A NEW APPROACH IN SEISMIC SAFETY EVALUATION FOR BLASTING OPERATIONS PERFORMED BY RUSSIAN MINING COMPANIES

Assoc. Prof. Dr. Andrei Kholodilov

Prof. Dr. Alexandr Gospodarikov

Assist. Prof. Dr. Aleksei Miasnikov

National Mineral Resources University (University of Mines), **Russia**

ABSTRACT

Open pit mines in Russia are characterized by vast extent up to several kilometers. When blasting operations are performed, the impact of seismic vibrations to objects of social and industrial infrastructure has to be evaluated periodically. Generally accepted seismic vibration impact analyses is based on peak particle velocity for the whole velocigram, which drastically restricts the volume of used measurement information.

In this article an effective method of using all particles velocity values received from a single blast in the open pit mine velocigram to find the parameters defining the link between prognosis peak particle velocity and reduced charge of an explosive is suggested. Reduced charge prescribes the mass of simultaneously exploded charge raised in 1/3 power divided by epicentral distance. To this effect a single blast in the open pit mine is prescribed as a sequence of simultaneously exploded charges characterized by their values of reduced charges. The record of seismic action from each charge in velocigram module envelope curve for a single blast in the open pit mine is carried out by using digital low-pass filtering showing the dependence of the particle velocity module on time. As a consequence of regression analysis it was established that full functional connection between prognosis peak particle velocity and reduced charge contains only one parameter. This parameter can be obtained from seismic wave propagation velocity value data.

Keywords: blasting operations, seismic vibrations, peak particle velocity, velocigram.

AN INVESTIGATION ON WEAR PERFORMANCES OF DIAMOND SAWBLADES: EFFECT OF PHYSICO-MECHANICAL PROPERTIES

Dr. Izzet Karakurt

Dr. Gokhan Aydin

Dr. Kerim Aydiner

Karadeniz Technical University, Department of Mining Engineering, Trabzon, **Turkey**

ABSTRACT

In this study, wear performance of diamond sawblades in sawing of rocks was experimentally investigated. Specific wear (SW) was selected as the criteria for sawblade wear performance and the SW was correlated with the rock physico-mechnical properties. Surface morphologies of wearing segments were also examined using scanning electron microscope (SEM) images. As a result, the microhardness was determined as the dominant physico-mechanical rock properties affecting the SW. Additionally; emerging, fractured, polished and pull-out crystals were observed in the wearing surfaces of the diamond segments.

Keywords: Diamond sawblades, Rock sawing, Specific wear

ANALYSING IMPACT OF PIT CLOSURES IN THE CZECH REPUBLIC AS REGARDS REGIONAL FINANCIAL AND TAXATION STRUCTURES

Jana Magnusková, Ph.D.[1]
[1]VŠB – Technical University of Ostrava, **Czech Republic**

ABSTRACT

The Czech mining industries have reduced considerably. The extraction of metal minerals declined in 1990 and was followed the strong trend of pit closures that started in 1992 with serious implications for people and industries in the affected regions of the republic. The mineral extraction industries were the state monopolies and it is the state that is considered to be responsible for easing the tension of these industries' reduced operation. The closing of pits have immediate implications for unemployment and related regional economy, social and taxation structures. Running of pits implies cooperation of many people and related regional industries, as it is the case of heavy industries in general. If these are cut down or fail, serious unemployment problems arise with difficult social consequences. This is especially the case if no other industries exist in the region that might be of some alleviating effect. There are two such regions in the Czech Republic, namely the Moravian-Silesian and Usti Regions, where the unemployment rate is in excess of 10%. The regions of high unemployment rate have less labour taxation budgetary means, which makes implementation of their investment plans difficult. It is rather obvious that the long-term prognosis of coal extraction in the Czech Republic in unfavourable and the coal extraction industries cannot solve the problem of permanent job provision. Some solution might be provided by attracting new industries to establish and new businesses to invest in the afflicted regions.

Keywords: Coal extraction, Pit closures, Economic impacts, Coal reduced production, Unemployment

ANALYSIS OF OCCUPATIONAL ACCIDENTS AT THE MINING ENTERPRISES OF THE NORTHERN REGIONS OF RUSSIA

Prof. Alexander Galkin

[1]Mining department, National Mineral Resources University, **S**t. Petersburg, **Russia**

ABSTRACT

On the basis of analysis of occupational accidents at mining and oil-and-gas enterprises, it has been established that the level of occupational accidents has a seasonal nature. Logical seasonal variations of accident rates have been considered, not only taking into account durations of stay in difficult weather conditions, but also changes of the general energy consumption of the workers, which depend on the temperature factor in the resident region. On the basis of analytical research on changing energy consumption of work in the various climatic zones, mathematical formulas (equations) have been derived for definition of duration of physiologically necessary rest, which depends on the temperature factor for different works. Comparison of results of calculations employing the technique (methodology) of an estimation of labor's gravity with results of experimental data from other researchers, received in the different years and for various professions, has shown more than satisfactory convergence. This has formed the basis for development of the new energy criterion for estimation of danger in receiving injuries by workers in difficult weather conditions. The estimation of an existing scale of labor's severity (energy consumption) by means of a new criterion has shown that there are limiting temperatures, which change the normative category. Nowadays, this factor isn't considered at the certification of workplaces, although there is a close connection between the danger of receiving injuries during work and its severity. For evident representation of change of labor's severity, which depends on the temperature factor, maps have been constructed, similarly to maps of climatic division into districts (zoning). Maps have been created on the basis of the complex account of viewing time of the temperatures, values of which were below the calculated limiting temperatures of change of labor's severity. The new indicator of thermal loading, measured in «hour-degree», has been proposed for a more objective picture. Construction of maps has been made for northern areas of the country, where the estimation of energy costs change from temperature is most expedient. Usage of these maps in an aggregate with the executed calculations will serve as the basis for developing a new methodology of workplace certification that further leads to a decrease in industrial traumatism at enterprises of northern regions.

Keywords: Labor protection, Occupational accidents, Temperature factor, Severity of work, Energy consumption

APPLICATION OF GAMES WITH INCOMPLETE INFORMATION FOR PROGRAMMING DEPOSIT EXPLOITATION – THE CASE OF AN ORE MINE

Dr. Mariusz Krzak

AGH University of Science and Technology, Kraków, **Poland**

ABSTRACT

Deposit exploitation requires effective managing by applying some actions, covering i.a. planning and decision-making. Usually, the basic strategic tasks of a mine include accomplishing the process of useful mineral exploitation, tending to minimize operational costs and optimizing resources' utilization. Proper decisions result in decreasing resources' losses, improving economic effects of geological-mining processes and prolonging a mine's lifetime. Solving the above-listed tasks, as well as further ones referring to the broadly understood deposit management, requires technological progress on one hand and working out economic tools on the other. On the planning and decision-making stage, the results of operational researches are usually taken into consideration, offering a bulk of mathematical and statistical tools, providing technical support in pointing out methods and optimal solutions of stated problems.

The deposits – in particular ore deposits – are interesting objects, as the same kind of useful mineral can establish various genetic types of deposits, of varied form and structure. On the stage of deposit opening and its further exploitation, it is important to provide its precise outline, together with identification of changeability of useful-mineral's quality, and transforming geological-mining features onto technical and economical parameters. This paper takes up the trials to adapt Bayesian games in scheduling the division choice dedicated for exploitation in a Zn-Pb ore mine. The decision problem, presented here as the game between the decision-maker (the mine) and the changing states of nature, was solved with the application of tools from theory of games, referring to the class of games with incomplete information. Such kinds of games allow taking into consideration the uncertainty of the players about both the game itself and the possible payoffs.

Keywords: Bayesian game, incomplete information, mineral deposit management

APPROACHING ENVIRONMENTAL ISSUES IN SALT MINING BY DISSOLUTION

Assoc. Prof. Dr. Eng. Ec. GOLDAN Tudor[1]

Dr. Eng. NISTOR Marian Catalin[1]

[1]University of Petrosani, **Romania**

ABSTRACT

Environmental impact rock salt mining by dissolution manifests in various ways: surface and ground waters may be affected by discharges of contaminated water, air can be affected by emissions of particulate matter, and subsidence of surrounding terrain can affect inhabited areas. Moreover, when it is not accurately known the deposit's tectonic and of surrounding rocks, the underground gaps remaining after the extraction of salt can propagate up to the surface, which may have as a result of uncontrolled outflow brine. When hydrocarbons are used to achieve the protection blanket, the discharge may cause environmental contamination. To avoid such catastrophic events occurrencse is important to know the characteristics of salt for proper sizing of safety pillars aimed at salt cavities stability provision. This paper presents possibilities of minimising the environmental impact from the solution salt mining processes.

Keywords: salt disolution, voids stability, impact, environment.

ASSESSING THE STABILITY SAFETY FACTOR IN OLTENIA LIGNITE OPENCAST MINING

Assoc. Prof. Dr. Eng. Ec. GOLDAN Tudor[1]

Assoc. Prof. Dr. Eng. MORARU Roland[1]

Dr. Eng. NISTOR Marian Catalin[1]

[1] University of Petrosani, **Romania**

ABSTRACT

Coal mining operation exerts a significant impact on the surface through the intermediate of land degradation over the long term, mainly as a result of instability in the land after extraction operations. Landslides are geodynamic process phenomena of altering the landscape, with slow and regular character, which restores the natural balance of slopes. When they tempestuously are occurring can cause loss of life and significant property damage. As it regards the exploitation of coal in the quarries, dumps of sterile resulting from the extraction of coal have generated serious discussion in time. Still in the design stage of their life cycle are taken into account the aspects related to physical and mechanical properties of the material they are made off. It comes both from strata above the lignite deposit and sterile intercalations within the coal layers. The paper gives an overview of various practices that can be adopted to control the adverse effect of mining. Also, based on the interactions between the geo-mechanics, planning and production groups in open-pit more is presented the determination algorithm of safety factor for the assessment of the risk of affecting the stability.

Keywords: lignite, open pit, stability, physical and mechanical properties.

ASSESSMENT OF THE MINING PRESSURE AROUND THE MAIN HORIZONTAL MINE WORKINGS BY INVOLVING THE RHEOLOGICAL BEHAVIOR OF THE SURROUNDING ROCKS

Assoc. Prof. Ph.D. Eng. Mihaela Toderas[1]

[1] University of Petrosani, **Romania**

ABSTRACT

Solving the problems of geo-mechanics that contribute to achieving the stability - reliability of mine workings involves the knowledge of the rheological behavior of rocks. We emphasize some of these issues, namely: clearing up the natural stress state; characterizing the deformation behavior of the rock massif; the secondary stress - strain of rocks around the main horizontal mine workings; characterization of geo-mining stability conditions where the galleries will be executed; studying the manifestation manner of the pressure and its calculation in the context of rock massif - support system – time mechanism of interaction; rheological characterization of the consolidated rocks, etc. This paper presents the manner of approaching the rock – support interaction problem for the sedimentary rocks from the Jiu Valley taking into account their rheological classification. Knowing the rheological behavior has implications in solving the problem referring to the mining pressure and its calculation in the context of rock massif – support system – time mechanism of interaction.

Keywords: pressure, mine working, time, displacements, support, interaction

ASSESSMENT OF THE WALL OF BENCHES SECOND AND THIRD OF THE PODHŮRA QUARRY

Ing. Andrea Polická, Ing. Michal Max Minařík,
doc. Ing. Milan Mikoláš, Ph.D., Ing. Pavlína Sachová,
Ing. Milan Komárek, Ing. Vlastimil Molčák
VŠB – TU of Ostrava, Faculty of Mining and Geology, Institut of mining engeneering and safety, **Czech republic**

ABSTRACT

The Podhura quarry is situated in the Olomouc region near the town of Lipník nad Becvou. The mining company is KAMENOLOMY CR s. r. o.

The first part of the paper focuses on the description of this locality. The next part describes geology and hydrogeology of this quarry. The main part of the paper addresses the problem of refraction, because in this quarry there is unstable material.

The East wall of the quarry approaches to the border at the second bench (to the border of the mining permit), so it will be necessary to model the final slope of the quarry. The geological structure of the deposit is relatively unfavourable in this part, and for this reason it is necessary to calculate a new general slope of this quarry. This is described in the last part of the paper.

Keywords: Slope, stability, wall, raw material, angle

AUTOMATED MONITORING AND MANAGEMENT SYSTEM FOR METHANE DRAINAGE NETWORKS OPERATED IN JIU VALLEY COLLIERIES

Assoc. Prof. Dr. Gabriel Bujor Băbuţ

Assoc. Prof. Dr. Roland Iosif Moraru

University of Petroşani, **Romania**

ABSTRACT

Methane drainage networks in Jiu Valley collieries are presently monitored and managed employing hand-based procedures, which does not allow the continuous monitoring of the parameters describing their operation; consequently, decisions are adopted after a certain time span, often a quite long one. In such conditions, optimizing the methane drainage network's operation is quite a difficult task, while the adjustment procedures are often based on empirically assessed principles and rules, while the characteristic parameters are not monitored and managed in real time. In this context, the paper aims to establish the overall architecture and functions that must achieve an automatic monitoring and management system of methane drainage networks. Also, through the specification and implementation programs have been set some general principles for design and development of such a system, adapted to particularities of collieries within Jiu Valley. The use of surveillance systems and automatic control will improve safety and stability of methane drainage networks used in the Jiu Valley collieries, leading to increase their efficiency and thus reduce the risks associated with the presence of methane in the underground atmosphere of mine workings.

Keywords: coal, methane, drainage network, occupational safety and health

BACTERIAL LEACHING OF URANIUM RAW MATERIALS FROM ROZNA DEPOSIT (CZECH REPUBLIC)

Ing. Jaroslav Závada, Ph.D.[1]
Ing. Hana Nadkanská[1]
Ing. Tomáš Bouchal, Ph.D.[1]
Ing. Beáta Gibesová[1]
Ing. Adéla Cibulcová.[1]
Ing. Vladislav Blažek[1]
[1]VŠB – Technical University of Ostrava, **Czech Republic**

ABSTRACT

The article deals with the possibility of using bacteria Acidithiobacillus ferrooxidans in extracting uranium from uranium ores from Rožná deposit in the Czech Republic. It presents a comparison between a purely chemical method of acidic leaching in sulphuric acid solution, and a biochemical method using the bacteria. The aim was to demonstrate the effect of bacteria on the leaching efficiency. Leaching was carried out under stationary conditions at the laboratory temperature of 25 ˚C. The results showed little difference in the efficiency of bacterial leaching compared with chemical leaching under these conditions, which are not optimal for bacterial growth.

Keywords: uranium, bacterial leaching, Acidithiobacillus ferrooxidans

CLEANER PRODUCTION IN MINING INDUSTRY: A FLOWSHEET FOR UNDERGROUND MINING OF IRON ORE DEPOSIT

Dr. Alexander Medvedev[1,2],

Prof. Igor Sokolov[3],

Dr. Nikolay Gobov[3],

Dr. Alexey Smirnov[3].

[1] Ural Federal University, **Russia**
[2] Institute of Industrial Ecology of Ural Branch of Russian Academy of Sciences, **Russia**
[3] Institute of Mining of Ural Branch of Russian Academy of Sciences, **Russia**

ABSTRACT

The paper addresses a possibility of Cleaner Production approaches application in an underground iron ore mining at deep horizons. In order to minimize the environmental impact such common ways as technology change and on-site waste recycling are proposed to be used. The main idea consists in combining a bottom-up mining process with the ores enrichment at an underground complex. The basic mining scheme is developed for Estunino iron ore deposit (Urals, Russia). The scheme includes: opening of the ore deposit by means of skip shaft and storey crosscuts (height of a storey - 100 m); ore extraction; ore enrichment at the underground complex; usage of waste rocks and enrichment tails for stowing in the goaf; transportation of iron concentrate to the surface. Preliminary assessment has shown that for conditions of Estunino iron ore deposit the proposed technology may be cost efficient and simultaneously much more environmentally secure, in particular because of full or partial absence of tailing storages, rock dumps, pipeline systems and other hazardous objects on the earth surface. Preliminary assessment has shown, that the proposed technology may be cost efficient and simultaneously much more environmentally safe due to full or partial absence of tailing storages, rock dumps, pipelines and other hazardous objects on the earth surface.

Keywords: bottom-up mining process, underground ore enrichment, environmental impact.

COAL CUTTING FORCE MEASUREMENT SYSTEM – (CCFM)

dr hab. inż. Witold BIAŁY prof. Pol. Śl.

Silesian University of Technology, Faculty of Management and Organization, Institute of Production Engineering; **Poland**

ABSTRACT

The article presents the construction and principle of operation of a unique instrument for determining the values of forces taking part in the cutting process (coal mining), which the author named POU-BW/01-WAP. It is the only instrument in the world which allows determining two components participating in the cutting process. The instrument has two measurement blocks, which are tensometric sensors of: the cutting force (F_s) and knife pressure force (F_d). These forces are recorded by means of a real mining knife applied in the drum-type longwall coal-cutter – tangential-rotary. Electrical devices of the POU-BW/01-WAP instrument include a set of elements for *Coal Cutting Force Measurement* (CCFM).

The instrument has an ATEX certificate, enabling work in real conditions as a device intended for use in potentially explosive atmospheres – in compliance with directive 94/9/EC.

Keywords: experimental research, force components, measurement, electrical devices

COMMENTS ON THE HEAT RELEASED DURING OPERATION IN HOT ROCK MASS AND ITS POSSIBLE APPLICATIONS

PhD Janusz Cygankiewicz,
PhD Józef Knechtel
Central Mining Institute, Mines Ventilation Department, **Poland**

ABSTRACT

An investigation has been carried out into the heat flow in the mining section, in which the virgin rock temperature is above 50ºC. The total power of electrical devices installed in the section is about 6 MW. According to the climate regulations currently in force in the Polish mining industry, the air temperature in the workplace measured with a dry-bulb thermometer can not be higher than 33ºC. To provide in such section the temperature consistent with the regulations, fresh air supply workings must be equipped with cooling installation of the total cooling potential of about 2 MW. From the analysis of the results of mine climate predictions and modeling of the rock mass cooling around those workings it follows that about 30% of the cooling power is necessary to take away the thermal energy from the hot rock mass. Assuming the required air temperature at 28ºC (enabling unshortened working time), then the cooling power needed for taking away the heat from the rock mass would be much higher. The performed studies show that the amount of the thermal energy released in the mining section also depends on the phase of the longwall course (the length of main gates and changes in rock temperature in them). It has been proposed that hot water from condensers could power the absorption cooling devices located on the surface. In this way the costs of air-conditioning would be reduced.

