

UNIVERSITATEA DE NORD DIN BAIA MARE  
Facultatea de Resurse Minerale și Mediu

*NORTH UNIVERSITY OF BAIA MARE  
Mineral Resources and Environment Faculty*

**BULETIN ȘTIINȚIFIC  
AL UNIVERSITĂȚII DE NORD DIN BAIA MARE**

SERIA D

Exploatări Miniere

Prepararea Substanțelor Minerale Utile

Metalurgie Neferoasă

Geologie și Ingineria Mediului

Volumul XXVII Nr. 1

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*Series D*

*Mining*

*Mineral Processing*

*Non-ferrous Metallurgy*

*Geology and Environmental Engineering*

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**MINERAL RESOURCES AND ENVIRONMENT FACULTY**

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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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## **EVALUATION OF GAS WELLS OPERATION STABILITY IN THE FINAL STAGES OF NATURAL HYDROCARBONS DEPOSITS DEVELOPMENT**

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**ABSTRACT:** *Article deals with the wells operation in case of bottom hole fluid accumulation and coordination of their technological operation modes with the gathering and processing systems. A critical literature overview was presented, and a new methodology for evaluating the the gas wells stability with liquid accumulation at the final stage of field development was developed. An example of testing this method was presented and its efficiency and reliability was confirmed.*

*Final stage of natural hydrocarbons field development is characterized by low reservoir pressure, gas flow rate, water cutting of wells production, leading to a number of negative consequences and creates significant problems in wells operation.*

*Therefore, the coordination of wells operation and gathering and processing systems at the final stages of field development will increase final gas recovery factor, stabilize the wells operation and increase their productivity.*

*Obtained results of these studies is the development and evaluation of a new method for determining the gas wells stability in the natural gas fields, which are at the final stages of their development and approval of wells and gathering and processing systems.*

*The advantages of this method are:*

- the possibility of using to assess the stability of almost all wells, and different types of liquids;*
- simplicity and lack of long and cumbersome calculations;*
- accuracy of the obtained results using the developed technique;*
- a small number of input data in comparison with the existing methods.*

*Despite many advantages, one of the major drawbacks of the developed method is that it does not take into account the amount of fluid that goes into the hole. This trend may be taking as the basis for further research.*

*As a result of the research a new method was developed to determine the critical gas velocity, the minimal required gas rate and tubing internal diameter to ensure liquid removal from the bottomhole to the surface. These results have been confirmed by wells operation simulation using Schlumberger software PipeSim. This technique allows for the rapid wells stable operation parameters design with acceptable accuracy, which in its turn will increase the efficiency of wells operation, increase productivity and optimize the gathering and processing systems.*

**KEYWORDS:** *the final stage of development, wells watering, gathering and processing systems, natural gas*



## **RISK ASSESSMENT STUDY ON THE NITRATES IN WATER AND VEGETABLES AVAILABLE IN DEZMIR VILLAGE, CLUJ COUNTY, ROMANIA**

***CORINA IOANA NEAMȚU\**, *ELENA MARIA PICĂ*, *VIOLETA POPESCU*,  
*VIOLETA PAȘCALĂU***

*Technical University of Cluj-Napoca*

**ABSTRACT:** *The nitrate contamination of the groundwater has become a major concern for environmental protection and human health, both in developed countries and developing ones. The nitrate pollution is due to several reasons, the most important being the use of nitrogen fertilizers, animal manure and the mineralization of organic matter in landfills.*

*This paper presents a risk assessment study on the inhabitants' exposure from the studied area, by daily ingestion of nitrate at higher concentrations than the limit allowed by the national standards. In order to achieve the goal of this study, a series of investigations were performed, such as water analyzes on the nitrate and heavy metals concentration in wells and the type of vegetables that are cultivated in the area. The water analyzes revealed high levels on both pollutants, exceeding the legal limits. The statistics given by the health authorities on diseases that could be related with the nitrate ingestion were consulted as well.*

