

THE FOCUSING OF INFLUENCE FROM MINING ACTIVITIES OF SASA MINE, WASTE WATER FOR THE ANIMAL AND PLANT PRODUCTS DOWNSTREAM AND UPSTREAM OF THE SURROUNDING RIVER

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Abstract

In this paper the impact of the mining activities and appearance of pollution at the animal (milk) and plant products will be shown. The content of heavy metals in the surrounding river and soils are potential hazardous environment for mentioned products in this region. Investigations of the milk, drinking water and different plant products have confirmed these facts. Laboratory investigations carried out for limited or permitted contents of heavy metals (Pb, Zn, Cu, As etc) are appropriate opportunity for protection and treatment of waste water in the surrounding rivers of the Macedonian mines for production of healthy food.

1. INTRODUCTION

Flotation tailing dams affect the environment through the soil, the water and the air, and in that way, they affect the plants and animal, and also the people. The most serious problem from the ecological aspect, associated with the storage of flotation tailing, is release of contaminated water into surface and groundwater flows, the more complex is in the surface flows. As a result of the long time releasing of contaminated water, dangerous substances are deposited on the sides of the river - bed and around it, which leads to contamination of the surrounding soil.

Often in practice, due to various objective and subjective factors, uncontrollable situations arise, that lead to increased emission of dangerous substances in the water (which is often used for irrigation) for a short period of time. The reason for that are minor or major problems in the flotation tailing transport system or defects of other ancillary systems of the tailing dam. Especially dangerous is if the flotation tailing flow directly in the rivers. Analyses of water quality are contaminated with heavy metals and according these results can be decided which methods and ways should be undertaken to improve their quality and their protection from further contamination for animal and plant products in this area.

In the Sasa mine (Pb-Zn ore), the water from the deposition lake on tailing dam No.3 – phase II (second phase) is released through the overflow collector in river Kamenichka. A small part (filtration and leaching water) are released as drainage water. Part of it is filtered into the groundwater flows. Despite all control measures to improve the water quality of the deposition lake on tailing dam of Sasa mine (clarify with more days staying, return line for water), sometimes is possible releasing of contaminated waters.

The quality of the overflow and drainage waters is subject to the control measurements including determination of their physical - mechanical purity (solid residue), toxic chemical elements and pH value. Control measurements are performed every month. Maximum allowable concentrations of heavy metals for water of III category are:

	mg/l
Pb	0,1
Zn	1,0
Cu	0,1
Cd	0,01
Mn	1
Fe	1
As	0,05
Cr	0,1
Co	2

The aim of this paper is evaluation of impact from the water quality in the vicinity of the Sasa mine, according to the concentration of heavy metals and to determine adverse impact on mine and tailing dam on the environment (animal and plant products). For this, series of activities were performed:

- Preparation of topographic map;
- Twenty samples of water were taken in the area of Sasa mine, along the rivers Bregalnica and Kamenichka, until the river Bregalnica flows into the river Vardar. Specifically, 3 samples over tailing dam system along the confluents of the river Kamenichka, 5 samples along the river Kamenichka (evenly distributed to the inflow into the lake Kalimanci), 2 samples in the lake Kalimanci and 10 samples along the river Bregalnica (from the village Istibanja to the village Ubogo). These samples are marked on a topographic map with markings from 1 to 20 (Figure 1);
- Preparation of animal and plant products samples for analysis and
- Analysis of heavy and toxic metals on collected samples (Pb, Zn, Cd, As, Cr, Fe, Mn, Cu), using the methods of ICP-AES, ICP-MS.

