

UNIVERSITATEA DE NORD DIN BAI A MARE
Facultatea de Resurse Minerale și Mediu

*NORTH UNIVERSITY OF BAI A MARE
Mineral Resources and Environment Faculty*

**BULETIN ȘTIINȚIFIC
AL UNIVERSITĂȚII DE NORD DIN BAI A MARE**

SERIA D

Exploatări Miniere

Prepararea Substanțelor Minerale Utile

Metalurgie Neferoasă

Geologie și Ingineria Mediului

Volumul XXVI Nr.1

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**SCIENTIFIC BULLETIN
OF NORTH UNIVERSITY OF BAI A MARE**

Series D

Mining

Mineral Processing

Non-ferrous Metallurgy

Geology and Environmental Engineering

Volume XXVI No.1

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2. Paper includes: title, authors, institution, abstract, keywords, paper content, conclusions and references.
3. Page dimensions A4, top 2cm, down 2cm, left 2,5cm, and right 2cm.
Times New Roman font, single spacing.
4. Paper's title will be written with capital letters 14pts, bold, centered. Authors will be written with 12pts, bold, italic, centered. Affiliation will be written with 12pts, italic, centered. Abstract and keywords with 10pts, italic, justify. After title, affiliation, abstract, keywords leave one line space. Before and after each subtitle leave one line space. Paper text will be written with 12pts, justify, figures/tables included in the text. References will be listed with 10pts.

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ECOTOXICOLOGICAL EFFECTS OF HEAVY METALS ON DUCKWEED PLANTS (*Lemna minor*). I. TESTS FOR GROWTH RATE REDUCING BY CADMIUM

VASILE OROS, ANA TOMA

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract. *Heavy metals are common contaminants of freshwaters. The toxic effect of heavy metals on duckweed is used as measure of toxicity for vascular plants. For this reason the toxicity test with duckweed is standardized by EC guideline and other international guidelines. This standard method was used in these experiments to test the effects of cadmium on growth rate of duckweed for 7 days of exposure. Five different concentrations of cadmium (8; 16; 24; 36 and 40 μM) and witness variant have been tested with plants from Lemna minor species. The results recorded after 7 days indicates a high effect of growth inhibition of cadmium even in small concentration. The plants are totally discolored, white and died. The EC_{50} values estimated by statistical processing of the results are $EC_{50} = 0.36 \text{ mg/L}$ (3.2 μM) for cadmium at 7 days of exposure.*

Key words: *toxicity, heavy metal ions, cadmium, duckweed, tests*

ECOTOXICOLOGICAL EFFECTS OF HEAVY METALS ON DUCKWEED PLANTS (*Lemna minor*). II. TESTS FOR GROWTH RATE REDUCING BY THE ZINC

VASILE OROS, ANA TOMA

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract. Cadmium and zinc are common contaminants of freshwaters. The toxic effect of heavy metals on duckweed is used as measure of toxicity for vascular plants. For this reason the toxicity test with duckweed is standardized by EC guideline and other international guidelines. This standard method was used in these experiments to test the effects of cadmium and zinc on growth rate of duckweed for 7 days of exposure. Five different concentrations of zinc (64; 128; 192; 156 and 220 μM) and witness variant have been tested with plants from *Lemna minor* species. The results recorded after 7 days indicates that the effect of zinc is less toxic, even at the high concentration the growth was not totally inhibited. The plants are not discolored but some chlorosis, small sizes and separation from colonies have been registered. The EC_{50} values estimated by statistical processing of the results are $EC_{50} = 5.45 \text{ mg/L}$ (83.4 μM) for zinc at 7 days of exposure.

Key words: toxicity, heavy metal ions, zinc, duckweed, tests

STABILIZATION ANALYSIS OF THE PURCARET DUMPS AFTER THE ACCIDENT IN 2010

Ioan Bud, Simona Duma, Dorel Gusat

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The produced material well know as mine waste is stored in dumps and tailings. Offter a minimum of geomechanical safety is ignored by the constructors of these dumps. A negative example of dump Purcaret will be presented by the authors. Some aspects of the dump stabilisation, visual impacts and also environmental effects are the topic of this paper.*

Keywords: *dump stability, geomechanical issues, factor of safety, environmental aspects*

MONITORING THE BEHAVIOR IN TIME OF STRUCTURES IN QUASI STATIC REGIME THE CASE OF THE BESKA DANUBE BRIDGE, NOVI SAD, SERBIA

