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AND TECHNICAL CONFERENCE**

**“INNOVATIVE DEVELOPMENT OF
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AND SUSTAINABLE USE
OF NATURAL RESOURCES”**

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Table of contents

Organizing committee composition	3
Table of contents	6
Greetings from the organization committee co-chairmen:	
<i>Sorin Mihai Radu</i> , Rector of the University of Petrosani, Romania	11
<i>Viktor Moshynskyi</i> , Rector of National University of Water and Environmental Engineering, Ukraine	12

SECTION “SUSTAINABLE USE OF NATURAL RESOURCES AND WATER ENGINEERING”

13

<i>V.Moshynskyi, M.Kucheruk</i> Technological features of peat extraction in Ukraine	13
<i>M.Khlapuk, O., Bezusyak, L., Volk</i> Development analysis of the flow hydrodynamic structure theory in pipes	16
<i>M. A. Diallo</i> , A geostatistical approach to groundwater modelling for thiaroye coastal aquifer	19
<i>M.Stochitoiu, I.Utu</i> Some aspects of power systems decarbonizing according to the u.e ambitions	22
<i>M.Kharytonov, V. Kozechko, S. Chernykh</i> Waste management in reclaimed minelands to produce the biofuel feedstock	25
<i>A. Dhurandhar</i> Integrated hydrogeological investigations for detection of deccan trap covered aquifer in zilpa area, katol taluka nagpur district India	28
<i>Y.Tkalich, N.Gonchar, O.Gavryushenko</i> Bioecological evaluation of different models of technosoils	30
<i>V.Viazovyk</i> Electrocatalytic intensification of burning processes for hard and gaseous fuel	33
<i>V. Antonik, I. Antonik, I. Melnikova</i> Character of changes in underground water conditions on the area adjacent to tailing ponds of mining and concentration works	35
<i>I. Apostu, M.Lazar, F. Faur</i> Water quality of urdari and south pesteană pit lakes	38
<i>O. Mytsyk, V. Poznyak, S.Lemyshko</i> biological testing of rocks and thickness of the bulk soil layer fertility	41
<i>D.Ruban, V.Boroday</i> Energy efficient control regulator development for the asynchronous motor with long-term operating modes using the microcontroll	44
<i>N. Salahudeen</i> Mathematical modeling of reverse osmosis for desalination of seawater	47
<i>O. Pivovarov, O. Kovaleva, J. Chursinov</i> Prevention of biofouling of industrial reverse water supply systems by plasma water treatment	50
<i>O. Miedvedieva</i> Change of hydrodynamic state within the kiliya district of Odessa region	52

<i>B. Orkhontuul, G.Dolgorsuren</i> Water -supply demand in the south gobi mining and heavy industry region of Mongolia	55
<i>D.Stefanyshyn, Y. Vlasiuk</i> On the feasibility of the development of small hydropower in Ukraine	57
<i>W.Sobczyk, K.C.Ishimi Perny</i> Environmental impacts of mining-atmospheric contaminations	61

S E C T I O N

“MINING AND PROCESSING OF USEFUL MINERALS”

<i>Z. Malanchuk, O. Vasylichuk, N. Kovalchuk</i> Ecologically safe operation of phosphogypse landfills at PJSC "RIVNEAZOT"	64
<i>V. Kornienko, V. Semeniuk</i> Improving the efficiency of the work of the vibro device for amber extraction by the vibro-hydraulic method	66
<i>I. Canbulat, C. Zhang, J. Watson</i> An overview of energy transition considerations associated with coal burst occurrences	69
<i>Kh.Yusupov, Y.Bashilova, B. Toktaruly</i> The use of oxidizing agents as a way to increase the efficiency of mining hydrogenous uranium deposits	71
<i>K. Khavalbolot, G. Ganbileg</i> Backfill technologies and green mining in underground metal mine in Mongolia	74
<i>B. Marc, A. Stanimirescu, S. Radu</i> Monitoring the quality of the environment in the mining units as a result of the modernization of the equipment	76
<i>L. Vasyliiev, D. Vasyliiev, N. Osinnia</i> Unstrengthening of gas-bearing coal seams	77
<i>C. Badulescu, D. Marchis</i> Research on hydrometallurgical processing of power plant ashes	80
<i>K. Nogaeva, E. Chyntemirov, M. Molmakova</i> Gravity concentration of ore from atygay deposit	83
<i>S. Onika, Y.Bildziuk</i> Research of determining factors of increase efficiency of road transport	85
<i>S. Lutovac, M. Gligorić, J.Majstorović</i> Analysis of application the means for replacing the explosives at rock mass destruction	86
<i>M. Kharchenko, A. Manhura, O. Melnikov</i> Basic physical and chemical mechanisms of ultrasonic field influence on porous medium	89
<i>T. Munkhtsetseg</i> Occupational safety issues in the mining industries of Mongolia	92
<i>V. Naduty, Z. Malanchuk, V. Kurilov</i> The development of works on complex recycling of raw materials of basalt open-pit minesfor the removal of aluminum concentrate	94
<i>O. Stolbchenko, I. Luts, D. Saveliev</i> Degassing of coal mines	96
<i>A. Kan, S.Yefimenko, A.Erushkin</i> Capabilities of using direct X-ray fluorecsence method for testing anode copper samples	99
<i>M. Khukhuudei</i> The possibility of using open-pit conveyor transport in the conditions of the tsankh field	102
<i>Y. Malanchuk, S. Stets, A. Stets</i> System research and modeling operational automatic control process of hydro monitor erosion zeolite-smectite tuffes ..	105

At by the use as a fuel natural gas the electro-initiation of process of synthesis of radicals was carried out at tension of 10 kV and higher. There was the considerable economy of fuel (without addition of additives ~15 %, with addition of additives ~20 %).