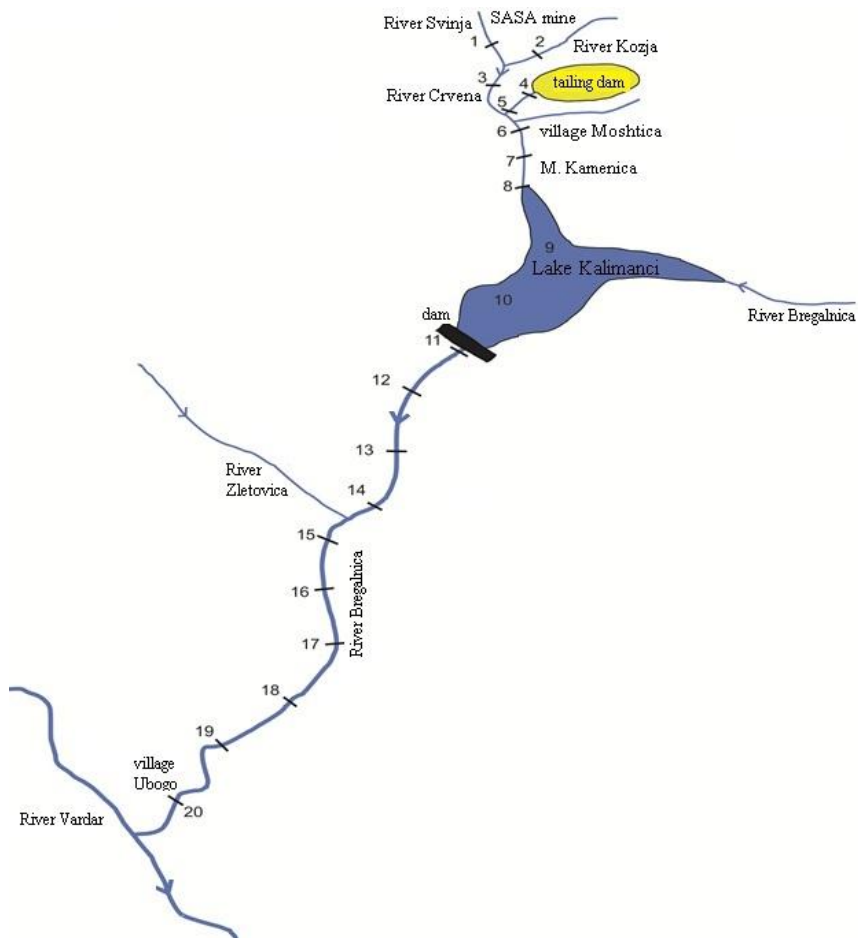


Figure 1. Map of measuring points for sampling water and places of investigated animal and plant products

3. RESULTS (Animals and plants products)

The measured values for the content of heavy metals in the animal products (milk) and different plant products were below gy tables or graphics shown. In the same time are shown descriptive statistics for some investigated examples in the region around the Sasa mine and surrounding river.

X	Y		Козјо Zn/2004	Козјо Zn/2010	Кравјо Zn/2004	Кравјо Zn/2010			Локалитет			
4664179	7626856	Селничани				9,02			Селничани	1	1	
4663406	7627825	Грујовци		10,24		14,08		Грујовци	Грујовци	2	2	
4662744	7628089	Аризанци				13,94			Аризанци	3	3	
4662417	7627967	Јагодинска маала	3,8		1,2				Јагодинска маала	4	4	
										5	5	
4660537	7628222	Долна Саса		14,61					Долна Саса	6	6	
4660428	7628320	Саско школо	3,425		6,9				Саско школо	7	7	
4658819	7628447	Самарџиско мало	4,8						Самарџиско мало	8	8	
4658707	7628299	Раздол							Раздол	9	9	
4658290	7631090	Моштица		14,33		14,18			Моштица	10	10	
4658067	7632286	Павлич дол		14,45		15,99			Павлич дол	11	11	
4654357	7632187	М.Каменица		13,25		11,12			М.Каменица	12	12	
4647142	7631750	Калиманци							Калиманци	13	13	
4646828	7629741	Бојаница	4,75						Бојаница	14	14	
4647253	7629311	Саска							Саска	15	15	
		Истибања				4,59			Истибања	16	16	
		Зрновци				8,73			Зрновци	17	17	
		Грдовци				8,12			Грдовци	18	18	
		Чифлик				8,56			Чифлик	19	19	
		Крупиште				0,05			Крупиште	20	20	
		Балван				2,97			Балван	21	21	
		Чардаклија				4,42			Чардаклија	22	22	
		Штип				8,00			Штип	23	23	
		Софилари				8,79			Софилари	24	24	
			Козјо Zn/2004	Козјо Zn/2010	Кравјо Zn/2004	Кравјо Zn/2010			Bojanica Y = 76 29741, X = 4 646 828			
		MIN	3,425	10,245	1,200	0,047	0,047					
		MEDIAN	4,275	14,328	4,050	8,643	8,643		s.Saska Y = 76 29311, X = 4 647 253			
		MAX	4,750	14,606	6,900	15,990	15,990					