GHEORGHE M.T.RĂDULESCU, ADRIAN T.G. RĂDULESCU

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract. *Structural monitoring has become a current activity in the life of constructions. In terms of responding to stress and the required frequency for determinations, structural monitoring can be classified into three segments: static, quasi static-quasi dynamic and dynamic, with specific tools, technologies, methods to each group, some of these being common. The paper addresses, theoretically and practically, the problem of structural monitoring of a bridge under quasi static regime, the Beska Danube Bridge in Novi Sad, Serbia, action carried out between April 10, 2010 and October 25, 2011.*

Keywords: *Bridge, Structural monitoring, Quasi static mode, Dynamic Surveying, Total station, Engineering Surveying*

KINETIC MODEL FOR THE INCLUSION REMOVAL IN COPPER REFINING PROCESS

VASILE HOTEA, JOZSEF JUHASZ, ELENA POP, GHEORGHE IEPURE, AURICA POP

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *This work is focussed on copper refining by the injection of soda ash powder. Experiments were carried out using 15 kg copper bath at two temperatures, 1200 and 1250°C. The carrying gas used for the injection trials was air with flow rates of 3,5 and 10 l/min. The results show that the copper refining process is more efficient at temperatures for the Na₂CO₃ injection process where as high temperatures produce better antimony removal for the injection of Na₂CO₃ powder. Na₂CO₃ injection with the air flow rate (10 l/min) produced higher removal rates. The kinetic model was adapted to the copper refining process to predict the rate antimony removal in terms of temperature and flow rate.*

Key words: *copper refining, powder Na₂CO₃, antimony, kinetic model*

MODEL FOR DETERMINATION OF COPPER ELECTRICAL CONDUCTIVITY OF THE WIRE TO THE CONTENT OF ANTIMONY RAW MATERIALS, ARSENIC AND LEAD

Elena Pop

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The mathematical statistics processing of the experimental data has pointed out a variation of the electrical conductivity of the copper wire (y') in relation with the composition of the raw material. Thus, by knowing the composition of the raw material and by inputting the data into the computed mathematical model the electrical conductivity of the rolled copper wire can be determined.*

By analyzing the influence of the impurities like antimony, arsenic and lead upon copper we can say that the antimony and arsenic are impurities that form fragile chemical compounds with a significant influence upon the structure and properties of copper. The lead is an insoluble impurity that forms with copper easily fusible eutectics.

Key words: *electrical conductivity, antimony, arsenic, lead*

IMPROVEMENTS TO THE TECHNOLOGY FOR COPPER ELECTROLYSIS

Pop Elena, Vasile Hotea, Jozsef Juhasz

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *In order to improve the technology for copper electrolysis, I suggest several changes to the copper electrolysis cell such as: replacing the material from which the electrolysis cell is made with plastic material. This is a good insulator reducing the lost quantity of current in the ground, preventing copper sedimentation on the surface of the cell and maintaining a constant temperature inside the cell.*

Another change would be: the anodes from the electrolysis cell must be equipped with two separators to allow equal space between the electrodes and to prevent contact between these which could otherwise lead to short circuits and ultimately to the slowing down or termination of the electrolysis process.

In order to improve the electric contact, the feeder needs an electrolytic conductor bath and then a water wash at the changing of the anodes.

So as to prevent the waste of thermal energy and the electrolyte's evaporation, I suggest covering each electrolysis cell with a protection lid.

Key words: *copper electrolysis, anodes, cathodes*

AIR POLLUTION AT A FUEL DISTRIBUTION STATION

GABRIELA FILIP , MIHAELA PODARIU

Technical University of Cluj Napoca, North University Centre of Baia Mare

ABSTRACT: *Activities within a fuel distribution station, namely fuels handling associated road traffic that lead to more or less ambient air pollution depending on station equipments, car turnover, condition of vehicles that benefit from the station services. Pollutants analyzed to determine the air quality inside the station are VOCs, CO, SO₂, particulate matter PM10 and noise. Analyzed station is a residential fuel distribution station.*

KEYWORDS: *air pollution, fuel distribution stations, VOC, noise level*

RESEARCH ON DEVELOPMENT POSSIBILITIES ON ECOLOGICAL PRINCIPLES OF THE BĂIȚA AREA, MARAMUREȘ COUNTY

MIRELA COMAN¹, ADRIANA MUNTEAN²

¹Technical University of Cluj Napoca, North University Centre of Baia Mare

²National Administration Romanian Waters, Somes-Tisa Branch

ABSTRACT: Mining activity in the basin Baia Mare who was practiced intensively and aggressively for several decades, has seriously affected the environment. Thus, after exploration and exploitation work from the mining area Băița, Maramureș county were finish, here were remained the 5 tailings dumps. Although these landfills are inactive from over a decade, they are, together with the mine waters, the major source of pollution in the area. The rain waters washes the abandoned mining perimeters and tailings dumps, training the particles of the heavy metals in suspension, because dumps are partly cultivated with grass, here and there degraded and only one of five dumps is equipped with a wastewater treatment plant. These waters heavily loaded, are drain in natural water courses nearby, resulting a significant contamination, affecting local ecosystems. The paper brings information on river water quality and the need to improve her quality, the water represent an indispensable factor for development.

