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The Pollution of River IBËR with Heavy Metals from Landfill of Kelmend

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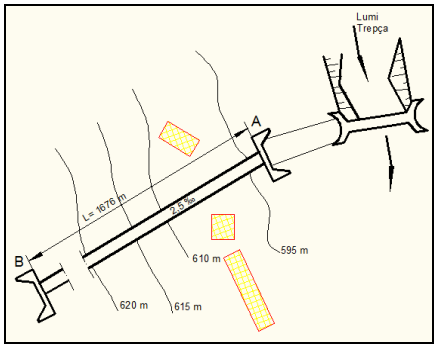
Abstract:In this paper treated the degree of water pollution that emerges from mining and mixed with industrial wastes and as such in the form of pulp thrown in landfills.
From the landfill through drainage and water flows in the river Ibër, penetrate the different pollutants that affect in water quality of this river.
The degree of contamination of the river Ibër is monitored at several points, on which it is made water sampling of landfill and where we have reached the conclusion on the possibilities of prevention of water pollution of the river Ibër.

Keywords- Landfill of Kelmend, industrial waste, pollution, river Ibër, heavy metals.

I. INTRODUCION

The mine "Trepça" in Stantërg extends 10km in northeast of Mitrovica. This mine works as a separate unit under the Mining, Metallurgical and Chemical Combine "Trepça" in Mitrovica.
Initially, the mine is open through corridor from the first tunnel, then through the central well to a depth of horizon XI (from quota 760m to quota 12m).
During that period there were open 11 horizons with vertical distance of 60m.
The depth of the mine is about 750m, while 2500m wide with an average of 20 ore troops, who in horizontal cutting have the size from (300÷3000) m^2.
The transportation of ore from Stantërg to enrichment factory made through the corridor, which connects Stantërg with the First Tunnel, on which is proceeded ennoblement of metals.
From Stantërg ore emerges the water, and as such this water, in the flotation to the first tunnel used in the flotation process.
The flow of waters in the surface, from the mining operation, usually have a low pH and contains high levels of heavy metals. (Connell et al, 1984)
After processing of Pb and Zn, the same water mixed with industrial waste and in this manner, through pipes, transported in the landfill of Kelmend.
The landfill construction was started in 1984 and occupies an area of 226.000 [m^2].
Initially, are removed wood mass and different plants, then is done the flattening of the terrain ,then in the basement of the landfill is constructed the drainage for removal of lucid water from the landfill.
Drainage is done with the help of vertical wells that are designed in distance from 50 to 100 m from each other.

a)



b)

Figure 1, a and b. The landfill in "Field of Kelmend" and corridor from enrichment plant to the landfill.

For the construction of the landfill is opened a corridor in a length of 1676m, from the first tunnel, near enrichment plant, and to the place of discharge, in "Field of Kelmend" (Figure 1, a and b).
Through this corridor, up to 90 years, in the form of pulp with content 50% sterile and 50% water, are deposited about 4.5 million m^3 of industrial waste.
The quantity and basic characteristics of the deposited material (from hydro filling studies) are presented in Table 1.

Table 1. Characteristics and quantity of industrial waste in landfill Kelmend

Filling material	Thick material fractions by flotation
The amount of solid material (F)	455,210 t/vit
Amount of slight material (L)	682,815 t /vit
Total (F+L)	1,138,025 t/vit
The average value of solid matter (particles)	210 microns

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The sterile material, form flotation in the form of solution, discharged through pipes in the landfill, where bear away the different factions.
Then, becomes the precipitation of heavy particles, while remaining water above the landfill, discharged through vertical wells, which are directly related to drainage shown in Figure 2. a, b, c, d.

a

b

b

c

d

Figure 2. a, b, c, d. The stages of landfill constructions.