Fig. 2 Descriptive statistics for animal products (milk)

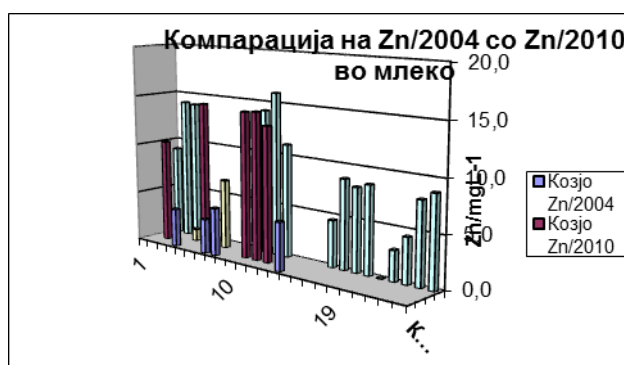


Fig. 3 Descriptive statistics for animal products (milk)

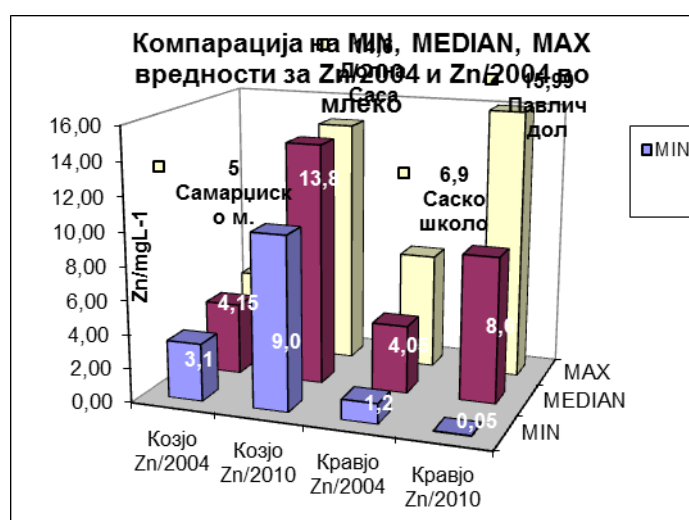


Fig. 4 Descriptive statistics for animal products (milk)

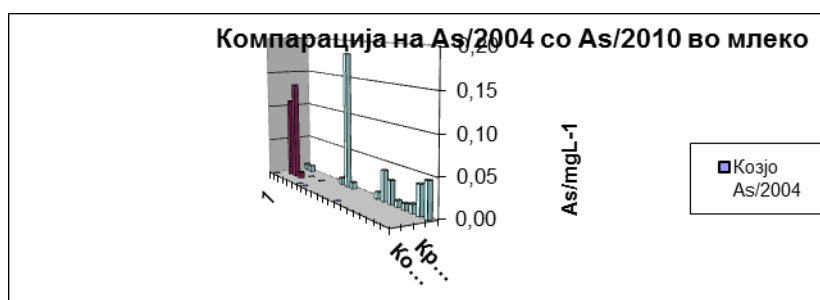


Fig. 5 Descriptive statistics for animal products (milk)

