

## Summaries

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HENRYK ALEKSA, FRANCISZEK DYDUCH, KRZYSZTOF WIERZCHOWSKI

**Chlorine and Mercury in Coal and the Possibilities of Their Reduction Using Mechanical Preparation** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The paper presents the possibilities of reducing the contents of mercury and chlorine in hard coal using the methods applied in mineral engineering. In relation to those elements, their location in the coal structure has been characterized, together with their origin and forms of occurrence. Discussed also are the technical methods of reduction of these contaminants in coal using the gravitational separation, floatation, leaching and dewatering. The proposals presented may find their application in the industry and contribute to reduction of emissions of these substances very harmful to health and environment.

**Keywords:** *chlorine in coal, mercury in coal, the possibilities of reducing*

MAŁGORZATA BALAWEIDER, JOLANTA MARCINIAK-KOWALSKA

**Researches over Possibilities of Waste Utilization to Production of Bricks** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

In mineral mining, in the technological processes of production, the wastes are being created, which are, in many ways, harmful for natural environment dependably on their chemical composition. The purpose of the conducted researches was determination of the possibilities of partial replacement of the ashes produced by thermal-electric power station "Kraków" SA by flotation wastes from limestone copper ores flotation and of production of required quality bricks. The paper presents the researches over bricks, done according to the present norms, which purpose was to determine the applied material accuracy. There is the perspective possibility of flotation wastes, containing a lot of silicon dioxide, application to bricks production.

**Keywords:** *flotation wastes, ceramic materials, brick*

JADWIGA ANNA BARGA-WIĘCŁAWSKA

**Quarries of Carbonate Raw Materials in the Świętokrzyskie Region as an Example of Ecological Corridors** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Studies of malacofauna and vegetation in quarries of carbonate rocks in the Świętokrzyskie region were carried out in the period between 1999–2005. The investigations were conducted on waste heaps and workings, and demonstrated the differences in ecological conditions between heaps and workings. Snail studies were performed using the quantitative method. The study revealed the presence of 57 snail species which constitutes 58% of all snail species occurring in the Świętokrzyskie Mountains. The most abundant snail communities were observed in the "Zygmuntówka" quarry, in "Miedzianka" and "Wietrznia" quarries, and in the area of the historical galena mine on Karczówka in Kielce. Terrains changed by mining are habitats of rare and endangered plant and snail species. The following snail species should be mentioned: *Cecilioides acicula*, *Clausilia bidentata*, *Acantimula aculeate*, *Trichi lubomirski*, *Helix pomatia* and *Helix lutescens*. Nine southern species were identified. Malacofauna of post-mining areas is a manifestation of transformations progressing in natural environment of our region.

**Keywords:** *quarries, carbonate rocks, malacofauna, ecological corridors, Świętokrzyskie Mountains, Southeastern Poland*

ZBIGNIEW BEDNARCZYK

**In Situ and Laboratory Tests Valuation for Recognition and Counteraction in Geodynamic Processes** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Experience connected with usage of different in-situ and laboratory test is described in the paper. It includes recognition of genesis and possibilities in geodynamic processes counteraction. Chosen by the author methods of landslide research, monitoring and modeling in open-cast mines, Norway and flysch Carpathians are presented.

**Keywords:** *landslides, in situ tests, laboratory tests, slope stability analysis, landslide counteractions*

PRZEMYSŁAW BUKOWSKI

**Water Hazard in Hard Coal Mines in the Upper Silesian Coal Basin in the Time of Mining Sector Reorganization** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The progressive process of mines abandoning in the USCB from early 90's caused the formation in mine workings of water reservoirs with a capacity of each of millions m<sup>3</sup> of retentioned water. Despite the observed decrease of incidents that result from the water hazard during last decade, the water reservoirs that come into existence in mine workings of abandoned mines endanger and will cause even greater hazard for conducted and planned mine workings. Their influence in conditions of various properties of geological environment entail the necessity of changes in an attitude to the assessment of the scale of water hazard and their prognoses, what was presented in general in the article.

**Keywords:** *safety, hydrogeology, water hazard, hard coal mine, water inrush, conception, the method of investigations*

JAN BUTRA, WITOLD PYTEL

**Mining Operations Conducted Close to Mined-Out And Yielding Zones in a Light of the Practical Experience and Numerical Modeling** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Bump and roof fall hazard potential is assessed based on the practical observations and numerical (FEM) modeling of mining operations conducted near the already mined-out and/or yielding zones.