Keywords: mining activities, Băița river, environmental impact

THE NEW CONCEPT OF PELLETING TO THE COPPER OXIDE CONCENTRATES FOR THE MELTING PROCESS

Jozsef Juhasz, Vasile Hotea, Elena Pop

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The aim of this paper was to elaborate a manufacturing technology of a cuprous oxide pellets from concentrates, applicable at industrial level.*

The experimental researches started on the premise to establish a formula for the preparation of raw material as easy to process further to melting in the blast furnace, respectively to minimize the possible using of additional auxiliary materials.

The experiments performed aimed to establish the following parameters: the composition of the charge, and the formula, the type of binder, the post-pelletising operations.

Keywords: *pellets, copper oxide concentrates, compression.*

MONITORING THE CONTENT OF NO₂⁻, NO₃⁻ AND NH₄⁺, IN DRINKING WATER FROM THREE RURAL LOCALITIES (ILBA – HANDAL, CICÂRLĂU AND BĂIȚA BĂII)

DORINA BACIU¹, ADRIANA MUNTEAN², G. ACHIM¹, VALERIA BREZOCZKI¹

¹Technical University of Cluj Napoca, North University Centre of Baia Mare

²National Administration Romanian Waters, Somes-Tisa Branch, Romania

Abstract: *this paper presents analysis and comparison with contaminants NH₄⁺, NO₂⁻ and NO₃⁻ located in areas known for agriculture activity (Handalul Ilbei, Cicârlau, Băița Băii).*

Keywords: *potable water, NO₂⁻, NO₃⁻, NH₄⁺.*

THE INFLUENCE OF THE REHABILITATION OF A WASTE WATER TREATMENT PLANT ON THE CBO_5 , CCO_{Cr} , TOTAL MATERIALS IN SUSPENSION AND AMMONIA NITROGEN

DORINA BACIU, A.A. HIROS

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *This paper, presents the purification yields concerning indicators: CBO_5 , CCO_{Cr} , MTS and ammoniacal nitrogen, before and after upgrading a sewage treatment of household.*

Key words: *pH, CBO_5 , $CCO-Cr$, MTS, ammoniacal nitrogen, purification yield, sewage.*

RIVER SOMEȘ WATER QUALITY STUDY IN BÂRGĂU AREA AND NEGRUȚEI VALLEY INFLUENCE ON IT

DORINA BACIU, LEONARD MIHALY COZMUȚA, R. VAIDIȘ, VALERIA BREZOCZKI

Technical University of Cluj Napoca, North University Center of Baia Mare

Abstract: *This paper presents the classification of Someș river water in one of the five classes of surface water quality in terms of oxygen saturation, dissolved oxygen concentration, CBO_5 , CCO_{Mn} and study the influence of Negruței Valley to the Someș River.*

Keywords: *surface water quality, CBO_5 , CCO_{Mn} , dissolved oxygen, saturation*

STUDY THE POSSIBILITY OF EXPLOITATION AND PREPARATION NONFERROUS MINERAL DEPOSITS OF USEFUL MINERAL SUBSTANCES WITH SMALL RESERVES IN TERMS OF ECONOMIC EFFICIENCY AS HIGH

Nicolae Băncilă-Afrim, Dorel Gușat

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *This paper presents the situation of small tonnage mining worldwide and there are references to mining in Romania, showing that the mines in our country started operating as small mines, developing then in stages, with increasing and promoting reserves.*

The paper continues by highlighting opportunities, needs and perspectives of small tonnage mining in general and particularly in Romania.

There are currently able to make mining profitable activities in Maramures County and the satellite coordination of the mines center as in Figure 1 and E.M. Săsar (Figure 2) with changing organizational charts to satellite mines, according to Figure 3, and the Central Mine to be dissolved in as short a time as possible.

Through this reorganization could achieve considerable savings in the wage bill in particular, but also other mining expenditure turned into a profitable activity. Of great importance could be the maintaining of the processing plant and flotation Săsar Central units which were damaged, not preserved.

Resumption of Baia Mare mining basin is conditional in the ore concentration, so that implies a relatively high initial investment, but the amount of existing reserves and current metals market price favors this (Gusat 2005; Bancila-Afrim, Buhrow et al 2005; Bancila-Afrim, Gusat, Bancila Afrim Jr. 2004).