Conclusion. The conclusion is that using of electrocatalysis with burning fuels leads to a significant increase in the amount of heat: the coal to 10-15%, wood to 14-25%, gas 15-20%.

This delivers a significant reduction in environmental impact. So with coal combustion NO_x emissions reduction is achieved by 80%, CO by 52%. Using wood -reduces NO_x by 49%, CO by 33%. The degree of burnout of coal increases by 17,5%. The consumption of energy to undertake the process does not exceed 5% of the excess heat.

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CHARACTER OF CHANGES IN UNDERGROUND WATER CONDITIONS ON THE AREA ADJACENT TO TAILING PONDS OF MINING AND CONCENTRATION WORKS

As is known, 1 kt of crude ore mined by the open pit method produces 200 t of marketable iron ore products, while the rest 800 t are mining and concentration wastes. Concentration waste materials (tailings) include liquid phase materials (slurry) of aqueous suspension remains of fragmented rock mass from which an iron ore component is extracted by the magnetic-flotation method. Slurry is fed to specific alluviation maps (beaches) of tailing ponds that can be either of plane or multilayered types.

In Kryvyi Rih iron ore region, there are eight tailing ponds of five operating mining and concentration works. They are mostly

concentrated in the southern part of Kryvyi Rih where four tailing ponds are located on the territory of 3-5 thou. ha. Two of them belong to the mining and concentration works (GZK) of the PJSC *ArcelorMittal Kryvyi Rih* (PJSC *AMKR*) (*Myroliubivka* and *Obiednane*, Map IV) and the rest - to the PJSC *Pivdenny GZK* (*Voikove* and *Obiednane*, Map I). The basic technical parameters of these facilities are the following

Tailing pond	Year of	Height, m construction	Area,	Capacity,ham m ³
Myroliubivka	1957	145	479	107
Obiednane Map IV	1971	180	320	235
Voikove	1955	75	250	157
Obiednane Map I	1971	135	230	185

Being gigantic hydro-structures on the surface, tailing ponds are factors greatly affecting hydro-geological structures. The research conducted deals with assessment of remote consequences for underground waters of the Cenozoic horizon of long-term functioning tailing ponds of mining and concentration works of the southern GZK group.

Before building tailing ponds, the aquifer in the Quaternary System sediments was widespread only in alluvial deposits on the left bank of the Inhulets and sporadically - in loess soil loams on watershed sections. After constructing the GZK tailing ponds, in 1961, the flooding expanded along the plane [1] heading to the Inhulets river and adjacent ravines, absolute levels of underground waters varying from 95 to 30 m. During the following decade, there were some changes in level modes caused by introduction of Maps I and VI of Obiednane tailing pond that made water levels raise abruptly. In 1975-1980, the subterranean back water zone of the horizon reached 1.5 km.

In 1984, the total area of water-table uprising on the territory adjacent to the tailing ponds of the PJSC *Pivdenny GZK* and the PJSC *AMKR* made up about 50 nkm² with the 3 m-level of underground waters that still remains the same.

Five years after constructing the tailing ponds, salination of the Quaternary horizon averaged 6.5 g/dm³. In 1975, it increased up to 8.8g/dm³, while in 1990, it reached 11.5 g/dm³. Right now, there are

formed stable leakages of water with 7 g/dm³ salination along the left-hand bank of the Inhulets river 1.7 km off Voikove tailing pond [2]. Anomalous content of manganese (up to 0.209 mg/dm³), oil products (up to 4.65 mg/dm³) iron ore, aluminum and bromine is detected in the underground waters [3].

The aquifer of Neogene sediments with 10.5-40 m deep underground waters is characterized by plane expansion and before construction of the tailing ponds, its salination was up to 1.93 g/dm³. It was widely used to meet household needs in drinkable water through wells and springs.

Construction of Voikove and Myroliubivske tailing ponds in 1960-1963 increased the level of Neogene horizon waters by 30m. After putting into operation Obiednane of Map I and I tailing ponds in Hrushevata Ravine, the water supply area shifted to the watershed *Hrushevata Ravine-Shyroka Ravine* and contaminated underground waters headed north-west towards the left-hand bank of the Inhulets. Technogenic factors and filtration losses from tailing ponds eventually activated the geological processes in flooding areas. This resulted in a landslide formed on the left bank of the Inhulets (Novoselivka) in 1989 and covered 22 farmsteads. In 1996-1998, there were new landslides resulted in erosion and bank destruction as well as marshy lands and quick sands. Hydrogeological surface damages are being observed and there are fresh cracks, subsidences, landslides, solution sinkholes, etc. [3].

In the 5-year time after constructing the tailing ponds, water salination was 5.6 g/dm³ and reached 11-14 gr/dm³ site wide from the tailing ponds to the bank of the Inhulets. There were found admixtures of manganese (up to 18.11 mg/dm³), oil products (up to 140.9 mg/dm³) and zinc (up to 90.56 mg/dm³). As a result, all drinkable water wells were destroyed.

The data provided indicate that construction and exploitation of facilities accumulating liquid wastes of iron ore concentration are extremely dangerous technological solutions causing irrevocable destruction of the hydrosphere on great territories located far from such sites.

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WATER QUALITY OF URDARI AND SOUTH PESTEANA PIT LAKES

Pit lakes result from the natural and/or artificial flooding of the remaining gaps of the former open-pit mining perimeters. Urdari and South Pesteana pit lakes were formed by natural flooding of the former lignite open-pits located in the mining perimeters identically named.