**Keywords:** *numerical modeling, yielding zones, cooper ore exploitation*

MAREK CAŁA, SEBASTIAN OLESIAK, TADEUSZ TATARA, DANIEL WAŁACH

**Analysis of Resistance of St. George Church in Rydułtowy from Dynamic Loading Due to Mining Excavation** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper shows the stability analysis of dynamic loading due to mining excavation on the church structure. Detailed analysis of existing damages of St. George Church in Rydułtowy were performed. Geotechnical site characterization and analysis of dynamic activity due to mining excavation were also carried out. Studies of historical damages to the monument and performed analysis allow to estimate the stability and resistance of the building.

**Keywords:** *dynamic resistance of buildings, mining tremors, surface vibrations*

MAREK CAŁA, ANDREA ROTH

**Application of Steel Wire Mesh for Ground Support under Rockburst Hazard** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper deals with loading of the support under rockburst hazard. Such a support should be able to absorb the kinetic energy of the rock blocks ejected to mining underground opening. The high-tensile Tecco mesh, which is made of steel wire with tensile strength of 1770 MPa was described. The Tecco mesh was tested in Australia to determine the force-deflection curve and the breaking load with different bolt patterns and wire diameters. Several numerical calculations (calibrated with laboratory tests) were also performed in Switzerland. Laboratory experiments

and numerical calculations showed that Tecco mesh was able to absorb energy from 33,6 kN/m<sup>2</sup> (Tecco S95/3, wire diameter 3 mm) to 50 kN/m<sup>2</sup> (Tecco S95/4, wire diameter 4 mm). These values are over a dozen times higher than for welded mesh or chain link mesh. The application of high-tensile steel mesh in mining openings in rockburst prone mines should be seriously considered.

**Keywords:** *rockburst hazard, mining support, steel wire mesh*

MIROSLAW CHUDEK, HENRYK KLETA

**Endangering of Shaft Inset Structures by Non-Continuous Deformations of Linear Type** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Perennial intensive mining operations leads to creation of geo-deformational areas, characterized by uneven level of extraction. Cumulative thickness of extracted bed on these areas can reach several tens meters and in spite of presence of protection pillars deformations occur, which could damage shafts and shaft inset structures. In the shaft area being analysed as well as in south-west direction from them, non-continuous deformations of linear shape occurred and took a form of faults with throw reaching 0,8 m. They are caused by complex geological structure of the rock mass and large cumulative thickness of already extracted coal seams, which resulted in disadvantageous for strength-deformational state of the soil distribution of rock mass and surface deformations. The paper presents a proposition of a model of formation of non-continuous deformations of linear type in such a conditions. Possibilities of geotechnical procedures for reconstruction of soil continuity and strength by use of geotechnical barriers have been also discussed.

**Słowa kluczowe:** *discontinuous deformations, shaft safety pillars, geomechanics, geotechnics protection*

MIROSLAW CHUDEK, PIOTR STRZAŁKOWSKI, ROMAN ŚCIGALA

**The Exemplary Analysis of Face Advance Speed Influence on the Land Surface Deformation Process** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The exemplary analysis of face advance speed on land surface deformation in its transient phase has been presented in this paper. On the basis of geodesic surveys results from one of GZW coal mines, parameters have been identified, that describe transient state of deformation. Then the influence of face advance speed influence has been determined on the values of chosen deformation indices. Analyses have been done by using computer simulation of extraction for different face advance speed.

**Keywords:** *forecasting of land surface deformations, transient deformations, face advance speed*

JAN DRENDA, ZENON RÓŻAŃSKI, KRZYSZTOF SŁOTA, PAWEŁ WRONA

**Fire Hazard on the Coal Waste Dumps** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The reason of the fire hazard at the coal waste dumps is huge contents of inflammable substances in material located at them. In the paper the causes and factors influencing the fire arise of coal waste dumps has been presented. The influence of fires on the atmosphere in the nearest vicinity of burning dumps has been described. The methods of fire prevention and extinguishing applied at the coal waste dumps in Poland has been presented and importance of periodic monitoring to fast detection of fires, has been underlined.

**Keywords:** *coal waste dump, fires, air pollution*

JAN DULEWSKI, ZDZISŁAW KULCZYCKI, PIOTR TRZCIONKA

**Using of Surveying-Geological Documentation of Abandoned Mines for Practical Solutions** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Geological and Mining Law lays on the President of State Mining Authority (WUG) an obligation of gathering and archivization of surveying-geological documentation of abandoned mines. The obligation is realized by Record Office of Surveying-Geological Documentation, which is the unit of WUG. The Office renders the documentation accessible persons or parties for purposes of realization of many goals in the fields of: land use planning; public safety; environmental protection; and claiming damages connected to mining. Data and information contained in

the documentation are practically used for a lot of planning solutions at mines as well as ecological projects in the post-mining lands.

