

## SUMMARIES

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### Artymiuk J., Bednarz S., Falbo G. Małozieć T.: **Development and Implementation of Drill Rig Hydraulic Drives** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Rotary and translatory motions are a basic form of transforming other type of energy on mechanical energy in the driving systems. The proper use of fundamentals of hydromechanics decides about the design and build of the driving systems, hydraulic systems with hydraulic control. Technical feasibility, especially tightness of hydraulic systems, is of big importance. This factor has been a drawback in the power hydraulics applications for years. A higher reliability of sealings caused a fast development of hydraulic drives. Hydraulic drives as the advantages have wide possibilities of control and transmission of drive to long distances, high efficiency, relatively simple design of control elements, possibility of making still and flexible drives as well as direct connection of the motor with the working machine or its sub-assembly. These drives require qualified attendance and strict following instructions and technical procedures. The dynamic torque of hydraulic drives is considerably higher than in other types of drive, resulting in short time constants of the system. Hydraulic Drilmec rigs have been supplied for different applications (oil, gas, geothermal and water researches) and tested in many field conditions – besides workover operations yet – confirming the flexibility, reliability and good performance of this idea. They are operating all around the world having a number of technical advantages.

*Keywords: drill ring, hydraulic drives*

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### Artymiuk J., Kielbik W.: **A Concept of Coal-bed Methane Removal with Drilling Wells in the Coal Mine Szczygłowice** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

During coal production in the Polish mines about milliard m<sup>3</sup> of methane are generated each year. Only the fourth part of coal-bed gas is directed to the methane-removal system. Most part of it is used, whereas the remaining one goes to the atmosphere, having an disadvantageous impact on the climate. Recently a technology of methane removal through surface drilling wells has been successfully worked out. By using drilling wells and specialist technologies, methane is recuperated from the coal beds, which is treated as recuperation of gas from unconventional sources.

*Keywords: coal, methane removal from mines, unconventional energy sources*

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### Bednarz S., Knez D.: **The Influence of Internal Weld Flash of Tool Joint on Drilling Fluid Flow** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Drill pipes called drill rods as an essential part of the drill string are used in horizontal directional drilling. The application of frictional welding is the most common method in plain pipes and tool joints connection. The outside and inside surfaces flash at the ends of parts joined arises after this operation as a result of high contact force, simultaneous rotation of tool joint and high temperature in accordance with the materials melting. The outside surface flash is removed by cutting method, however big problems are encountered during removal of the flash inside of the pipe. The paper concerns the influence of the internal flash on the drilling fluid flow during making the hole. The ununiform flash shape creates difficulties in the analytical description of this phenomenon. According to this, computer simulation appears to be a very effective tool for solving this problem. Friction losses and velocity vectors field in the flash zone are evaluated on numerical calculations basis.

*Keywords: horizontal directional drilling, weld flash, influence*

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**Bednarz S., Kopey B., Urba R.: Prevention and Control of Blowouts Parameters at Oil Well Workover Operations • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Many years production of oil and natural gas requires well service and at times internal intervention or workover operations. Considerable technical risk is involved in these operations. This is a result of the well equipment technical condition after a lot of years' exploitation, severity of environment affecting on downhole equipment as surface wellhead facilities. The operation program shall account for many factors, types and wellhead design, christmas trees, tubing, packers, circulation valves, subsurface safety valves, wireline tools and pressures, production rate and well fluid features. Well killing at many factors affected is focused on replacing of formation fluid with operation fluid non-contaminating the well and reservoir. At the end of this operation reducing of surface wellhead pressure to atmospheric pressure level is requested. Technical and environmental conditions affecting on some well killing procedures are presented in the paper.