Keywords: underground mine, mining section, thermal working conditions, cooling devices, heat recovery

COMMERCIAL SIGNIFICANCE OF ASSOCIATED MINERALS OF IRON ORE KRYVBAS DEPOSITS (UKRAINE)

Assoc. Prof. Dr. Mariia Kurilo

National Taras Shevchenko University of Kyiv, **Ukraine**

ABSTRACT

Main criteria of complex development of Krivbas iron ore deposits were studied: 1) quantity, quality and concentration of main reserves and related minerals in deposits, 2) mining technical and technological conditions of development, geographical, economic and environmental operating conditions of deposit's exploration. Largest iron ore deposits of Krivbas were had been evaluated to define commercial significance of associated minerals. They are characterized by high degree of geological, technical and economic study. Main favorable geological and economic conditions of sustainable complex development of deposits are large proven estimated reserves and availability of industrial particularly energy and transport infrastructure. Negative factor for value of associated mineral's reserves are market of mineral resources, in particular, demand for products of this quality; environmental risks in development of mineral resources, land use and other environmental components.

Keywords: iron ore deposits, related minerals, commercial significance, reserve's evaluation

COMPARATIVE CLOSURE METHODS OF THE UNDERGROUND EXPLOITATION OF LIGNITE IN ROMANIA

Eng. Gheorghe LASC Ph.D Stud.[1]

Prof. Dr. Victor ARAD [1]

Oana BĂRĂIAC Ph.D Stud. [1]

Eng. Vlad Adrian COSMA Ph.D Stud. [1]

[1] University of Petroşani, **Romania** .

ABSTRACT

Comparative analysis of specific closure methods of the underground exploitation of lignite in three distinct areas and with tradition in coal mining in Romania, namely Comanesti – Bacau county, Varzari - Bihor county and Jugur - Arges county, is an opportunity in finding reliable and efficient technical methods of eliminating the effects produced by the mining companies activity.

The paper includes the history of each exploitations mentioned, it describes the best practices in closure and remediation of mines, it analyzes in comparison the stratigraphic, hydrologic, geologic and tectonic situation, as also the impact of mining activity upon environmental factors and finally it describes in comparison the technical solution of closure and rehabilitation of each perimeter taken in analysis.

Keywords: mining, lignite, underground, closing, greening

COMPARISON OF EXTRACTION AND PROCESSING OF STONE IN CHINA AND CZECH REPUBLIC

Ing. Milan Komárek

Ing. Pavlína Sachová

Doc. Ing. Milan Mikoláš, Ph. D.

Ing. Andrea Polická

VŠB – Technická univerzita Ostrava, Hornicko–geologická fakulta, Institut hornického inženýrství a bezpečnosti, **Czech Republic**

ABSTRACT

The paper describes the comparison of extraction and processing of stone blocks for raw stone production and fine stone production in China and the Czech Republic. In the Czech Republic describe the extraction and processing of sandstone in Podhorní Újezd County, performed by company Kamen Ostromer s.r.o. In China, describes the extraction and processing of sandstone and limestone from the Yunnan area.
The article concludes compare the extraction and processing in both locations.

Keywords: sandstone, stone, diamond, cutting

COMPARISON OF METHODOLOGICAL APPROACHES OF HYDRORECLAMATIONS IN LIGNITE MINING BASINS ON THE EXAMPLE OF THE CZECH REPUBLIC AND GERMANY

Ing. Veronika Dušková [1]
Ing. Beáta Gibasová [2]
Ing. Adéla Cibulcová [3]
Ing. Helena Trčková [4]
[1]VSB-Technical University of Ostrava, Faculty of Mining and Geology, **Czech Republic**

ABSTRACT

The paper compares the development of reclamation methodologies of lignite mining areas in the Czech Republic and Germany. Attention is particularly paid to hydroreclamations, which are one of the best from the current landscape management perspective. The paper provides a detailed outline of the development of the legislative framework of reclamations in the Czech Republic and the German Republic, active share of the mining companies - phase of reclamation cycles and civil society. It also summarizes the challenges and problems associated with hydroreclamation in the compared countries and based on the comparison, best practices and approaches to reclaimed areas will be recommended both in terms of amenities, such as the economic utilization of the upcoming grants from the EU, as well as the environment.

Keywords: hydroreclamation, reclamation, legislation, environment, financial resources

COMPUTATIONAL STUDY IN THE CIVIL USE EXPLOSIVES AREA

PhD. Eng. Emilian Ghicioi[1]
PhD. Eng. Stud. Ilie-Ciprian Jitea[1]
PhD. Eng. Stud. Nicolae-Ioan Vlasin[1]
PhD. Eng. Attila Kovacs[1]
PhD. Eng. Gabriel Vasilescu[1]
PhD. Eng. Edward Gheorghiosu[1]
PhD. Chem. Stud. Maria Prodan[1]

[1] National Institute for Research and Development in Mine Safety and Protection to Explosion, Petrosani - **Romania**

ABSTRACT

Research in the area of explosion energy use for controlled demolition of buildings requires thorough knowledge of areas such as the phenomenology of explosion behavior of materials under stress by shock waves, structural dynamics, seismic engineering, etc. The design of these types of processes requires consideration, to the nearest relative degree of danger due to vibration, pressures, tensions in the area affected by the explosion. The estimation of the maximum values of the induced stress has a significant essential importance, and so, the implementation of computerized solutions for experimenting, allows the examination of a large number of scenarios, the limit being mainly subjected by the time allocated for the computerized simulation. In this context, the research in the area, the acquiring of experience and knowledge, and also the validation of the results by comparing them with the previous practical tests and the tests specified in the specialized literature, it becomes a relevant and necessary requirement.

Keywords: explosives, explosion, computerized simulation of explosion phenomenon, specialized AUTODYN software, research institute INSEMEX Romania.

CONDITION OF LOCALITIES IN POST-MINING AREAS IN THE CZECH-POLISH BORDERLAND WITH FOCUS ON THE OSTRAVA-KARVINA COALFIELD

Prof. Ing. Vlastimil Hudeček, CSc.
Doc. Ing. Milan Mikoláš, Ph.D.

Faculty of Mining and Geology/Technical University of Ostrava, **Czech Republic**

ABSTRACT

Coal mining in the Czech-Polish borderland is concentrated in the Ostrava-Karvina Coalfield, which forms the southwest part of the Upper Silesian hard coal basin. By the closure of mining companies and mining plants of underground mines, many changes in the composition of surface constructions have occurred. Extensive remediation and reclamation of devastated areas are aimed at ensuring the return of the landscape where environmental damage has occurred due to industrial activities to a useful purpose. At present, experience together with the phasing out of mining leads to remedying the effects of mining activity, which is controlled in advance and according to conditions of environmental protection.

In the article, evident changes in the surface of closed underground mines and possible trends in the further use of reclaimed areas, constructions and equipment left empty after coal mining are stated. The article is supplemented by a number of photographs documenting these changes.

Keywords: Closed mine workings, cultural monuments, gas drainage

CONSIDERATIONS ON THE HARD COAL MINING REORGANIZATION IN JIU VALLEY SINCE 1990

F.R. Lupuleac,
E. Cozma,
I. Onica
University of Petrosani, **Romania**

ABSTRACT

Jiu Valley mining plays an important role in the energy sector of Romania. For joining the general and sectorial policies of EU and for accomplishing the overall economic and social balance of the country, the hard coal mining from Jiu Valley has undergone and continues through an extensive reorganization process.

The mining reorganization mainly focused on reducing the production capacity while reducing headcount.

Given the volume of industrial hard coal reserves, in the context of increasing worldwide electricity consumption, it is necessary to continue the mining of this resource, whilst pursuing economic efficiency of this activity.

Keywords: mining basin, hard coal, mining, reorganization, capacity, productivity.

CONSIDERATIONS REGARDING THE DEVELOPMENT OF AN ECONOMIC-MATHEMATICAL MODEL FOR OPTIMIZING THE TECHNOLOGICAL VARIANTS IN THE COAL MINE FACES

Assoc. Prof. Dr. Dolea Gheorghe-Gabriel

Lecturer Dr. Mangu Sorin-Iuliu

Lecturer Dr. Csiminga Diana Cornelia

University of Petrosani, **Romania**

ABSTRACT

In the present paperwork is proposed an economical-mathematical model (fuzzy) that aims optimize the technological variants of the mechanized coal face. By fuzzification, the issues to solve become more flexible and allow the decision maker to acquire more variants for the functions objectively established. The description of technological solutions is carried out by a set of controllable variables of "category" type by which the type of the machinery is defined within the frame of the actual geological & mining conditions. In the paperwork are used concepts of "successions graph" and "matrix of compatibilities"; with their help a methodology to choose between different technological variants of coalfaces is proposed. It treats the problem of developing the functions that express the membership degree in vague concept. In the end it is presented an assessment procedure for the technological variants of mechanized coal face.

Keywords: economical-mathematical model, coal face, "matrix of compatibilities", fuzzy.

DEGASSING OF COAL SEAMS BASED ON CYCLIC HYDRODYNAMIC IMPACT

Prof. DSc. Gennadiy Korshunov
PhD. Aleksander Seregin
PhD. Pavel Afanasyev
National Mineral Resources University (University of Mines), **Russia**

ABSTRACT

In this article, method increasing the effectiveness of advance degassing described. Laboratory simulation research`s hydroimpulsive impacts on coal seam using equivalent materials are given. Technological schemes to create hydroimpulsive exposure suggested. Theoretical crack growth parameters in the coal seam are presented.

Keywords: degassing, coal seams, hydrodynamic impact, methane.

DETERMINATION OF CHANGES OF THE MINING AREA OF THE PODHŮRA QUARRY

Ing. Pavlína Sachová

Ing. Michal Max Minařík

Doc. Ing. Milan Mikoláš, Ph. D.

Ing. Andrea Polická

Ing. Milan Komárek

Ing. Martina Havlicová

VŠB – Technická univerzita Ostrava, Hornicko–geologická fakulta, Institut hornického inženýrství a bezpečnosti, **Czech Republic**

ABSTRACT

This contribution is focused on determination of change the mining area of the Podhůra quarry. This quarry is located near the town of Lipník nad Bečvou in Olomouc region and it is the property of KAMENOLOMY ČR s.r.o. company.

The article summarizes the basic legislative requirements necessary to mining area extension in the Czech Republic. The article then deals with the geological definition of the predicted source of building block, characteristics of the location and the deposit itself. Finally, the paper includes the calculation of geological and mineable resources of the predicted source and mining-technical conditions of mining.

Keywords: building stone, Mining law, exploration, resources, mining

DUST SUPPRESSION BY SPRAYING

Prof. Ing. Vlastimil Hudeček, CSc.

Ing. Pavel Zapletal, Ph.D.

Doc. Ing. Petr Žůrek, CSc.

Ing. Beata Gibesová

Ing, Barbora Forstová

Ing. Lucie Martínková

VŠB – Technical University of Ostrava, **Czech Republic**

ABSTRACT

In the article, a new method of dust suppression by spraying is presented. By a number of experiments and theoretical analyses it has been found that to the correct function of spraying, a ratio between the size of dust grain and that of water droplet is of importance. For confirming this opinion, authors carried out several in situ measurements and came to a conclusion that by selection of a suitable type of nozzle the effectiveness of dust suppression by spraying can be increased.

Keywords: Dustiness, dust grain, water droplet, nozzle, spraying, dust grain size, water droplet size

ECONOMIC EVALUATION OF POSSIBLE SCENARIOS FOR LARGE-SCALE EXCAVATOR REPLACEMENT

Ing. Hana Ruckova,
Prof. Ing. Vlastimil Hudecek, CSc.,
Doc. Ing. Milan Mikolas, Ph.D.
Ing. Jitka Castkova
VSB-Technical University of Ostrava, **Czech Republic**
SZPI, Usti nad Labem**, Czech Republic**

ABSTRACT

Of the mining of brown coal using surface mining methods, a concept of large opencast operations by means of production units of TC2 series (excavators KU 800 and K 2000, long-distance belt conveyors with 1600 and 2200 mm belt widths and stackers ZPD 800, ZP 5500 and ZP 6000) and TC3 series (excavator K10 000, long-distance belt conveyor with 2200 mm belt width and stacker ZP 10 000) is characteristic. When serious large-scale excavator accidents happen, enormous operational losses occur. It is necessary to deal with the interruption of mining operations, replacement of the large-scale excavator and renewal of production capacities. For the localities where an incident has happened, a number of possibilities of transferring inactive large-scale excavators, either from the mining company itself or from other companies, always exist. The large-scale excavator moves under its own power in an assembled state or is transferred in a disassembled state and then is again assembled on an assembly site. A specific alternative is the temporary or permanent replacement with bath technology.
In the article, authors are concerned with the economic analysis of replacement of a large-scale excavator KU 800.5/K65 from the Bilina opencast mine that burnt out by fire and was totally destroyed [1,7].

Keywords: Large-scale excavator accident, batch technology, economic analysis

EFFICIENCY OF USING LIGHTWEIGHT CONCRETE IN MINE WORKINGS OF THE NORTH

Prof. Alexander Galkin

Postgraduate student Andrej Naumov

Saint Petersburg State Mineral Resources University Gorny, **Russia**

ABSTRACT

In this work, the contemporary problems of walling of underground mines of the North, related to the increased amount of air that needs to be supplied to the mine to ventilate it and operate it at its natural thermal mode, are considered. During the warm period of year, this leads to decrease in stability of rocks. In order to increase the stability of surrounding rocks, it is suggested that light shotcrete is used. Reports of positive experience with usage of such technology come from mines of Norilsk and South Yakutia. A method for assessment of economic efficiency of usage of thermal resistance layer on the mine walls has been presented. The method is based on comparison of expenses of creation of thermal isolation layer using regular concrete and the shotcrete. The basic formulas for comparative calculations have been defined. Nomogram, which allows to quickly determine the area of effective shotcrete usage on the basis of the price of thermal insulation material.

Keyword: light concrete, shotcrete walling, heat-protective walling, North mines, natural thermal conditions, opening strength, frozen rock, economic efficiency, calculation procedure.

ENERGETIC SCENARIOS BASED ON JIU VALLEY HARD COAL UTILISATION

Prof. PhD. Eng. Sorin Mihai Radu[1]
Prof. PhD. Eng. Nicolae Ilias[1]
Prof. PhD. Eng. Iosif Andras[1]
PhD. Student Ec. Eduard Mija[2]
PhD. Eng. Tiberiu Iacob-Ridzi[3]
[1]University of Petrosani, **Romania**
[2]Hunedoara Energetic **Complex, Romania**
[3]Petrosani City Hall, **Romania**

ABSTRACT

The future of coal mining in Jiu Valley is acutely conditioned by a multitude of factors, arising from the interference of force lines of different decision centres, the effects of which – often cumulative or even antagonistic – may lead to irreparable consequences. The failure to take into account the totality of all the economic, social-geographic, technogenic and anthropogenic aspects have not allowed until now the outline of realistic and viable scenarios which may cut the Gordian knot of the multilevel challenge which this socio-industrial complex faces, scenarios which shall be the basis of a coherent and consequent strategy, challenges which unsolved may produce irreversible and dramatic effects for the future of the area as well as that of the national economy. The paper intend to offer – at least as a methodological approach – an assessment based on the scenarios of benefits and losses which the national economy may record by ignoring or not taking into a fair account of the proportion of the role of this industrial complex for Romania's energetic future.

Keywords: assessment, energetic, hard coal, Jiu Valley, scenario

ENVIRONMENTAL AND ECONOMIC ASPECTS OF COAL DEPOSITS EXPLORATION OF THE ULUGH-KHEM BASIN (TYVA REPUBLIC)

Prof. Dr. Vladimir Lebedev
Tuvinian Institute for Exploration of Natural Resources of Siberian Branch of the Russian Academy of Sciences, **Russia**

ABSTRACT

The information on exploration maturity degree, structural style, coal-mining, explored reserves and coal deposits huge resources and perspective of carboniferous areas received an industrial estimation is generalized on the basis of the geologic-reconnaissance works, mineral resources prospecting and research works. The basic attention is given to concrete deposits and the perspective carboniferous areas representing essential geologic-economic interest; qualitative and quantitative characteristics of coals are resulted on such areas. Separate most perspective deposits are analyzed for potential economic prospects of their development. The paper is of great interest for regional and federal level managers of coal branch development, for coal sector experts, for research scientists, and also for the potential investors participating in natural resources development of the region.

Keywords: coal sector, deposit, frontier region, economic development, international trade, potential of the natural resources, investors, coal areas, transport disconnection

ENVIRONMENTAL ASSESSMENT OF MINE TAILINGS: CAN-ETILI BASIN (TURKEY) AS A CASE STUDY

Oznur Karaca[1]
Krishna R. Reddy[2]
[1]Canakkale Onsekiz Mart University, Canakkale, **Turkey**
[2]University of Illinois at Chicago, Illinois, **USA**

ABSTRACT

Improper mining activities cause various environmental problems. A major problem is the heavy metal pollution. Can-Etili Basin (Northwest Turkey) has been subjected to intense mining activities with open/underground mining operations in several locations within the basin. Acid mine lakes have been also created at the abandoned mining sites. This study was conducted to investigate physical and chemical characteristics of the mine tailings and sediments and the types of contaminants present in them. Further, the leachability and associated environmental risk of the contaminants present was also investigated. Two locations of the basin were selected for this study, and several representative samples of mine tailings, rock outcrops, and lake sediments were collected. These samples were tested for physical properties such as moisture content, particle size, specific gravity and hydraulic conductivity and for chemical properties such as organic content and pH. The metal contamination in each of the samples was also determined. Subsequently, batch and column experiments were conducted to quantify the leachate/bioavailable toxic metals. The results showed that the sediments, mine tailings and outcrops contain several toxic metals at elevated concentrations. The most dominant metal contaminants found were: Pb (79 mg/kg), Ba (190 mg/kg) and Ni (470 mg/kg) in mine tailings; Pb (64 mg/kg), Ba (310 mg/kg) and Ni (570 mg/kg) in lake sediments; and Pb (96 mg/kg), Ba (279 mg/kg) and Ni (760 mg/kg) in outcrop rocks. The extent of leachable/bioavailable metals was dependent on the physical and chemical characteristics of the media, and the toxic metals such as Pb, Cu, Zn, and Ni were found to leach in the amounts ranging from 5 to 15 mg/kg. The total and leachable toxic metals found in the materials at the basin have potential to impact the public health and surrounding environment. Additional research is being conducted to quantify the risk as well as to develop practical green and sustainable methods to mitigate the environmental risk.

