

## SUMMARIES

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### Artymiuk J., Bednarz S.: **Problems Related with Hydraulic Manifold Selection in the Production Wellheads Control Station** • Drilling Oil and Gas 2005 • Volume 22/1

Working parameters of a BOP control station decide about the reliability of systems operation and safety of drilling. The operation system of the station was subjected to high pressures exerted by an external pump control system, co-operating with the valve system, supply cables, pressure accumulators, and hydraulic manifold. Owing to the function performed by BOP, the operating system should provide a reliable operation of working BOP systems. The most important parameters of the manifold are the working volume of hydraulic fluid and control pressure. Values of these parameters condition the quantity and size of accumulator tanks as well as the magnitude of the hydraulic manifold. The distribution of stresses in the manifold under the pressure enables a proper selection of construction elements of the hydraulic manifold.

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### Artymiuk J., Sokalski M.: **The New Drilling Control – Soft Torque Rotary System** • Drilling Oil and Gas 2005 • Volume 22/1

The system reads top drive torque. The soft torque system adjusts the rotational speed according to torque variations measured, achieving dampening of torsional oscillations on the bit and equipment. The system reacts on torque rate of change and adjusts the speed. Increasing torque reduces the speed proportional to the torque rate of change. A controller adjusts the speed according to torque variations measured. Increasing torque indicates sticking of pipe or bit. Decreasing torque increases the speed likewise. The system easily adapts to existing top drive systems, AC, DC or hydraulic.

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### Bednarz S.: **String Tripping and Drawing Operations vs. Blow-up Prevention** • Drilling Oil and Gas 2005 • Volume 22/1

Safety of drilling requires careful control of pressure in the boreholes in the course of drilling operations, tripping of a single casing, exchange of tool replacement as well as tripping/drawing of the string. Regardless the type of well's outlet, the tripping/drawing operations frequently are hindered by fracturing of the walls of the hole, lost circulations, cavings, unexpected flux of formation fluid etc. In a number of cases these effects are due to gross hydrodynamic changes of pressure caused by the movement of the string in the fluid filling up the borehole. When in motion, the string moves with a varying rate. These operations also depend on whether or not they are conducted in an open borehole. Another serious cause of such problems is the lack of well trained crew who would understand the processes taking place in the borehole. Frequently the procedures applied in the first symptoms of eruption are appropriate in the process of drilling, but they are not fit for the tripping/drawing operations. This may lead to an open eruption. Another factor vital for maintaining the readiness to adequately respond to the hazard is the precision of measurements of drilling mud in the trip tank.

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### Bielewicz D., Wysocki S., Wysocka M.: **Analysis of Corrosiveness of Over-Packer NaCl-Based Fluids in the Conditions of Hydrogen Sulfide Influx** • Drilling Oil and Gas 2005 • Volume 22/1

The authors present the results of experiments oriented to determining the corrosiveness of over-packer Na-Cl-based fluids, saturated with hydrogen sulfide, in the area of the BMB field, as well as the selection of the most efficient corrosion inhibitor. The experiments concentrated on the measurement of H<sub>2</sub>S, pH and corrosiveness of over-packer fluids saturated with hydrogen sulfide at temperature 60 and 80°C. The experiments were conducted for two types of solutions: NaCl and NaCl + CMC LV, with the initial pH ~ 10 and 12. Analogous experiments were performed for the above fluids after adding three corrosion inhibitors. The analysis of the results showed that the lowest corrosiveness in the hydrogen sulfide conditions at a temperature of 80°C was obtained for the NaCl-based fluid with CMC LV and admixture of the corrosion inhibitor ANTYKOR PP with the initial pH = 12.

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**Broda P., Kwarciński J., Twardowski K.: The Influence of Sampling Site and Hard Coal Sortment on Evaluation of Methane Content • Drilling Oil and Gas 2005 • Volume 22/1**

This paper is based on the analysis of long-term desorption tests with the use of the USBM – a method applied to document coalbed methane in Poland since the mid 1990s. Tests were performed on coal samples representing five grain classes and samples were taken from six different sites in the technological process of coal mining, processing and post-exploitation processing on the surface. The tests were carried out with the use of variance analysis method with a single (one factor) classification on the example of the Hard Coal Mine “Budryk”.

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**Brylicki W., Stryczek S.: Corrosion Resistance of Injection Grouts Produced at Different w/c Ratio in Magnesium Sulphate Environment • Drilling Oil and Gas 2005 • Volume 22/1**

Setting and hardening of hydraulic binders used in drilling, mining and geotechnology are quite different from those occurring in civil, water or marine engineering. Depending on the degree of mineralization of deposit waters and their chemical composition, the cement grouts applied in mining (including salt mining) as well as those introduced by means of bore hole injection, are exposed very frequently for the extremely hard exploitation conditions. As it results from many years lasting practical experiences, the destruction of cement grouts, particularly in the magnesium sulphate environment, goes on very extensively. In this work the results of experiments on hardened grouts, produced at water to cement ratio varying in the range from 0,4 to 0,6, exposed to magnesium sulphate attack, will be reported. The following cements were taken into account: portland cement CEM I 52,5R – Górażdże, portland fly ash cement CEM II/A – V 32,5 R – Górażdże and metallurgical cement CEM III/A 32,5 NA – Strzelce Opolskie. The durability of hardened grouts in MgSO<sub>4</sub> solutions was tested according to the Polish – European standard PN-EN 196-10.