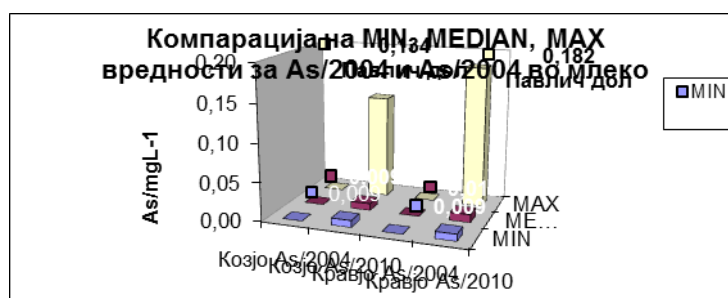


Fig. 6 Statistics presentation of Plants Products

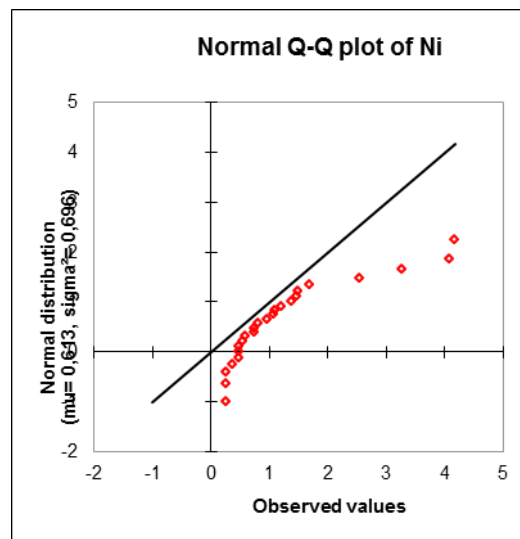


Fig. 7 Statistics presentation of Plants Products

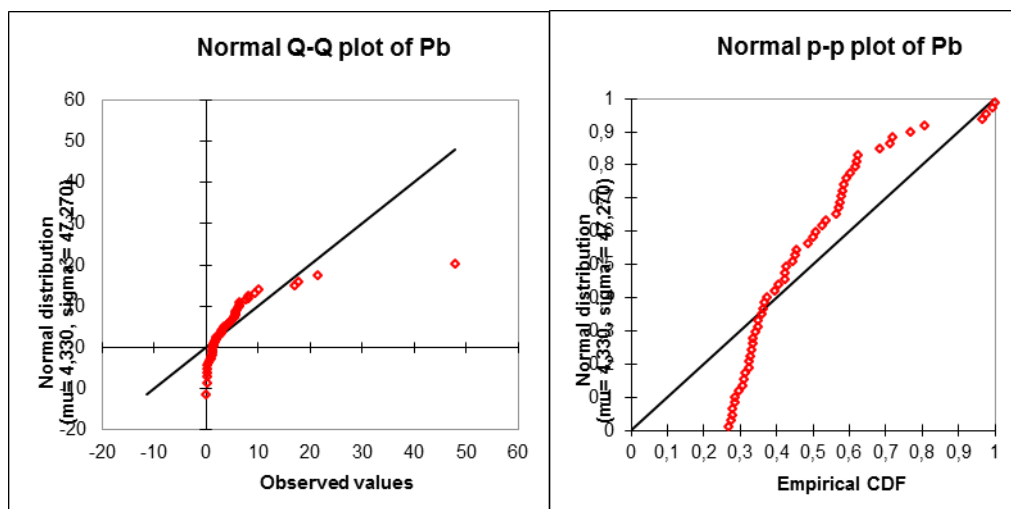
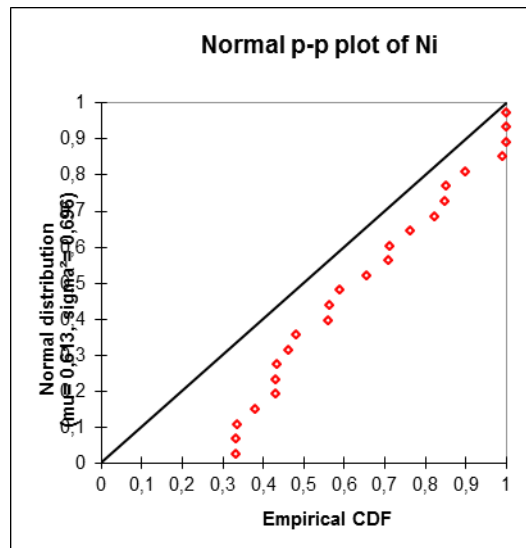