Keywords: Tailings, heavy metals, leachability

EVALUATION OF SPONTANEOUS COMBUSTION OF BROWN COAL MASS ON COAL HEAPS

Ing. Pavel Schmidt[1]

Ing. Vlastimil Moni, Ph.D.[1]

Prof. Ing. Boleslav Taraba, CSc.[2]

[1] Brown Coal Research Institute j. s. c., **Czech Republic**
[2] Ostrava University, Ostrava, **Czech Republic**

ABSTRACT

The article presents the summary of information about the spontaneous combustion of brown coal mass on coal heaps. It describes the procedure "The evaluation of the degree of the danger for the genesis of the spontaneous combustion of coal on coal heaps". The evaluation includes analysis of important influencing factors. The conclusion of this article contains definite text of the proposition. It will be verified in the last year of the solution of this project TA01020351 – program ALFA.

Key words: lignite, brown coal, dump, heap, coal self-ignition...

EXAMINATION OF ADSORPTION AND DESORPTION OF ETHYLENE ON SEVERAL SAMPLES OF POLISH HARD COALS

Msc Agnieszka Dudzińska

Central Mining Institute, Mines Ventilation Department, **Poland**

ABSTRACT

Ethylene is a component of mine air. Its presence in the atmosphere of a coal mine is closely related to the evolution of the processes of self-heating of coals. Based on the measured concentration of ethylene, fire indices are determined, which are used for the current evaluation of fire hazard. In this study an influence of ethylene adsorption on hard coals on the assessment of the self-heating processes development was investigated. The adsorption tests were carried out on 4 samples of hard coals having various content of carbon and oxygen, varied porosity and different hydrophilic nature of their surface. It was shown that the quantities of adsorbed ethylene are quite large and depend on the degree of metamorphism of coals, their porosity, carbon and oxygen content, polar groups containing oxygen and moisture contained in coal matter. The largest amounts of ethylene are adsorbed by low-rank coals having high content of oxygen, moisture, porosity and increased values of specific surface area. Tests on ethylene desorption on hard coals were also performed, using the method of lowering ethylene pressure above the adsorbent. The desorption isotherms do not converge with the adsorption isotherms, forming an open hysteresis loop. In the coal structure there are likely to remain certain amounts of ethylene linked more strongly with the coal structure and these quantities depend on the type of coal. The process of ethylene adsorption can lead to a reduction in its concentration in the mine atmosphere and thus can affect correctness of the self-heating phenomenon assessment.

Keywords: adsorption, desorption, ethylene

EXPERIMENTAL EQUIPMENT FOR ENHANCED METHANE PRODUCTION BASED ON HYDRAULIC FRACTURING CONTROL

Ph.D. St. Andrey Patutin

Ph.D. St. Tatyana Shilova

Dr. Sergey Serdyukov

Institute of Mining, Siberian Branch, Russian Academy of Science, **Russia**

ABSTRACT

The paper deals with an experimental model of borehole equipment designed for directional hydraulic fracturing in order to obtain additional methane flow into degassing wells during coal mining. Hydraulic fracturing is one of the most effective methods to increase the permeability of the coal seam due to the formation of new paths for gas filtration. Special attention should be paid to the direction of crack propagation during fracking. The main components of the system, including a special module that allows to control the development of the initial crack are presented. The hydraulic test results showed that designed equipment meets the main requirements and can be used during coal bed methane production.

Keywords: borehole equipment, degassing, hydraulic fracturing control, coal bed methane

EXPERIMENTAL RESEARCHES REGARDING THE IMPROVEMENT OF FOUNDATION SOIL IN THE ROVINARI MINING BASIN

Eng. Daniel Cristian NISTOR Ph.D Stud. [1]

Prof. Dr. Victor ARAD [1]

Dr. Eng. Cătălin Marian NISTOR [1]

Oana BĂRĂIAC Ph.D Stud. [1]

Eng. Vlad Adrian COSMA Ph.D Stud. [1]

[1] University of Petroşani, **Romania**

ABSTRACT

This paper wants to provide to professionals in the design and execution of roads, experimental data about geomechanical and technological characteristics of the rocks, which can be used for improving foundation soil in the Rovinari mining basin.

In the study were determined the following geomechanical features: freeze-thaw resistance, uniaxial compressive breaking strength, wearing resistance using Los Angeles method, wearing resistance using Deval method, abrasive resistance using Baron method, resistance coefficient (Protodiakonov) and alkali-aggregate reaction. These properties were studied in interaction with the foundation soil.

These trials were carried out on samples collected from 8 points located on the river Jiu, of which 5 of them were gravel pits and 3 were quarries.

The results were presented as average values, but we also presented the maximum and minimum values for each sort and collecting point.

Keywords: geomechanics, terrestrial communications roads, infrastructure, stability

EXPERIMENTAL RESULTS FOR MATERIALS CUTTING WITH ABRASIVE WATER JET

PhD Eng. Jucan Daniel [1]

Eng. Anghelescu Lucica [2]

Prof. Cruceru Mihai [2]

Lecturer Popescu Cristinel [2]

[1]ITP GROUP, **Romania**

[2]University "Constantin Brancusi" of Targu Jiu, **Romania**

ABSTRACT

The paper presents the experiments performed for hydraulic abrasive cutting jet. The results are presented graphically and the influence of each factor on the cutting parameters is analyzed.

It was found that if the cutting water jet is performed, the material erosion is carried out in ring surfaces, in cutting and processing with abrasive jet, the material erosion is carried out from a point or a line and then on a larger area, resulting in higher efficiency.

It was also found that such as cutting and abrasive jet machining is directly influenced by the pressure of the jet, the flow of water coming into contact with the surface and the nature of the material which is subject to cutting and processing.

Comparing the results of this paper, it could be noted that for the case of cutting and processing of surface the data are consistent, while for volume processing, they differ, depending on the processing speed of the material.

For abrasive jet cutting and processing, it can be better approximated the behavior of the material for an abrasive action of a certain geometry. It can be also accurately determined the pressure at which cutting and processing by cracking are starting, pressure values between plastic deformation occurs, in order to smooth and hardening the surface, both for water jet and abrasive water jet .

Keywords: abrasive cutting jet, material erosion

GAZODINAMIC REGIME ON GEOMECHANICS POINT OF VIEW FOR JIU VALLEY COAL BEDS

Prof. Dr. Victor Arad[1]

Assoc. Prof. Dr. Susana Arad[1]

Eng. Vlad Adrian Cosma Ph.D Stud.[1]

Eng. Marius Şuvar Ph.D Stud.[1]

[1] University of Petrosani, **Romania**

ABSTRACT

An analysis between dynamic regime of gases and geo-mechanical characteristics was realized based on observations and interpretation of underground measurements. Geo-mechanical properties were determined for rocks collected from the Valea Jiului basin and vary due to the degree of metamorphism. Geo-mechanical characteristics have a tendency to increase from the east to the west part of the basin. Results analysis obtained for the geo-mechanical properties of coal from the Valea Jiului show a great diversity depending on the mining area, the tectonic, the petrographic components and state of tension. Measurements regarding the gas emissions were performed in 174 boreholes, providing in this way a zoning of methane emissions. The dependencies between coal and rock porosity and methane concentration were assessed and between porosity, permeability and methane flows from the coal seams. Based on the theoretical and experimental research carried out, a statistical model describing the coal bed methane emissions was developed for the specific conditions within the Valea Jiului coal basin, in Romania.

Keywords: geomechanics, coal beds, emission, gazodinamic regime, statistical model

GEOTECHNICAL STUDY AND POSSIBILITIES OF RECOVERY OF THE USEFUL COMPONENTS FROM TAILINGS PONDS

Eng. Susana IANCU (APOSTU) Ph.D Stud.[1]

Prof. Dr. Victor ARAD[1]

Oana BĂRĂIAC Ph.D Stud.[1]

Eng. Daniel Cristian NISTOR Ph.D Stud.[1]

Eng. Gheorghe LASC Ph.D Stud.[1]

[1] University of Petrosani, **Romania**

ABSTRACT

In Romania there are a number of about 93 tailings ponds with a total volume of about 324 million m^3 of tailings stored, namely 729 million tonnes of tailings. This mass of mining waste can be efficient valued, thus contributing to the greening of affected mining areas and reintroduction in the economic circuit of appreciable quantities of metal and non-metal minerals.

Coroieşti tailings pond is exploited for coal: vitrit 40.23%, argillaceous minerals 43.21%, which can be used in the construction materials industry. In the tailing ponds site from U.P. Coroieşti were performed geotechnical works that consisted of a drilling on the Pond 1A beach and several wells drilled outside of the two compartments 1A and 1B, which led to the determination of ponds stability.

We used a software that allows the calculation of the stability of the potential slip surfaces using the group of the analysis methods of the limit balance with the division of the section in vertical strips. The analysis methods can be used for single surfaces that have been identified in situ as potential critical slip surfaces or more slip surfaces. For Coroiesti tailing pond, we have used the method of surfaces generating by using a polygon, which represents the geometrical place of the slip surfaces centres in a metrical form with the resolution given by nework increment pace.

The material samples taken from these geotechnical works have been analysed in the Laboratory for Analysis and Testing in Constructions of the University of Petrosani and the following parameters have been determined: volumetric density; granulometric analysis; porosity; angle of internal friction; cohesion; specific compaction; permeability.

Keywords: tailings pond, stability, mining waste, useful products, geotechnical works

GEOTHERMAL RESERVOIR SIMULATION

Prof. Dr. Aleksander Lipaev

Almetyevsk State Oil Institute, **Russia**

ABSTRACT

The first step in geothermal simulation is laboratory study which involves determining thermal properties of the rock under conditions close to in-situ occurrence, and evaluation of reservoir and flow characteristics of the samples under study .

The second step deals with collecting geophysical data from wells where core sampling for laboratory study was performed.

The third step starts with defining in the field profile interlayers of different lithology, saturation and type of cement. Here, other essential properties are also taken into consideration. Logging data is compared with laboratory data, thus identifying the causes of possible interrelations. Then dependencies between thermal, flow and fluid storage properties are considered.

The fourth step is the period when a site for thermal treatment is selected, and the section according to its thermal and flow properties, as well as fluid storage capacity, is considered. By doing this the curves for thermal conductivity, porosity, permeability and saturation are created.

The fifth stage involves the study of changes in the thermal properties of the log, identification of the factors that influence the thermal front distribution around the wells, and determination of areas for improving thermal stimulation.

Creating geothermal models makes it possible to achieve better results in formation treatment and reduces heat loss.

Keywords: heat treatment techniques, high viscous oil, heavy oil, heat models, reservoir, heat simulation.

HEAP OF COAL WASTE
ENVIRONMENTAL EVALUATION METHODOLOGY

PhD DSc. Eng. Krzysztof Pikoń,
MSc. Eng. Magdalena Bogacka,
Prof. PhD. DSc. Eng. Jan Nadziakiewicz,
Assoc. Prof. PhD. DSc. Eng. Wojciech Stanek,
MSc. Eng. Lucyna Czarnowska
Silesian University of Technology, **Poland**

ABSTRACT

Although renewable energy is recently the fastest growing part of energy sector, hard coal still remains the main source of energy in the world. The unwanted side effect of coal production is waste which in large quantities are stored as waste coal heaps. The environmental impact of them could be very high taking to the consideration its life cycle chain.

The methodology of environmental assessment of coal industry of heap of coal waste is proposed in the manuscript. Standard impact categories set - usually used in evaluation process - is enriched with new ones which are focused especially on waste management. New impact indicators are proposed in the manuscript. They contain information about quality of waste management in the coal mine, potential emissions, avoided emissions due to change of type of land use etc. In addition the danger of large scale emissions due to random incidental events like uncontrollable burning coal-waste-heap as well as elements of risk assessment is included into the evaluation process as well.

Keywords: environmental impact, coal mining, coal heaps, LCA

IMPROVEMENT OF HIGH-PERFORMANCE LONGWALL FACE COMPLEXES EFFICIENCY AT UNDERGROUND EXTRACTION OF COAL

Prof. Dr. Vladimir Zubov

PhD. Grigoryi Karpov

National mineral resources university "University of Mines", **Russian Federation**

ABSTRACT

In given article modern techniques of longwall complexes recovery are considered by the example of Kuzbass coal mines. The structure of time consumption required for longwall face recovery is given. The technique of recovery based on improving the stability of immediate roof, that allows reducing breakage face dead-time duration is recommended.

Keywords: recovery rooms, longwall face, immediate roof, roof caving, front abutment pressure

INDEX AS A MEASURE OF THE QUALITY CAPABILITY EVALUATION PROCESS INPUT QUANTITIES OF ROCK EXCAVATION

MSc. Marcela Malindzakova, PhD.[1]
Assoc. prof. MSc. Andrea Rosova, PhD.[1]
Assoc. prof. MSc. Jozef Futo, PhD.[1]
MSc. Vladena Baranova[2]

[1] Technical University of Kosice, Faculty of Mining, Ecology, Process Control and Geotechnology, **Slovakia**

[2] VSB - Technical University of Ostrava, Faculty Mechanical Engineering, **Czech Republic**

ABSTRACT

Experimental stand for Slovak Academy of Sciences (SAS), Institute of Geotechnics is used to study the disintegration of rocks, the mechanism of mechanical disintegration and disconnecting tool attrition for more than thirty years. During these years in various fields of science and technology came to some revolutionary changes that could not remain without response in this field of science. Non-standard methods of identification were the motivating factor for re-increase of measurement accuracy. Further research was therefore focused on increasing the precision and measurements accuracy of input and output variables. Because the stability of input variables crucially affects one of the experiment determinants, a way was sought to numerically evaluate the measured values by a quality indicator especially in application for rock disintegration processes.

Keywords: Random process, process capability index, input/output system variables, random variables, characteristics of random processes, the process of disintegration of rocks modeling

INVESTIGATION OF CAUTIOUS BLASTING MODEL APPLIED DURING TUNNELING OF ÜSKÜDAR-ÜMRANİYE-ÇEKMEKÖY SUBWAY CONSTRUCTION

Sadettin Bağdatlı

Alper Çeltikçi

Vocational School, Construction Program / Okan University, **Turkey**

ABSTRACT

Traffic and transportation have become daunting problems in almost every metropolitan area in the world today. Public transportation systems appear to be the sole genuine solution to these problems. One of the most convenient types of transportation in metropolitan areas is subway systems. In Istanbul, a number of new subway lines are under construction to solve the ever-increasing traffic problem of the city. The Üsküdar-Ümraniye-Çekmeköy line is one of the most important subway lines under construction on the Asian side of the city since traffic congestion in this area is impossible to be tackled with in any other way. Because there is no suitable location for shaft opening within the construction area of the Bulgurlu station (the sixth station), an approach tunnel has been built by the NATM starting from a point 200 meters away from the station.

This paper examines the blasting operations carried out during the excavation of the approach tunnel, focusing upon the vibrations induced by blasting and the effects of blasting on the residential structures. The Peak Particle Velocity (PPV) and frequency were measured and evaluated according to the USA (USBM) norms. During the 50 controlled blasting operations conducted until now, the vibrations were recorded 94 times by means of various technical apparatuses. By relating the vibration records to the scaled distance calculated on the basis of the explosive weights per delay, the ground transmission coefficient (K) and the geological coefficient (β) were found.

Keywords: Cautious Blasting, NATM, Vibration Measurement

INVESTIGATION OF MINI-BENCH BLASTING APPLICABILITY AND GROUND VIBRATION EFFECTS AT THE EXCAVATION FOR FOUNDATION IN SETTLEMENT

Lecturer Alper Celtikci

Lecturer Sadettin Bagdatli

Vocational School, Construction Program, Okan University, **Turkey**

ABSTRACT

Today the need for housing, transportation, and infrastructure has become more pressing due to rapid urbanization and population increase. In subway, infrastructure, and housing constructions, blasting excavations are required because of the hardness of rocks on the ground surface and underground.

The aim of this paper is to demonstrate the feasibility of the method of mini bench blasting during foundation excavations on hard rock units in settlement areas. In order not to damage buildings surround the foundation excavation area of Government Project. It is argued that mini bench blasting shots can be applied in foundation excavations in settlement areas without any risks.

Within the scope of this study in order to predict peak particle velocity level for this site, ground vibration components were measured for mini bench blasting. In blasting operations; ANFO (blasting agent), gelatin dynamite (priming) and delay non-electric detonators (firing) were used as explosives. Parameters of scaled distance (charge quantity per delay and the distance between the source and the station) were recorded carefully and the ground vibration components were measured for all blast events.

Then, the data pairs of scaled distance and particle velocity were analyzed statistically. At the end of statistical evaluation of the data pairs, an empirical relation which gives average line at 50% confidence level and upper bound 95% prediction line with a reasonable correlation coefficient was established between peak particle velocity and scaled distance.

