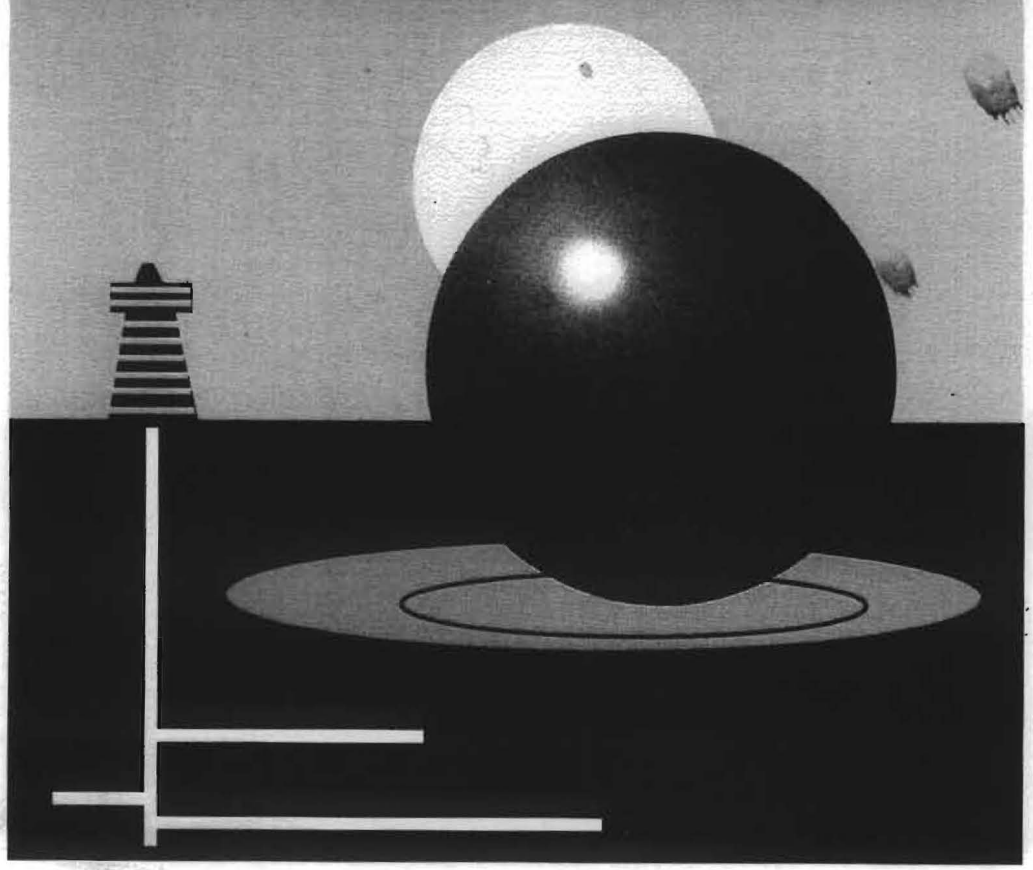

Jugoslovensko savetovanje sa međunarodnim učešćem
Rudarsko - geološki fakultet, Beograd

Yugoslav Conference with International participants
Faculty of Mining and Geology, Belgrade

RUDARSTVO I ZAŠTITA ŽIVOTNE SREDINE
MINING AND ENVIRONMENTAL ENGINEERING

ZBORNIK RADOVA
PROCEEDINGS

Beograd 25 - 27. april 1996.

Jugoslovensko savetovanje sa međunarodnim učešćem ***RUDARSTVO I ZAŠTITA ŽIVOTNE SREDINE,***
Rudarsko-geološki fakultet, Beograd, april 1996.

Yugoslav Conference with International Participants ***MINING AND ENVIRONMENTAL ENGINEERING,***
Faculty of Mining and Geology, Belgrade, april 1996.