The composition of deposited waste changes, while the purify water, which carries with it heavy metals from landfill lake, through the collector and the stream flows into the river Ibër.
There are the years that nobody cares about the revitalization of the landfill and as such it presents a potential hazard, not only to pollution of surface and groundwater, but also on environmental pollution in general. (Kadri et al, 2011)

II. MATERIAL AND METHODS

Water samples were taken on the River Ibër, near the landfill of Kelmend.
Some of the physical parameters are determined in place sampling, while the determination of specific parameters is done in the laboratory.
The samples were divided into separate containers and is done their conservation in accordance with the procedure of conservation, American Public Health Association, 2005 (APHA, 2005).
For determining the degree of concentration of heavy metals in water, the samples have dealt with Atomic Absorption Spectrophotometric method (AAS), until the identification of the presence of other physical-chemical parameters, are based on photometric, volume metric, comparative and visual methods, at the same time by using manual instruments.
The experimental part was realized in Mitrovica Health Institute and in First Tunnel Flotation.

III. RESULTS AND DISCUSSION

In Table 2 are presented physical-chemical parameters and the presence of heavy metals in the river Ibër as a consequence of Kelmend landfill.

Table 2. Physico-chemical parameters and the concentration of heavy metals in the river Ibër (year 2014).

Date	**Symbols**	**Measuring unit**	**Maximum allowed values**	**6.03.2014**	**6.08.2014**
Physical parameters				II	VII
Time	**h**	0:00:00		10:50	12:25
Weather				sunny	sunny
Water temperature	**T_w**	^{0}C	25	7.6	22
Smell	**Sm**	smelling		without	without
Turbidity	**Tur**	NTU	1.2-2.4	4.58	///
Electrical conductivity µS/cm	**χ**	µScm-1	1000	593	480
Concentration of H^+ ion	**pH**	0-14	6.5-8	7.78	?
Chemical parameters					
Nitrates	**NO_3^-**	mg/L	30	6.124	8.6
Nitrites	**NO_2^-**	mg/L	0.2	0.227	0.653
Ammonia	**NH_4^+**	mg/L	0.2	3.8	0.728
Phosphates	**PO_4^{3-}**	mg/L	1.0		0.824
Total phosphorus (poli+orto)	**P**	mg/L	1.0		0.602
Sulphates	**SO_4^{2-}**	mg/L	150	141.87	55.97
Heavy metals					
Zinc	**Zn^{2+}**	mg/L	1	0.235	0.156
Cadmium	**Cd^{2+}**	mg/L	0,005	0.013	0.011
Manganese	**Mn^{2+}**	mg/L	0,05	0.354	0.141
Cuprum	**Cu^{2+}**	mg/L	0,02	0	0
Iron	**Fe^{2+}**	mg/L	0,3-1,0	0.103	0.099
Lead	**Pb^{2+}**	mg/L	0,05	0.023	0.177

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During the monitoring is ascertained the presence of heavy metals that can not be sedimentation and move together with water, which through drainage discharged into the river Ibër.
It is known that heavy metals dissolved in water quickly, then precipitation as carbonate, sulphate and sulphide that are less soluble (Goletić, 2005).
Water that through drainage from the landfill flows into the River Ibër and thus causes pollution of the river to the extent over the permitted values of the EU Directive.

III. CONCLUSION

By assessment of waters state, based on the obtained results during monitoring, in samples taken we notice exceeded the concentration of heavy metals beyond the reference values with Mn, Cd and Pb.
Therefore, the obtained results for some heavy metals, which are defined in the water of river Ibër, do not comply with the criteria and standards of the EU.
The situation on the ground obliges us to conclude that the landfill occurred in Kelmend, which is still active, remains one of the potential sources of pollution on the river Ibër.
To prevent pollution of the river Ibër recommend to investigate the possibility that sterile material from the landfill, be transferred to the mine.
If such a thing can not be realized, then the landfill in question must fulfill the following conditions:
Be covered the landfill surface with a layer of soil, which is suitable for re-cultivation.
To compiled projects for building facilities for wastewater treatment from industry.
Be made wastewater treatment arising from the flotation process and these waters to used again on flotation process.

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