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**Brylicki W., Stryczek S., Rzepka M.: Durability of Cement Grouts Produced from Metallurgical Cement CEM III/A and Drilling Cement WG in Chloride and Chloride-Magnesium Corrosive Environment in Deep Bore Holes • Drilling Oil and Gas 2005 • Volume 22/1**

The durability of cement protective coat is strongly influenced by the conditions of setting and hardening process in bore holes at significant depth. The efficiency of sealing operation is the consequence of this durability, particularly in aggressive environment and variable geological conditions. In this work the standard properties of fresh and hardened grouts produced using the salt brine and mineral admixtures, exposed to water and highly mineralized solutions, will be reported. The grouts were made from metallurgical cement CEM III/A 32,5 and drilling cement WG with very low C3A content, below 3%. The results of porosity and gas permeability measurements, as a function of curing time in water and corrosive media, will be also presented.

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**Bujok P., Damec J., Drabkova S., Jancik P., Rado R.: Definition of Danger Zones for Gas Bore Holes • Drilling Oil and Gas 2005 • Volume 22/1**

The exploitation of oil and gas has long lasting tradition. Therefore, more and more often there can be found negative results of this activity, above all so called ecologic loads. To these loads belong: a contamination of natural environment, contamination in superficial layer and contamination of water after uncontrolled leaks of rock oil during the mining or processing. Major problem are long closed gas and oil wells. Because of the industrialization of the areas, and also because of the long time, which passed since the end of exploitations, their condition leaves a lot to desire. This paper presents some of the problems concerning technical forecasting of out of operation oil and gas mines contamination zones.

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**Burachok O.: Research of Multicomponent Mixture Filtration in Gas-Condensate Reservoir • Drilling Oil and Gas 2005 • Volume 22/1**

The problem of calculation the development indexes arises during the process of gas-condensate fields development. Very often the actual data are greatly vary from the projected ones. This happen due to neglect of gas-condensate-water mixture component change that took place in the reservoir due to retrograde condensation. The mathematical model of gas-condensate mixture filtration process with consideration of component change is given in this paper. The model includes three equations, one of which is differential, one recurrent and an integral. This system of equations with some assumptions aloud us to give sharp estimation for description of the processes that take place in the reservoir. This method can be used in projection of gas-condensate fields development.

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**Czekaj L., Fijał J., Grzywnowicz I., Jamrozik A.: Influence of Drilling Waste on Selected Physicochemical Properties of Coherent Ground • Drilling Oil and Gas 2005 • Volume 22/1**

The problem of drilling waste salinity is discussed in the paper. The soluble components from soil environment were analysed for their ability to liberate. Attention is also paid to buffer and yield properties of the ground containing drilling waste. The analyses show that washable salts increase the alkalinity and coherence of the soil-and-ground environment.

The salinity level of soil and ground with drilling waste admixture requires draining of this anthropogenic system followed by a suitable agro- and phytoremediation.

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**Duliński W., Ropa C.E.: Analysis of Equations of Flow for Set Distances Between Pumping Stations and the Route of a High-Pressure Gas Pipeline • Drilling Oil and Gas 2005 • Volume 22/1**

Employing equations for pressure drop in high-pressure gas pipelines, calculations were made for a critical length, and on this basis – the distance between the pumping stations. Calculations were conducted with the use of various formulae under the assumption that the  $\epsilon$  ratio of compressibility ranges between 1.25 and 1.8.

Values produced by equations of WNII-Gaz and Institute of Gas Technology, U.S.A. were closest to those obtained with the Jacob equation. The presented example also showed that the recommended distances between pumping stations  $L = 0.5 L_{kr}$  stays within the compressibility ratio. The authors also discussed the issue of a high-pressure gas pipeline as a gas storage for covering uneven gas demands.

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**Fąfara Z., Miska W.: Petroleum Hydrocarbon Contaminants Dispersion in Granular Soil in Light of Laboratory Research • Drilling Oil and Gas 2005 • Volume 22/1**

The phenomenon of flow petroleum hydrocarbon contaminants dispersion, when they migrate in granular soil after their previous on surface spilling, are analysed in the paper. A laboratory measuring post has been presented. The results of measurements for horizontal hydrocarbon dispersion description follow. The measurements were made for three different physical soil models representing typical sandy soil and sandy-mud soil and ethylene, as contaminants. The prepared measuring post creates conditions of similarity. They enable calculation of the amplitude of the incorporated signal during a quantitative interpretation of the received results, which is proportional to the magnitude of flow horizontal dispersion and speed of relocation value front of wave of dispersion in individual models of soils. A strong dependence of coverage and largeness of horizontal hydrocarbon dispersion wave from filtering soil properties has been proved. The mechanism of scattering additionally depends on primary porous media saturation with water.