*Keywords: oil well, workover, production*

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**Bęben D., Jewulski J., Janocha A.: Demulsifiers and Their Influence on Oil Exploitation Processes • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

A considerable part of exploited oil is emulsion, which according to the World's statistics constitutes 25–35% of extracted oil. The presence of emulsion decreases oil production from wells, resulting in the increase of cost of its separation and acceleration of corrosion of production utilities. A number of methods of oil emulsion separation exist; however majority of them are based on the surfactants (demulsifiers). A specific surfactant may be efficient only for a given emulsion. It cannot be used for other emulsion without prior studies and analyses as may result in stabilization or formation of hardly separable multiple emulsions. The demulsifier should be so selected as not to cause corrosion of utilities. It should also be non-toxic and easily removable from sewage water. These issues are discussed in the paper.

*Keywords: oil exploitation, demulsifiers, oil emulsions*

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**Boy A.: Development of Reservoir Simulation Mittelplate – a Challenge for Technology • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Mittelplate, the largest German offshore oil field, is located in the estuary of the Elbe river in the North Sea. From October 1987 until June 2005, 15 million tons of oil were produced from three different reservoir sections. These reservoirs, called Beta, Gamma and Epsilon/Delta, show different production history and behavior. The bulk of the oil was produced from the Gamma and Epsilon/Delta reservoirs. These reservoirs are high-permeability reservoirs with an active aquifer. In contrast, the lower-permeability reservoir Beta contains most of the reserves of the field to be produced. This reservoir has no active aquifer and needs water injection to maintain pressure and production. Because of limited water availability, optimum distribution of the injected water is essential for optimum recovery from the field. Development of such a configuration with complex boundary conditions can only be achieved through reservoir simulation. First, small models were developed to solve problems like single well productivity estimation, aquifer size estimation and communication between wells within a pilot flood area. The base of field knowledge grows continuously during the life cycle. New seismic interpretation and new geological studies, including differentiated facies descriptions, lead to new reservoir models with different geological realizations. These realizations were studied to simulate possible future developments. In addition, facility constraints like pump limitations and water conditioning are limiting factors for the field development. Combining facility constraints with different geological models is the main task in simulation today. The target is not to arrive at one 'optimum' forecast, but to show the spread of possible field development scenarios from which an appropriate one can be chosen. This complex situation is a challenge for the Mittelplate consortium of RWE Dea AG and Wintershall.

*Keywords: oil field, reservoir simulation, geological*

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**Brudnik K., Przybyło J., Winid B.: Evaluation of Hydrogeological Conditions of the Northern Region of Wieliczka Salt Deposit Based on Discharges from Leak WVI-32, WVII-16 and WVI-6 • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Leaks WVI-32, WVII-16 and WVI-6 are located at the northern boundary of the Wieliczka salt deposit. The leaks in the region occurred as a result of the mining of salt using the leaching chamber method. These leaks are a significant hydrological phenomenon as they constitute 56.6% of total flux to the mine and are unsaturated brine. The changeability of the leak inflow discharges since their occurrence has been discussed in the paper. The result of the analysis indicates that the most dangerous inflows were from leak WVI-32.

*Keywords: hydrogeological, salt deposit, leaks*

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**Bujok P., Bříza K., Pánek P., Svozil L.: Possibility of Geosequestration of CO<sub>2</sub> in Exploited Hydrocarbon Deposits • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The authors deal with problems of reduction of carbon dioxide emissions, carbon dioxide capture and possibilities of long-term storage in suitable storage sites, especially from the point of view of the so-called geosequestration (utilisation of geospheric sinks). It is hydrocarbon deposits where mining operations are being completed that seem to be the most suitable potential storage spaces. There, deposited CO<sub>2</sub> sweeps out residual oil and increases the total recovery by 10–15%.

*Keywords: geosequestration of CO<sub>2</sub>, recovery, reduction of CO<sub>2</sub>*

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**Danayev N.T., Akhmed-Zaki D.Zh.: Influence of Temperature of Water to Oil Displacement • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

In work a task is examined about ousting of oil taking into account influencing of temperature of the begun to the swing water, different from the temperature of productive layer for the plane-parallel cases of motion of liquids.