**Keywords:** *survey-geological documentation, environmental protection, damage prevention*

*IRENEUSZ FIRLIT*

**Mining of 402 Coal-Seam in the Aspect of Ecological Area Called the Sources of the Kłodnica River Protection** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

In the post-war years the mining industry underwent intensive development. Newly established mines were given area more than once with hard geological-mining conditions or localized under urbanized or ecological lands. Staszic hard coal mine is extracting the material in very difficult conditions connected with nature values of the mining land. The example is the extraction of coal from the seam 402 in the filed „L” localized under ecological area called the sources of the Kłodnica river.

**Keywords:** *technology of coal mining, preservation of lands with law protected, influence of the exploitation on surfaces of the land*

*DANUTA FLISIAK*

**Methodology of Rock Salt Research in Triaxial Compression Tests for Underground Storages Design** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

In many research centres concerning with rock salt utilization for underground storage there is confidence of ability to load resistance with preservation large ductile deformation without failure. Triaxial tests show that whole range of stress and temperature which are accompanying underground caverns utilization, in three-dimensional stress state exist clear boundary between compressibility and dilatancy domains. The effect from increase irreversible volumetric strain is rapid increase of creep rate with power dependence of stress and approaching a brittle failure as a result of creep. Rock salt deformation properties, defined as dilatancy boundary and creep rate, also depend on small change of temperature, with strenght preservation. Paper presents laboratory procedures of triaxial tests, necessary for geomechanical effects analysis in storages surroundings. For selected example, using of research results for stress criterion determined for long-term stability of rock salt is showed up.

**Keywords:** *rock salt, underground storages, triaxial compression tests*

*STEFAN GALCZYŃSKI, ANDRZEJ WOJTASZEK*

**Designing of Anchorage of Underground Workings** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Two technical methods of designing the bolting support are considered in the paper. They are the following:

- 1) as cover support against roof colapse in the general stable strata,
- 2) as the bearing support against fall in the general disturbed strata.

The calculation pattern of bolting support was given.

**Keywords:** *rock mechanics, bolting, bolting designing*

*STANISŁAW HAJDO, JERZY KLICH, GRZEGORZ GALINIAK*

**Ecological and Technological Success in 40 Years History of Sulphur Mining in Poland** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper presents main concept of borehole mining technology, which determined survival of the only one sulphur mine in Osiek (Poland). The main achievements in land reclamation, liquidation and development of mining grounds were also shown.

**Keywords:** *sulphur, borehole mining, environment protection*

AUGUSTYN HOLEKSA, MIECZYSLAW LUBRYKA, RYSZARD SKATULA, ZBIGNIEW SZREDER

**22a Longwall Working in the Seam 510/1 Coal Mine “Jas-Mos” under the High Seismic Activity** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The paper presents an example of the coal wall exploitation with the great seismic activity, which was mainly accompanied with the edge of superstructure and the neighbourhood of the dodge zone. It shows an applied monitoring of the threat of the rockburst and an active rockburst prevention.

**Keywords:** rockburst hazard, rockburst prevention, safe exploitation

ZDZISLAW IWULSKI

**Rockrockburst Hazard Prognosis with the Help of Time Series** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper shows an attempt to estimate tremor hazard for one of sections in Underground Copper Mine “Rudna” with the application of time series. Observed time series may be approximated for example by model ARIMA  $(d,1,1) p = 0,1,2,3$ , but selection of a certain model is not obligatory. Then models of greater numbers of parameters are producing slightly lower estimations of white noise variance, but the difference is not valid. Applicability of such type models for estimation of rock tremors hazard does not guarantees the 100% success at present day. It seems that if energy series is reasonably evaluated, other series like convergence, seismoacoustic etc. should be also included in design the model of transmission function.

**Keywords:** time series, random processes, rockrockburst hazard prognosis

ROBERT KACZMARCZYK, STANISLAW RYBICKI

**Structural Surfaces in the Overburden Soils of the Lignite Deposits, Their Characteristic and Geotechnical Properties** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Field observations of geological profile of the overburden soils of lignite deposits Turów and Bełchatów shows some structural surfaces used as a slip surfaces of many landslides. They are usually surfaces of loosing structure of soil came to the existance after sedimentary, tectonic and erosion processes. In the article types of these surfaces, their structural character and some geotechnical properties are described.