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**Fąfara Z., Rychlicki S.: Influence of Soil Properties on Hydrocarbons Petroleum Migration on Basis of Laboratory Analyses • Drilling Oil and Gas 2005 • Volume 22/1**

The mechanisms connected with migration of petroleum hydrocarbon substances in soil and influence of soil properties on their character are presented in the paper. Laboratory measuring stand are described, and exemplary results migration ethylene and car fuel in two models of soils: sandy and sandy-mud, after spilling hydrocarbons on surface are presented. The results have been used for qualitative and quantitative analyses of the influence of properties of soils on the course of hydrocarbon substance diffusion. The rate of vertical filtration of individual contaminant substances in the considered models of soil at various depths, where measuring points were located, was assessed. With the received values it was possible to show the influence of the absolute permeability ratio and primary moisture retention curve on the character of migration. A relationship of coverage and velocity of horizontal dispersion of hydrocarbons with parameters of soil has been indicated.

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**Gonet A., Lewkiewicz-Małysa A., Macuda J.: The Analysis of Possibilities of Mineral Waters Management in Krosno Region • Drilling Oil and Gas 2005 • Volume 22/1**

Mineral waters quite commonly occur in Poland, especially below groundwater layers. They are widely used in industry as chemical and medical material and utilized as waters for consumption purposes. As chemical material they are employed in producing table salt, as well as iodine, bromine, magnesium and other chemical elements or compounds. As medical material they are applied in health-resort medicine. Recently mineral waters, especially those of low mineralization level, have been used on a large scale for consumption. The geological conditions of Krosno region have been presented in the paper and mineral waters occurring in Ciężkowice sandstones have been characterized as well. The physico-chemical composition of particular mineral waters that occur in the regions of Iwonicz and Krosno, have been compared and analyzed as to evaluate the exploitation possibilities of these waters in Krosno for drinking and balneological purposes. Water from the Mac Allan 4 water bore can be used for mineral water drinking cure, while water from the Mac Allan 11 water bore can be used for production of iodine-bromine medical salt.

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**Gonet A., Stryczek S., Wójcik K.: Evaluation of Cement Stabilization of Clayey Soil Contaminated with Diesel Oil • Drilling Oil and Gas 2005 • Volume 22/1**

The results of researches on the change of consistency, mechanical and filtration properties of soil under the influence of diesel oil are presented in the paper. The usability of cement for the stabilization of soil contaminated with diesel oil has been assessed.

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**Jewulski J., Zagrajczuk D.: Selection of Parameters of Contamination Removal from Soil on the Basis of Laboratory Experiments • Drilling Oil and Gas 2005 • Volume 22/1**

The results of laboratory experiments on the efficiency of oil-products removal from soil by washing out with various chemicals are presented in the paper. The first stage of experiments concentrated on the measurement of surface tension of selected surfactants on the contact with various hydrocarbons, e.g. oil, diesel oil, lubrication oil. The samples of contaminated soil were then washed out with selected surfactants. The hydrocarbon matter content was determined with an analyzer OMS2. The obtained results were presented in a graphical form and then analysed.

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**Kaliski M., Staško D.: Power Prognoses for Poland by the Year 2025 • Drilling Oil and Gas 2005 • Volume 22/1**

Precise determination of perspective demand for energy minerals underlies the power policy of Poland. A number of factors influencing the development of power situation in changing economic conditions causes that prediction concerning energy carriers is very difficult and burdened with high degree of uncertainty. To rationally take decisions concerning energy carriers it is crucial to know the trends in power demands in over ten years' perspective. The prognoses made in the last years are listed and preliminarily analysed for the differences in the projected need for energy by the year 2025.

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**Kasza P.: Application of Biopreparations for Increasing the Efficiency of Hydraulic Fracturing of Rocks • Drilling Oil and Gas 2005 • Volume 22/1**

Bioproducts are widely use in oil and gas industry. Some of them can be used for removing welbore zone damage caused by polimer residue after drilling or stimulation treatments. There are commercial available bioproducts for removing polimer residue from proppants and fracture face after hydraulic fracturing treatment.

Laboratory study results of proppant damage removing by using bioproducts are described in this paper . Tests were done using BM sand as a proppant and HPG croslinked gel as frac fluid. Commercial available bioproduct Bio 2 was used for proppant bed cleaning. Positive results was reported after the tests, esecially in low reservoir temperature.

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**Kopey B., Kopey V.: Development of Equipment for Paraffin Build-up Prevention • Drilling Oil and Gas 2005 • Volume 22/1**

The great number of oil well in Ukraine and Europe are equipped by sucker rod pumping units. In many wells, especially in Dolyna oil fields in Ukraine the paraffin build-up on sucker rods and tubing is observed.

To prevent paraffin build-up we propose some improvement of equipment for sucker rod pumping. All examples of equipment were designed and optimized by means of 3D computer modeling and finite element method (FEM) analysis.

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**Kopey B., Kopey V., Lyskanych M.: Tool-Joint Thread by Finite Element Method Modeling • Drilling Oil and Gas 2005 • Volume 22/1**

Tool-joints of drill pipes are very loaded elements of drill column. They are exposed to the action of longitudinal loads due to the proper weight of column, transversal forces and bending moments, axial vibrations, internal pressure and corrosion destruction of metal by drilling mud. Tool-joint threaded connection is tightened usually by optimal torque, determined by full-size fatigue tests when mean stress in pin measuring plane achieves 0.3–0.4 of yield strength [1].