*Keywords: oil, temperature influence, oil production*

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**Drożdżak R.: Kaczyński Tool and Method for Determining Filtration Coefficient of Ground • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The theoretical assumptions and practical principles of the R. Kaczyński method of laboratory determining filtration coefficient of grounds are presented in the paper. The technical and geometric parameters of an experimental stand made at the Faculty of Drilling, Oil and Gas AGH-UST are discussed, and the results of measurements are presented.

*Keywords: filtration coefficient, Kaczyński method*

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**Dubiel S., Ziaja J.: Identification of Causes of Natural Gas Inflow to a Well, Depending on the Pressure Conditions Encountered during Drilling-Up Hydrocarbon Deposits • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The tasks and basic technological solutions accompanying drilling up the hydrocarbon deposits are presented in the paper. The advantages and disadvantages of these solutions are discussed in the aspect of safety of work, protection of primary permeability of reservoir rocks as well as the reliability of the obtained data about the reservoir parameters. A block diagram of identification of causes of gas inflow was presented, accounting for the pressure conditions accompanying drilling-up hydrocarbon deposits. Final conclusions are formulated.

*Keywords: drilling of oil wells, drilling-up deposits, decision block*

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Dudlja N.A.: **Intensification of Cuttings Removal** • Drilling Oil and Gas 2007 • Volume 24  
• No. 1

The author presented results of investigations on improving the efficiency of cuttings removal. Gum turbolizers increasing the flow rate of the mud in the annular space are used. Basing on the field experiments with the use of turbolizers, their distribution in the drill string is optimized. Additionally, experiments on the number and distribution of nozzles in the bit were made in view of improving the process of cleaning the well's bottom from cuttings.

*Keywords: well cleaning, removal of cuttings, turbolizers*

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Duliński W., Ropa C.E.: **Selection of Parameters for the Hole Exploitation of Carbon Dioxide in the Aspect of Hydrates Prevention** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The problem of exploitation of a gaseous well with carbon dioxide is presented in the paper. The pressure drop was calculated in the near-well zone for various values of yield and permeability of reservoir rock. The exploitation was analyzed on the basis of calculated pressure drop in the drill string. Owing to the considerable decrease of temperature per unit of pressure drop, a mantle heater of gas with a limiting contraction was planned in the surface utilities as a protection against ice blocks or hydrates formation.

*Keywords: exploitation, gas, carbon dioxide*

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Fafara Z.: **Analysis of Influence of Selected Parameters on the Simulation Results of Oil Products Filtration in the Ground Medium** • Drilling Oil and Gas 2007 • Volume 24  
• No. 1

The modelling of processes accompanying oil products contaminating the ground-water environment lead to constructing a mathematical model of migration. Its parameters are constants or variables describing the properties of the porous medium, oil product contaminating ground and water, as well as parameters characterizing thermodynamic conditions in which the contamination took place. By using numerical methods for solving the system of mathematical equations, additional parameters are introduced, e.g. time step, and spatial step of realization of calculations. The aim of the paper is analysis of influence of discretization of spatial variable on the final results of simulation.

*Keywords: filtration, ground, mathematical model of migration*

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Fafara Z.: **Comparison of Experimental Results and Numerical Analysis of Oil Products Migration in the Ground-Water Medium** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The results of experimental results of migration of selected oil products in the ground-water environment were compared with the results of numerical simulation of the process. The laboratory measurements were performed at a special laboratory stand using three physical loose ground models corresponding to the sand and sand-dust conditions. The simulation was made with the use of a mathematical model of the oil contamination migration in the ground-water medium, applying fundamental physical laws and empirical dependences. The parameters of the mathematical model were defined on the basis of the results of independent laboratory experiments and literature data.