**KEYWORDS:** *nitrate, groundwater pollution, human health, vegetables*

## **EFFECTS OF CADMIUM ON THE GROWTH OF THE WHEAT SEEDLINGS**

**VASILE OROS**

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

**ABSTRACT:** *Tests and the results of different tests conducted in order to determine cadmium toxicity on common wheat plants (*Triticum aestivum*) are presented. The tests were conducted by cultivating the wheat seedlings in nutritive solutions with different cadmium sulphate concentration (0; 0.5; 2.5; 12.5 and respectively 62.5 mg Cd<sup>2+</sup>/L). The main variables measured were the roots growth (elongation) and of the shoots, and also the biomass (dry weight) measured after 14 days exposure. The results reveal that small concentrations (0.5 and 2.5 mg/L) of cadmium will have very reduced negative results. Thus, a 0.5 mg/L concentration will have a practically insignificant effect (an 8% reduction of the growth index after 2 weeks). A 2.5 mg/L concentration will result in a 13% growth reduction for the shoots and 7% for the roots. The moderate cadmium concentrations the toxic effects are visible in the reduction of shoots and roots growth. The roots are more sensitive to the effects of cadmium than the shoots. A 12.5 mg/L concentration will seriously affect the growth of the roots (a 70% reduction in the growth of the roots). The effects on the shoots is less dramatic, but still evident (19% growth reduction). High cadmium concentrations will bring about strong effects, especially on the roots. Thus, at 62.5 mg/L concentration, the growth of the roots is practically stopped (an 89% reduction in growth) and the growth of the shoots is also drastically affected (60% reduction). The growth of biomass is inhibited at a reduced rate by the small concentrations of cadmium in the nutritive solution. Thus, a 9-15% diminish in biomass growth is registered at cadmium concentration up to 2.5 mg/L. At 12.5 mgCd/L the inhibition effect on biomass growth is strong (44%) and at 62.5 mgCd/L the biomass growth is 65% smaller than the reference without cadmium. Statistical analysis of the results and estimation of the aggregate toxicity indicators  $EC_x$  for the toxicity of cadmium on wheat seedlings (after 14 days of exposure) resulted in the following values:  $EC_{50}=39.41$  mgCd/L;  $EC_{90}=79.40$  mgCd/L;  $EC_{10}=1.97$  mgCd/L;  $EC_{05}=0.157$  mgCd/L.*

**KEYWORDS:** *cadmium, phytotoxicity, tests, metals, wheat*

## **PARAMETERS MONITORING: PH, TURBIDITY, HARDNESS, CONDUCTIVITY, RESIDUAL CHLORINE, OXIDABILITY, NITRATE, NITRITE AND AMMONIA AFTER WATER TREATMENT OF CATCHMENT AREA BSC – BAIA SPRIE**

***DORINA BACIU<sup>1</sup>, ELENA CICAL<sup>2</sup>, BIANCA BLAGA<sup>1</sup>, MARIETA SILAGHI<sup>1</sup>***

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*<sup>2</sup>Vital Ltd. Baia Mare*

**ABSTRACT:** *The purpose of this monitoring was to provide information about water quality, produced and distributed, about the effectiveness of treatment technologies, with emphasis on disinfection technology, in order to determine if drinking water of catchment area BSC, between 25.01.2012 - 19.12.2012, is appropriate or not in terms of the values of the relevant parameters set by law (Drinking Water Law 458/2002- republished in 2012). For the control monitoring, the following parameters are required: •The hydrogen ion concentration (pH) • Turbidity • Hardness • Conductivity • Residual chlorine • Oxidability • Nitrate • Nitrite •Ammonia.*

**KEYWORDS:** *drinking water treatment, monitoring, pH, oxidability, residual chlorine*

## **ASPECTS OF AIR POLLUTION WITH PM 1 PARTICULATE MATTER AT A LIMESTONE PROCESSING PLANT IN ROMANIA**

**GABRIELA FILIP, MIHAELA PODARIU**

*Technical University of Cluj-Napoca, North University Centre of Baia Mare, Romania*

**ABSTRACT:** *Particulate matter is the main pollutant resulting from the activity of a limestone quarry, having implications on environment pollution and human health. Particles of PM 10 and PM 2.5 are constantly monitored observation unit, but this does not happen in the case of PM1 particles. Actually for PM 1 particles there are no limitations in environmental regulations, Directive 2008/50/EC imposes limitations only for PM 10 and PM 2.5. PM1 ultrafine particles typically remain in the air for days or weeks, extending pollution on kilometers distance from the source. PM1 particles are easily disseminated and almost immediately penetrate the human body, being the most harmful to human health. This paper presents measurements of PM1 concentrations in a limestone processing plant and in its immediate vicinity.*

**KEYWORDS:** *PM1 ultrafine particles, air pollution*

## **WASTE WOOD RECOVERY AS MICRO-BRIQUETTES**

***GABRIELA FILIP, MIHAELA PODARIU, FLORIAN DORIN***

*Technical University of Cluj-Napoca, North University Centre of Baia Mare, Romania*