Key words: *satellite mine, mine center, small fields, exploiting the mine, ore preparation, returns as high.*

DETERMINING THE PHYSICAL, CHEMICAL AND MINERALOGICAL CHARACTERISTICS OF THE NONFERROUS SULFURIC MINERALIZATION ROATA, THE MINING PERIMETER CAVNIC

VALERIA BREZOCZKI, ȘTEFANIA STECZ

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The paper presents results obtained under laboratory conditions aimed at determining the physical, chemical, granulometric and mineralogical characteristics of the nonferrous sulfuric ores from Roata, within the mining perimeter Cavnica.*

Step by step, the ore was subjected to chemical analyses, rational analyses for useful elements, granulometric analyses of both the rough ore and the crushed and ground ore, as well as mineralogical analyses.

The purpose of these investigations is to determine the behavior possibilities of this type of ore when subjected to grinding, especially during the flotation process, and to lead and control these processes and operations so as to obtain marketable concentrates of lead and zinc.

Key words- *sulfuric mineralization, physical, chemical and mineralogical features, classification of metals according to granulometric groups, mineralogical associations.*

DISTRIBUTION OF SPONTANEOUS COMBUSTION DANGER ZONE IN GOB OF FULLY MECHANIZED TOP-COAL CAVING WORKFACE

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Xi'an University of Science and Technology, Xi'an, 710054, China

Abstract: *A dimensionless steady coupled model of air flow diffusion and chemical reaction in loose coal of fully mechanized top-coal caving mining workface (FMTCCMW) is setup. The model is solved numerically to obtain distribution of oxygen concentration and air flue, the “three zones” which includes heat dissipation zone, self-heating zone and chocking zone of spontaneous combustion is then partitioned in the FMTCCMW gob henceforth. Numeric simulation with varied pressure grade in the workface and oxygen consumption rate of coal shows that as oxygen consumption rate of coal rises, oxygen concentration declines while air leakage intensity almost keeps constant in the gob; as pressure grade in the workface increases from 0 Pa, width of self-heating zone in the gob increases first, then attains maximum value and decreases afterward.*

Key words: *Fully mechanized top-coal caving workface; Spontaneous combustion; Self-heating zone; Numeric simulation*

ANALYSIS OF THE FLOOD PRODUCED ON THE TISA RIVER DURING 09-10.12.2010

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²*Romanian Water National Administration – Abast Cluj – Sga Maramureș-Baia Mare*

ABSTRACT: *This paper presents the flood analyzes produced on Tisa River Basin from 9 to 10 December 2010. Tisa River has a length of 63 km, Maramures county catchment area being 3237 km². The main tributaries of Tisa River in Maramureș County with appreciable basins are Viseu River and Iza River. Tisa River flow and level monitoring is conducted at the Hydrometric Station from Sighetu Marmatiei city and Viseu Valley Hydrometric Station upstream of the confluence of the Tisa River with Viseu River, level determinations are done. In Viseu and Iza rivers flow and level monitoring are made by Hydrometric Stations Bistra and Vadu Izei.*

On 9.12.2010, between 15.00-16.00 hours was reported exceeding the attention and flood levels on the Tisa River at Viseu Valley Hydrometric Station, the maximum level measured was $H_{max} = 220$ cm (CI+20 cm) and Hydrometric Station Sighetu Marmatiei was recorded maximum $H_{max} = 252$ cm (CA 22 cm) which corresponds to a flow of 1155 m³/s. Flood from December 2010 was a feature flood of home rainwater.

For Tisa River flood monitoring is necessary to establish a Hydrometric Station at Teceu and embankment to Remeți-Teceu sector.

Keywords: *flood, maximum flow, water level, attention level, the level of flooding*

INTEGRATED SYSTEM OF MUNICIPAL SOLID WASTE MANAGEMENT IN BAI A MARE CITY, MARAMUREȘ COUNTY

Irina Smical, Vasile Oros

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The aim of this paper is to highlight the management of an integrated system of municipal solid waste collecting in Baia Mare City focusing on selective collecting of recoverable components.*

Although before the adhesion of our country to EU there were no targets of municipal waste selective collection in Baia Mare city, in the last years a pilot system of municipal waste selective collection had been implemented and developed. For the beginning this one aimed the selective waste collection from population and in order to facilitate it the responsible factors had established a collecting network and an endowment with technical equipments.

Thus, major kind of materials have been sorted and recovered in different industries. In this way the environment security has been increased.