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**Kosowski P., Rychlicki S., Stopa J.: Cost Analysis of CO<sub>2</sub> Separation from Exhaust Gases to be Stored Underground • Drilling Oil and Gas 2005 • Volume 22/1**

In this article authors present the problem of estimating the cost of carbon dioxide separation. This problem is connected with the Kyoto Protocol regulations and limits of greenhouse gases emission. This article shows the costs of two technologies of carbon combustion for electricity generation: Pulverized Coal (PC) combustion and Integrated Gasification Combined Cycle (IGCC) combustion. Some economical aspects of the geological sequestration are also mentioned.

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**Kuleshov A.A., Tarasov Y.D., Dokoukin V.P., Nicolaev A.K.: Dynamic Load Compensation at Usages of Oil and Gas Pipelines • Drilling Oil and Gas 2005 • Volume 22/1**

In the report considered urgency of account in calculations of pipe lines of dynamic loads from seismic influences of natural and technical nature. Dependencies are offered on the base of studying the features of arising the striking loads for the determination of their value. For excluding the resonance processes and reducing the dynamic loads are offered technical deciding on blanking the elevated pipe line fluctuations, protected by patents Russia.

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**Lewkiewicz-Małysa A., Winid B.: Selected Aspects of Mine Waters Management • Drilling Oil and Gas 2005 • Volume 22/1**

Utilization of mine waters has become a serious problem in mining and processing industry. Appropriate practices of waste mining waters management should be implemented to minimalised the destructive impact on the environment. The waste mine waters differ in physiochemical composition which is a result of natural and sometimes technological processes. Salinity of such waters is the major problem. Two possible methods of saline mine waters management have been discussed in the paper – reprocessing chemical material (salt production) and underground storing. The assessment has been based on collating chemical analysis results of salt mine leakage waters, water from copper ore mine and formation brine from gas deposit mine. The examined waters differ in their salinity levels, calcium and magnesium content. Yet, the most significant difference is the lack of heavy metals in water from salt mine leakage. The influence of the above factors on the choice of mine waters utilization method has been discussed. Possible problems that may occur while storing the salt mine waters in the underground rock structure have been pointed out as well.

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**Macuda J.: Analysis of Changes in Groundwater Chemistry near Industrial Landfills • Drilling Oil and Gas 2005 • Volume 22/1**

Industrial waste is environmentally noxious. This mainly refers to waste produced by chemical industry, mainly phosphatic fertilizers and plastics. Such waste contains considerable amounts of washable organic and inorganic components. Seepages penetrating the groundwaters from untight or badly sealed landfills contain ammonia, arsenic, chromium, lead, copper, zinc, iron and organic compounds. The results of groundwater monitoring of groundwaters near the analyzed landfill show their qualitative changes and the measures for improving it. The obtained results can be a basis for further decisions regarding the reduction of the negative impact of the landfill on groundwaters and surface waters.

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**Macuda J., Zawisza L.: Presence of Methane in Lignite Mine KWB “Bełchatów” S.A. • Drilling Oil and Gas 2005 • Volume 22/1**

Gases in coal-bearing strata are accumulated both in the coal structure and in the pores of the accompanying rocks. They may take the form of free gases present in the fractures and porous spaces, or may be adsorbed in coal. Free gases make up ca. 1 to 5% of volume of all gases accumulated in the exploited coal seams. The authors present results of many years’ analyses of methane concentration within the opencast KWB “Bełchatów” S.A., accounting for the geological conditions and advancement of mining works. Methane emission to the atmosphere greatly depends on dewatering of the field and the magnitude of the mined overburden and advancement. Dewatering of the rock mass preconditions methane migration through a system of fractures, pores with developed hydraulic contacts and fault zones. Another important factor responsible for increased methane emission is relaxation of the deposit strata while removing the overburden. This has been shown on the maps of changes methane concentration in the opencast area.

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**Nagy S., Macuda J.: Designing Dicyclopentadiene Removal from Groundwaters • Drilling Oil and Gas 2005 • Volume 22/1**

Odorant, after being introduced to natural gas, increases safety level of gas use both in communal and in industrial applications. However, when the odorant leaks, the environment becomes contaminated with a hardly removable substance. This mainly applies to groundwaters. By the early 1990s, the dicyclopentadiene (DCP) was used as an odorant for industrial purposes. Geological and hydrological conditions of a region contaminated with DCP are presented in the paper. Then follow mathematical results of modelling of DCP removal from groundwaters with the aerization method. To update and confirm the conditions defined in the model, it is suggested to monitor the process every two months over a year.

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**Pinka J., Marcin M.: Remediation of Soil Contaminated with Hydrocarbons – New Ecological Approach in Oil and Gas Industry • Drilling Oil and Gas 2005 • Volume 22/1**

During oil and gas production, refining, and transport, soils can be contaminated when fluids are spilled or released into the ground, when the drilling fluid becomes contaminated in the reserve pit, or when pipeline breaks or leaks release crude oil and/or produced water into the soil. Cleaning up this contamination can add significantly to the operational costs of oil and gas production and transport. This article deals with soil contamination detection as well as methods and equipment used in soil cleaning. Presented article is focused mostly on the contamination of soil with hydrocarbons connected with hydrocarbons production, treatment and transport in Slovakia. A part of the article is dedicated to the modern ENZYMEDEG technology used for decontamination in Slovakia.