Keywords: Mini-Bench, Blasting, Ground Vibration, Bench Design, Foundation Excavation

LABORATORY METHODS FOR DETERMINING EXPLOSION PARAMETERES FOR UNDERGROUND DANGEROUS MIXUTERS

PhD. Chem. Stud. Maria Prodan[1]
PhD. Eng. Constantin Lupu[1]
PhD. Eng. Emilian Ghicioi[1]
PhD. Eng. Doru Cioclea[1]
PhD. Eng. Stud. Andrei Szollosi-Moța[1]
Phd. Eng. Stud. Nălboc Irina[1]

[1] National Institute for Research and Development in Mine Safety and Protection to Explosion - INCD INSEMEX Petroşani, **Romania**

ABSTRACT

Coal dust, methane and hybrid mixtures explosions are a real consequence of underground coal mining operations. The explosion risk management strategy is based on the reduction of event probability through pro-active hazard awareness and control processes. In order to take the necessary measures to prevent the explosions occurrence and to minimize the associated consequences it is needed to understand the explosion mechanism. Knowing, modernisation and the development of methods for determining the explosion characteristic parameters of underground dangerous mixtures increase the capacity of expertise in explosions, the extension of knowledge about the explosion phenomenon and increase the occupational health and safety by using experimental data obtained in developing the explosion proof protection measures. Determination of explosion parameters plays an important role in the primary phase of explosion risk assessment and conformity assessment stage equipment and protective systems intended for use in potentially explosive atmospheres. In order to assess the risk of explosion and the explosion events expertise is necessary to know the specific explosion parameters for air - flammable substances mixtures. In this paper were determined the maximum explosion pressure p_{max}, maximum rate of pressure rise (dp/dt) max and explosion severity factor for explosive atmospheres encountered in underground coal mines.

Keywords: explosion, coal dust, hybrid mixtures, maximum explosion pressure, maximum rate of pressure rise

LABORATORY TEST OF COAL SPON-COM INDICATOR GASES

Prof. Ing. Alois Adamus, Ph.D.

Ing. Jindrich Sancer, Ph.D.

Ing. Lukas Snopek, Ph.D.

VSB-Technical University Ostrava, **Czech Republic**

ABSTRACT

The underground mining of coal is often burdened with a risk of spontaneous combustion. In the case of gassy mines, spontaneous combustion can be an initiation source of methane explosion, which has led in a number of cases to mine disasters. One of the methods of early indication of spontaneous combustion is the analysis of indicator gases released from the centre of spontaneous combustion. The article deals with the laboratory test of thermal oxidation of the coal substance; it provides information on gases released from coal at various temperatures. The result is a gas image of indicator gases of coal spontaneous combustion.

Keywords: spontaneous combustion, indicator gases, thermal oxidation, endogenous fires.

MAINTENANCE AND RISK ASSESSMENT OF A CONCRETE FRAME BRIDGE IMPACTED BY MINING DEFORMATIONS OF THE AREA

Dr. eng. Bętkowski Piotr[1]

Dr. eng. Pradelok Stefan[1]

Dr. eng. Łupieżowiec Marian[1]

[1] Silesian University of Technology, Faculty of Civil Engineering, **Poland**

ABSTRACT

Computational analysis of influences of mining exploitation on certain frame bridge are described in this paper. Mining deformations of ground cause the coming into existence of internal additional forces in structures. The frame structure of the object causes that it is necessary to pay special attention to interaction of the structure and ground, which is coming into existence of internal additional forces in the structure. A distribution of inner strengths in the structure is determined in these elements of the object which are important for the safety. Method of static scheme changing as technical solution, which adapted construction to take additional loads from mining deformations of the area, is discussed. The example of computational analysis is given. A system of monitoring will let to control the risk of structure's failure.

Keywords: mining, risk management in the surface protection, monitoring

MINERAL EXPLORATION OF ALLUVIAL GOLD - COMPARATIVE RESULTS USING 11" AND 50" DIAMETER BOREHOLES

Dr. Dimitris Drymonitis

National Centre for Sustainable Development**, Greece**

ABSTRACT

I.G.M.E. (Institute of Geology and Mineral Exploration) (at present N.C.S.D.) has carried out a major exploration project for alluvial gold deposits in Northern Greece since 1975. The orebody under study is one of great interest in North-Eastern Greece, where a great exploration project has been carried out.

During the first exploration stage 94 boreholes, 11" in diameter were drilled and about 5,000 samples taken. A first geostatistical ore reserves estimation was carried out.

Having decided that the deposit is economically interesting, a new exploration campaign was carried out by drilling 8 new boreholes, 50" in diameter, close to the corresponding 11" boreholes.

The analyses of the 50" diameter samples showed a significant increase of the gold content of about 42% in average. This important and interesting analytical outcome lead to the re-evaluation of the variables of the deposit, to define the source of this significant difference.

Keywords: mineral exploration, alluvial gold, drilling, geostatistics, correction factors.

MINING OF URANIUM ORE IN THE WORLD AND IN THE CZECH REPUBLIC

Doc. Ing. Petr Žůrek, CSc.[1]
Ing. Václav Zubíček, PhD.[1]
Ing. Beáta Gibesová[1]
Ing. Adéla Cibulcová[1]
Ing. Lucie Martínková[1]

[1]VSB-Technical University of Ostrava, Faculty of Mining and Geology, **Czech Republic**

ABSTRACT

Uranium mining represents a significant share of mining activities. The mining methods vary depending on the conditions of the ore deposit. In the world, the predominant method of mining is leaching. The conditions in the Czech Republic are not very suitable for this method. The paper describes a method of underground mining applied at the last uranium mine in Central Europe, Dolní Rožínka. Subsequently, the article deals with the extraction of uranium ore at the McArtur River mine in Canada. The paper also deals with processing of uranium ore after extraction. The article offers a view of the global uranium mining in the last 6 years.

Keywords: uranium ore, undeground, mining

MN MINING WASTES AS AN INDUSTRIAL INCOME FOR CONCRETE PRODUCTION: INVENTORY OF WASTE-DUMPS AND RESOURCES ESTIMATION IN THE IBERIAN PYRITE BELT, SW SPAIN

Prof. Dr. Teresa Valente[1,2]

Prof. Dr. Jose Antonio Grande[2]

Prof. Dr. Francisco Salguero[2]

Dr. Andrés Sánchez[2]

[1] CIG-R (PEst-OE/CTE/UI0697/2011). Centro de Investigação Geológica, Ordenamento e Valorização de Recursos, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, **Portugal**

[2]CIPIMS. Centro de Investigación para la Ingeniería en Minería Sostenible. Escuela Técnica Superior de Ingeniería. Universidad de Huelva. Ctra. Palos de la Frontera. s/n. 21819. Palos de la Frontera. Huelva. **Spain**.

ABSTRACT

The present work aims to evaluate the possibility of achieving an environmental and economic valorisation of Mn-wastes through their recycling for concrete production. The study area is located in the Spanish sector of the Iberian Pyrite Belt (IPB), where there are numerous abandoned mine-waste dumps, resulted from exploitation of manganese mines. The methodological approach included field surveys for elaborating an inventory and a general map of all the abandoned exploitations, remote sensing methods for identifying old mines and for estimation of affected areas; and laboratory analyses for characterizing the mine wastes regarding evaluation of their potential as filler for concrete production.

The obtained results indicated the existence of 149 mines, representing a total affected area of 235 ha. Among these waste dumps, about eleven of them have more than 10 000 m^3 of Mn-gangue with chemical composition compatible with the normative for concrete production. The recycling of such wastes may accomplish two main purposes: to supply the market with low cost aggregates and, simultaneously, to contribute for the environmental rehabilitation of the affected areas.

Keywords: Manganese gangue, mining waste-dumps, recycling, filler, Iberian Pyrite Belt.

MODEL FOR ESTIMATING BLASTED ROCK FRAGMENTATION

Prof. Dr. Slavko Torbica

M.Sc. Veljko Lapcevic

University of Belgrade – Faculty of Mining and Geology Belgrade, **Republic of Serbia**

ABSTRACT

Estimation of blasted rock fragmentation is of great importance in hard rock mining. There are many, mostly empirical or semi-empirical, models for its estimation. New theoretical model for estimating fragmentation of blasted rock is proposed in this paper. Model is based on theoretical research in rock breakage by explosives. Conducted research resulted in new rock breakage theory that made possibility of estimating tension crack density and radii of fragmenting zones. Utilizing these theoretical results with assumption that prior blasting quasi-isometric fragments are formed it is explained how blasted rock fragmentation could be estimated. Also, it is shown how structural properties of rock mass impact rock blasting and its fragmentation. Example is given, at the end of the paper, where it is explained how rock fragmentation could be estimated using geometrical analysis.

Keywords: Rock blasting, blasted rock fragmentation, rock breakage by explosives, p-wave

MODEL OF MINERAL DEPOSITS ECONOMC EVALUATION

Prof. Ing. Michal Cehlár, PhD. [1]

Ing. Zuzana Jurkasová, PhD. [1]

Ing. Marcel Behún, PhD.[1]

Doc. Ing. Stanislav Szabo, PhD. [2]

[1] Technical University of Košice, Faculty of Mining, Geology, Process Control and Geotechnology, **Slovakia**
[2] Technical University of Košice, Faculty of Aeronautics, **Slovakia**

ABSTRACT

After the changes to the economic systems in many European countries the criteria of assessment and evaluation of mineral deposits have changed significantly, and authors of these „recomputations and calculations“ use various, often unsuitable methods, mainly because they have never had an opportunity of becoming acquainted with modern and comprehensive methods of mineral deposit evaluation. It results that this book might be a contribution also for experts from practice.

Keywords: model, economic evaluation, mining industry, mineral deposit, efficiency of investment

NEW METHOD TO FEED FILLING MATERIALS INTO SHAFTS WITH DIRECTING TUBULAR TANKS

Assoc. Prof. Stanislaw Prusek

DSc. Eng. Slawomir Bock

Główny Instytut Górnictwa (Central Mining Institute), **Poland**

ABSTRACT

Shafts closure is most often conducted by filling it with a grainy material fed into the shaft with a conveyor or directly from a lorry. Unfortunately, during the shaft closure, the selected filling material degrades, and the composition of the grain size changes. Such refined material may not meet the requirements posed to maintain filtering properties in the backfill column.

That paper presents new method of feeding material into the shaft. It enables to limit the degree of degradation of a filling material, which is especially important in case of materials of low strength. The described solution limits damage to the lining of a shaft and its equipment by directing the filling material to the bottom of a shaft. Addition of water increases consolidation of the filling material, which facilitates its flow during backfilling. Moreover, water significantly limits sparking when such materials as granite or slag are fed. The verification of proposed method was performed using numerical analysis (Bonded Particle Model implemented in the PFC3D code).

Keywords: Shaft closure; PFC3D; Numerical modelling; Material modelling; BPM

OCCUPATIONAL SAFETY AND HEALTH RISK ASSESSMENT IN ROMANIAN SURFACE GAS EXTRACTION FACILITIES

Prof. Dr. Lucian Ionel Cioca[1]

Ph.D.Stud.Eng. Mihai Popescu Stelea[2]

Assoc. Prof. Dr. Roland Iosif Moraru[2]

[1] „Lucian Blaga" University of Sibiu, **Romania**
[2] University of Petroşani, **Romania**

ABSTRACT

Depending on their nature, risks related with human activity can affect both the personnel directly involved in the working systems as well as those not participating in working processes, or the environment (due to pollution or industrial disasters). The main goal of the research was to identify, assess, prevent and control those occupational safety and health risks and stressors arising in or from the workplace which may cause injuries, illnesses, impaired health and well-being or significant discomfort among workers, the final goal being to decrease the number of accidents for workers at the surface facilities used to extract natural gas. The major risk taken into consideration which leads to the worst industrial accident in gas extraction is the risk of explosion. The purpose of this paper is to contribute to increase the safety degree of surface installations used for the extraction of natural gas by reducing occupational accidents and occupational diseases occurrence and consequences using radar charts as an indicator for the implementation level of legislation concerning Labor Safety and Health, as well as by substantiating the measures for improving work safety and health. The results obtained have facilitated an increased safety level for the Romanian surface installation used for natural gas extraction by achieving the goals we have pursued through the research conducted.

Keywords: natural gas, risk assessment, radar chart, compression station.

OPPORTUNITIES AND BARRIERS OF CRITICAL MINERALS MANAGEMENT IN POLAND

Assoc. Prof. Barbara Radwanek-Bąk,
Polish Geological Institute-National Research Institute, **Poland**

ABSTRACT

The assurance of future raw materials supply seems to be one of the most important elements of mineral resources policy. The problem of increasing risk of supply of many raw materials in Europe has been recognized in recent years, mainly in the context of declining EU economy competitiveness when compared to dynamically developing countries like China, India etc. It become a driving force for developing a new mineral policy within the EU zone, that refers mainly to non-fuels. In recent years, the supply risk is particularly serious in case of the group of critical minerals. This group of a dozen minerals like: antimony, beryllium, cobalt, gallium, germanium, fluorite, graphite, indium, magnesite, niobium, tantalum, tungsten, REE, PGMs, and probably some more (potassium salts, phosphate) was considered as the most crucial for the development of modern, innovative UE economy. Therefore, certain activities have been taken to solve this problem, both on the EU and national levels.

Poland is a country rather poor in critical minerals, and only a few of the latter occur in the known primary deposits. Additionally Polish potential in this area is weakly investigated. Critical minerals are almost not produced in Poland and, till now, the demand for them is met practically by import. The usage of secondary sources of these minerals, like, for example, electronic scrap and urban mining wastes, is insufficient yet. Thus, the discussed group of minerals was not perceived as really "critical" but rather as of limited importance. An expected dynamic growth in demand–give rise to verify this opinion. Some activities should cover both –the geological prospection and search for new more effective recovery technologies of critical minerals from primary and secondary sources. Management of the new polymetalic Mo-Cu-W deposit and launching new mine should be a challenge for our decision-maker, authorities and the local society for the acceptance of mining.

Presented paper shows the main problems of critical minerals management in Poland, pointing their sources and possible scenarios of development.

Keywords: critical minerals, new technologies, exploration

OPTIMISATION POSSIBILITIES OF OPERATIONAL DUTY OF BUCKET TEETH OF WHEEL EXCAVATOR

Vlastimil Moni

Jaroslav Graman

Lubomír Donát

Tomáš Škaloud

Petr Klouda

František Helebrant

Brown Coal Research Institute j.s.c., **Czech Republic**

ABSTRACT

The cutting edge (blade) geometry and the cutting edge (blade) material are key influences for efficiency and energy demands of the bucket wheel excavator mining processes in brown coal open pit mines. The frequent exchange of the cutting edges (blades) causing by wear and tear or break is the cause of increasing of mining processes energy demands and reduction of excavator working time, i.e. lower productivity of the equipment complex.

The basic thought of this paper is dealing with relation and association of bucket wheel excavator cutting edge (blade) geometry and corresponding energetic demands, life time, position in bucket, termographic image and blade material in typical mining and geological conditions of the North Bohemian coal basin. We use measuring devices and evaluation methods. The blade wear and frequency of blade exchange optimization is expected output.

Key words: Brown coal, bucket tooth, temperature, monitoring.

OPTIMIZATION OF MINING AT THE BROWN COAL MINE BÍLINA IN THE MEANS OF GNSS

Ing. Ph.D. Bílý[1]

Ing. Vaněk[2]

Doc. Ing. Ph.D. Mikoláš[3]

Ing. Brabenec[4]

[1] Severočeské doly a.s.

[2] Mining expert and designer

[3] TU – VŠB Ostrava

[4] Revitrans a.s.

ABSTRACT

Surface mining companies around the world in recent years coping with the ever increasing pressure to improve economic efficiency and security of the entire mining operation. In recent years, however, have in your hands before and unprecedented helpers - geoinformation technologies that enable them to meet these demands and to keep mining companies in operation.

Keywords: Wheel excavator, GNSS, mining model, volume calculation, the quality of raw material

OPTIMUM PARAMETERS OF MINING MACHINES FOR SPECIFIC CONDITIONS

Assoc. Prof. Jiri Fries[1]

Ing. Tomas Hapla[1]

Ing. Tomas Neumann[2]

[1] VŠB-Technical University of Ostrava, Institute of Clean Technologies for Extraction and Utilization of Energy Resources, **Czech Republic**
[2] VŠB-Technical University of Ostrava, Department of Production Machines and Design, **Czech Republic**

ABSTRACT

In the case of the process of mechanical disintegration of mineral raw materials, the supply of a certain amount of energy, which is consumed for the separation of rock chips (elementary pieces) from the rock mass, is required. By this process, the entire cycle of mining of the economic mineral is given. The minimum energy demand of the disintegration process is achieved especially through the correct selection of a tool and the selection of optimum cutting speed and rate of tool advance into the cut, and also other parameters that have a minor impact on the very disintegration process. For the determination of optimum parameters of mining machines, a sophisticated instrument for the in-situ measurement of disintegrating forces can be used. The instrument is ATEX certified for use in a potentially methane explosive atmosphere, and thus can be used in all mines not only in the Czech Republic but also practically all over the world. The principle of the instrument consists in the in situ measurement of disintegrating forces and then the application of them to a specific machine or a mining organ.

Keywords: disintegration; optimum parameters; mining machine

POST-MINING AREAS RECLAMATION – CASE STUDY

dr hab. inż. Witold BIAŁY prof. Pol. Śl.

Silesian University of Technology, Faculty of Management and Organization, Institute of Production Engineering;

ABSTRACT

Practically, the only area in Poland where mining is carried out by the borehole method is the region of Upper Silesia. This activity results in the degradation of areas. In recent years in Poland (particularly in Upper Silesia) intensive activity has been undertaken to restore biological processes in these areas, regulate the air and water relations, neutralise the toxicity of deposits and give the area a shape convenient for the planned works. Since environment protection does not have a long tradition in Poland, some of the activities undertaken to reclaim the post-mining areas are frequently random and deprived of any specific scientific bases. These problems have been reflected in the records of formal and legal requirements at the level of the union; therefore, they apply to all EU member states. Using an example of one of the mines located in this territory, problems caused by the exploitation of hard coal as well as proposals of solutions to restore these areas „to life" have been presented.

General goals and directions of post-mining areas management have been presented as well as the results of conducted research, in which, using a selected example, young people pointed to the directions of degraded areas transformations which they found particularly attractive.

