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USING ADMINISTRASTIVE CONTROLS TO REDUCE TAILING DAMS RISK ON THE ACTIVE TAILING DAMS IN MACEDONIA

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Abstract

The Administrative measures are reflected in the long-term analysis followed by the human factor. The administrative measures taken by the nuclear industry, and have proven to be very effective in cases of the tailing dams. They are based on: keeping accurate records; selecting appropriate staff; etc. Completing precise documentation and all possible changes, and appropriate staff is an issue that should be given attention, so bring appropriate personnel and their practical training through the work in a period of time is a necessity for a timely analysis of the situation. Emergency contain accurate documentation guidelines for emergency procedures in the event of changes to the facility and a requirement anyway.

Introduction and administrative measures to protect and previous investigations

Because complete perception of the degree of pollution of wastewater from the tailing dams from Macedonian mines Zletovo, Sasa Toranica Mine, the following table will be displayed on the allowable amount of harmful impurities in the waste water in the period until 1997. categories leads from I-IV.

Table 1. Allowed amounts of harmful impurities in wastewater by category

	I ; II	III ; IV
pH	6,8 8.2	6,0 9.0
Suspended solids	10 30 mg/l	80 100 mg/l
Dry residue filter	350 1000 mg/l	1500 1500 mg/l
phenols	0.001 mg/l	0,3 mg/l
NO_3	10 mg/l	15 mg/l
Sulphides	-	0.05 mg/l
CN	0.01 mg/l	0.1 mg/l
NH_3	0.1 mg/l	0.5 mg/l
Hg	0.001 mg/l	0,001 mg/l
As	0.05 mg/l	0,05 mg/l
Cr	0.1 mg/l	0,5 mg/l
Fe	0.3 mg/l	1.0 mg/l
Pb	0.05 mg/l	0.1 mg/l
Zn	0.2 mg/l	1.0 mg/l
Cu	0.1 mg/l	0.5 mg/l
Cd	0.001 mg/l	0.01 mg/l

Table 2. Characteristics of wastewater from flotation plants

	Zletovo	Sasa	Toranica	Bucim
pH	7.2	9.0	8.5	8.8
Suspended solids	185 mg/l	100 mg/l	-	180 mg/l
Dry residue filter	500 mg/l	250 mg/l	45 mg/l	800 mg/l
Cl	15.9 mg/l	10 mg/l	19.9 mg/l	71.9 mg/l
SO_4	238 mg/l	200 mg/l	30 mg/l	385 mg/l
CO_3	-	-	30 mg/l	-
NO_3	0.95 mg/l	-	0.4 mg/l	4 mg/l
Sulphides	1,9 mg/l	-	1,3 mg/l	0,42 mg/l
CN	0.3 mg/l	-	0.01 mg/l	-
NH_3	0.116 mg/l	0.05 mg/l	0.8 mg/l	0.3 mg/l
Na	69 mg/l	-	12 mg/l	29 mg/l
K	17.5 mg/l	-	5.5 mg/l	5.5 mg/l
Ca	8.9 mg/l	-	26.9 mg/l	128.9 mg/l
Mg	58.8 mg/l	-	6.8 mg/l	28.1 mg/l
Fe	0.85 mg/l	0.20 mg/l	0.025 mg/l	0.1 mg/l
Mn	2,55 mg/l	0.25	0.005mg/l	1,05 mg/l
Pb	0.11 mg/l	0.02 mg/l	0.011 mg/l	-
Zn	0.9 mg/l	0.01 mg/l	0.019 mg/l	0.003 mg/l
Cu	0.24 mg/l	0.05 mg/l	0.24 mg/l	-
Cd	0.001 mg/l	0.03 mg/l	-	-

Viewing the results of wastewater flotation of lead-zinc mines Zletovo, Sasa and Toranica and copper Bucim mine and allowable amounts of harmful impurities in the waste water can not be seen easily that in most parameters, the water is discharged from the tailing dams in river flows exceed the norms and standards for waters of the I-II category. Waste water treatment in the tailing dams which are a major source of environmental pollution the environment should be carried out through the use of feedback recycled water, reduce the consumption of toxic reagents, replacing toxic reagents by less toxic, partially water purification and more.