**ABSTRACT:** *The wood wastes (sawdust, shavings, wood chips) even untreated, can be dangerous for the environment, surface waters, groundwater, soil and atmosphere by improper storage. One of the ways of efficient wood waste recovery is using them as a fuel in the form of briquettes.*

*The wood waste briquetting process presented in the paper takes place in a production line equipped with a waste separator (by particle sizes and magnetic properties), a sawdust dryer, a briquetting/extrusion machine and auxiliary transport items between machines.*

**KEYWORDS:** *wooden micro-briquettes, environmental friendly*

## USING LEGENDRE POLYNOMIALS TO DEVELOP THE TERRESTRIAL GRAVITY POTENTIAL IN SPHERICAL AND RECTANGULAR COORDINATES

**GHEORGHE M.T. RADULESCU, ADRIAN T.M. RĂDULESCU,**  
*Technical University of Cluj Napoca, North University Centre of Baia Mare*

**ABSTRACT:** A material point located on the surface of the Earth is subject to multiple forces: gravity  $\overline{F}$  (directed toward the Earth's center of mass), centrifugal force  $\overline{q}$  (Figure 1), the forces of attraction exerted by other celestial bodies (Sun, Moon, the most important) whose component is weight (gravity)  $\overline{g}$ . The region of space where the complex gravitational influence of Earth's rotation and gravitational field is extended is the gravitational field. In order to accurately represent the forces of attraction, a point on the Earth's surface and a current point located at distance  $l$  from the other one are considered. This paper presents the contribution of Legendre Polynomials in establishing the terrestrial gravitational field, based on the above. The aim of this work is to determine the Earth's figure, which is essential in coordinating all satellite programs, GNSS/GPS, and the functioning of space geodesy in general.

**KEYWORDS:** *terrestrial globe, gravity, gravitational field, Legendre Polynomials, space geodesy, satellite programs*

## **ON THE GENERAL STRUCTURE AND COMPONENTS OF THEMATIC INFORMATION SYSTEMS CATEGORY "X" DATA BANK – GEOGRAPHIC INFORMATION SYSTEM (“X”DB – GIS)**

***VIRGIL MIHAI GH. M. RADULESCU, CORINA RADULESCU***

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

**ABSTRACT:** *Full computerization of information systems in an enterprise is the dream of every manager. The new concepts of thematic databanks fall into this challenge with respect to the information between the stakeholders and the activities within a mining organization. To achieve the analysis of thematic databases, you must go through preliminary issues on computerization in organizations. The entire analysis should be integrated in conjunction with the characteristics of each organization, information, organizational structure, environmental conditions in which they operate, specific conditions, etc. This paper falls within the thematic area of automation of the **information system**, making it wholly or partly a **computer system**. Once in the organizational system the computer system will be the most important component of the information system and the increase of its role will lead to a substantial improvement of the unit management. Practice has proved that the integration of the entire computer system in a "X" DB – GIS type databank, is the solution of the future in information management of any organization. This paper highlights the structure and overall components of such a system, according to the authors.*

**KEYWORDS:** *Databank Management Systems, Themed Information Systems, "X"DB - GIS, Organization, Enterprise, Business, Information, Decision.*

## **STUDIES AND RESEARCH ON SAW BLADES, CIRCULAR BLADES AND BANDS**

***POP ELENA***

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

***ABSTRACT:*** *This paper presents the material used to produce saw blades, circular blades and bands for mill saws as well as their behaviour while cutting beech. In order to well exploit saw blades and bands, several rules which were established taking into consideration the quality of the material and their technical condition, must be followed.*

***KEYWORDS:*** *saw blades, saw, frame saw, band*



## **STUDIES AND EXPERIMENTAL RESEARCH REGARDING THE PROCESSING AND CHARACTERIZATION OF ALUMINUM BEVERAGE CANS AS WASTE**

***CAMELIA BUNGĂRDEAN, VASILE SOPORAN, OANA SALANȚĂ***  
*Technical University of Cluj-Napoca,  
Faculty of Materials and Environmental Engineering*

**ABSTRACT:** *Aluminum cans become waste after the completion of their use phase. Aluminum can waste passes through many stages in the recycling process. The first stage of the recycling process is collecting the aluminum can waste and transporting it to recycling centers, after which the cleaning and removal of coatings is performed, the separation of the can's parts made of different types of alloys and finally the smelting and casting of ingots. The remelting process is an important stage in recycling, and the form in which aluminum packaging waste is found and processed affects this melting process. In this sense, the paper presents the preliminary studies on the influence of the melting process on the final chemical composition of the alloy obtained by direct melting of aluminum beverage can waste, without prior processing and its differences from the original composition of the aluminum cans forming alloys.*