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**Rado R., Lubaś J.: Drilling and Use of Absorptive Boreholes for Injecting Mine's Discharge Waters • Drilling Oil and Gas 2005 • Volume 22/1**

Researches and works on limiting emissions of contaminations to water, soil and air have been conducted for years. Coal mines have to tackle this problem as well. As it is not possible to completely eliminate contaminants, an idea occurred to inject discharge mine's waters into absorptive layers or to special retention tanks, instead of surface waters. This concept is very interesting owing to a very high pollution of surface and groundwaters in the areas with the on-going underground exploitation. Discharging of mine's waste waters to the rock mass produces financial profits in the form of reduced expenditures on treatment operations and lowering of contaminations in water and ground environments. Technical aspects of performing an injection well for discharge mine's waters in the area of the Upper Silesian Coal Basin are presented in the paper.

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**Rogowska-Kwas R., Macuda J., Procyk B.: Al<sub>2</sub>O<sub>3</sub> – Modified Porous Glasses for Water Environment Protection • Drilling Oil and Gas 2005 • Volume 22/1**

Porous glasses representing the Na<sub>2</sub>O–B<sub>2</sub>O<sub>3</sub>–SiO<sub>2</sub> group were analysed with the emphasis on hydrocarbon contaminations removal from water environment. Depending on their chemical composition and temperature at which the removal process was carried out, the glasses varied in their surfaces of sorption. The results of tests on the texture of porous glasses exhibited differences in the size and volume of meso- and micropores. These properties may have an ultimate influence on the efficiency of hydrocarbons removal from water solutions. The paper gives the results of laboratory analyses of gasoline-removal from water with the use of porous glasses. To show the influence of the size and volume of pores on sorption properties, analyses were made on two porous glasses modified with 0.3 Al<sub>2</sub>O<sub>3</sub> and 0.6 Al<sub>2</sub>O<sub>3</sub>, for which the removal process was performed at 575 or 700°C.

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**Rzyczniak M., Józwiak A.: Influence of Time of Cogged-Bits Application on Mechanical Parameters of Borehole Drilling Technology • Drilling Oil and Gas 2005 • Volume 22/1**

An attempt was made to answer the question of whether or not in a given span of time it is possible to observe significant changes in the values of mechanical parameters of borehole drilling technology in a given geological region. To solve this problem, the changes of axial stress, rotary velocity and multiplication of axial stress and rotary velocity for selected types of cogged-bits were analysed with the use of statistical mathematics methods. The analyses were made for drilling tools exploited in the years 1993 to 2000 for drilling in the Miocene strata near Tarnów, Poland. Equations of simple regressions were determined and significance tests for correlation coefficients and linear regression coefficients were carried out with the objective to assess the strength of dependence between the analysed parameters.

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Siemek J., Büttner P., Maniu Duse D., Koeckritz V., Kretzschmar H.-J., Krzystolik P., Nagy S., Rychlicki S., Pinka J., Stryczek S.: **Leonardo da Vinci Project CeLGAS – International Education Initiatives in Teaching of Gas Engineering • Drilling Oil and Gas 2005 • Volume 22/1**

This paper describes status of realization of CeLGAS pilot project Leonardo da Vinci programme for e-learning and conventional teaching of engineers in natural gas engineering. The structure, objectives and realization program is given. The project is realized in co-operation Polish, German, Slovakian and Romanian Universities, Vocational Community (two organization) and two research centers. The objective of the CeLGAS Project is to enhance the co-operation between European universities, research companies and vocational communities in the area of vocational education in the gas engineering. The main objective of the CeLGAS is to develop and maintain the complex of: Conventional and Distance Learning Vocational Centre with highly educated specialists.

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Simon K., Gaurina-Međimurec N., Matanović D., Krištafor Z.: **Cleaning Capability of Different Fluid Systems Used in Coiled Tubing Drilling • Drilling Oil and Gas 2005 • Volume 22/1**

Coiled tubing drilling (CTD) worldwide has grown tremendously in the last decade. In well drilling application gas, foam and liquid (mud) can be used as drilling fluid. The use of a liquid is much simpler and cheaper than the other alternatives and should therefore be considered wherever possible. Using of biopolymer fluid systems is widely accepted. One of the most important fluid system characteristics is hole-cleaning capability, because coiled tubing rotation is not possible. Results of laboratory testing of different fluid systems as well as fluid flow simulation for different geometries of wellbore in term of efficient cuttings transport during coiled tubing drilling are presented in the paper.

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Stopa J., Wojnarowski P., Rychlicki S.: **Computer Simulation of the Mature Oil Field Revitalization by the UGS Operations • Drilling Oil and Gas 2005 • Volume 22/1**

In this paper the compositional simulation results of the underground storage of natural gas in depleted oil reservoir are presented. The physical phenomena, resulting in possible revitalization of the residual oil are briefly discussed. Simulation results show that during the gas withdrawal period the stripping of higher hydrocarbon components from residual oil lead to increase of the Wobbe index. Other significant effect is increasing of the oil production resulting from the UGS operations.