Keywords: mining exploitation, post-mining area, reclamation, transformations

PRACTICAL APPLICATION OF THE NEW MMM METHOD IN NON-DESTRUCTIVE TESTING

Ing. Pavel Schmidt[1], Ing. Vlastimil Moni, Ph.D.[1]

Ing. Jan Blata, Ph.D. [2], Ing. Dariusz Cymerys[2]

Ing. Jan Ripel

[1] Brown Coal Research Institute j. s. c., **Czech Republic**
[2] VSB - Technical University of Ostrava, **Czech Republic**

ABSTRACT

Many non-destructive testing (NDT) methods might be used for arising surface and subsurface cracks and defects revealing in material. NDT methods comprise both simple methods used for surface cracks revealing only, e.g. penetrating testing and much more sophisticated methods, e.g. radiography testing, methods based on eddy current principle, etc. One of the new progressive methods with many advantages and great information value is Metal Magnetic Memory (MMM). Following paper contains description of the method basic principles and practical application examples.

Keywords: non-destructive testing, Metal Magnetic Memory

PRINCIPLES FOR THE APPLICATION OF LEGAL STANDARDS FOR THE KEEPING OF POST-MINING TERRITORIES IN POLISH-CZECH BORDER REGION

doc. Ing. Milan Mikoláš, Ph.D.
prof. Ing. Vlastimil Hudeček, CSc.

Faculty of Mining and Geology/Technical University of Ostrava, **Czech Republic**

ABSTRACT

Mining and quarrying in the affected territories often results in negative impacts and interventions on the landscape and the environment. This article aims to cover the content of the available legislation standards in the Czech Republic which are related to the area of devastation and consequent obligations to redevelopment and reclamation of the landscape. One of such areas is the territory on the border of Poland and Czech Republic, which was affected by mining activities in the coal mines. The article will be used as a part of promotion of operational programme of the cross-border the Czech Republic-Poland cooperation called „Education of Specialists in the Field of Keeping Post-mining areas in Polish-Czech Border Region".

Keywords: Mining Act, reclamation, post-mining territories, mining

and a number of special laws and other regulations in the field of mining, agriculture, forestry, environmental protection, nature conservation, landscape planning and Building Regulations. In their entirety, reclamations are obligation of mining companies. Amendment of the Mining Act and other related legislation was complemented and extended to include provisions that are intended to increase the protection of the environment against the adverse effects of mining, especially in the case of opencast mining in designated deposits. In the Czech Republic, these provisions emphasize that within planning exclusive deposits there must be a guarantee that in the course of mining activities and after their completion, the organization will have sufficient funds for the timely and proper remediation and reclamation of land affected by mining in exclusive deposits.

The Ostrava- Karvina region is known especially for its mining and industrial activities. And it is the mining activity that represents a phenomenon that has a significant impact both on the environment and the landscape character of the concerned area, but also on the social and economic structure of the society. Mining has caused a number of anthropogenic changes of the relief (aesthetic and qualitative changes of the environment). On the other hand, it contributed to the development of industry and the whole region. The mining activity and the subsequent changes noticeably changed the demographic structure of the site.

1. THE HISTORY OF MINING IN THE KARVINÁ PART OF THE OSTRAVA-KARVINÁ REGION

Mining of coal in the Karviná region started later than in the Ostrava or Petřvald region, but this time shift is not very significant. In Karviná, people began to explore for coal in the early 1770s and already in 1776, the then owner of the estate Karviná, Jan Erdmen Florian Larisch-Mönnich, began the extraction. The development of mining in the Ostrava region was similar; the deposits of coal had been known since 1763, but the first official permission for drift mining was not released until October 28, 1776, when it was granted to a smith, Jan Keltička. In 1782, successful coal mining was started by the Hlučín estate owner, baron John Adam Grutschreiber. A report on coal mining written by a mining master Lutz on coal mining in Karviná, where two coal seams coming to the surface on Čechovice hill were opened by drifts, dates back to 1785. Coal has been mined continuously in Karviná since 1794. Count Larisch-Mönnich acquired the mining rights in 1806, and according to archival materials, he was awarded the oldest mining grants on 31 July 1811.

The Larisch-Mönnich family owned the local mines until their expropriation in 1945. In 1852, Count Franz Handwerk and Count Žerotín founded the Gabriela pit, which approached the modern concept of mining. This mine, however, soon burnt out and due to a lack of funds, it was sold to the Těšín Archducal Chamber in 1862. The director Hohenegger had a new hole built next to the existing Gabriela pit, and in 1883, the Hohenegger mine was founded. In 1906, the two mines and all the mining rights were sold to the Austrian Mining and Metallurgical Company, later (in 1920) renamed as the Mining and Metallurgical Company.

The second oldest mining activities are associated with the Orlová region. In 1822, baron Mattencloit began to build the Versuch pit (later the Bettina pit) on the hill called Havírna on Doubrava land. In 1836, shallow shafts in Doubrava gave rise to a mining company, called Orlovskodoubravské těžířstvo (Orlová-Doubrava Mining Company) owned by Baron Anton Mattencloit and Count Jindřich Larisch-Mönnich. Baron

Salomon Mayer Rothschild joined the company later. Baron Mattencliot gradually sold his shares to the Rothschilds in two stages (1846, 1849). Later, Baron S. M. Rothschild also acquired shares belonging J. Larisch-Mönnich, and he became the sole owner of the mine field. The original pits were subsequently rebuilt and the Doubrava plant, which belonged to the union of Rothschild Vitkovice hard coal mines, was founded.
Coal mining in the Orlová region also has a development branch in Orlová – Lazy. Between 1835 and 1838, the Vienna Rental Company headed by Baron Rothschild and von Gemüller began to dig the pits Altmaschinenschacht (Old Machinery Pit), Schwaben - Schacht (Albert) and Mühsamschact, known for its highly complex geological structure. In 1848, the Bedřich - Egon shaft was founded. In the late 1880s, the company became the sole property of the Gutmann family and continued its operation under the name of the Hard Coal Plants Orlová – Lazy. In 1933, there was a change in ownership, when the Czech Trade Company belonging to the Živnobanka group took possession of Orlová mines.
The municipalities with a long mining history also include Petřvald. The first geological exploration already started there in the 1760s in connection with the influence of the "National Mining Committee" under the leadership of the mining master Lutz. The coal mining industry began by the foundation of the Jindřich pit (1844). It was followed by the Evžen pit (1862), the Albrecht pit (1872), later the Hedvika mine), the Marianka pit (1878), the Jan pit (1885) and the Habsburg mine (1912, also known as the Pokrok mine), but it was already built by the Austrian Mining and Metallurgical Company. In the 1950s, the mining plants located within the municipality were gradually merging into larger units. This gave rise to the ČS Pionýr mine and the Julius Fucik mine, which were subsequently merged in 1970 into one organizational unit called the Julius Fucik mine, the national enterprise in Petřvald. [1]

2. ENVIRONMENTAL IMPACTS OF MINING

2.1. Characteristics of the effects of mining activities on the environment

Mining and processing of coal is an activity that significantly affects and changes the geology, environment and landscape character of the concerned area. The spectrum of environmental components affected by mining activities is probably the widest of all other impacts of human industrial activities. The impact of mining activities on the environment is essentially twofold. First, there are manifestations that are directly connected with mining. In particular, the ground surface subsidence due to undermining, the formation of neoplasms of anthropogenic origin (waste heaps, sludge ponds), deterioration of surface and ground water, methane leaks, damage to plant and animal ecosystems, etc. Besides, activities connected with mining also have a negative impact on the environment. The highest load is represented by the industry dealing with preparation processes, which poses a threat for the environment due to emissions, pollution of water courses, damaging vegetation and forests, the dumping of waste etc.
In the case of the Karviná part of the OKR (Ostrava- Karviná Coal Region) the landscape is significantly affected as a whole, which is then referred to as the mining landscape. In this area of intense and long-term mining, large changes in geomorphology, hydrology, air, land and other parts of the biotic landscape are going on.

2.1.1. Waste heaps

In underground coal mining, the deposits must first be made accessible by a mining pit or drift, through which the mined mineral is transported to the surface. However,

associated rocks surrounding the mineral – spoil – gets to the surface together with it. The spoil must be separated and deposited on the waste heap (spoil bank). The amount of spoil produced during extraction depends partly on the total amount of coal mining and the mineral deposits, partly on the technology of mining. This difference is evident when comparing the Ostrava and the Karviná part of the coal district. Given that Ostrava seam have a relatively low thickness (about half a meter) and they are often placed very deep, from 0.8 to 1.2 tons of stone gets the surface together with one ton of coal. In contrast, Karviná seam have a high thickness (up to 4 meters), and they are placed in shallow depths, so only from 0.35 to 0.75 tons of stone per 1 ton of coal comes to the surface. The quantity of spoil transported to the surface can be reduced when used as backfilling for the excavated area.

In the past, spoil was often stored directly at the mouth of drifts and shallow mining pits. As a result of increasing coal production, however, the amount of the produced spoil grew and it was dumped at one place. Gradually, the area began to be dominated first by conical waste heaps. Currently, the extracted spoil is utilized as a material for landscaping and leveling subside hollows, building material to create ground body of roads, for reclamation of slag ponds and as backfill. When depositing spoil on the surface in the form of waste heaps, the terrain is increased and anthropogenic neoplasms which represent a foreign element in the landscape are created. It changes the microclimate and mesoclimate, drainage conditions, groundwater quality and overall appearance of the landscape. Waste heaps create new spatial relationships in the landscape.

2.1.2. Sludge ponds

In the process of coal washing, the specific weight differences of coal, stone and middling (streaky stone coal) are used. Fine parts of coal are then separated from spoil by means of so called flotation. A byproduct of coal preparation is coal sludge, which is a finely pulverized material dispersed in water, consisting of coal and rock particles with a size less than one millimeter. The sludge is then collected in sedimentation tanks (sludge ponds), which are usually located in subsidence hollows, formed as a result of mining.Coal sludge in the tanks are divided into two categories according to the ash content. Energetically usable sludge contains up to 50 % of ash, and after being dried to the coal granules, it can be used as a low quality fuel. Energetically unusable sludge is used for rehabilitation of subside hollows, or it is deposited on waste heaps and mine workings. When the operation is finished, the space of the sedimentation tanks is filled with spoil sludge, and subsequently, these areas are reclaimed. Furthermore, sludge ponds can stay flooded and they can be reclaimed by means of water management, or it is possible to dry them up and proceed to agricultural or forestry reclamation. At present, the modern technology of coal preparation fully eliminates the discharge of coal sludge into the settling tanks. Therefore, only spoil sludge is discharged into these tanks, and after they are filled, the tanks are reclaimed and returned to the cultural land.

2.1.3. Terrain subsidence

A typical manifestation of underground mining of coal deposits are deformations of the surface or surface objects. The extent of the resulting deformation is thus dependent on the area of exploited coal seams and their thickness, the geological conditions and the intensity of mining technology and work in the particular part of the mining field. The basic deformations include subsidence (vertical movement) and shift (horizontal movement). It can be assumed that since the establishment of the OKR, more than 1.6 billion tons of coal was mined, which represents creating approximately the same free

space in a mountain massif. Subsides are particularly obvious in the Karviná part of the district; as a result of mining in coal seams of high thickness in a small depth, they reach more than 40 meters at places. For example, in the period from the start of mining in 1854 to 1994, the Peter of Alcantara church subsided by as many as 34 meters, being deviated by 6.8 degrees.

In the Ostrava part of the district there are seams of lower thickness, therefore subsides were not so intense there. Most often, these subsides range from 5 to 250 cm. The biggest subsides reach 20 meters, for example Ostrava castle subsided by 14 meters during mining. There were 27 mined coal seams with a total thickness of 46.8 m. The resulting subside hollows are unable to deal with water drainage, which leads to flooding of the area causing degradation of soil and biota.

2.1.4. Mine water

During mining operations, it is necessary to pump mine water, which represents all of the water in the mining area. This water is then, in accordance with the existing permits, discharged to watercourses to such limits in order not to endanger the functions and lives of these surface streams. However, from an ecological point of view, mine water is almost harmless in its natural environment. The problem arises in connection with their discharge. Under the conditions of the OKR, the Heřmanice dosing tank is in operation, which is designed to prevent excessive pollution of watercourses by salinization. The dosing tank is mainly used for controlled running of mineralized mine waters and its regulated discharge to rivers in agreement with the environmental and water management authority, and the Povodí Odry company.

2.1.5. Emissions of mine gases

The serious negative effects of mining activities also include the release of firedamp from underground. This is a common occurrence in coal mining. The main component of firedamp is methane, together with CO and CO_2. Methane is produced in coal seams, from where it gets into the mine air. The problem, however, occurs after abandonment, when ventilation stops and mine gases accumulate in the mining areas, from where they subsequently uncontrollably penetrate to the surface (along the tectonic faults, inadequately secured mining pits, etc.).

In the case of uncontrolled leakage of methane into the atmosphere, the gas, due to its properties, gets to the highest layers of the atmosphere. It is environmentally unsafe, because the influence of methane in terms of heat absorption is 21 times higher than that of CO_2, and it participates in 23% of total emissions.

3. THE OBLIGATION OF ORGANIZATIONS IN RECLAIMING

3.1. The obligations and rights of an organization in mining exclusive deposits

The organization must ensure the remediation, which includes the reclamation under special laws of all land affected by mining and monitoring of storage space after its closure. Remediation of land released during the extraction is carried out according to the plan of opening, preparation and extraction. Remediation means the removal of landscape damage and general alteration of land and territorial structures. To ensure the above mentioned activities, the organization is required to maintain reserve funds. The amount of the reserve chargeable to the costs must correspond to the requirements of remediation of land affected by mining. These reserves are a cost to generate, assure and maintain income. [2]

3.2. Plans for opening, preparation and extraction of exclusive deposits and plans for ensuring and disposal of major mine workings and quarries

Plans for opening, preparation and extraction must provide sufficient time in advance for opening and preparation of the exclusive deposit before mining, economical and continuous extraction applying appropriate mining methods and ensuring safety. Part of the plan for opening, preparation and extraction is a quantification of the expected costs of mining damages arising in connection with the planned activities and the rehabilitation and reclamation of the affected land, including the proposed amount and method of creating the necessary financial reserves. At regular intervals, the district mining authorities inspect creating financial reserves for mining damages and for the rehabilitation and reclamation of land affected by the extraction of exclusive deposits. They keep records concerning these inspections.

3.3. Creating financial reserves

To ensure mining damages, the organization is required to maintain reserve funds. The amount of the reserve chargeable to the costs must correspond to the requirements of the mining damages in the course of time according to their occurrence, or in advance, before they occur. This reserve is a cost to generate, assure and maintain income. Creating reserves pursuant to the paragraph is subject to approval by the relevant district mining authority, which also approves the draw on the reserve in agreement with the Ministry of Environment of the Czech Republic. These funds shall be deposited to a special escrow account in a bank and must not be subject to liability or included in the estate under a special law, nor can they be subject to regulation and the enforcement. Before issuing a decision to draw on these reserves, the district mining authority will require the opinion of the affected municipality. For organizations with state owned share, the district mining authority decides in agreement with the Ministry of Industry and Trade of the Czech Republic. The request by the organization to draw on the reserves as per paragraph 1 must be accompanied by a list of mining damage, the estimated cost of removal and the time course of spending on removal mining damage. The cost of the necessary expertise is at the organization's expense. The organization must deposit funds in the amount of the reserve to a special escrow account for the corresponding financial year no later than 30 June of the calendar year following the end of the corresponding accounting period. If the organization fails to do that even within a reasonable substitute deadline set by the district mining authority, the district mining authority may suspend the validity of the mining permit. Cash reserves that are deposited in a special escrow account in a bank, can be

a) temporarily placed in other assets subject to the rules laid down by the implementing legal regulation to be issued by the Czech Mining Authority with the approval of the Ministry of Industry and Trade, and after consultation with the Ministry of Finance, or

b) after the approval of the relevant district mining authority pursuant to a contract between the state represented by the Ministry of Finance and the person liable to generate these cash reserves, transferred to the account of reserve administration, administered by the Ministry of Finance with the consent of the. The contract must contain a guaranteed rate of appreciation of the funds deposited in the account of reserve administration and the period for transferring from the account of reserve administration back to the special escrow account maintained by the organization. Cash or other assets deposited to the debit of the escrow account pursuant to paragraph 5 shall not be subject to financial security, shall not be included in the estate and are not subject to enforcement or execution. In the case of mines and quarries, whose sole shareholder is the state, and which were, within the framework of restructuring of the coal, uranium and ore industry, included by the government in the concept of restructuring of coal, and

uranium and ore mining, and it was therefore not possible in these cases to create the reserve for remediation and reclamation, and the reserve for remediation of mining damage, or it was impossible to create these reserves in a sufficient amount, these costs are paid by the stated in the amount required, through the budget chapter of their respective organizational units. Remediation means the removal of landscape damage by all-embracing alteration of land and territorial structures disturbed by mining.
Together with the request for opening, preparation and extraction of the exclusive deposit by opencast and underground mining, the organization shall prepare and submit plans of opening, preparation and extraction in accordance with Annex No. 3 the Czech Mining Authority Decree No. 104/1988 Coll., On the rational use of exclusive deposits, permitting and reporting of mining activities and reporting activities associated with mining as amended. The organization will attach quantifying the expected costs of remediation and reclamation of land affected by the extraction of the exclusive deposit and a proposal for creating the necessary financial reserves, including the timing of their creation to the application. [4]

4. THE METHOD NEGOTIATING IN CONNECTION WITH RECLAMATION PROJECTS

Reclamation is the final stage of mining activities under the provisions of Act No. 44/1988 Coll., On the protection and use of mineral resources. Discussion of the documentation and the project of remediation and reclamation takes place in several subsequent stages. The main documents must be approved before the extraction, i.e. before the approval of POPD (plan of opening, preparation and extraction). The concerned natural or legal persons and public authorities, if their interests are affected by utilization of the exclusive deposit - the final reclamation stage enter into discussion. The main documents discussed are the following:

- The general plan of remediation and reclamation (SPSaR) solves general alteration of the area) and spatial structures incl. basic economic perspectives. It is a basic conceptual material for remediation of the consequences of mining with a view to the end of the quarry life. With respect to the discussions with the relevant authorities (departments of planning, environmental departments, the Ministry of Environment, etc.), the governments of the municipalities and the mining authority, it becomes for the related time period part of POPD.
- Plan of remediation and reclamation - the general part is based on the SPSaR and it is attached to the application for removal from agricultural land and removal from land for the fulfillment of forest functions - agreed with the Ministry of Environment and other authorities concerned.
- Plan of remediation and reclamation (POPD) for the period of POPD validity of the relevant authorities is approves by the mining authority upon approval by the Ministry of Environment, municipalities and other state administration bodies. The approval of the POPD also depends on the assessment of the impact on the environment pursuant to Act No. 100/2001 Coll. The approved POPD is a necessary precondition for mining itself. The development and discussion of the above mentioned documentation precedes the commencement of mining. During mining, the reclamation process will be specified in more details.
- Special Reclamation Plan (Reclamation Master Plan) is an advanced stage of remediation and reclamation for the five year period. It is based on SPSaR and it

the basis for the preparation of project documentation and lists commenced, unfinished and completed reclamations. After discussion with the public administration bodies of the Ministry of Environment and landscape planning, it is mandatory for the mining company.