Keywords: *waste, selective collection, recycling, recovery*

RESEARCH REGARDING THE ECO-EFFECTIVE MANAGEMENT OF ELVS IN MARAMUREȘ COUNTY

Irina Smical, Vasile Oros

Technical University of Cluj Napoca, North University Centre of Baia Mare

Abstract: *The end of life vehicles (ELVs) arising is considered to be a major environmental issue, both due to the large quantities of waste and due to their composition which may include various hazardous substances.*

The management of ELVs in Maramureș County includes both collection and treatment of ELVs. Some operators are licensed only for ELVs collection others for both collection and treatment.

Regarding the environmental sustainability, the Environmental Protection Agency of Maramureș County The ELVs management in Maramures County makes and updates annually an inventory with all collected/treated ELVs.

Recovering a range of materials like: metals, tyre, plastics, glass etc generates an economical benefit for economical operators but the major benefit is for environmental sustainability.

Keywords: *ELVs, waste, reuse, recycling, recovery*

EFFECTS OF THE DANGEROUS HYDROMETEOROLOGICAL PHENOMENA IN CAVNIC RIVER BASIN IN THE PERIOD 2001-2011

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ABSTRACT: *The paper presents a study of hydro meteorological phenomena of the Cavnice River and effects of them on adjacent areas during the period of study 2001-2011.*

Cavnice River has a length $L = 34.8$ km, and the surface of hydrological basin is $S = 262$ km². Major bed is very narrow and confused with levels of Quaternary erosion. Cavnice River has a supply regime "pluvio-nival" with spring and autumn floods. Floods are fast and short term without flood banks at Cavnice, but only to Copalnic.

Flow monitoring and observations related to changes in hydrological conditions drainage is performed at gauging stations from Copalnic and Cavnice. During 2001-2011 on Cavnice River took place 19 floods, the highest being recorded during 3 to 6 March 2001, when at Cavnice was reached the historic high level 133 cm. Flood from 3 to 6 March 2001, caused the highest damages, the value of which at Cavnice are 12,832,200,000 lei, at Copalnic-Mănăștur 4,038,450,000 lei and at Șișești 2,043.9 lei.

Keywords: *Cavnice River, rainfall, flood area, quick flood, quick flood effects, maximum flow, water level, level of attention, the level of flooding, the danger*

MACRO AND MICRONUTRIENTS IN THE ARABLE SOILS STRONG ANTHROPOGENIC, IN WEST AREA OF BAI A MARE CITY

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ABSTRACT: *This paper presents the evolution of some agrochemical indicators (macro- and micronutrients) determined on soil samples collected in March, before starting the agriculture work specific in spring, in different last two years (2011 and 2012), from two experimental plots, located in known zones with environmental problems. Year 2011 presents the beginning of the agricultural experiments, concerning the evolution of the nitrogen regime of arable soils from the vicinity of tailings dumps, in the west part of Baia Mare city, with different fertilization and controlled monitoring conditions.*

KEYWORDS: *tailing dump, macronutrient, micronutrient, fertilization.*

MDB GIS: A NEW CONCEPT IN CREATING MINING INFORMATIONAL MANAGEMENT

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Abstract: *The new concept, according to the author, is modulated starting from a trunk which defines the initiated information system in minimalist terms. The system will allow the addition of an infinite number of modules at the "data" level, relational" level, "programs-software applications", "processing equipment", but also at the level of the components in the "database management system" and last but not least at the "users" level. Finally we want to make a plea for large scale informatisation of all activities of mining companies, addressing this defining aspect of organizational management globally, but with gradual implementation, step by step, on areas and activities, means mentioned in the paper, software, databases, GIS, contained in the new MDB GIS concept with the capability to ensure this.*

Keywords: *MGIS (Mining Geographical Information System), Mining Database combined with a GIS platform, MDB GIS(Mining Data Bank Geographical Information System), Mining database, informatisation of business, large scale informatisation of all activities of mining companies.*

INFLUENCE OF HIGH LIGHT INTENSITY ON THE CELLS OF CYANOBACTERIA SYNECHOCYSTIS SP. PCC 6803

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ABSTRACT: *Cyanobacteria suspension were treated with high light (600μE) for 120 minutes at a temperature of 30°C, to study the adaptation of photosynthetic apparatus to light stress. Influence of the treatment on cyanobacteria cultures were studied using the method of chlorophyll fluorescence induced by "flash". Based on results were drawn graphs corresponding to relative fluorescence intensity, normalized fluorescence intensity and variation of maximum fluorescence values. Samples were analyzed in the present of herbicide diuron (DCMU) which blocks electron flow from photosystem II and without diuron.*

KEYWORDS: *cyanobacteria, photosynthesis, high light intensity, electron transport, fluorescence*