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Stryczek S.: **Present State and Perspectives of Geoengineering Methods • Drilling Oil and Gas 2005 • Volume 22/1**

A division of geoengineering methods has been proposed, accounting for geotechnics, geomechanics and engineering geology, in their broadest sense. Geoengineering started to develop in new, unknown domains, i.e.: civil engineering, environmental engineering, mining construction, trenchless construction, hydrotechnical construction, surface earthworks. One may risk a conclusion that geoengineering is going to grow in power in the coming decades. Therefore, it is vital to develop researches in this respect and also educate future geoengineers who could undertake this challenge. It should be born in mind that unprofessional staff, erroneous projects and badly done surface and underground works may result in grand catastrophes of unpredictable scale.

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Stryczek S., Gonet A., Wiśniowski R.: **Directions of Development of Geoengineering Methods • Drilling Oil and Gas 2005 • Volume 22/1**

Since the beginning of the 20th century the economic development has been related with the constantly increasing need for information and power sources, stimulating at the same time higher demands in the communal sector.

These needs determine the necessity to develop and modernize geoengineering methods as well. Technical advancement enabled elaboration of new technologies, being an alternative for the traditional methods used so far. Deficiency of areas that would be geomechanically suitable for the construction of new building and engineering objects and the high costs of deep foundations spurred the idea of searching new, cheaper and more efficient methods of reinforcing and sealing ground and rock mass. The directions and scope of applied geoengineering methods are presented in view of various engineering activities to be undertaken.

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**Stryczek S., Gonet A., Wiśniowski R.: Influence of Water-to-Cement Ratio on Technological Parameters of Fresh Slurries Made from Multicomponent Cements • Drilling Oil and Gas 2005 • Volume 22/1**

By the close of 2004, a production of very economic multicomponent cements with high fly ashes content, ground, granulated blast-furnace slags and low klinker content. Set sealing slurries made from multicomponent cements have a specific phase composition and a suitable microstructure, providing a warranty of highest exploitation durability. The results of experiments on fresh sealing slurries made from multicomponent cement CEM V/A – 32.5 of different water-to-cement ratios are presented in the paper. Special attention has been paid to the influence of the water-to-cement ratio on rheological model and its parameters.

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**Stryczek S., Gonet A., Wiśniowski R.: Influence of Superplasticizers on Rheological Properties of Pozzolan Slurries • Drilling Oil and Gas 2005 • Volume 22/1**

Cementing of the casing as well as sealing and strengthening of the soil and rock mass in different geological conditions requires using appropriate sealing slurries, having strictly determined technological parameters. Increased requirements with respect to sealing slurries used for drilling and geoengineering purposes cause that new types and new concentrations of mineral additives are sought for to meet the particular needs. The results of laboratory experiments concentrating on the influence of various concentrations of silica fly ashes on technological parameters of slurries made from Portland-slag cement CEM II/B-S 32.5 are presented in the paper.

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**Śliwa T., Baniak K.: Applicability of Drains to Heat Recuperation from Ground and Groundwaters • Drilling Oil and Gas 2005 • Volume 22/1**

New energy sources have to be searched for a number of reasons. An idea of using drains for installing a recuperation system of low-temperature heat of the ground and groundwaters is proposed in the paper. This can be an alternative for horizontal ground heat exchangers, especially when the area has been already drained. The paper consists of a description of technical issues connected with the construction and use of such drains. Problems related with making such a system to be encountered during exploitation, are presented in the paper. The applicability of the described concept depends on the operational conditions of the drain as a system regulating water relations in the top strata of the ground. The conditions of drainage and heat exchange are discussed in the paper.

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**Śliwa T., Starowiejski K.: Application of a Water Network as a Source of Low-Temperature Energy in Systems Employing Heat Pumps • Drilling Oil and Gas 2005 • Volume 22/1**

The paper deals with the applicability of tap water as a low-temperature source of energy. This kind of energy becomes more and more popular nowadays, owing to its accessibility. The most frequently applied sources of dispersed heat are groundwaters, surface waters, rock mass and air. The recuperation of heat from soil can be performed twofold. The first way lies in the circulation of energy carrier in a special system of pipes disposed in the ground. The other one, is a recuperation of heat from deep waters through especially designed wells. Heat of surface waters can be received through special installments.

The authors present an idea of linking these two concepts through waterworks – a kind of heat exchanger between the water from surface or deep intakes and the ground. Tap water can flow through a heat pump in an open system, provided the volume of the running water is sufficiently huge to satisfy the power demands. A quasi-closed system is also possible. The regulation of the circulation loop in the existing waterworks lies in linking the nearby pipe branches through an additional section of the network.

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**Tarkowski R., Uliasz-Misiak B.: Sources of Carbon Dioxide for Enhanced Oil Recovery • Drilling Oil and Gas 2005 • Volume 22/1**

The article presents possibilities of gaining CO<sub>2</sub> from large point sources of emission in Poland for enhanced oil recovery by underground injection of this gas. This technology has been used for decades, especially in the USA, where natural and anthropogenic gas is used. In Poland due to little reserves and natural gas production, anthropogenic CO<sub>2</sub> for EOR process could be used. The biggest CO<sub>2</sub> emitters are presented (above 500 Gg/year), basic technological process which produce the gas, industrial plants locations, concentration of carbon dioxide in flue/industrial gases are characterized. Economical and environmental aspects of using CO<sub>2</sub> for EOR are underlined. Location of the biggest CO<sub>2</sub> emitters was defined in connection with hydrocarbon reservoirs location which have various sizes and stages of exploitation.