- Project (operating) documentation of remediation and reclamation for the implementation period - the documentation required by the Building Act for the landscape planning, construction and water management in accordance with applicable regulations - consultation with landowners, the relevant authorities (the building authority) and local authorities. [2]

5. RECLAMATION FUNDING SOURCES (FINANCIAL RESERVE, DIRECT COSTS, OTHER SOURCES - GRANTS, ETC.)

Act No. 44/1988 Coll., On the protection and use of mineral resources, as amended, requires mining organizations to ensure remediation and reclamation of land affected by mining. Remediation means the removal of landscape damage by alteration of the area and all the territory structures. To ensure remediation and reclamation, the organization is required to maintain reserve funds. The obligation of the creating financial reserves is determined by Act No. 44/1988 as amended, Act No. 541/1991 Coll., Act No. 168/ 1993 Coll. and Act No. 313/2006 Coll. Since 2004, these funds have been kept in a separate escrow accounts. Creating financial reserves for escrow accounts is carried out in accordance with Act No. 593/1992 Coll. as amended by Act No. 438/2003 Coll. and Act No. 223/2006 Coll. Drawing on the funds from the reserve for remediation and reclamation is governed by § 37 paragraph 2 of Act No. 44/1988 Coll., as amended. Part of the volume of work is financed from other sources - state funds to eliminate the damage of the past - which results from the Government Resolution No. 242 /2002. Individual projects meeting the challenge of inter-ministerial committee for projects to repair the damage of the past are realized within the state resources, if they are accepted. State interests are represented by a supervisor at the individual reclamation event.

6. CONCLUSIONS

In this article, we have briefly outlined the history of mining in the Ostrava and Karvina territories. It is an area of post-mining parts that are part of the project solved within the Czech-Polish border cooperation. The professional issues related to mining activities and their manifestations include the way of the application of legal standards in the implementation of subsequent remediation and reclamation in the investigated area.

We would like to express thanks for the opportunity to publish this article as part of PL 3.22/2.3.00/12.03351 "Education of Specialists in the Field of Keeping Post-mining areas in Polish-Czech Border Region ".

REFERENES

[1] Černý I., et al: Uhelné hornictví v Ostravsko-karvinském revíru,*Anagram Ostrava 2003*, ISBN 80-7342-016-3,pp 564;

[2] Act No. 44/1988 Coll., on the protection and utilization of mineral resources (Mining Act)

[3] Act No. 61/ 1988 Coll on mining activities, explosives and the state mining administration

[4] Vyhláška ČBÚ 104/1988 Sb. ve znění pozdějších předpisů

PROGNOSIS OF THE MAXIMUM SUBSIDENCE AND DISPLACEMENT OF THE GROUND SURFACE IN THE JIU VALLEY COAL BASIN CONDITIONS

Prof. Ilie ONICA, Min.Eng.Ph.D.
Prof. Eugen COZMA, Min.Eng.Ph.D.
Lecturer Dacian-Paul MARIAN, Min.Eng.Ph.D.
Ph.D. Student Nelu ŞTEFAN, Min.Eng.
University of Petroşani - **Romania**

ABSTRACT

In this paper there are presented two prevision mathematical models of the maximum subsidence and displacements, based on the profile function method, depending on the main influence factors, in the conditions of the thick coal seams of the Jiu Valley basin – Romania.

Keywords: coal seam, subsidence, horizontal displacement, profile function.

REFLECTIONS ON COST CALCULATION INTO THE MINING COMPANIES IN ROMANIA

Lecturer Dr. Mangu Sorin-Iuliu
Lecturer Dr. Csiminga Diana Cornelia
Assoc. Prof. Dr. Dolea Gheorghe-Gabriel
Lecturer Dr. Iloiu Mirela
University of Petrosani, **Romania**

ABSTRACT

In the multitude of management information, the accounting information has a special place, being useful at least the following three reasons:

- underlying planning future activities and enable notification of deviations from plan;
- underlying the adoption of the multitude of daily microdecisions;
- allow choosing the best solutions to operational problems.

However, the cost calculation and decision-oriented control has become one of the core components of the mechanism driving the company profitable. As an informational tool, the calculation "produces" and provides the information on the costs and profits, and as a management tool, it is a decisional technique that increases profitability.

Unlike other industrial firms, the mining companies (and their subunits, mining) has a very specific of production processes, where certain features of how they are organized and tracked cost calculations.

In these circumstances, this paper attempts to capture just those features are linked to the prediction and costs control.

Keywords: mining company, cost calculation, cost provision, cost control.

RESEARCH OF POSSIBILITIES OF PROGNOSIS OF BROWN COAL SPONTANEOUS COMBUSTION SOURCES GENESIS

Ing. MONI, Ph.D.[1],
Ing. KLOUDA[1],
Ing. KUDELOVA[2]
[1] Brown Coal Research Institute j. s. c., **Czech Republic**
[2] KOMA - Industry s.r.o., Ostrava, **Czech Republic**

ABSTRACT

This article presents summarizing information about the solution of partial part of research problem of prognoses of deposited brown coal spontaneous combustion sources genesis as a part of project TA01020351 - program ALFA. We will gradually describe the results of long term measurements carried out on selected brown coal heaps realized from 2011 to 2013. The attention is devoted to characterization of key parameters. These parameters influence the genesis of combustion. The second problem is the comparison of results of thermal imaging with laboratory results of gas and coal samples sampled in situ, with the influence of atmospheric conditions (insolation, aeration, rainfall, atmospheric pressure changes etc.), with influence of coal mass degradation, physical and chemical factors and another failure factors to brown coal spontaneous combustion processes.

Keywords: lignite, brown coal,, deposit, heap, coal self-ignition, monitoring.

RESEARCH ON COAL MINE PROJECT INVESTMENT DECISIONS BASED ON GREY CLUSTERING – CORRELATION DECISION MODEL

Prof. Mingxiang LU[1]

Assoc. Guojuan JIA[2]

Postgraduate student, Zhuo TANG[1]

[1]Management College of Xihua University, **Peoples R China**
[2]Xuangang Branch of Datong Coal Mine Group Company Limited, **Peoples R China**

ABSTRACT

The research builds grey clustering - correlation decision model to study on project investment decisions by combining the grey clustering decision model and the grey correlation decision model. The model can comprehensive evaluate the programs and choose the optimal program. At the same time, it can reduce artificial subjective factors influencing on the result of investment decisions in a certain extent. The empirical data are used in the proposed analysis on coal mining project investment decisions. According to empirical analysis and validity validation of the grey clustering - correlation decision model, we found the evaluation result is stable and the method is feasible and effective. By the reseach, it provides theoretical basis for making the project investment decisions, and provides practical basis for investors of coal mine project making scientific investment decision by evaluating the projects comprehensive and choosing the optimal project.

Keywords: Grey system theory, Grey clustering-correlation decision model, Coal mining project, Investment decisions, Validity validation

RESEARCH ON METHANE EMISSION MECHANISM AND PATTERN IN A LONGWALL COAL FACE AT LIVEZENI COLLIERY

Assoc. Prof. Dr. Roland Iosif Moraru

Assoc. Prof. Dr. Gabriel Bujor Băbuţ

University of Petroşani, **Romania**

ABSTRACT

Methane emission mechanism and pattern in the underground longwall faces operating in collieries from Petroşani coal basin are extremely complex and yet not elucidated processes. They are highly depending on several geological, technical and mining parameters. Safety reasons are requiring the methane - air mixtures to be adequately diluted and dispersed from underground atmosphere. The use of a methane emission pattern forecast method and knowledge of this variable mechanism should allow the improvement of underground ventilation management. This is the aim of the research study carried out at Livezeni colliery, whose results are highlighted in the paper. Special attention is given to the influence of coal face daily advance rate and the coal cutting system employed in hard coal mining. Graphical correlations between relevant parameters, established for the case study, can be processed by interpolation for other mining blocks within the basin, thus serving to the ultimate goal, to further improve the technical solutions of health and safety provision for all personnel and staff members working in the face.

Keywords: hard coal, methane, emission, flow, longwall face, advance rate

RESEARCH ON STABILITY OF THE STERILE ROCK DUMP ARSULUI VALLEY

Prof. Dr. Maria LAZAR

Assoc. Prof. Dr. Adrian FLOREA

Lecturer Dr. Csabi Lorint

University of Petroşani, **Romania**

ABSTRACT

The sterile rocks dump Arsului Valley is located in the mining basin Petrosani and consists of the waste from the underground work for the coal extracting. Although it is a relatively small dump, there is a likelihood of slope slides, in particular of the final slopes. The sliding of the waste material can lead to a number of technical and environmental problems: damage to the dumping works and machinery, blocking the creek Arsului Valley and the access road. The paper presents the researches on stability reserve of the dump, the measures for slide prevention and the geometry for further dump construction.

Keywords: sterile rocks, dump, slide, stability, environment, slide prevention

RISK ANALYSIS OF ENERGY SECURITY OF THE CZECH REPUBLIC

Ing. Miroslav Seidl [1]

Ing. Yveta Tomášková, Ph.D. [1]

Ing. Nikola Smatanová, Ph.D. [1]

Ing. Petr Kolman [2]

[1] VŠB - Technical University of Ostrava, Faculty of Mining and Geology, **Czech Republic**
[2] Severní energetická a.s., **Czech Republic**

ABSTRACT

Raw materials are a basic input into the production processes in a given country. Energy raw materials have the priority and an irreplaceable position in this area. Lack of these raw materials poses a threat for any economy. No country in the world is fully self-sufficient in raw materials, as there is always a certain degree of dependence on imports. The degree of a country's dependence on imports of energy resources determines the country's energy security. This dependence alone is a source of risks that can be influence, but frequently cannot be influenced and need to be assessed and managed. The first step in the whole process of risk assessment is the identification of risks, which enables subsequent risk analysis and evaluation. The aim of this process is to find the options of how to treat these risks and subsequently mitigate their consequences.

This paper focuses on the first stage of this process – identifying the risks affecting energy security in today's globalised world, namely the Czech Republic as an EU Member State. The authors' intention is to create a general-purpose methodology for risk management for the issue at hand.

Keywords: Energy security, risks, uncertainty, energy raw materials

ROCK MASSIF – SUPPORT MECHANICAL INTERACTION MODELS PROPOSED FOR THE GEOMECHANICAL CONDITIONS FROM PETRILA COLLIERY, ROMANIA

Assoc. Prof. Ph.D. Eng. Mihaela Toderas[1]

[1] University of Petrosani, **Romania**

ABSTRACT

Selecting the rock massif - support system interaction model involves establishing the model that corresponds to the studied problem, which requires knowledge of the real deformation behaviour of the massive by assessing all involved geomechanical characteristics, but also all the technical, mining and organizational factors, which determines the pressure manifestation's regime and ensure the stability throughout the duration of activity of the underground works. This paper presents some results obtained during three years based on the measurements of the manner of support's deformation in galleries located at the levels +50, 0, -50, -100 and -150, considering that in this period the gallery located at the level -150 was in drift. The results have allowed: processing of the dependence of the minimum specific bearing capacity required of the metallic arched support, according to the values of the stability coefficient based on mathematical statistics; assessing the dependence of the pressure on the support on time; it was also determined the dependence of rock displacements in respect to time for the calculated stability coefficients.

Keywords: interaction, support, rock massif, elastic-viscous-plastic model, stress - deformation state, relaxation zone

ROOM AND PILLAR MINING AT OKD, A.S. IN THE CZECH REPUBLIC

Ing. Jiří Golasowski, Ing. Robert Vochta [1]
Prof. Ing. Vlastimil Hudeček, CSc., Doc. Ing. Milan Mikoláš, Ph.D [2]
Ing. Pavel Dvořák [3]
[2]VŠB – Technical university, **Czech Republic**
[1]OKD, a.s.**, Czech Republic**
[3]Minova Bohemia, **Czech Republic**

ABSTRACT

This paper will address the many challenges involved in implementing room and pillar mining at great depths in a region that has never tried this method before. The region of the Czech Republic has a long history of bituminous coal mining extending nearly 200 years. Longwall mining has been the traditional method of mining, but due to its subsidence impacts cannot be used under some densely populated areas and thus an experimental project has been undertaken at ČSM Mine operated by OKD, a.s. in the Czech Republic. The room and pillar method was chosen mainly to minimize subsidence impacts, however, mining here is very challenging including but not limited to the following items which will be addressed in the paper.

Existing gateroad and roadway development for the mines in this region is typically performed with either roadheaders or drill and blast methodology and steel arches are the primary means of support throughout. Since the room and pillar method of mining is not used here – along with its key features: continuous miners, bolters and other equipment not typically used here, pillars, and explicit use of bolts as the primary support, it must first be demonstrated through empirical means (an authentication process) that it is indeed possible to overcome all of the problems associated with the conditions of the deep mines at OKD in the Czech Republic and de facto, as well in Central Europe. Secondly, the outcome of the authentication process must be sound enough to obtain the consent from the Czech Mining Authority as they, also, are unfamiliar with this method of mining and existing laws and regulations were not written to address some of the particulars of this method of mining.

In the framework of the verification/authentication process we will demonstrate compliance with the main objective of the introduction of the room and pillar mining method at OKD which is the minimum effect on the surface and the possibility of its use for exploitation of reserves under densely populated areas where the use of conventional technology by the retreat LW method with regard to the influence of surface is impossible.

Keywords: Room&Pillar, experimental project, new mining method, Longwall mining, surface subsidence, authentication process

SIMULATION OF A FIRE OCCURRED UPON THE VENTILATION NETWORK OF PRAID SALT MINE

PhD. Eng. Doru Cioclea[1]
Eng. Ion Gherghe[1]
PhD. Eng. Constantin Lupu[1]
PhD. Stud. Eng. Marius Cornel Suvar[1]
Eng. Corneliu Boanta[1]
Eng. Florin Radoi[1]
PhD. Stud. Eng. Cristian Tomescu[1]
PhD. Stud. Eng. Vlad Mihai Pasculescu[1]

[1] National Institute for Research and Development in Mine Safety and Protection to Explosion, Petrosani - **Romania**

ABSTRACT

The ventilation process is considered to be the primary protection in underground exploitation of minerals. Due to this fact, it has major importance in ensuring and maintaining the health and safety conditions on the pathway of mine workings.

A fire resulting from the oxidation or from the burning of organic substances at low velocities, besides the harmful effect of the exposure to burning gas, the thermal effect resulting from the excessive increase of burning gas and organic substances temperatures, it also has an aero-motor effect upon the ventilation network, resulting in the forced intensification of the ventilation in the area of influence.

The fire changes the airflow conditions because it has a higher viscosity, fact which leads to the local increase of apparent resistance of the mine working in which the phenomenon occurs. In certain conditions it may lead to the local reverse of airflow, with harmful effects for the underground workers.

Keywords: CANVENT, fire, simulation, ventilation, ventilation network

SOCIAL EVALUATION OF MINING ACTIVITY EFFECTS

PhD Michal Zasadzien[1]

[1] Silesian University of Technology, **Poland**

ABSTRACT

Mining affects the environment's elements in a direct and indirect way. The direct effect includes mainly the use of arable, forest and recreational areas for the needs of mines and waste dumping grounds. The indirect effect involves broadly understood effects of mining exploitation, which include geo-mechanical transformations, soil degradation, waters and atmosphere contamination. Another important factor is the fact that mining damage has a considerable influence on the people inhabiting the degraded areas and may cause the feelings of hopelessness, loneliness and helplessness due to the place of residence. The conflict areas the existence of which results from the conflict of interests of the industrial branch and society should meet the requirements for biological living conditions. Investigations were carried out into the social awareness regarding the environment degradation related to mining exploitation. The aim of the research was to get to know the opinion of the transformed areas' inhabitants about the impact of mining activity on the environment and to determine major factors of this influence. The indirect goal was also to determine the level of ecological awareness. The studies included an analysis of opinions regarding basic environmental changes that result from mining activity. The issues subjected to research are numerous and complex, hence the studies do not aspire to explain and elaborate on all the investigated phenomena. Research material was collected using a specially prepared questionnaire, containing eight areas related to the problems and effects resulting from the mining activity which are experienced by the inhabitants, divided according to the economic, ecological and social aspects and directions of the analysed area revitalisation:
1) mining exploitation,
2) mining activity effects,
3) ecological aspects,
4) social effects,
5) revitalisation,
6) directions of revitalisation in the cultural and social area,
7) directions of revitalisation in the area of infrastructure,
8) revitalisation priorities from the inhabitants' point of view,
The article presents the results of questionnaire survey which covered an area of ca 1 km-diameter, in the immediate vicinity of „Jas-Mos" hard coal mine.

Keywords: revitalisation, degradation, environment, post-mining area, society

SPECIFICATION OF THE FIRM LIFE CYCLE IN CHOSEN INDUSTRIAL SECTOR

Doc. Ing. Lucia Domaracká, PhD.

Mgr. Mária Muchová, PhD.

Institute of Business and Management, Faculty of Mining, Ecology, Process Control and Geotechnology, Technical University of Košice, **Slovakia**

ABSTRACT

The life cycle of the firm is general abstract expression of the firm existence in the business environment. The business environment has its own specifics in each industrial sector. It is therefore logical, that life cycle of the business will have also its specific attributes reflecting the industry sector, in our case – mining. In the article are analyzed each phases of the business life cycle and we try to specify differences and development of the life cycle business in the chosen industrial sector towards theoretical model of the business life cycle.