Because complete perception of the degree of pollution of wastewater from the tailing dams from Zletovo, Sasa and Toranica Mines in Bregalnica River and its tributaries, the following tables will show the quantities of harmful impurities in the waste water in the period up to 1995 - 2000 . Conducted research on the content of heavy metals in wastewater and river sludge Bregalnica along the river and its tributaries show that:

- According to the content of heavy metals in water and river sludge investigation area can be divided into two parts;
- First part creates the area with measuring points in which the content of heavy metals far above allowable limits, as a result n their anthropogenic origin;
- Rest creates the area with the measuring points in which the content of heavy metals is low, indicating their natural origin.

Table 3. Sasa

Location of samples	pH	Dry rest (mg/l)			Elements (mg/l)			
		Non filter.	filter	Suspens.	Pb	Zn	Cu	Cd
Overflow col..	8,0	700	400	300	0,05	0,14	0,13	0,01
drainage	7,5	1500	1000	500	0,07	0,15	0,03	0,01
tunnel	-	700	400	300	0,01	0,35	0,04	0,02
joint	7,5	800	600	200	0,06	0,30	0,03	0,01

Табле 4. *SASA*

Locatition of samples		Overflow water, mg/l	Tunel water, mg/l	Joint water, mg/l	Allowed conc., mg/l
Dry residue	Non filter.	414	1020	1763	-
	filter	355	380	409	1500
	Suspens	69	640	1354	60
pH		8.0	7.5	7.5	6.0-8.5
Ca		102.559	96.144	104.198	-
Mg		1.86692	1.83244	2.1793	-
Na		4.85165	5.49556	5.67332	-
K		6.83857	4.52829	5.05803	-
Al		0.77348	0.25788	0.40304	-
Fe		0.00757	0.01098	0.01245	1.0
Mn		1.84884	1.85961	2.16111	-
P		0.0128	0.0276	0.0166	-
Ti		0.01023	0.0126	0.01257	-
Sr		0.3575	0.43265	0.43037	-
Ba		0.04502	0.04446	0.04554	-
Zn		0.05441	0.4213	0.45764	1.0
Pb		<0.001	<0.001	0.0039	0.1
Ni		0.00133	0.00897	0.0056	0.1
Co		0.00632	0.00573	0.00783	2.0
As		0.00798	0.05048	0.05536	0.05
Cr		<0.001	<0.001	<0.001	0.6
Cu		<0.001	<0.001	<0.001	0.1
Cd		<0.0001	0.00061	<0.0001	0.01
Ag		<0.0001	0.00282	<0.0001	0.02
Tl		<0.01	<0.01	<0.01	-
Bi		<0.01	<0.01	<0.01	-
Ga		<0.001	<0.001	<0.001	-
In		<0.01	<0.01	<0.01	-
B		<0.001	<0.001	<0.001	-
Li		<0.001	<0.001	<0.001	-

Table 5. TORANICA

	Measured values	Allowed values*
pH	8.2	9.0
Suspended rest mater.	-	100 mg/l
Dry residue filter	284 mg/l	1500 mg/l
Cl	15.9 mg/l	-
SO_4	38 mg/l	-
CO_3	30 mg/l	-
NO_3	0.4 mg/l	15 mg/l
Sulphides	1,9 mg/l	0.05 mg/l
CN	0.01 mg/l	0.1 mg/l
NH_3	0.6 mg/l	0.5 mg/l
Na	19 mg/l	-
K	7.5 mg/l	-
Ca	88.9 mg/l	-
Mg	8.8 mg/l	-
Fe	0.085 mg/l	1.0 mg/l
Mn	0.007 mg/l	-
Pb	0.011 mg/l	0.1 mg/l
Zn	0.019 mg/l	1.0 mg/l
Cu	0.24 mg/l	0.5 mg/l
Cd	0.001 mg/l	0.01 mg/l