**Keywords:** engineering geology, open pit mine, landslides, structural surfaces

EWA KISIELOWSKA, EWELINA KASIŃSKA-PILUT, JUSTYNA JAŚKIEWICZ

**The Research on the Influence of the Selected Physicochemical Agents on Cooper Bioleaching Process Efficiency from After-Flotation Waste Using Microfungi of the *Aspergillus Niger* Species** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The aim of the research presented is an analysis of ways of utilizing microfloral autochthonous organisms from the after-flotation waste of the Gilow stockpile in order to bioleach copper. The alkaline character of the environment disables the use of the traditional processes of acid bioleaching, because of both the economical and environmental aspects. A research of the bioleaching process of the after-flotation waste was conducted using microfungi of the *Aspergillus niger* species, which dominate in the autochthonous environment. The metabolism of these microfungi, connected with the production of large amounts of organic acids, allowed to conceptualize their usage in the biohydrometalurgy copper processes. After isolating in a pure culture and multiplying the microfungi biomass *Aspergillus niger*, the experiments began. Weighed samples of the waste were covered with a selective medium and then inoculated with the microfungi biomass, playing the role of the bioleaching agent. After thirty days of incubation, the end product was chemically analyzed, showing effects of the conducted copper bioleaching process (79,16÷87,98%)

**Keywords:** copper, bioleaching, microfungi, *Aspergillus niger*, after-flotation waste

WALDEMAR KORZENIOWSKI

**Morphometric Method for Rock Mass Quality Designation for Bolt Support in Pomorzany Lead and Zinc Mine** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The basic support method of exploitation workings in Polish lead and zinc mines is the bolting technique. Based on many years of observations of behaviour of underground excavations, investigations on strata quality and bolting effectiveness under diversified geotechnical conditions, a supplementary criterion for roof classification and bolt matching has been suggested. Application of the morphometric method for description of roofs and wall-sides in the excavations allowed the four characteristic surface categories to be specified that are in clear relation with bolting effectiveness and the excavation stability. The goal of the introduction of extra parameters into the obligatory method is first of all, to minimize the error in RQD estimation.

*Keywords: rock bolting, rock-mass classification, morphometric method, lead and zinc mine*

ANDRZEJ KOWALSKI

**Surface Deformations for Today's Hard Coal Mining in Poland** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The specificity of contemporary determinants of mining extraction conducting in the aspect of surface protection and their effects in surface deformation was presented. Particularly the influence of the length of extraction longwalls and changeable extraction velocity on the dynamics of surface deformation growth. Attention was paid on the problem of rise of surface discontinuities in the form of steps and fissures at medium and high depth of extraction conducting.

*Keywords: mining, underground extraction, mining area, deformations*

DAMIAN KRAWCZYKOWSKI, KAZIMIERZ TRYBALSKI

**Mathematical Identification of Industrial Copper Ore Grinding and Classification Process by Application of Regressive Models** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Problems of the identification industrial process of the copper ore preparation to the enrichment process were presented in this paper. Identification was achieved by mathematical modeling using the linear regression models of energetic factors to evaluation of the ore preparation process.

*Słowa kluczowe: mineral processing, copper, energetic factors, optimization, modeling*

IWONA KUCZYŃSKA, ANNA BEDNAREK, BEATA DEMKIEWICZ, DANUTA MARCINKIEWICZ

**Possibilities and Conditions of Extracting Aggregate from Extraction and Processing of Hard Coal** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Extraction and processing of hard coal generates waste. Also waste management is regulated by law. Up till recently the great majority of these waste was used with derelict land reclamation. However, in terms of market end ecology, under the current circumstances of amended and adjusted to UE directives laws, there appear even more new directions of waste recovery. The paper presents suggested changes to the treatment of barren rock and coal output, meant for enrichment processing. It indicates how a Mechanical Coal Processing Plant can — apart form trade coal assortment — produce also aggregate. The road and highways developing program brought to light the problem of lack of aggregate and mineral materials necessary in construction engineering, technical and hydro — technical works connected with road development. Consequently there appeared a great need of searching for new sources of this materials. In this situation, the aggregate production in coal mining becomes a crucial and rational method of acting, resulting additionally in an ecological effect — protection of primal mineral deposits and waste reduction.