Keywords: Life cycle of the company, mining industrial sector, phases of the life cycle

STRUCTURAL SAFETY OF MINING TAILINGS REFLECTED IN NATIONAL AND EUROPEAN REGULATIONS

PhD Student Eng. Danciu Paula Luminiţa,
Coord. Prof. Dr.Eng. Dan Stematiu
Technical University of Civil Engineering, **Romania**

ABSTRACT

The paper emphasizes the importance of legislation and regulations on safety mining tailings. The first part of the paper presents the current state of technical documents on national and international level. Mines have topographical, geological and mineralogical different features and functions according to management systems, levels of knowledge and understanding of tailings. This leads to the fact that each waste sterile is unique. Applicable laws and regulations of mining tailings differs considerably from one country to another. As we consider, there is presented a review of issues regarding law, management and surveying procedures for mining tailings in different countries. The second part of the paper contains statistics on tailings disposals and the coverage in specific technical regulations. Mining tailings are unfortunately certain risk-bearing works. The size of the risk is given by the relatively high frequency of accidents recorded and produced, as by the magnitude of the consequences, including the disastrous environmental effects that are most evident. Number of accidents recorded worldwide at tailing ponds is particularly high. Some statistics elements on accidents are presented including two examples in Romania. In the last part, the existing legislative framework and the need for a unified legal framework are presented. Drafting carefully and creating heterogeneous regulations it is a solution to various safety issues concerning the tailing ponds.

Keywords: tailing ponds, safety, technical regulations, failure mechanisms, failure probabilities, water management, monitoring, case studies.

STUDY OF 2K-52MU CUTTING AND LOADING MACHINE IN FACES WITH INDIVIDUAL SUPPORT IN LONEA MINE

Iosif Dumitrescu, PhD, Eng. Assoc. Prof.

Bogdan-Zeno Cozma, PhD, Eng. Lecturer

Vilhelm Itu, PhD, Eng. Lecturer

University of Petroşani, **Romania**

ABSTRACT

The necessity of mechanization of coal exploitation in Jiu Valley mines, in the current economic crisis, involved adaptation of existing equipments to new conditions of re-furnishing of certain faces. Thus, within the refurnishing program of a frontal face, with individual support in Lonea Mining Plant, the 2K-52MU cutting and loading machine was used, which was available in Livezeni Mining Plant. Besides the problem of adaptation of the machine to TR-5 scraper conveyer, the study of the stability of the machine on the conveyer in the condition of a face with individual supports was necessary. To this end, the stability coefficients of the machine in cutting and loading of the coal on the conveyer, and even blocking the drum in the face were determined. The study was made for 250 kN maximum traction force of the machine and the variation of the face inclination angle in the range of 0 and 30° for three cases of movement of the machine, towards the actuating station, towards the turning station and with both drums down for clearing the face.

Keywords: machine, conveyer, stability

STUDY ON THE PARTICULAR CONDITIONS OF THE MINING VENTILATION BY USING NUMERICAL METHODS

PhD. Student Eng. Marius Cornel Șuvar[1]

PhD. Eng. George Artur Găman[1]

PhD. Eng. Constantin Lupu[1]

PhD. Eng. Emilian Ghicioi[1]

PhD. Student Eng. Nicolae-Ioan Vlasin[1]

PhD. Eng. Doru Cioclea[1]

Univ. Prof. PhD. Eng. Victor Arad[2]

[1]National Institute for Research and Development in Mine Safety and Protection to Explosion, INCD INSEMEX, **Romania**
[2]University of Petroşani, **Romania**

ABSTRACT

The mine air composition changes in terms of quality during its passing through the underground mining works, mainly due to the formation and releasing in the deposit and the surrounding rocks of toxic and explosive gases.

Knowing in detail the distribution and the parameters of the airflows, the gas dynamic phenomena relating to the mining ventilation is of high importance for ensuring the safety of workplaces, through the possibility of diminishing the intoxication and / or explosion hazards.

The paper presents a series of computerized modelling achieved using the ANSYS MultiPhysics software package, starting from a specific, representative ventilation network segment. There was thus obtained a comparative study of multiple models, based either on the density or the pressure. There are also evaluated, one at a time, the transport equations in each of the three cases: stationary, transient and pseudo-transient.

Modelling results are then compared with the ones obtained by using the specialised 3D CANVENT application – relative to the same real geometrical space.

Keywords: mining ventilation, numerical modelling, CFD, ANSYS, INSEMEX

SUBSIDENCE MODELING AT VALEA ARSULUI - VULCAN COLLIERY

Assoc. Prof. Dr. Adrian FLOREA

Prof. Dr. Maria LAZAR

Lecturer Dr. Csabi Lorint

University of Petroşani, **Romania**

ABSTRACT

Vulcan is one of the few active remaining collieries from Jiu Valley, in the Meridional Carpathian Mountains. Before proceed with stability analysis was necessary to create a model of waste dump Valea Arsului - Vulcan colliery. The landfill location is in an area affected by the subsidence phenomenon due to underground coal extraction. The challenge was to estimate the actual shape of the terrain surface beneath the waste dump body. As starting point was old aerial photogrammetrical survey made before starting landfill process. The paper presents the modeling approach and the achieved results of subsidence phenomenon occurred in the waste dumping area Valea Arsului - Vulcan.

Keywords: subsidence modeling, mining waste dump, Jiu Valley colliery

SWOT ANALYSIS – POINT OF DEPARTURE FOR STRATEGIC MANAGERS

Assoc. Prof. Dr. Michal Vaněk
Dr. Igor Černý
Prof. Dr. Vlastimil Hudeček
Dr. Lucie Krčmarská
Dr. Jana Magnusková
VŠB – Technical University of Ostrava/**Czech Republic**

ABSTRACT

The strategic planning belongs to key activities at the top management level. The right strategy decision asks for realization of many strategic analyses that are usually completed by the SWOT analysis. Many cases of the standing practice of the SWOT realization consist in simple listing of individual factor items. This paper concentrates on assessing the SWOT analysis by means of weighing that regards both the theory and practice of the SWOT analysis conducting. The paper has focused on assessing the SWOT analysis of the major mining company in the Czech Republic, namely the OKD, a.s., which assessment was conducted by weighing the influence of the analysis individual factors.

Keywords: strategy, SWOT analysis, OKD, a. s., Assessment methods

TAILING REFLOATING IN THE TREPÇA MINES-PRISHTINA KOSOVO

Ramiz Krasniqi[1],
ShaipLatifi[1],
Ahmet Tmava[1],
Sebahate Jonuzi[2],
Ibush Jonuzi[1]
[1] Independent Commission for Mines and Minerals
[2]AKK

ABSTRACT

Mineral resources in the Earth are expending, almost in the existing developing deep of the mine sites. But in those mines which have reserves now are in the extreme deep. Reserve to bi under the Sea level, is now normality.

But in such deep it has to do with totally others work conditions. The air pressure is more then atmosphere the mine ventilation is expensive, and the underground pressure are going to bi higher, with that are coming the strata punch crush. The vertical ore transportation is going to bi expensive with that growing the ore exploitations cost in the mine. [2]

With this the offers of the metals is going to decrease, the lack of metals in the market is a cause of metal price growing.

The markets value of metals is growth 4 times. Also the surface exploitation of the tailings is economically of interest.

In the fact the value of the Pb, Zn, Ag, and Au metals are 12 time more then in the

Moment of creation of the mine dumps which is the last year 1980. For the ambient care the mine dump are decreased for more then 10%, and now is possible to create e new mine dump with new buildings materials which gave us possibilities to totally isolate the tailing from the ambient. That is the question of the time.[1]

Keywords: Resources, transportation, refloating, cutoff, metal

TECHNICAL DIAGNOSTICS IMPLEMENTATION INTO PRODUCTION PROCESS OPERATIONAL EXPERIENCES

Ing. Bc. Petr Vaněk[1]
Ing. Martin Procházka[2]
Ing. Iva Kudelová[3]
doc. Ing. František Helebrant, CSc.[4]
Ing. Ivan Bílý, Ph.D.[5]

[1] U Mostu , **Czech Republic**
[2] VÍTKOVICE POWER ENGINEERING, **Czech Republic**
[3] KOMA - Industry s.r.o., Divize KOMA - Technologické centrum, **Czech Republic**
[4] VŠB – TU Ostrava, **Czech Republic**
[5]SD a.s., Doly Bílina, **Czech Republic**

ABSTRACT

Technical diagnostics of machines and equipment is beautiful and diverse technical discipline. Technician - diagnostician , is in a way a specialist for machines and equipment. The human body is powered by the same " vitally " important fluids , control systems , articulated, muscle and filtering mechanisms such as production machinery and equipment . In the second case, we unplanned downtime is a financial burden , non- productive time . The content of my article is a methodical procedure for the introduction of this technical " surgical " discipline for machinery and equipment for the manufacturing enterprise.

Keywords: technical diagnostics, maintenance,

TECHNO-ECONOMIC PARAMETERS RELATED TO THE VRSHNIK CU-AU ORE BODY, BUCHIM COPPER MINE, EASTERN MACEDONIA

Full Prof. Dr. Todor Serafimovski[1]

Kiril Filev[2]

Doc. Dr. Goran Tasev[1]

Assoc. Prof. Dr. Violeta Stefanova[1]

[1] Faculty of Natural and Technical Sciences, University "Goce Delčev"-Štip, **R. Macedonia**
[2] DPTU Bučim DOOEL-Radoviš, **R. Macedonia**

ABSTRACT

Calculated ore-bearing coefficient in the Vrshnik ore body was 0.78%, meaning that within the ore body boundaries only 22% of mass is not mineralized somehow, which is highly compatible with remaining three ore bodies within the Buchim porphyry copper mine. The calculated value of variation coefficient (V) has shown value of 70% that is in the range of 43-100%, which displays that this ore body belongs to the third group of deposits with uneven mineralization. An average copper, gold and silver concentrations were determined as 0.305% Cu, 0.18g/t Au and 0.91 g/t Ag, respectively. Minimal economic content (MEC) within the Vršnik ore body, as represent of this kind of mineralization, was determined as 0.160% Cu. In similar manner was calculated the lowest copper boundary (cutoff grade), which have shown value of 0.138% Cu and thus allowing certain decrease of contents in exploited ore. Also, there were calculated so called copper monometal values, which included influence of the present gold and silver in the ore. Calculated copper monometal was set at relatively fair 0.399% Cu that represents solid mainstay for exploitation of copper in these low percentage ores. Calculated ore reserves in this particular ore body were 13 577 267 t of ore with 0.305% Cu, 0.18 g/t Au and 0.91 g/t Ag and increased mine life for additional 6 years.

Keywords: Vrshnik ore body, primary mineralization, secondary enrichment mineralization, variation coefficient, minimal economic concentration.

TECHNOLOGICAL READINESS OF THE MINING PROJECT IN TERMS OF ECONOMIC PARAMETERS

Prof. MSc. Michal Cehlár, PhD.[1]
Prof. MSc. Ján Pinka CSc.[2]
MSc. Oľga Végsöová, PhD.[2]
MSc. Petra Pinková[2]
[1] Institute of Business and Management, the Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, **Slovakia**
[2] Institute of Montaneous Sciences and Environmental Protection, the Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, **Slovakia**

ABSTRACT

After the changes to the economic systems in many European countries the criteria of assessment and evaluation of mineral deposits have changed significantly, and authors of these "recomputations and calculations" use various, often unsuitable methods, mainly because they have never had an opportunity of becoming acquainted with modern and comprehensive methods of mineral deposit evaluation.
Raw materials are essential for the sustainable functioning of modern societies. Access and availability of raw materials are essential for the proper functioning of the national economy. Sectors such as construction, chemical, automotive, electronics, aerospace, engineering all depend on access to raw materials. Geological structure of Slovakia is due to geological diversity and confirmed the occurrence of mineral resources is an interesting site for the location of the project based on the exploration and subsequent exploitation of mineral resources. This analyse focuses on the analysis of macroeconomic indicators parameters considered for the investment project. It deals with the evaluation of the benefits for the state and region and project implementer.

Keywords: gold deposit, gold mining project, cost of gold mining, underground mining, mineralogical composition, gold-bearing rocks.

THE AVERAGE SALARY, THE LABOUR PRODUCTIVITY AND THE UNEMPLOYMENT IN THE FIELD OF BROWN COAL MINING

Ing. Markéta Rolčíková, Ph.D.[1]

Ing. Lucie Krčmarská, Ph.D.[1]

Ing. Lukáš Otte, Ph.D.[1]

Ing. Igor Černý, Ph.D.[1]

Ing. Miroslav Seidl[1]

[1] Technical University of Ostrava, Faculty of Mining and Geology, **Czech Republic**

ABSTRACT

The mining of brown coal in the Ore Mountains basins in the North Bohemia region of the Czech Republic has a long tradition. The brown coal mining is irreplaceable not only for the development of industry and industrial agglomerations, but also in the "life" of the inhabitants of Northern Bohemia and even for the development of particular regions. Without brown coal mining people would not be employed. Therefore, they would not be able to ensure the livelihood for their families. Consequently, high unemployment rate in the region would result in the deterioration of the services provided in the region. It is necessary to bear in mind that the unemployment has an impact on the income and the expenditure of the State budget of the country concerned, because the unemployment benefits are derived from the amount of salary.

The aim of submitted paper is to evaluate the development of average salary in the selected companies engaged in brown coal mining in relation to both average salary in the sector and the average salary in the Czech Republic in the period of 2008 – 2012. In addition to salary development, the evolution of labour productivity indicators in selected companies engaged in the brown coal mining need to be further investigated, too.

Last but not least, the evolution of labour productivity indicators needs to be compared with the development of unemployment indicators as well.

Keywords: average salary, unemployment, labour productivity, mining of brown coal

THE DATA PREPARATION FOR LONGWALL WORKFACE AUTOMATION WITH THE SHIELD-DATA BASED HORIZON CONTROL

S. Beitler[1], M. Holm[1], A. Mozar[2],

Prof. Dr.-Ing. M. Junker[2], Prof. Dr.-Ing. C. Bohn[1]

[1] Institute of Electrical Information Technology/Clausthal University of Technology, **Germany**

[2] RAG Deutsche Steinkohle, **Germany**.

ABSTRACT

Today coal is one of the most important energy sources and covers around 30% of the worldwide used primary energy in 2012 and remained the fastest-growing fossil fuel [1]. Based on current availability of renewable energies and the forecast of future resources of other fossil fuels, coal will play an important role also in the next decades. Especially the deep lying hard coal with its high energy content is interesting for energy generation.

For a productive and safe exploitation of this deep lying hard coal, the automation of the cutting process will become more and more important in future. Like in other publications of the authors described, the goal of a fully automated longwall workface will be reached by a fusion and integration of all involved subsystems like the shearer and the roof support to control the exploitation machine by one superordinate control algorithm.

One challenge for the automation is the data acquisition and data preparation for a superordinate controller out of these different subordinated subsystems. For an automated process the successful data preparation is the most important point. Control algorithms can only work correct with the input of the necessary data. The data preparation in a longwall workface is a complex task because several data from different subsystems are needed. These subsystems are often from complete different manufactures and have sensors of different local distribution and different sampling time. Also these systems are of different size and the cutting machine with its implemented sensors is moving through the seam and the local allocation of the measured values from these sensors has to be done also by the data preparation.

Keywords: longwall mining automation, automatic shearer guidance, data preparation; shield-data-based horizon control

THE DETERMINATION OF THE PROTECTIVE LAYER ON THE REPOSITORIES OF URANIUM MINES

Ing. Hummel Martin, Ph.D.[1]

Mgr. Hummelová Ilona[1]

Wilhem Laimy[1]

[1] HGF, VŠB-TU Ostrava, **Czech Republic**,

ABSTRACT

To determine the parameters of the protective layer of the repository uranium mines, used a number of methods. This paper presents methods to determine these parameters using classical analysis by diffusion and then computing program, which is available as a calculator on the Internet.

Keywords: Methane, Uranium mine, Uranium waste

THE EFFECT OF LONGITUDINAL INCLINATION IN AUTOMATIC CONTROLLED SHEARER WORKFACES

M. Holm[1], **S. Beitler**[1], **F. Kainer**[1], **A. Mozar**[2],

Prof. Dr. M. Junker[2], **Prof. Dr. C. Bohn**[1]

[1] Clausthal University of Technology, **Germany**

[2] RAG Mining Solutions, **Germany**

ABSTRACT

In underground coal mining the shearer is a commonly used extraction machine in longwall workfaces. Beside the manual control of the shearer by an operator, today the memory cut, but also other automation methods can be used for cutting drum height adjustment. The result of the cut of both, the lower and the upper, cutting drums is the generated face opening at one position of the longwall workface.

For a straight seam these automation procedures will work adequately and the generated face opening will be constant, but without correction they won't work properly if longitudinal seam inclination changes. Because of the dimension of the shearer, there is a distance of some meters between the cutting drum and the contact to the face conveyor of the shearer body. So the longitudinal inclination at the position of the shearer body will influence the cut, which is executed some meters away. This can cause safety critical situations, in case of inclination change, because the cutting drums will leave coal in the face and cut surrounding rock, without adaption of the cutting drum height.

The focus of this paper will be to illustrate the aforementioned problem for cutting drum height adjustment, using the memory cut or other automation methods, if seam inclination changes in longitudinal direction of the face. Therefore, some simulation results will be shown for different ground situations of a seam. Additionally, a control algorithm will be tested to show the advantages of the cutting drum height adjustment by involving the measured floor inclination and the seam trend.

Keywords: longwall mining automation, seam trend inclination change, memory cut, horizon control, defined face opening DFO

THE EFFECTS OF EXPLOSIONS ON THE UNDERGROUND VENTILATION SYSTEM

PhD. Student Eng. Marius Simion Morar[1]
Prof. PhD. Eng. Sorin Mihai Radu[2]
PhD. Eng. Doru Cioclea[1]
PhD. Student Eng. Teodora Mititica[2]
[1] National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petrosani, **Romania**
[2] University of Petrosani, **Romania**

ABSTRACT

During the process of extracting coal there are released significant quantities of flammable gas which may lead to the occurrence of the explosion type phenomena. For an explosive mixture of air-methane, the source of initiation must submit activation energy between 125.4 and 292.4 Kj/mol and for the initiation and the propagation of an explosion in a coal dust-air explosive mixture, the heat necessary for the propagation reaction must be higher than 1,775 Kj/m^3. In underground mining works, in relation with the flammable substance there may occur the following types of explosions:

- Methane explosions;
- Coal dust explosions;
- Methane and coal dust explosions.