Table 6. BUCIM

	MDK *III-IV* class	Measured values
pH	6-9	8,05
Total dry rest	-	2520 mgr/l
Total rest	-	2505
El. conductivity	-	1350 мс.
CN	0,1 mgr/l	без
Zn	1,0 mgr/l	0,03 mgr/l
Cu	0,1 mgr/l	0,15 mgr/l
Bicarbonate	-	50 mgr/l
Fe	1,0 mgr/l	0,50 mgr/l
Chlorides	-	155 mgr/l
Ca	-	79 mgr/l
K	-	65 mgr/l
Mg	-	35 mgr/l
Mn	-	0,77 mgr/l
Na	-	105 mgr/l
Pb	0,1 mgr/l	0,1 mgr/l
Slicates	-	5,0 mgr/l
Sulphates	0,5 mgr/l	265 mgr/l
Cr	0,6 mgr/l	0,05 mgr/l

Table 7. BUCIM

	MDK *III-IV* class	Measured values
pH	6-9	5,55
Total dry rest	-	3220 mgr/ l
Total rest	-	2005
El. conductivity	-	2390
CN	0,1 mgr/l	0
Zn	1,0 mgr/ l	0,80 mgr / l
Cu	0,1 mgr/ l	120,5 mgr / l
Bicarbonate	-	20 mgr / l
Fe	1,0 mgr / l	1,50 mgr / l
Chlorides	-	15 mgr / l
Ca	-	69 mgr / l
K	-	35 mgr / l
Mg	-	235 mgr / l
Mn	-	5,7 mgr/ l
Na	-	55 mgr / l
Pb	0,1 mgr/ l	0,10 mgr / l
Slicates	-	5,0 mgr / l
Sulphates	0,5 mgr/ l	305 mgr / l
Cr	0,6 mgr / l	0,03 mgr / l

Table 8. ZLETOVO

	MDK *III-IV* class	Measured values
pH	7.2	9.0
Total dry rest	500 mg/l	100 mg/l
Total rest	184 mg/l	1500 mg/l
Cl	13.9 mg/l	-
SO_4	238 mg/l	-
CO_3	-	-
NO_3	0.94 mg/l	15 mg/l
Sulphides	0.189 mg/l	0.05 mg/l
CN	0.3 mg/l	0.1 mg/l
NH_3	0.116 mg/l	0.5 mg/l
Na	69 mg/l	-
K	17.5 mg/l	-
Ca	80.9 mg/l	-
Mg	58.4 mg/l	-
Fe	0.85 mg/l	1.0 mg/l
Mn	2.657 mg/l	-
Pb	0.1 mg/l	0.1 mg/l
Zn	0.93 mg/l	1.0 mg/l
Cu	0.24 mg/l	0.5 mg/l
Cd	0.001 mg/l	0.01 mg/l

Tailing dams consisting of sandy dam lake drainage system and evacuation equipment clear water is an object of great importance: - Provides full security and stability of sand waves; - A constant hydraulic flow slag; - To have a permanent job hydro cyclone when separating sand from dressing; - To have a functional drainage system at any moment; - To provide sufficient time for the necessary physical and chemical processes, ie knowledge-tance of the solid phase at the bottom and degradation of delinquent flotation reagents in order to get a clear and clean water for use in the plant or discharge water flows without danger be polluted environment; - Have built collectors for admission and evacuation of clear water; - To have a sand dam with required thickness and porosity for admission and evacuation of pure water; - Has an economic justification in the process of concentration;

Analysis is performed Dr. Erwin Gertner intensity of the negative consequences of the surrounding environment in various mining activities shows that they, and especially mineral technology takes first place as a potential major polluter.

The intensity of the negative consequences of the mineral technology of the surrounding environment depends on the characteristics of the raw material, in particular the presence of minor fractions and easy saluted minerals whose compositions include harmful elements.

Relatively great choices reagents basic pollutants concentration in flotation processes, opportunities for replacement toxic (cyanides, phenols), with non-toxic or less toxic reagents which reduces the negative impact of mineral technology on the natural environment. Attention deserve research and their application in the area of reducing the consumption of toxic reagents necessary, regardless of whether the goal increasing the selectivity of reagents, saving reagents or environmental point of view, what is the most significant effect of the reduction of toxic wastewater reagent . Here should be mentioned the most specific example of reducing the consumption of NaCN and ZnSO4 in most plants for ore flotation Pb-Zn concentration. Outstanding contribution to the preservation of a healthy natural environment can be cited and the use of toxic waste salts or chemicals which are by-products, in the capacity of flotation reagents, certainly in consumption that will not jeopardize the water. Here we should first talk about the use of waste salts NaOH as a pH regulator, then cyanides salts acting deprecators FeSO4 as a modifier, using transformer oil as a collector and so on.