IZDAVAČ/PUBLISHER

CENTAR ZA ZAŠTITU ŽIVOTNE SREDINE Rudarskog odseka,
Rudarsko-geološkog fakulteta, Beograd, Đušina 7,
CENTER FOR ENVIRONMENTAL PROTECTION, Mining Department,
Faculty of Mining and Geology, Belgrade, Đušina 7

CIP - Katalogizacija u publikaciji

504.05/.06:622(082)

JUGOSLOVENSKO savetovanje sa međunarodnim učešćem Rudarstvo i zaštita životne sredine (1996 ; Beograd)

Rudarstvo i zaštita životne sredine : zbornik radova Jugoslovenskog savetovanja sa međunarodnim učešćem / Jugoslovensko savetovanje sa međunarodnim učešćem Rudarstvo i zaštita životne sredine, Rudarsko-geološki fakultet, Beograd, april 1996 = Mining and Environmental Engineering : Proceedings of the Yugoslav Conference with International Participants / Yugoslav Conference with International Participants Mining and Environmental Engineering, Faculty of Mining and Geology, Belgrade, april 1996. ; [urednik Miloš Grujić]. - Beograd = Belgrade : Centar za zaštitu životne sredine = Center for Environmental Protection, 1996 (Beograd : Goragraf). - 408 str. : graf. prikazi ; 24 cm

Tiraž 300. - Bibliografija uz svaki rad. - Rezimei; Summaries.

ISBN 86-80887-81-1

626.877(082) 622.271.4(082)

622.013(082) 622.8(082)

a) Rudarstvo = Životna sredina - Zbornici b) Jalovišta - Rekultivacija - Zbornici c) Rudarstvo - razvoj - Zbornici d) Rudnici - Bezbednost - Zbornici

ID=46119180

Narodna biblioteka Srbije, Beograd

ISBN 86-80887-81-1

TIRAŽ: 300

ŠTAMPA: "Goragraf" - Beograd

Jugoslovensko savetovanje sa međunarodnim učešćem RUDARSTVO I ZAŠTITA ŽIVOTNE SREDINE, Rudarsko-geološki fakultet, Beograd, april 1996.

Yugoslav Conference with International Participants MINING AND ENVIRONMENTAL ENGINEERING, Faculty of Mining and Geology, Belgrade, april 1996.

SELENIUM IN SEDIMENTS ALONG THE REACHES OF THE RIVER ZLETOVICA AND ITS TRIBUTARIES

SELEN U SEDIMENTIMA DUŽ TOKA REKE ZLETOVICE I NJENIH PRITOKA

*B. Boev, S. Lepitkova**

ABSTRACT

Selenium belongs to the so called essential biological microelements which has a great impact on health of people depending on whether its concentration is small or high. Absence of selenium in human nutrition results in endemic cardiomiopathia known as Keshan disease (Chen et al. 1980).
Higher selenium concentration (in human blood or some food) lowers development of cancer in human body (Shamberger et al. 1976).
No data have been published in the Republic of Macedonia concerning selenium presence in individual environments.
Our aim was to determine selenium presence in sediments along the reaches of the River Zletovica and its tributaries because it is known that waste waters from mine pits and lead and zinc flotation plants of Zletovo Mines in the town of Probistip flow into it.

APSTRAKT

Selen je takozvani bazični biološki mikroelement koji ima velikog uticaja na zdravlje ljudi u zavisnosti da li je njegova koncentracija mala ili velika. Nedostatak selena u ljudskoj ishrani dovodi do endemske kardiomiopatije poznate pod nazivom Kešanova bolest (Chen et al.1980).
Veća koncentracija selena (u ljudskoj krvi ili u hrani) usporava razvoj raka u ljudskom telu (Shamberger et al. 1976).
U Republici Makedoniji nema objavljenih podataka o prisustvu selena u pojedinim sredinama.
Naš cilj je utvrdivanje prisustva selena u sedimentima duž toka reke Zletovice i njenih pritoka, jer je poznato da u nju teku otpadne vode iz rudničkih jama i flotacijskih postrojenja rudnika Zletovo u gradu Probištipu.