**KEYWORDS:** *processing, aluminum cans, chemical composition, remelting.*

## **MICROBIOLOGICAL INDICATORS FOR DETERMINING THE FAECAL POLLUTION IN WATER AND SEDIMENTS**

***COSMINA SIMONA BABUT, VALER MICLE, ADRIAN FLORIN POTRA***

*Technical University of Cluj-Napoca, Romania,  
Faculty of Materials and Environmental Engineering*

**ABSTRACT:** *This paper presents a study conducted by the authors on the main indicators of fecal pollution of surface water and sediment. It is also made a description of the methods for the determination of microbiological fecal indicator bacteria. Coliforms bacteria or faecal coliforms, Escherichia coli microorganisms of the Enterobacteriaceae family and Enterococci (faecal streptococci) are part of the biological indicators of water quality. The spores belonging to the genus Clostridium are considered as microbiological indicators of sediments. In particular Clostridium perfringens has the characteristics of a microbiologic indicator of fecal pollution.*

**KEYWORDS:** *contaminated water, biological methods, Escherichia coli, Clostridium.*

## **MATHEMATIC MODELING OF SALT POLLUTION FILTER-MIGRATION PROCESSES IN WATER CARRYING HORIZONS**

**SABAN V.Z.**

*Ivano-Frankivsk National Technical University Of Oil And Gas*

**ABSTRACT:** It was developed the mathematical model, which is filter-migration processes, taking place in natural conditions. In the suggested work object- oriented approach, which is considered as one of the most perspective and progressive, is used for two-phase geo- filtration mathematical model simulation and studying. Based on this model it was researched the salt contamination spread dynamics and considered the external factors influence to this process. Developed model is based on two-phase filtration with operating factors influence consideration, makes it possible to solve a number of problems related to the prevention of water carrying horizons pollution. Developed model characteristic is problem-oriented nature.

**KEYWORDS:** *filtration, water carrying horizon, migration, modeling, hydrosphere, penetrability, capillary pressure.*

## QUALITATIVE INDEXES OF APATITE CONCENTRATE OF UKRAINIAN TITANIUM-APATITE DEPOSITS

**SERGIY VAKAL<sup>1</sup>, JAROSLAV ADAMENKO<sup>2</sup>, BADYM CHVANOV<sup>3</sup>,  
MYROSLAV MALOVANYI<sup>4</sup>, OLEG CTOKALYUK<sup>5</sup>**

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**ABSTRACT.** *The properties of Ukrainian apatite deposits (Fedorivske, Nosachivske and Kropyvnyanske) have been compared with those of Khibinsk phosphorites (Russia). The apatite concentrates chemical compositions has been compared. It has been shown that apatite concentrate of Ukrainian deposits may be used for the main purpose without any limits. Using X-ray investigations it was determined that fluorapatite is the main crystal phase of Ukrainian apatite concentrates and concentrate of Kropyvnyanske deposit contains fluorapatite hydroxide. SEM-investigations of the form and sizes of apatite mineral particles did not show essential differences between Ukrainian and Russian apatites that allows to predict their similar technological parameters of treatment.*

**KEYWORDS:** *apatite, deposit, concentrate, technology, fluorapatite, chemical composition, X-ray analysis, SEM.*

## **PURIFICATION OF NATURAL WATER FROM ORGANIC SUBSTANCES USING MAGNETIC TREATMENT**

**IGOR ROY<sup>1</sup>, LEONID PLYATSUK<sup>1</sup>, JAROSLAV ADAMENKO<sup>2</sup>,  
TARAS KACHALA<sup>2</sup>**

*<sup>1</sup>Sumy State University, <sup>2</sup>Ivano-Frankivsk National Technical University of Oil and Gas*

**ABSTRACT:** *The paper focuses on the study current state of water resources and the main problems of drinking water. The main environmental problems related with organic substances in natural waters, have been considered. The main ways of solving problems of rational use drinking water resources were considered. Technology of magnetic water treatment solutions has been described. The mechanisms of action of magnetic treatment were discussed, its specificity and role in solving environmental problems was identified. Arrangement for studying the effectiveness of magnetic treatment in the oxidation of organic substances by ozone has been developed. The operation principle of the arrangement for water purification from of organic substances has been described.*