*Keywords: filtration, ground, mathematical model of migration*

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**Fąfara Z., Miska W.: Discussion on the Influence of Ground Wetting on Filtration Rate of Hydrocarbons on the Basis of Experimental Results • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

A depth profile of wetting of physical ground models was determined at a laboratory stand for analyzing migration of hydrocarbons in a ground medium. Analyzing the migration of oil product contaminants, the vertical filtration rate was established in the ground. A strong dependence on depth was found. The filtration value decreased over 10 times at a distance of about 1 m. The aim of the paper was explaining this phenomenon. A mathematical model describing fluid filtration in a wetted ground medium was selected on the basis of the literature study. On this basis the authors tried to explain the discrepancy of the experimental results.

*Keywords: ground wetting, filtration rate, hydrocarbons*

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**Gonet A., Stryczek S., Brudnik K.: Limitation of Surface and Quaternary Waters around a Backfilling Well TP-17 in the Salt Mine “Wieliczka” • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The Salt Mine “Wieliczka” has been subjected to a number of hazard during its 7 centuries history. The most important hazard comes from water. Prevention and protection works have been undertaken to minimize the risk. On the example of a backfilling well TP-17 there were presented: its location, tasks and causes of water migration to the mine, technologies of closing the well TP-17 and sealing up the neighboring rock mass, results of geoengineering works.

*Keywords: water migration, geoengineering, closing the well*

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**Grigoraş I.-D.: Rehabilitation Analysis of a Natural Gas Field from the Transylvanian Depression • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The paper has the following objectives: Physical-geological and production data analysis; Natural gas resources estimation using statistical and material balance methods; Production history analysis; Production problems identification; Rehabilitation possibilities recommendation.

*Keywords: natural gas, production, rehabilitation*

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**Grigoraş I.-D.: Study of Underground Natural Gas Storage in a Reservoir from the Transylvanian Depression • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The paper has the following targets: the analysis of the geological model, the determination of the optimum storage and exploitation conditions and the evaluation of the possibilities of increasing the storage capacity of the reservoir.

*Keywords: underground storage, natural gas, Transylvanian Depression*

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**Janocha A., Steliga T., Bęben D.: Analysis of Properties of Crude Oil from the LMG Field • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Oil field Lubiatów-Międzychód-Grotów (LMG) is diversified geologically. Samples of each part of the oil field deposits possess peculiar properties. Smooth exploitation can be carried on only when the composition and properties of the natural gas and the crude oil well are known. Special attention should be paid to threats connected with

precipitating hydrates, paraffins, asphaltenes and salt. The results of analyses of oil field LMG are presented in the paper. The analysis of these results points out to the trends to be taken into consideration when designing technological solutions.

**Keywords:** *LMG field, oil properties, oil exploitation, hydrates*

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**Jewulski J., Zagrajczuk D.: Laboratory Experiments on Thermochemical Demulsification of Oil • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The results of laboratory experiments on the efficiency of various surfactants in the process of thermochemical demulsification of selected oils from the Polish oil fields are presented in the paper. The correct selection of a demulsifier on the basis of individual investigations shall enable best decomposition of the oil-water emulsion. Laboratory tests were carried out at 4 various temperatures 40, 50, 60 and 70°C for various times of sedimentation of the emulsion. Some of the results are presented in tables or in a graphic form. On this basis the best demulsifiers could be chosen for the given types of oil.

**Keywords:** *laboratory experiments, demulsification, oil, thermochemical method*

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**Kaliski M., Jedynek Z., Trzaskuś-Żak B.: Factors Shaping World's Oil Prices in 2006 • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

This paper presents key factors influencing the world's oil prices in 2006. It introduces major social and economic events reflected in price levels, and gives a characteristic of the world's oil market. It also sets out a price forecast for the year 2007.