The explosion type event occurring underground produces a dynamic shockwave which is radially propagated on the path of the mine workings both towards the main ventilation station and of the mine workings for fresh air entrance.During the playback of the explosion type phenomena there occurs heat, dynamic effects and chemical effects over the air, effects which change the air flow and the mine air composition.

Keywords: building, construction, explosion, underground, ventilation

THE GEOMORPHOLOGICAL CHANGES CAUSED BY THE ARTISANAL MINING IN THE MINING AREA KABERA – RWANDA

Mgr. Milada Dušková[1]
Mgr. Jan Macháček[2]
doc. RNDr. Irena Smolová, Ph.D.[3]
[1] Department of Development Studies, Faculty of Science, Palacký University Olomouc, **Czech Republic**
[2] Department of Development Studies, Faculty of Science, Palacký University Olomouc, **Czech Republic**
[3] Department of Geography, Faculty of Science, Palacký University Olomouc, **Czech Republic**

ABSTRACT

Rwanda is a small East African country with significant mineral resources - tungsten, cobalt, tantalum, tin and gold in particular. These ore minerals are being mined in Rwanda for more than 80 years, but the production gained momentum only recently. These metals are essential in the electrical industry as electrical engineering products. Due to the difficult legal and technical conditions, natural resources are extracted by the manner typical of developing countries - artisanal and small-scale mining (ASM). It is dominated by a mixture of artisanal and semi-industrious methods. The miners use methods like panning, sluicing, digging and hand picking to obtain the pre-concentrates. As a result of this method of extraction, there are significant variations in the relief of the landscape. The Kabera mine site is situated in the Western Rwanda. It is a part of the concession of Rutsiro rich in tungsten ore. Artisanal method of mining on the location Kabera began in the 1950s. At present, the location is owned by a mining company with only an exploratory concession, which is limited to four years. For this reason, it is not worthwhile for the company to invest in any costly mining or processing machinery in the mining area and therefore extraction is left to the local population, from whom the extracted ore is purchased. The amateur miners exploit it in an ASM manner that can be divided into two levels, according to the place from where the ore-bearing rock is obtained – from scree deposits in the mining site and from alluvial of the river beds of the river Rutsiro which flows alongside the foothill of the Kabera hill. ASM in the Kabera area involves using a stream of water in which the minerals are washed. The mining of tungsten has impacts on the environment and the river network system (bank ripping and landslides). Problems with erosion that deflect the flow of rivers and increase the levels of suspension and sedimentation in river basins are the biggest problems connected with ASM. Thanks to the combination of digging, sluicing and panning methods, new various landforms of georelief are created such as ditches, trenches, valleys, erosion gullies, accumulations of tailings and talus piles as well as plenty of shafts.The main purpose of this article is to capture and assess the rate of geomorphological changes and their impact on the structure of the landscape in this study area. The authors used the results of their own morphographic analysis from their field researches carried out in 2012 and 2013 with the goal of characterising the intensity of the anthropogenic processes conditioned by the extraction of tungsten ore in the Kabera mining area.

Keywords: Rwanda, mineral resources, artisanal and small-scale mining, geomorphological changings

THE LABORATORY TEST OF CHARACTERISTIC SPON-COM GASES OF NORTH BOHEMIAN LIGNITE

Prof. Ing. Alois Adamus, Ph.D.

Ing. Jindrich Sancer, Ph.D.

Ing. Lukas Snopek, Ph.D.

VSB-Technical University Ostrava, **Czech Republic**

ABSTRACT

One of the methods of early indication of spontaneous combustion of the coal substance is the observation and evaluation of gases released from coal with an increase in temperature. Laboratory verification of released gases can be carried out by the method of thermal oxidation. Indicator gases for the spontaneous combustion of brown coal were examined in the framework of research done in the Brown Coal Research Institute in Most in the eighties and the nineties of last century; subsequently, this research was followed by the cataloguing of seams prone to spontaneous combustion performed at the Faculty of Mining and Geology of VSB-Technical University of Ostrava and recently then with research co-operation of both the mentioned workplaces. The article deals with the overview of laboratory works in question that have been done so far in the Laboratory of Spontaneous Combustion of Substances of Institute of Mining Engineering and Safety of VSB – Technical University of Ostrava.

Keywords: spontaneous combustion, indicator gases, thermal oxidation, spontaneous combustion of lignite, endogenous fires.

THE OPERATING DIAGNOSTIC OF THE ACTIVITIES OF THE LONGWALL SHEARERS IN THE USE

Ing. Petr Tomek [1]

Assoc. Prof. Jiri Fries [2]

[1] VŠB-Technical University of Ostrava, Department of Production Machines and Design, **Czech Republic**
[2] VŠB-Technical University of Ostrava, Institute of Clean Technologies for Mining and Utilization of Raw Materials for Energy Use, **Czech Republic**

ABSTRACT

The contribution to the several factual examples shows possibibilities of the current operating diagnostic of the longwall shearers. From the acquired data there are evaluated the failure conditions of the monitored mine equipment, the course of the loading driving engines and the correct operation of the safety elements of the longwall shearer. The results of these data analysis consequently find the use at engineering designs of the longwall shearers and by the determination of their optimum parameters. The author processed real data measured at concrete mining conditions of longwalls in real underground mines.

Keywords: Diagnostic, Mining Machinery, Mining Equipment, Longwall Shearers, Driving Engines

THE POSSIBILITY OF METHANE EXPLOATATION FROM CLOSED UNDEGROUND MINES

Prof. Ing. VlastimlHudeček, CSc.[1]
Ing.Petr Urban, Ph.D[1]
Ing.BeátaGibesová[1]
Ing. Josef Chovanec, Ph.D[1]
Ing. AdélaCibulcová[1]
[1]VSB-Technical University of Ostrava, Faculty of Mining and Geology, **Czech Republic**

ABSTRACT

The paper presents evaluation of the impact of shale gas mining on the consumption of coal. In some countries, notably the U.S. A., shale gas mining has been developed to such a level that gas is considered to be a significant energy source. Shale gas has also replaced coal consumption, so there has been a surplus of coal in world markets. This was also reflected in the Czech Republic and other countries, and it will probably result in closing some underground mines. To reduce the economic impact of mines closing down, the paper suggests to use mines for mining methane.

Keywords: shale gas, mining, methane

THE STUDY OF SIMILARITY STABILITY SURFACES FROM MINING FIELDS OF SALT IN SOLUTION EXTRACTION IN ROMANIA

Eng. Gheorghe LASC Ph.D Stud.[1]

Prof. Dr. Victor ARAD [1]

Oana BĂRĂIAC Ph.D Stud. [1]

Eng. Vlad Adrian COSMA Ph.D Stud. [1]

[1] University of Petroşani, **Romania** .

ABSTRACT

Comparative study of the stability surfaces from mining fields of salt in solution extraction in the three distinct areas and with tradition in salt mining in Romania, namely the Ocna Mures – Alba county, Targu Ocna – Bacau county and Ocnele Mari - Valcea county, is a challenge and an opportunity to find similarities and also specific differences, an inventory of causality and of the effects of environmental and local community damage.

The paper includes the history of each exploitations mentioned, the hydrological, geological and tectonic analysis, it describes the particular events and the measures of approaching them, and finally the comparative analysis of stability solution, conclusions, proposals and future research directions.

Keywords: mining, salt, surface stability, analysis, water, greening

THE USE OF NETWORK MODELING AND PRODUCTION THEORY FOR MINING PROJECT MANAGEMENT

Prof.eng. Ph.D Florian Buşe[1]

Lect. eng. ec. Ph.D Gheorghe-Florin Buşe[1]

[1] University of Petroşani, **Romania**

ABSTRACT

A series of information, data and procedures are required for mining projects management, referring to: the factor structure, the production function type structure applied to basic mining processes; the characteristics of the preparation and exploitation processes specific to the technology used; the representation of projects using networks and specific elements which to consider in their mining process approach; the methodologies needed to solve the problem of production factors management for network mining activities with the purpose of efficient and continuous use of existing production factors. The developed model considers two aspects: the descriptive aspect of using, as instruments, the network representation combined with basic elements of production theory; the optimizing-decision aspect based either on exact optimizing procedures (i.e. the decision tree) or on heuristic and approximation procedures, which relates to the activity planning purpose and, consequently, to the fair costs of factor consumption.

The methodology suggested by the paper allows the approach of both aspects, concentrating on the latter, respectively giving the mining operative management a tool easy to use, with positive impact on getting a better economic result when exploiting a deposit, starting from the restrictions and limits imposed by the existing situation.

Keywords: production factors, mining project, network modeling, factor consumption, time reserves

TIME SCHEDULE AND CAPACITY UTILISATION CONCERNING AUXILIARY MECHANIZATION FOR OPENCAST MINE STRIPPING SHOVELS

Ing. Mária Jarolimová, Ph.D.[1]

Ing. Dagmar Čechová, Ph.D.[1]

Ing. Pavlina Sachová[1]

Ing. Andrea Polická[1]

Ing.Michal Max Minařík[2]

[1] Institute of Mining Engineering and Safety, Faculty of Mining and Geology, VŠB-TU, **Czech Republic**

[2] Quarries ČR s.r.o, **Czech Republic**

ABSTRACT

The paper takes into account time schedule and capacity utilisation as regards employment of stripping shovel auxiliary mechanization by open-pit lignite mining. The introductory chapter briefly characterizes the locality of investigation; and the current condition of the auxiliary mechanization in situ is explained. The paper further focuses on the time schedule and capacity utilisation of this auxiliary mechanization, evaluates optimum options of its utilization, and suggests the best employment variant possible. The paper concludes with the economic assessments of the suggested measures for implementation.

Keywords: Opencast mining, lignite, additional equipment for mining, time schedule and capacity utilization

TROLLEY FOR SKIP MANEUVRING IN LUPENI MINING PLANT

Iosif Dumitrescu, PhD, Eng. Assoc. Prof.
Bogdan-Zeno Cozma, PhD, Eng. Lecturer.
Vilhelm Itu, PhD, Eng. Lecturer.
University of Petroşani - **Romania**

ABSTRACT

Mining trolleys can be used for horizontal haulage and on inclined planes. Trolleys for inclined planes of higher power than 40 …50 kW are very similar in construction and operating principle to winning machines with drums. They can be actuated by cylinder-auger reduction gears or with auger reduction gears. In case of cylinder reduction gears, cylindrical electrical-hydraulic brakes are required on the entry shaft, similar to the electro-planes on travelling cranes. The paper presents the adaptation of a 45 kW trolley for inclined plane, to replace a 75 kW trolley used for 27 500 kg skip manipulation, destroyed as a result of a wrong maneuver, in Lupeni Mining Plant. The adaptation means finding solutions to problems regarding mechanical transmission, fixing to the foundation, consolidation of drum bearings and improvement of the ratchet safety mechanism control system.

Keywords: mining trolleys

UNDERMINED AREA BANISKÁ – HAZARDS AND IMPACT ON GEOECOLOGICAL STRUCTURE OF LANDSCAPE (SLOVAKIA)

Dr. Juliana Krokusová[1]
Dr. Vladimír Čech[1]
Dr. Monika Ivanová[1]
Dr. Vladimír Solár[1]

[1] Department of Geography and Apllied Geoinformatics, Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, Slovak republic

ABSTRACT

Undermined area Baniská is a very dangerous element in landscape. It is located between the villages of Rudňany and Poráč in the northern part of the Volovské vrchy mountains. In the past, there was very intensive mining and industrial activities because of rich deposits of mineral resources. Mining and industrial activities noticed a strong regress in the latest years. Most mining operations were closed and the mining was stopped. The impact of mining activity and its components on the landscape presents a complex problem. The exploitation of mineral resources has a great impact on the underground and the surface. There is an extensive and complicated net of worked-out spaces: stopes, drifts and shafts. This area is geologically unstable. Intensive mining activity and geological instability results in the creation of big cave-in. Its shape is linear and its distance is 1 km. The formation of this space is the consequence of a long-continuing process of cave-in. The road between the villages of Rudňany and Poráč has had to be redirected three times because of continuing cave-in process. Moreover, this area is located in the Roma settlement, so the residents` lives are in imminent danger.

Keywords: undermined area, mining underground, cave-in area, danger

USING ULTRASONIC FAULT DETECTION TO PREVENT ACCIDENTS AND ENSURE SAFETY IN OPERATION OF COAL GRINDING TECHNOLOGICAL EQUIPMENT

Drd. eng. Măceşaru Cristina Ionela[1]

Lecturer dr. eng. Florea Vlad Alexandru[1]

[1] University of Petrosani, **Romania**

ABSTRACT

Insurance based on the diagnostic process of any technical system be organizing its diagnosis through testing or operation. Non-destructive flaw allows detection efficiency defects, determining the nature and their parameters, ie the position, orientation and size for pieces or subassemblies belonging to coal preparation equipment. In this way can decide acceptance, remediation or refusal, in accordance with the criteria of admissibility of defects execution prescribed documentation (including norms and standards) and their causes can be identified and corrective action execution technology. Using phasor method of ultrasonic fault detection is a modern way to help locate and determine the orientation of the pieces of equipment defects grinding of coal because they depend on three-dimensional mobility and transducer device (no manual movement of the transducer). This paper treats aspects of using ultrasonic detector for detecting defects of type DGS 100 subassemblies of the mills to prevent accidents and increase the safety level of exploitation.

Keywords: coal, mill, defects, prevent accidents, subassemblies, ultrasonic fault detection

UTILIZATION OF ABANDONED MINE WORKINGS FOR HEATING

Doc. Petr Žůrek, CSc.[1]

Ing. Beáta Gibesová[1]

Ing. Adéla Cibulcová[1]

Ing. Radovan Kukutsch, PhD.[1]

Ing. Jiří Kostrhun[1]

[1]VŠB – Technical University of Ostrava, **Czech Republic**

ABSTRACT

Mining industry decrement and restructuring, unprofitability of some mineral resources caused closure or limit production operations at many locations in the Czech Republic. Old mining work is understood by the Mining Law underground mine works which is abandoned and the original operator or his successor in title does not exist or is not known. Or even by force adjustment since 2002, is an old mine works also abandoned quarry for reserved mineral extraction, the original operator or his successor in title does not exist or is not known. For example, only in the Ostrava-Karvina district is currently the 359 old mines. Most organized mines is solved within against methane measures. At least secured mines is implemented monitoring and maintenance. So far in our country shows limited interest in the use of previously or currently concluded mining objects. The abroad experience shows that the using of old mine workings is interesting. In paper is described how to use reserves of underground water to winning of temperature.

Keywords: Old mine workings, utilization of abandoned mines, heat pump

VENTMEX – PORTABLE SOFTWARE FOR MINE VENTILATION CHARACTERISTIC CURVES

PhD. Student Eng. Nicolae-Ioan Vlasin[1]

PhD. Eng. George Artur Gaman[1]

PhD. Eng. Constantin Lupu[1]

PhD. Eng. Emilian Ghicioi[1]

Univ. Prof. PhD. Eugen Cozma[2]

[1] National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petrosani, **Romania**
[2] University of Petrosani, **Romania**

ABSTRACT

VENTMEX v0.1 is a computer application designed and developed by the National Institute for Research and Development in Mine Safety and Protection to Explosion, being the object of the Romanian Research Program "NUCLEU" PN 07-45-02-44. The software is portable on Windows operating systems and is a very useful tool for researchers and specialists from mining and industrial ventilation area, providing a simple and intuitive interface for inputs of "*in situ*" collected data. Based on these data – primary consisting by fan flow, Q_v, fan pressure, H_v, mine flow, Q_m, and mine pressure, H_m – and considering other operational specifications of the fan, the application calculates and prints in a tabular form the relevant parameters for characteristic curves design: pressure curve, power curve and efficiency curve. Graphic representations are displayed in separate windows, allowing a visual comparison of several data sets. Both inputs and results can be saved with .txt extension and graphics can be stored with .png or .svg extensions.

Keywords: ventilation software, characteristic curves, mining ventilation, VENTMEX, INSEMEX

VERIFICATIONS OF THE ELECTRIC SAFETY PARAMETERS OF BLASTING MACHINES USED AT BLASTING WORKS IN UNDERGROUND MINES

PhD. Eng. Lupu Leonard[1]

PhD. Eng. Jurca Adrian[1]

PhD. Eng. Ghicioi Emilian[1]

PhD. Eng. Burian Sorin[1]

PhD. Student Eng. Suvar Marius Cornel[1]

[1] National Institute for Research and Development in Mine Safety and Protection to Explosion, Petrosani - **Romania**

ABSTRACT

Using the blasting machines in underground mines involves complying with the European Essential Safety Requirements.

Verification of the electric safety parameters of the blasting machines has a particular importance taking into consideration the existing explosion risk which should be minimized for the purpose of ensuring human life safety and health.

This paper has as objectives describing the electric safety parameters, as well as operation in conditions of safety and reliability of the blasting machines used in underground mines

Keywords: explosive atmosphere, explosion protection, blasting machines

CONTRIBUTION TO THE SOLUTION OF THERMALLY ACTIVE RECLAMATION OF COAL WASTE HEAPS

Assist. Prof. Dr. Ing. Frantisek Tichanek [1]
Ph.D. Ing. Roman Tichanek [2]
[1] VSB – Technical University of Ostrava, **Czech Republic**
[2] Energie - stavebni a banska a.s., **Czech Republic**

ABSTRACT

The elimination of the environmental burdens currently represents one of the most serious problems. Thermally active spoil heaps have a detrimental effect on the environment. The article deals with the possibilities how to suppress thermal activity and subsequent recultivation of the spoil heaps which occur in connection with coal mining and coal preparation. The report describes the sanation of the spoil heaps of the Tuchlovice, Schoeller and Katerina coal mines. Based on the knowledge gained during the implementation, there are designed series of interconnected activities of the recultivation process which minimizes the risk of failure of proposed sanation methods.

Keywords: coal waste heap, thermal aktivity, thermal monitoring, reclamation