**KEYWORDS:** *drinking water, organic substances, ozonation, magnetic treatment, intensification.*

## **STUDY OF CHEMICAL REACTION KINETIC OF DINITROGEN TETRAOXIDE IN NITRIC ACID WITH UREA SOLUTION**

**ALEKSEY ABLEYEV<sup>1</sup>, SVETLANA BOLSHANINA<sup>1</sup>, SERGEY VAKAL<sup>1</sup>,  
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**ABSTRACT:** *The chemical reaction of dinitrogen tetraoxide solved in nitric acid with urea solution has been studied. The solution of dinitrogen tetraoxide in nitric acid known as rocket propellant oxidizer. The aim here was to determine kinetic characteristic of the process, which are as follow: order of reaction and activation energy. Those characteristics are required to investigate the reactions mechanism and to setup the optimal reactions parameters. Operating parameters are the concentration of urea 5%, oxidizer with N<sub>2</sub>O<sub>4</sub> concentration of 22%, and the temperature (0-25 °C).*

**KEYWORDS:** *urea, nitrogen oxide, fuel oxidizer, kinetic, activation energy, reaction rate*

## **SELECTING THE OPTIMUM CERAMIC SUPPORT IN THE FORMING OF BIOFILM USED IN THE REMEDIATION OF GROUNDWATER CONTAMINATED WITH CHLORINATED SOLVENTS**

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**ABSTRACT:** *Our main goal was selecting a porous ceramic support for forming biofilm, used afterwards in the degradation of chlorinated solvents. The choice of support was achieved through "batch" reactors with closed circuit and through a continuous-circuit reactor at a temperature of 30 °C. Then a pilot plant was used consisting of four cylindrical glass columns filled with ceramic supports of different porosity. A microbial consortium grewed and selected in advance from the groundwater of a contaminated site was introduced. Alternating during the experimental period, water with butane as the growth substrate, and water with O<sub>2</sub> for aerobic conditions conformation, was added. Trichloroethylene used as the contaminant was introduced into the system continuously. Upon completion of the 100 days of experiment, Biomax ® porous support, proved to have the best results in the formation of biofilm realizing a high rate of pollutant degradation.*

**KEYWORDS:** *ceramic support, chlorinated solvents, TCE, butane, bioreactor*

## **COMPUTER-AIDED CHART OF ECOLOGICAL SAFETY EVALUATION OF ATMOSPHERIC POLLUTION BY DRILLING FLUID STEAMS**

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**ABSTRACT:** *When it comes to complex evaluation of environmental state, alongside with mathematical modeling an important part is played by GIS-technologies that help manage geoecological information, perform data analysis and give special picture of the subjects under study in the form electronic ecological maps. GIS consist of sets of modern tools meant for work with geographical and ecological data [1].*

*ArcGis by ESRI is basic GIS software. ArcGis is an integral set of software GIS-products for determined types of tasks. It should be noted that the biggest disadvantage of ArcGis in scientific research is its high expense. It inspires scientists for alternative search and creating own software products which would make it possible to solve the tasks set by them.*

**KEYWORD:** *computer-aided chart, GIS, integrated software*



## **EVALUATION OF INFORMATIVENESS GEOLOGICAL INDICATORS OF OIL-AND-GAS-BEARING OF LOCAL STRUCTURES OF BORYSLAV OILFIELD OF UKRAINIAN CARPATHIANS**

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**ABSTRACT:** *The study and analysis the geological structure and character of local objects of Boryslav oilfield of the Boryslav-Pokuttya area of Precarpathian foretrough was conducted. With the help of mathematical statistics the degree of informativeness of oil-and-gas-bearing of local structures was determined and future prospects for solving this problem were outlined .*

**KEYWORDS:** *oil-and-gas-bearing, deep seated folds, field, hydrocarbon pool, Boryslav-Pokuttya area of Precarpathian foretrough, Boryslav oilfield.*

## **FEATURES OF IMPACT OF MYKOLAYIV OIL AND GAS-CONDENSATE FIELD DEVELOPMENT ON THE ENVIRONMENT**

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**ABSTRACT:** *Mykolayiv oil and gas-condensate field is located in Sumy Oblast. Mykolayiv field was discovered in December 1978, by the test of borehole. The sources and types of impact on key elements of the environment during the exploitation of oil and gas field are examined. Measures to avoid negative impact and to eliminate undesired consequences are proposed. To reduce and prevent the harmful effects on geological environment there are following stipulated measures: exploitation of production wells is conducted according to technological regimes.*

**KEYWORDS:** *oil field, gas field, conservation measures, Ukraine*