**Keywords:** *oil, oil prices*

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**Kaliski M., Staśko D., Trzaskuś-Żak B.: Restructuring and Privatization of Polish Gas Sector under Its Liberalization • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

This paper presents an analysis of transformations in gas sector under current EU regulations, Polish law and government programs accepted for implementation since 1996, when after the transformation of state-owned enterprise PGNiG the joint stock company Polskie Górnictwo Naftowe i Gazownictwo (PGNiG) S.A. fully owned by state, has been established. The paper contains analysis of subsequent restructuring programs including organizational transformation and privatization. It also refers to EU legal acts and amended Energy Laws Act. The paper attempts to evaluate the transformations implemented as a result of government programs and laws.

**Keywords:** *restructuring, privatization, gas sector*

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**Kasza P.: Reaction Rate Decrease as a Key to Successful Acidizing Treatment in High Temperature Carbonate Reservoirs • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Laboratory research of use emulsified acid for matrix acidizing treatment in high temperature carbonate reservoirs was presented in this paper. The main goal of this research was introduce this technology to use in stimulation wells of BMB oil field. After the research a pilot treatment has been done. After obtaining positive results from this treatment, this technology has been used for stimulating BMB oil and gas wells. Oil and gas production increase and differential pressure drop were observed after acidizing operations.

**Keywords:** *acid, carbonate reservoirs, emulsified acid*

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**Kędracki M.: Degradation of Surface Caused by Trenchless Methods Application and the Protection Measures • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The authors of the paper present known ways of protecting surface against degradation caused by the use of trenchless methods as well as exemplary protection of building objects against the consequences of tunneling. The analysis of feasible systems of stresses around the tunnels leads to determining a safe width of artificial roof protecting the surface against the tunnelling consequences.

*Key words:* trenchless technology, tunneling, subsidence

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**Kozáková E., Škvareková E.: Sanation Technologies Leading to Regeneration and Revitalization of Environment Components • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Sanation technologies are technologies that are leading to regeneration and revitalization of objective environment component (soil, water, air) at a level approaching to natural situation. The aim of sanation works is elimination of hygienic and ecotoxic risks resulting from existence of contamination ground or underground water. Fruitfulness of sanation action depends on different factories more detailed in the objective article. At the same time in this article sanation techniques suitable to cleaning of grounds (*ex situ*, *in situ*), insulating techniques and finishing screens- barriers are listed.

*Keywords:* sanation technologie, regeneration, revitalization, environment componets

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**Lewkiewicz-Małysa A., Winid B.: Interpretation of Chemical Indicators Based on Hydrocarbonate Waters from the Iwonicz Anticline • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

In the region of Iwonicz anticline lowly-mineralized, medium-mineralized and highly-mineralized waters occur. They have been made accessible both at their natural outflows (springs) and by bore-holes and wells. There are such types of waters as  $\text{HCO}_3\text{-Ca}$ ,  $\text{HCO}_3\text{-Ca-Mg}$ ,  $\text{HCO}_3\text{-Cl-Na}$  containing also specific element components. On the basis of chemical analyses carried out for eleven water intakes over last ten years, the proportion among the ions has been calculated and ions interrelations and variability during the examined period of time have been compared. Discussed values of indicators and their diversity may speak about a relation of supplying water intakes with active zone of water exchange.

*Keywords:* chemical indicators, hydrocarbonate waters

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**Lewkiewicz-Małysa A., Macuda J.: Manageability of Non-used Groundwater Intakes in the Krynica Region • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The geologic and hydrogeologic conditions in the Krynica region are presented, and the groundwater chemistry and hydrochemistry classified. This refers to unmanaged intakes of weakly mineralized and mineralized water. Most frequently these are springs, which owing to their yield, location and high quality, can be used as drinking water intakes. High-yield springs, localized close to the human residences, can be used for supplying people with drinking water; springs in the neighbourhood of tourist routes can be used for tourist purposes, after prior adaptations.

