings

Impact of pollution to the vegetation around the “Lintich” tailings and the direction of spread of surface contamination

Positive dimension of the Banská Štiavnica mining area – UNESCO cultural and technical heritage



“Lintich” tailings area – important technical monument – smoke flue and 50 m high chimney



Mining museums in nature, Glanzenberg mining museum - preserved immovable and movable technical monuments



Artificial reservoirs (tajchy) built for the needs of mining in the 18th century

Acknowledgement

Contribution was prepared within the project of the Operational Programme Quality of Environment titled „Monitoring of contaminated sites in the Slovak Republic – part 1“, co-funded by the European Union / Cohesion Fund (ITMS code: 310011A874) and the project of the Operational Programme Environment titled „Monitoring of contaminated sites of selected areas in the Slovak Republic“, co-funded by the European Union / Cohesion Fund (ITMS code: 24140110231)