*Keywords: mining waste, aggregate, construction products*

MAREK KWAŚNIEWSKI, STANISŁAW LASEK

**Numerical Analysis of Methane Migration from Floor Strata to a Longwall Face** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

A two-dimensional numerical model of a large (1000 × 200 m) part of the rock masses in the vicinity of coal seam 349 in longwall panel 802 in region B in the Murcki colliery was built using the distinct element code *UDEC*. Longwall mining of this seam with roof caving was simulated in the model over a length of 450 m. It was found that migration of methane from coal seams lying beneath the mined seam is possible under conditions where the floor strata deform to a great extent, undergo separation, fracture and break into blocks. It was revealed that the fractured zone in thin floor layers built of weak rocks develops more rapidly than the caving zone over the mined-out area and reaches a depth of about 30 m below the seam. The floor strata undergo an intense heave towards the mined-out area. Even at the early stages of mining, the upward movement of the strata exceeded 1.5 m. Under the assumption that (i) methane-bearing strata occur 15.6 m below seam 349 and include seam 350 and the strata lying beneath, and (ii) the methane reservoir pressure is equal to 2 MPa, the direction, pressure, quantity and velocity of the methane flow through cracks developing in the floor strata under the area of seam 349 being mined were investigated.

**Keywords:** *discontinuous rock masses, distinct element method, floor heave, longwall mining, methane, numerical modelling*

KRZYSZTOF LABUS

**Interpretation of Mine Water Chemistry by Means of Compositional Data Analysis** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The paper presents the principles bases of Compositional Data Analysis (CDA). This statistical method enables interpreting the data, being proportions of some whole. The implementation of this method was presented on an example of mine waters from the Chwałowice coal mine (Silesia). The visualisation by means of ternary diagrams was helpful for interpreting the results. CDA was especially useful in identifying the following hydrochemical processes to occur in the mine waters' environment: ion exchange, halite dissolution, sulfates reduction, barite precipitation, and desorption of iodine from the aquifer material.

**Keywords:** *mine water, groundwater chemistry, Compositional Data Analysis*

URSZULA LORENZ, ZBIGNIEW GRUDZIŃSKI

**Mercury Content as a Potential Factor Limiting "Value in Use" of Hard Coal and Brown Coal** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Mercury concentration in the environment at present is 2- to 3-times higher comparing to the period before industrial development. Three branches of industry: production of chlorine by mercury method, cement production and coal combustion are main sources of mercury emission into the air. Mercury is a natural component of coal. Combustion of coal (both hard and brown) on a mass scale in power plants, industrial plants and for communal needs, despite relatively small mercury content, contributes to significant load of mercury to the environment and presently is one of most important anthropogenic source of mercury. According to research conducted in Poland, average mercury content in hard coal varies from 100 to 150 ppb (microgram per kilogram,  $\mu\text{g}/\text{kg}$ ), and in brown coal — from 300 to 350 ppb.

**Keywords:** *Hg occurrence, Hg content in coal, Hg emission*

JACEK M. ŁĄCZNY, SEBASTIAN IWASZENKO, DANIEL SŁOWIKOWSKI, MARCIN HUZARSKI

**Simulation of Sorption Possesses on Permeable Reactive Barriers Using for Limiting Contaminants Release from Wastes of Coal Mining** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Wastes, as a byproduct of coal mining and conditioning, could cause serious groundwater contamination danger when introduced to environment without appropriate protection. It is especially true in using such wastes for reclamation and leveling purposes. Contaminants release from deposits can be stopped or at least highly limited by

use of permeable and semi-permeable reactive barriers. The possibilities of removal of As, B, Ba and Sr ions from infiltrating water were investigated. Diversity of chemical properties and interactions in water environment requires selective selection of barrier's construction materials and structure. Upon experimental data and results of mathematical modeling with PHREEQC and self developed code, a system of reactive barriers was designed, addressing each of mentioned elements.

**Keywords:** *wastes, fly ash, byproduct of coal mining, groundwater contamination, permeable and semi-permeable reactive barriers, mathematical modeling, sorption adsorptions*

TADEUSZ MAJCHERCZYK, ANTONI JAKUBÓW

**Gasodynamic Hazard in the Coal Mines of the Jastrzębie Coal Company** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Gasodynamic phenomena are one of the most serious life and health threats for miners working in the underground coal mines. The paper presents factors affecting the occurrence of gasodynamic phenomena as well as symptoms indicating a possibility of occurrence of such phenomena in coal mines. The descriptions of methane and rock bursts, which occurred in the mines of the Jastrzębie Coal Company (especially in the "Zofiówka" and "Pniówek" coal mines), are briefly presented in the paper. Circumstances of methane and rock burst occurring on 22 November 2005 in the "Zofiówka" Coal Mine (D-6 transport heading, 409/4 seam) as well as particular measures taken after the burst are thoroughly analysed in this paper.