Fig. 8 and 9 Statistics presentation of Plants Products

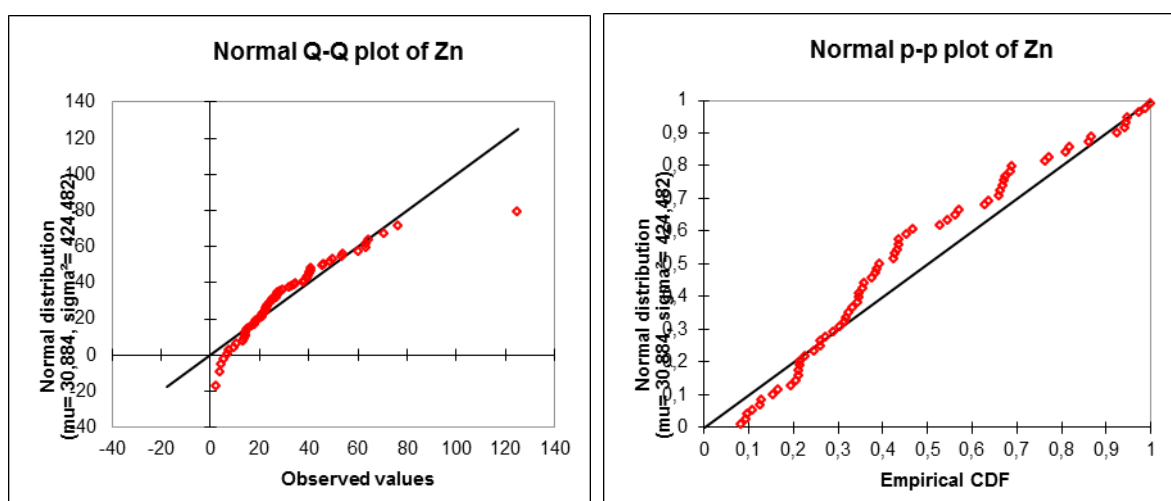


Fig. 10 and 11 Statistics presentation of Plants Products

4. CONCLUSION

According to the obtained results for the concentration of heavy metals in the surface – river water it can be concluded that the waters that pass or derived from the vicinity of the mine Sasa have high concentrations of certain heavy metals that are represented in the ore and flotation tailing.

Along the river Bregalnica to the village Ubogo (inflow in the river Vardar), water can be classified even in class II. The exception is in the vicinity of Shtip, from village Chiflik, to village Dobroshani, where increased concentration of zinc appears again. It is periodically because the higher concentration of zinc in this area appeared only during the first sampling, while the second time has been reported fairly clean water in this area.

The fact that water is very polluted to the inflow into the lake Kalimanci, and further along the river Bregalnica continues as cleaner water indicates that as a result of the water staying, heavy metals are deposited. This fact is very important for the appearance of the heavy metals in the animal and plant products around the river. Comparing the obtained results and the concentrations measured in 2004/2005 (the period when Sasa mine was not working), a difference in the concentration of heavy metals (2010) can be confirmed.

In the Sasa mine already introduced some ISO standards, including Standard for environmental management - ISO 14001. With this standard, care to the environment will be performed. To date, problems are solved in a good direction, although there are still risks and possible unexpected cases that may make unnecessary problems to the environment, especially on the plant and animal products in this area.

5. LITERATURE

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