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**Tarkowski R., Uliasz-Misiak B., Szarawarska E.: Methods for Monitoring Underground Storage of CO<sub>2</sub> • Drilling Oil and Gas 2005 • Volume 22/1**

Underground storage of CO<sub>2</sub> requires control by using monitoring. It needs to be done at the moment of choosing the site for sequestration and also after finishing the process of injection. The aim of monitoring CO<sub>2</sub> underground storage is tracing CO<sub>2</sub> spreading in geologic formation, controlling injection the integrity of wells during and after operation, verification of CO<sub>2</sub> volume, which was injected and controlling parameters of injection.

The article presents methods for monitoring underground storage of carbon dioxide used all over the world.: measurement of reservoir and exploitation parameters, direct and indirect (well logging, time lapse seismics, crosswell seismics, electromagnetic monitoring of CO<sub>2</sub> sequestration, electric resistivity tomography, gravimetric monitoring of aquifers, passive monitoring) methods for detecting the CO<sub>2</sub> plume, satellite and air bore methods for detecting land surface deformation.

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**Uliasz-Bocheńczyk A., Mokrzycki E.: Review of the Possibilities of Carbon Dioxide Utilization • Drilling Oil and Gas 2005 • Volume 22/1**

The problem of greenhouse gas emissions, and mainly carbon dioxide, possibilities of emissions limitation and ways of utilization of emitted CO<sub>2</sub> are among the most important issues connected with environmental protection investigated in many countries in the world. The Authors of the publication reviewed methods of carbon dioxide utilization, trying to acquaint the reader with this complicated problem, which has influence on environmental protection. The publication introduces methods for direct sequestration of carbon dioxide (CO<sub>2</sub> storage in oil and gas reservoirs), indirect (afforestation) and so called advanced methods (e.g. mineral carbonation).

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**Wilk S., Galas M., Mijal M.: Impact of Landslides on Gas Pipelines • Drilling Oil and Gas 2005 • Volume 22/1**

The factors influencing landslide formation are discussed in the paper. Landslide structure has been analysed in view of factors causing landslide stabilization. The influence of water on phenomena taking place in an unstable ground with a gas pipeline inside, are discussed. Stresses in a creeping soil, forming a landslide, are analysed. The influence of water filtration through the landslide ground is depicted. A graphical representation of landslide impact on gas pipelines disposed in an unstable ground is discussed.

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Wilk S., Galas M., Mijal M.: **Forces Acting on Gas Pipelines Disposed in Unstable Soils** • Drilling Oil and Gas 2005 • Volume 22/1

The factors influencing the stability of slopes are analysed in the paper. Mathematical dependences for determining the pressure of creeping soil of the slope on a gas pipeline disposed in an unstable soil are determined. During the exploitation of a gas pipeline disposed in unstable soil, the soil moves around the pipeline owing to its compressibility. The movement of the soil around the gas pipeline is proportionate to the increase of soil load (linear dependence of deformation and load). With time, as the soil load increases, the displacement of soil advances, and the soil under the gas pipeline starts being pushed out. A partial increase of shear zones around the pipeline (boundary state) can be observed. Gradually, as the load of the soil increases (mainly due to hydration of the ground), the soil is further displaced and the soil under the pipeline starts being pushed out. A partial increase of shear zones around the pipeline (boundary state) can be observed. Further dislocation of the soil from under the gas pipeline takes place without burdening the soil at a simultaneous pushing out of the soil from under the pipeline and disposal of the soil on the pipeline's surface. Boundary loads are exceeded resulting in further creeping of soil with the gas pipeline.

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Wiśniowski R., Stryczek S., Skrzypaszek K.: **Concept of Research Stand for Drilling Fluid Measurement** • Drilling Oil and Gas 2005 • Volume 22/1

Fluids used in the drilling practice are analysed in the paper. New apparatuses used for measuring the pressure and volume of flowing fluid are reviewed. Modern equipment recording experiment results are compared. A concept of universal research stand for laboratory and field experiments is presented.

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Wiśniowski R., Stryczek S., Skrzypaszek K.: **Methodics of Determining Generalized Reynolds Number for Drilling Wells Described with the Herschel–Bulkley Rheological Model** • Drilling Oil and Gas 2005 • Volume 22/1

The authors give a characteristic of fluids applied in the drilling practice, and indicate the purposefulness of application of the Herschel–Bulkley model for describing their rheological properties. Then they discuss the influence of generalized Reynolds number on determination of non-Newtonian fluid pressure loss, with focus on fluids described with the Herschel–Bulkley rheological model. In the lack of possibility to analytically determine the generalized Reynolds number for a fluid described with the Herschel–Bulkley rheological model, numerical methods were suggested. Basing on a special algorithm and software, the results were exemplified.

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Wiśniowski R., Ziaja J.: **Analysis of Friction Forces Acting in the Course of Drilling a Pilot HDD Well** • Drilling Oil and Gas 2005 • Volume 22/1

The possibilities of predicting weight on bit or draft force in the course of specific technological stages of horizontal directional drilling are presented in the paper. For this purpose, factors influencing the process of string and drilling bit movement are analysed. Then follow dependences, on the basis of which friction forces acting in the borehole can be determined. Practical application of the proposed procedures is exemplified.