**Keywords:** *gasodynamics phenomenas, effects of outburst*

PIOTR MAŁKOWSKI, TADEUSZ MAJCHERCZYK, ZBIGNIEW NIEDBALSKI

**Analysis of Rockbursts Layout in the Area of Longwall B-1 in the Seam 403/3 Considering Chosen Mining and Geological Factors** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The paper presents rockbursts layout in the area of the longwall B-1 which was located close to the faults. Recording dynamic phenomenas let assume, that seismic activity in the region were shown by the exploitation and regional tremours. The analysis of the stress field and the failure zone in the longwall B-1 area proved that one group of tremours were connected with mining factors and the second one with rock mass movements on the fault surface.

**Keywords:** *rockburst hazard, state of stress, rock mass tremours*

ANDRZEJ MARKIEWICZ, JAROSŁAW SUCHAN, RYSZARD TOMANIK

**Mining Exploitation and the Tectonic Dislocation of Lower/Upper Permian Rocks Boundary in "Rudna" Mine, the KGHM Polish Copper SA** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The tectonic deformation of Upper and Lower Permian rocks on the Fore Sudetic Monocline appears as subhorizontal displacements of the bottom part of Zechstein rocks in vicinity of polymetallic stratabound orebody. The dislocations relate to the paleomorphology of the Rotliegende/Zechstein boundary. The paper describes relations between the tectonic and structure zonation of the hostrock inside the paleohighs and the petrographical rebuilt of dolomite structure and the conditions of mining exploitation. The discussion can be practically apply in to geodynamic analyze of the hostrock and preparing the mining works.

**Keywords:** *mining exploitation, Fore Sudetic Monocline, Zechstein, tectonic, sub-horizonat shear surfaces, roof stability*

JAKUB MAZUREK

**Surface Deformations in the Hole Exploitation Barycz Salt Mine (Liquidated). May the Cavities Happen?** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The solution exploitation of salt in the Barycz mine (started in 1924) resulted in continuous and discontinuous (cavity) rock mass deformations. The excavation finished nine years ago, but the deformations may occur for several



dozen years. The paper discuss the deformation process, measurements and documentation of final deformations. It also shows the difference between actual deformations and the prognosis and the prognosis of deformations after the year 2000. The regions where deformation indexes may range values typical for I surface category were identified and also regions with cavity hazard.

**Keywords:** *solution salt exploitation, rock mass deformations, prognosis of deformations, cavities*

ARKADIUSZ MICHALSKI

**The Activities of KWB “Konin” Brown Coal Mine in Relation to Sustainable Development** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

“Konin” Brown Coal Mine has been in operation in the Konin region for more than 60 years, enabling it to play an important role in the country. Transformations in the natural environment resulting from the mine’s activities are in accordance with the principles of sustainable development. The consequence of these activities is the competitiveness of the brown coal-based electricity production.

**Keywords:** *lignite opencast mining, biological reclamation, types of reclamation, ways of management*

MARIAN MICHAŁEK

**Conception of Structural Protection of Underground Workings Located Near the Shaft Bottom Adopted for Underground Reservoir** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Underground constructions retracted from use like shafts and other big underground structures located near the shafts causes problems for mines and are a source of hazard and costs. Its often a result there are no ideas how to use this objects for another, not mining purposes. Such conceptions should be invented a few years before this objects liquidation. Shortage of such conceptions included both technological and economical aspects make problems with finding investors for use of such objects. In this paper have shown some ideas how to ensure permanent stability of the coal mine underground workings located in the hard rock near the shaft for creation of the underground water reservoir.

