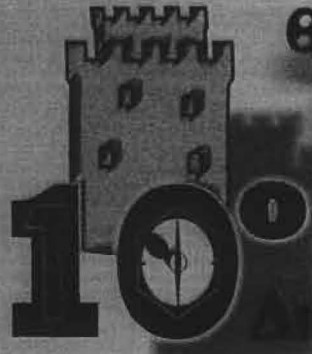


ΕΚΤΕΤΑΜΕΝΕΣ  
ΠΕΡΙΛΗΨΕΙΣ



EXTENDED  
ABSTRACTS



ΘΕΣΣΑΛΟΝΙΚΗ 2004

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## SOIL CONTAMINATION IN THE VICINITY OF RIVER ZLETOVSKA

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### ABSTRACT

The basic task of this paper is to obtain information according to which the degree of contamination to the soils with certain metals such as Fe, Mn, Pb, Zn, Cd, Cu, Cr, Ni, Co, As will be determined along the Zletovica River flow by means of geochemical exploration. These explorations should serve for making a study about the environment within the great project for the construction of the water economy site Zletovica.

Table 1: Soils Samples ICP-AES ( Profile I-Kiselica River )

Sample №	Pb (mg/kg)	Zn (mg/kg)	Cu (mg/kg)	Co (mg/kg)	Ni (mg/kg)	Fe (mg/kg)	Cd (mg/kg)	As (mg/kg)	Cr (mg/kg)	Mn (mg/kg)	pH	Temp.of extract (°C)
I-1-20	80	149	88	49	22	41520	<1	32	29	1100	6.3	25.9
I-1-40	82	184	84	47	24	40380	<1	33	32	1110	5.9	25.8
I-1-60	98	170	85	46	23	42900	<1	35	25	1100	5.8	25.9
I-1-80	80	144	93	46	24	42530	<1	34	33	970	5.9	25.9
I-2-20	2160	1140	230	31	7	67710	1	210	16	3140	2.3	25.9
I-2-40	2600	1420	230	40	12	63280	3	180	20	6740	2.4	25.8
I-2-60	5310	1940	345	42	9	72700	4	205	18	14120	2.4	25.9
I-2-80W	5940	1950	317	38	10	67200	6	190	18	14970	2.8	25.9
I-3-20	1860	1160	195	32	9	43490	3	104	15	7180	3	26.1
I-3-40	2170	800	170	23	<5	45600	<1	144	16	5300	3.3	26
I-3-60	2060	1140	206	33	<5	53150	2	164	13	5750	3.6	26
I-3-80	1950	1720	172	27	9	52440	3	172	13	10520	2.9	26
I-4-20	2240	1270	366	37	13	45570	<1	116	33	9940	3.2	26.1
I-4-40	2310	953	335	35	8	47370	<1	147	20	6080	3.4	26.2
I-4-60	3390	1240	235	30	<5	49840	1	160	13	4670	3.8	26
I-4-80W	1670	1420	220	31	6	37040	4	83	13	2020	6.9	26
I-5-20	1010	1370	170	56	21	53320	2	79	24	7250	4	26
I-5-40	197	850	123	50	20	48460	3	40	17	3640	4.1	26.1
I-5-60	128	690	96	50	22	56220	<1	46	20	2400	6	26.1
I-5-80	336	476	114	63	24	67020	<1	68	20	2280	6.4	26.2
I-6-20	436	205	75	42	9	30030	<1	21	19	1360	5.4	26.1
I-6-40	894	500	108	21	10	33300	<1	45	24	3170	4	26.1
I-6-60	1040	510	110	20	10	37610	2	50	17	3700	3.9	25.9
I-6-80	237	300	86	18	7	33380	<1	20	21	2470	3.9	25.5
I-7-20	230	110	75	34	5	22960	<1	15	18	1080	5.7	25.5
I-7-40	70	65	51	29	15	29980	<1	18	18	850	6.1	25.5
I-7-60	62	80	54	36	12	30740	<1	13	16	920	6.1	25.5
I-7-80	92	81	85	32	13	30470	<1	19	17	920	6.1	25.5

There preliminary explorations concerning this type of explorations and they were published by (Boev & Lepitkova, 1997 ; Lepitkova & Boev et al. 1994; Lepitkova & Boev, 1995; Boev & Lepitkova, 1996, 2002; Lepitkova & Boev, 1998, 1999, 2002).

*(a) Sample preparation*

- Air drying;
- Cleaning from indecomposable organic residue, twigs, roots, coarse stones;
- Grinding in agate mortar;
- Screening through non-metal sieve with 1mm grid wholes;
- Separating of 100 g average sample for analysing the pH conductivity;
- Sample grinding in agate mortal to a size of 0.074 mm and proceeding with portions for chemical analyses of the required components;
- Preservation of duplicate sample.

*(b) Sample analyses for Cd, Cr, Co, Cu, Pb, Mn, Ni, Zn, As*

The analysis is performed according to the requirements of ISO 11047 by means of extraction with aqua regia and concentrations determined by AAS and ICP-AES. The element As is determined according to ISO 11 466.

Water extract is made in the ratio 1:5 and 1:10. The elements in the extract are analyzed according to ISO 11885 by means of ICP-AES. pH determination in water extracts in the ratio 1:2.5 by means of potentiometer method according to ISO 10523. Conductivity determination according to the requirements of BDS EN 27888 by means of conduct metric method in water extracts in the ratio 1:25

The increased concentration of heavy metals in the samples of soil taken from the previously mentioned exploration wells at the both exploration profiles (I-II) is a potential danger for polluting the surface water flows of the rivers and the underground water that are in direct hydraulic relation to these water flows.

Looking downstream, the surface water from the mentioned rivers empty into the Bregalnica River. It, along its flow, has formed alluvial detritus where a confined type of aquifer with free level was formed. The city of Stip, as well as other inhabited places in the region, is being water supplied from such water aquifer.

For getting a final conclusion about the danger of pollution of great ground water quantities (aquifers) from local and regional aspect, it is necessary to carry out detailed hydrogeological and geochemical exploration works.

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