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Wojna-Dyłał E., Zawisza L.: **Determining Contours of Oil and Natural Gas Fields on the Basis of Hydrodynamic Criteria** • Drilling Oil and Gas 2005 • Volume 22/1

The size and shape of a hydrocarbon field are determined by geological boundaries of strata and surface of the contour. The location of contours depends on the flow of formation waters, reservoir properties of rocks and properties of reservoir fluids. The mapping method of hydrodynamic hydrocarbon traps presented in this paper to determine the site of the field contour and so the deposit boundaries for oil and natural gas.

To define the field contours it is necessary to work out a structural map of water-oil-bearing horizon, potentiometric map for reservoir water, map of specific gravity for reservoir water, map of specific gravity of oil in reservoir conditions, map of porosity, map of permeability and map of capillary pressures. Then the methodics presented in the paper should be applied. The procedure lies in performing some simple algebraic operations on maps. The realization of the discussed methodics is presented on the example of the oil field Czerwieńsk, in the Main Dolomite strata in the Fore-Sudetic area.

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**Wójcikowski A., Wójcikowski M.: Usually Drilling Guar Muds to Drilling Geothermal Wells • Drilling Oil and Gas 2005 • Volume 22/1**

The results of research of guar gum behavior in different well conditions have been presented. This article includes the characteristics of apparatus used in this researches. Mentioned, the possibility of too high formation damage of origin sandstone permeability. Additionally, described the mechanism of damage inner structure of guar which provide to flush the sandstone.

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**Wysocki S., Bielewicz D., Strauss H., Wysocka M.: Polyampholyte-Potassium Drilling Mud Based on Non-Modified Bentonite for Drilling in Clayey Rocks • Drilling Oil and Gas 2005 • Volume 22/1**

The results of analyses of polyampholyte-potassium drilling mud with a double hydration inhibition system for drilling in clayey rock are presented in the paper. The experiments show that the ampholytic polymer AMF-4-HCl provides a non-modified bentonite mud good rheological properties, low filtration, high resistivity to increased temperature and contamination with mono- and multivalent salts.

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**Zawisza L., Macuda J., Chećko J.: Evaluation of Mine's Gases Hazard in the Liquidated Hard Coal Mine "Niwka-Modrzejów" • Drilling Oil and Gas 2005 • Volume 22/1**

Closing of hard coal mines, especially stopping the process of mine's water pumping, results in a reconstruction of the Carboniferous water-bearing horizon, leading to the intensification of gas flux to the near-surface zone ("piston effect"). Stopping the fans considerably enhances the movement of mine's gases towards the surface in closed mines. Stopping the fans results in accumulation of gases in workings and old workings. The surface method of geochemical mapping is especially useful for detecting methane and toxic gases migration from hard coal mines in the process of their closing. The results of geochemical analyses performed in the area of the hard coal mine "Niwka-Modrzejów" are presented in the paper. The obtained results and their comparison with the existing geological-reservoir model prove that intensification of mine's gases flow towards the surface continues through the zones of tectonic discontinuities, crackings, loosened zones in the Upper-Carboniferous sedimentary rocks. The thickness and lithology of the overlying overburden, plays a decisive role in the limitation of mine's gases migration.

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**Zawisza L., Piesik-Buś W.: Hydrodynamic Modelling of Sedimentary Basins on the Example of the Permian Basin in the Fore-Sudetic Monocline • Drilling Oil and Gas 2005 • Volume 22/1**

Theoretical fundamentals of modelling and hydrodynamic classification of sedimentary oil basins are presented in the paper. Hydrodynamic classification of oil basins is based on the effects differentiating the liquid phase, especially the movement of reservoir fluids. Definition of this type of hydrodynamic basin lies in determining its development stage at present: before, during or after the invasion of infiltration waters. Bearing in mind data of reservoir pressures distribution, directions and flow rates of groundwaters, as well as properties of reservoir fluids, three main types of sedimentary basins have been distinguished: juvenile (centrifugal), transient (centripetal) and mature (static). Physical phenomena and interrelations taking place between accumulated hydrocarbons and the accompanying reservoir waters and pressures predestine the first type as most perspective; the third type is usually eliminated as non-perspective. The so far final results of hydrodynamic analyses for the Permian basin in the Fore-Sudetic Monocline prompt the conclusion that the basin is a very perspective juvenile (centrifugal) basin.

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Ziaja J., Baniak K.: **Technical Analysis of a Horizontal Borehole Drilled under the Uszwica River in Brzesko Okocim, Poland** • Drilling Oil and Gas 2005 • Volume 22/1

A horizontal borehole under the Uszwica River bed underwent a technical analysis. It was based on *in situ* analyses of mechanical parameters of drilling and laboratory tests of the collected samples. Mechanical parameters of drilling used in the project were assessed. The paper is closed with conclusions and recommendations for such drilling works to be done in the future.

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Ziaja J., Wiśniowski R.: **Review of Cutting Tools for HDD** • Drilling Oil and Gas 2005 • Volume 22/1

The newest drilling tools used for HDD technology are presented in the paper. New designs and new applications of these tools for specific geological conditions are described. There has been no codification of such tools so far, therefore the authors suggested guidelines for tools classification for the purposes of horizontal drilling technology. They also formulated recommendations concerning technical decisions on drilling tools selection on the basis of their wear analysis.