**Keywords:** *mining, underground construction, bottom shaft*

GRZEGORZ MUTKE

**Rockburst Hazard Prognosis for Underground Mines Taking into Consideration Tremor Parameters Close to the Tremor Sources — Experiences From Polish Mines** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

To study the rockburst hazard and underground mine working stability it is essential to know not only the static loads but also the dynamic loads. The performed analysis of the effects of mine tremors from the Upper Silesian Coal Basin, and of their intensity and various types of damage, clearly shows that they only occurred when the tremor sources were located close to the openings (mostly up to 100 m). These observations show that the ground motions parameters at such distances may be crucial for the occurrence of a rockburst because the high values of the PPV parameter are proportional to high dynamic stresses and underground hazards. An empirical criterion for potential rockburst hazard has been developed based on the worked out correlation dependences. In analyzing the documented database of 120 rockbursts from the Upper Silesian Coal Basin that occurred during a period from 1988 to 2006, the above mentioned criterion was verified. It has been found, that 90% of the rockbursts occurred in the area where peak particle velocity (PPV) reached values ranging from 0,05 m/s to 1 m/s. The investigation results presented in this paper may be used in both the spatial and time table planning of mining operations under predicted high seismicity conditions and the rational choice of support and preventive actions ensuring functionality of mine workings and improvement in work safety level.

**Keywords:** *mining tremor, rockburst, near-field wave, peak particle velocity, peak particle acceleration, seismic source parameters, dynamic loads, geophysical empirical criterion for potential rockburst hazard*

KRZYSZTOF PACZEŚNIEWSKI, ANDRZEJ PYTLIK, EWA RADWAŃSKA

**Tests of Reaction of Mine Support Elements under Dynamic Loads on a Test Stand** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper presents results of stand tests of elements of mine supports with increased resistance to dynamic loads. The increased resistance of the mine supports subjected to the tests is a result of improved work on the hitherto designs of supports. The application of the increased supports results in increasing safety on longwalls and mine roads in the areas with ground tremor hazard. This paper shows dynamic characteristics of reaction of the mine support elements the resistance of which to dynamic loads has been improved as compared to the hitherto constructive solutions. Also the stand used for testing elements of mine supports under dynamic loads is described. The technical possibilities of the stand as well as the measurement and recording instruments used during the tests are presented.

**Keywords:** *mine support, support reaction, dynamic load, dynamic resistance, test stand*

MAREK POZZI, TADEUSZ MZYK

**Rating of Impact of the Wastes Disposal in Underground Excavations of Coal Mining on Hazard of Underground Water in the Experience of Hydrogeochemical Modelling** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The placed, in mining excavations, energetic wastes do not make up for underground waters of danger, however the change of hydraulic conditions, it can establish of hazardous for the quality of underground waters on result of leaching contained in wastes components. It in analysis of influence of wastes on quality of underground waters was used was the programmes to modelling the flow of waters and the pollution migration, after affirming that the rock conditions permit of infiltration model admission. The conditions of migration was characterized based on own studies results of waste materials, rocks and chemical constitution of the water, in the area of their storage.

**Keywords:** *waste disposal, pollution migration, ground water quality*

STANISŁAW PRUSEK, WOJCIECH MASNY, ANDRZEJ WALENTEK

**Numerical Modeling of the Rock Mass Around an Excavation Exposed to Mining-Induced Pressure** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper presents results from numerical modeling of the rock mass around an excavation which is exposed to different mining-induced pressure. The numerical modeling was based on the *in-situ* measurement in the longwall tailgates. The measurements were carried out in the polish hard coal mines.

**Keywords:** *geomechanics, roadways, deformations, numerical modelling*

STANISŁAW PRUSEK, MAREK ROTKEGEL, KRZYSZTOF SKRZYŃSKI

**The Process of Planning Tunnel Supports with the Help of CAD Software** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper presents the process of planning supports for roadways in coal mines. There were described the support planning stages and the main factors that influence the choice of the most appropriate sort of supports in given geologic and technological conditions. Some commercially available and the GIG-proprietary computer programmes used at the Central Mining Institute in Katowice (GIG) for evaluating the load to be exerted onto planned roadway supports, optimising their geometrical parameters and calculating their required supporting and load bearing capacities were described and characterised.

**Keywords:** *mining, roadways support, planning supports for roadways*

WIKTORIA SOBCZYK

**Environmental Nuisances of Mining Activity in Respondents' Opinion — Survey Report** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The maintenance of equilibrium in natural environment is a crucial criterion of proper functioning of industrial objects. Mining activity causes a threat to natural environment, including human health and life. Respondents to sociological investigations were chosen through purposeful selection. The subject of analysis was questionnaires of people living in mining areas and professionally related with mining. The response allowed to get acquainted with a scope of their interests as well as with opinions on environmental matters at the domicile. Environmental nuisances caused by the mining industry are considered very significant by habitants of Silesia region. The influence of mining activity on the health of the population has been emphasized in particular.