INTRODUCTION

The River Zletovska is the longest artery in the Kratovo-Zletovo volcanic area. All waste waters which are dumped after recovery of lead-zinc ores flow into the river or its tributaries. Namely, intensive hydrothermal processes took place during the Oligo-Miocene which resulted in formation of numerous lead, zinc and copper deposits. Recovery of these ores is the basic economy in the town of Probistip and nearby villages. Zletovo lead and zinc mines were put into production because of their rich mineral resources. They process about 300 000 tones of lead and zinc ore annually and produce about 30 000 tones of concentrates. Technological flowsheet discharges large amounts of waters which are collected in tailing ponds. Waters which flow near the dump piles and mine pits take large amounts of dissolved material and precipitate it in sediments along the reaches.

APPLIED METHODOLOGY

Monitoring system is introduced on the River Zletovica and its tributaries in order to determine the presence of individual elements in sediments (in our case it was selenium). (Fig. 1) Twelve probes from each sediment were taken and analyzed by ICP method. The results obtained are shown in Table 1.

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DISCUSSION

Table 1. Selenium content in sediments of individual sites along the reaches of the River Zletovica and its tributaries (ICP method, AES, mg/kg)

	1	5	4	3	2	7	8	6
I	0.5	0.5	5.3	3.5	2.7	1.0	4.4	1.0
II	0.5	0.6	0.5	3.1	2.8	0.7	0.5	2.1
III	0.5	0.5	3.2	2.4	0.5	3.5	1.0	5.5
IV	0.5	8	3.8	2.4	0.5	0.5	0.7	4.5
V	0.5	8	5.3	4.1	3.8	1	0.5	0.7
VI	0.5	3	0.5	0.5	1.4	0.5		3.8
VII	0.3	0.5	0.5	0.5	1.4	0.5	3.4	5.9
VIII	0.5	2.4	0.5	1	2.1	2.1	1.0	3.8
IX	0.5	1.8	0.5	1.7	2.1	3.8	2.4	2.1
X	0.5	0.5	0.5	1.7	2.4	1.7		4.5
XI	0.5	5.6	2.4	0.5	1.7	2.4	1.7	2.1
XII	0.6	1.6	1.4	3.8	6.9	0.5	3.4	0.5
Mean	**0.49**	**2.75**	**2.03**	**2.1**	**2.83**	**1.51**	**1.9**	**3.04**

Results of the analyses shown in Table 1 indicate that:

1. Selenium content in measure site 1 (the Zletovo location) is fairly uniform and amounts to 0.49 mg/kg. From ecologic point of view this measure site is not a contaminated environment with respect to the presence of individual elements (heavy and essential elements). The site does not belong to the zone assumed to be contaminated by processing and recovery of lead-zinc ore.
2. Selenium content in measure site 2 (Koritnica locality) amounts to 2.83 mg/kg. In one measurement only the amount of 6.9 mg/kg was determined. It should be mentioned that this measure site is situated at the catchment of all waste waters from the Dobrevo Mine.
3. Selenium content in measure site 3 (Globica location) amounts to 2.1 mg/kg and is 4 times higher than that in Zletovo measure site.
4. Selenium content in measure sites 4 and 5 (Kiselica and Strmos localities) amounts to 2.03 and 2.75 mg/kg. These measure sites are situated along the flowage which passes close to the flotation tailing ponds of the Zletovo lead and zinc mines.
5. Selenium concentration in measure sites 6, 7 and 8 (Buciste, Ziganci and Ularci localities) ranges from 3.04, and 1.51 to 1.9 mg/kg. These measure sites are situated along the reaches of the River Zletovica in which the Koritnica and Kiselica tributaries flow in. These two tributaries take in all dump waters from the flotation plant and lead-zinc mine.

CONCLUSION

Monitoring system was introduced in the investigated sites which are part of the large Kratovo-Zletovo volcanic area which contains large amounts of lead-zinc ores and encouraged construction of mining and technological plants. This paper shows selenium presence in sediments along the River Zletovica and its tributaries.

The results given indicate that in the area of the monitoring system (Fig. 1) there is increased selenium concentration with respect to Zletovo measure site which is a natural geochemical environment. This increase is due to increased concentrations of lead-zinc ores in the system or large influence on the area due to pollution by lead-zinc ores.

Ključne reči: selen, sedimenti, životna okolina

Key words: selenium, sediments, environment

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