Examination of removing minerals oils, various remaining power reagents and solvents phenols from aqueous solution comprises adsorption using natural zeolites and organic bentonite. Recent absorb mineral oils and phenols from aqueous solution, the removal efficiency of 98% mineral oil and 95% phenols. Any freeboard or dam construction of the tailing dam table represents a whole that must be contained the following facilities: Intake flotation tailing pulp; Evacuation water; Other supporting other facilities

You have to keep in mind that when freeboard is real. Through observation should be followed. All appeared plants waters and other phenomena, the amount and extent of the physical and chemical pollution. At the same time, the height of the dam will be constantly changing, and thus its dimensions, which means that during exploitation must done and individual measurements. In terms of technical monitoring of the dam, the basic control provides permanent monitoring quantities and clear filtration

of water through the body of the dam, or the functioning of the entire drainage system must be provided schedule piezometers to monitor the stability of the dam.

Also, upon completion of freeboard or exploitation provide benchmarks for monitoring the possible deformation of the dam, and also part-time measurements to be performed in case of flood wave, the occurrence of earthquake shocks with higher intensity and the like. As a result of long-term down contaminated water comes to the accumulation of harmful substances in and around the sides of the bed, which leads to contamination and the surrounding land. In practice very often, due to various objective and subjective factors, occur uncontroll conditions that lead to emission in a short period of water hazards in increase multiple. It is particularly dangerous, if there is a direct outpouring tailings streams.

As far as the protection measures at work the tailing dam must provide all permanent current applicable laws and technical regulations which will ensure a smooth and safe operation of the workers. In this regard, all norms, standards and regulatory measures, as well as guidelines for providing emergency assistance and organization, as well as conditions in terms of the expertise required to meet those specific to perform those duties. In contemporary practice prominently occupy administrative measures are reflected in the long-term analysis of the problem, followed by factor-man. These measures are essentially based on: keeping accurate records; selection of appropriate staff; necessity for on-site training of personnel; documentation of the emergency;

Flotation dams operating environment through land, water and air, and through them the entire flora and fauna, and humans. Impact of the Flotation dams environment, in terms of design and exploitation can be controlled through the following elements: • taking of land for their formation; • pollution of surface waters with excess discharge or overall taking sedimentation Lake with discharge of drainage water; • contamination of groundwater flow filtration and waters;• Air pollution by fine particles of dry tailings, which are carried under the influence of air currents; • Land contamination during deposition of particles blown by wind or its contamination with polluted waters; • potential risk of accidents during demolition of dams that can result in major damage and possible casualties.

Environment is a complex system whose parts are interconnected and dependent on each other, so that changes in one part can cause changes in other parts. To provide measures of protection, you need a good knowledge of the negative effects that occur when mining exploitation, as they would reduce the least possible extent. On the basis of the negative impacts anticipated protection measures relating to: • Water protection measures; • air protection measures; • Soil protection measures;

Can also be mentioned special precautions for the construction of the tailing dams as improving stability, as well as administrative measures.

CONCLUSION

Potential danger of the destruction of the dam which might lead to serious disorders ecosphere possible casualties and heavy damage is a problem which should be paid attention. In contemporary practice, the data show that the destruction of the dam occurs under the influence of various factors,

and according to data from USCOLD 1994 (U.S. Conference on Largo SAYS) dominant: instability slopes (22%); earthquakes (17%); floods (16%); bad derived fundaments; excessive amount of drainage water (9%); erosion and other impacts. The combined method for the construction of the dam a more positive influence on the stability of slopes, but with a freeboard of the dam project comes to applying new layers of waste slag, so that the body of the dam increases, and fine structure and granule composition makes dam and mass statically unstable and susceptible accident. At higher natural changes (earthquakes, torrential rains and other), can jeopardize the immediate environment, primarily village Topolnica. Bronchoconstriction n upper overflow collector and cut retention space, potential flood hazards are increased

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