**Keywords:** *hard coal, environmental nuisance, sociological investigations*

ANDRZEJ STANIEK

**Method for Identification of Grouting Continuity of Rock Bolts as an Efficient Way to Control Safety Conditions in Mine Roadways** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

A rock bolt which is grouted underground may not be properly inserted with the result of discontinuity of resin layer. Such discontinuity may also occur in working conditions due to typical rock behavior and displacement. It may be very hazardous to mine safety. In this paper a method for non-destructive identification of discontinuity of a resin layer surrounding rock bolt is presented. The method uses modal analysis procedures and is based on an impact excitation where a response transducer is positioned at a visible part of a rock bolt. As an installed rock bolt acts as an oscillator, different length of discontinuity of resin layer changes its modal parameters. By proper extraction of these parameters, from which a resonant frequency is seen as most valuable, the intended identification is possible. Also the results of research work concerning influence of explosions on installed rock bolts are presented. The investigated rock bolts were localized in a coal mine roadway near the region of explosions of dynamite charge. The test were performed before and after the explosions. The usage of the method was tested in copper mines as well.

**Keywords:** *rock, rock bolt, method, modal analysis*

MARIA SZYMAŃSKA-CZAJA

**Review of Estimation Methods Geometrical Properties Assessment of Recycled Mineral Resources** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Geometrical properties of grained solid materials describe such parameters as grain size, size distribution curve, grain shape, specific surface, porosity etc. For specifying them in laboratory practice a several different method currently are used. Each method based on different physical phenomena of the material. This cause a diversity of the results, what is inconvenient in introducing to the technological processes applying fine-grained row materials. The paper presents ability assessment of geometrical properties of fine-grain materials investigated in recent years, based on several research results and practical observations unambiguous and multi-conditioned relations between separate geometrical properties.

**Keywords:** *granulometric analyses, grain composition, specific surface, shape grain*

KRZYSZTOF TAJDUŚ, ANTONI TAJDUŚ

**Application of Submodelling to Simulate Construction Influenced by Mine Excavation** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

This paper describes the correct selections of the boundary conditions, of the models presents the influence of the underground excavations on the building based on *FEM*. The authors incline to solve this problem by using the

doblepart metode, based on global model and sub-model. In this technic the bonduary conditions of the sub-model are the value of vertical and horizontal displacements calculate previously in global model. Aditionally the authors made some calculations of the influence of the size of the model bedrock of the stress values in the fundations based on it.

**Keywords:** *FEM, submodelling, global model, boundary conditions, rock mass, subsoil*

KRZYSZTOF TOMICZEK

**Note on the Differences of the Behavior of Rocks under Uniaxial Tension and Compression Condition**  
• Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

Cylindrical specimens of *Brenna* and *Jastrzebie* sandstones and *Strzelin* granite were tested under the monotonic compression and the monotonic and the cyclic uniaxial tension. The curves of the axial stress versus the axial, lateral and volumetric strains show the differences of the behavior of rocks under uniaxial tension and compression conditions. The strain-stress characteristics of rocks under uniaxial tension exhibited non-linearity. The average volumetric strain increased with the increase in the axial strain and in the tensile loads. The results indicated that the Poisson's ratio as well the tangent and the secant moduli decreased with the increase in the tensile loads. When the rocks were subjected to load cycles in the uniaxial tension some residual axial, lateral and volumetric strains remained after unloading. According to the experimental results, the conclusion of a diametrically different behavior of rocks under the tension conditions vs. compression was given.

**Keywords:** *uniaxial monotonic and cyclic compression and tension tests, deformational properties of rock, Young modulus, Poisson's ratio, dilatancy, brittle fracture of rock*

KAZIMIERZ TRYBALSKI, DARIUSZ FOSZCZ, ANDRZEJ KONIECZNY

**Analysis of the Work of Grinding and Flotation Technological System with Application of Block and Transmittance Models and Simulink Matlab Program** • Kwartalnik Górnictwo i Geoinżynieria • z. 3/1, 2007

The paper presents one of the mineral raw materials beneficiation technological systems modeling methods. On the basis of laboratory and industrial results concerning grinding and flotation of copper ores, as well obtained beneficiation characteristics and functional dependences, the model of beneficiation system was done by application of block schemes, transmittance models and Simulink Matlab program. Applying the obtained model in the form of calculating schemes, programmed in Simulink Matlab program, the simulating researches of concerned technological scheme were conducted for changeable feed characteristics. Three possible and probable variants of industrial process course were investigated. This concerned both the changes of selected particle size fraction content as well of copper content in individual particle fractions.

**Keywords:** *copper, processing, modeling, transmittance*