*Keywords:* Krynica, drinking water, spring water, mineral water, aerated water

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**Macuda J.: Evaluation of Changes of Groundwater Chemistry in the Area of a Chemical Waste Landfill • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Chemical industry exerts a very strong and diversified influence on all environmental elements. One of the existing ways of its negative influence is deposition of waste produced during various technological processes. This mainly refers to the waste generated during nitrogenous fertilizers and plastics production; the waste contains considerable amounts of washable organic and inorganic components, especially in the case of leaky landfills. Such waste, mainly disposed in untight landfills, is a significant source of contamination of surface and groundwaters. The results of laboratory analyses of groundwaters near the landfill and analyses of changes of concentrations of selected indices created bases for trends of qualitative changes of waters flowing out of the analyzed area.

*Keywords: groundwater, environmental elements, landfill*

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**Macuda J., Gasiński J., Lesiecki J.: The Use of Pipes Made of Polyester Resins for Dewatering Wells in Lignite Opencase BOT Belchatów S.A. • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

High requirements are set before materials to be used for drilling dewatering wells in lignite opencasts, in the strongly dewatered rock mass. Traditional materials, e.g. steel are in some cases substituted by artificial materials of unique technological and utility parameters. This especially refers to dewatering wells realized within opencasts where the casing has to be cut with the advancement of overburden removal and lignite exploitation. Cutting of the casing should be done prior to the digger operation, in order to avoid scoop damaging on the contact with a steel pipe. Presently these works are realized by specialized teams of miners, which is expensive and necessitates synchronizing with the extraction operation. The authors presented technical and technological selection criteria of polyester pipes HOBAS for casing large-diameter dewatering wells in the geologic and mining conditions of the lignite mine BOT Belchatów S.A. A unique construction and high technological parameters of these pipes make them easily removable by the scoop, and simultaneously maintaining the remaining strength parameters. The resistivity of these pipes to corrosion, as well as the possibility of linking the pipes with prefabricated subs DCL easily and safely are very advantageous.

*Keywords: drilling, dewatering wells, polyester pipes*

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**Macuda J., Łukańko Ł.: Influence of Natural Gas Control and Measurement Stations on the Acoustic Environment • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The natural gas control and measurement station, being basic technological units of natural gas distribution create considerable acoustic hazard for the environment. The amount of noise emission and thus the impact on the acoustic environment greatly depend on the design of the applied equipment, work parameters of the station and the location, frequently near housing estates. The influence of selected natural gas control and measurement stations on deterioration of the acoustic atmosphere in the close vicinity is discussed in the paper. Stations of various design and various technological parameters were analyzed.

*Keywords: environment, natural gas*

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**Macuda J., Winid B.: Analysis of the Quality of Groundwater near Czarna, Poland • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The hydrocarbons and the related horizons of formation and edge waters in the Carpathians cause that this region is very specific as far as hydrogeology is concerned. There occur regular waters, waters of increased mineraliza-

tion, therapeutic mineral waters as well as native waters and saline waters. Their applicability is mainly related with their chemical composition. The concentration of specific elements and their interrelations illustrate processes taking place in water as it is running, and also its quality. The results of analyses of chemical composition of groundwaters sampled in two (partly closed from the bottom) oil wells KRN Czarna, i.e. No. 5 and 67, springs Pod Kieratem as well as a new well S-1<sub>FZ</sub> are presented in the paper. On this basis they were assessed qualitatively in view of their usability as regular drinking water, mineral water or therapeutic water.

*Keywords: quality groundwater, mineral water*

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**Nagy S.: The Simplified Estimation of Wellhead Pressure in ReInjection Geothermal Processes • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Exploitation and reinjection of geothermal waters after partial recuperation of their enthalpy has become a world's common. Two types of reservoir collectors can be encountered in the Poland: pore- and fracture-type collectors. Physical phenomena related with the injection of fluids to the pore- and fracture-type medium can be divided into hydrodynamic (pressure and fracturing effects) and chemical/thermodynamic phenomena connected with a change of temperature and chemical composition of fluid. The classical formulas has been adopted to include rate depended skin, change viscosity and density of water with injection temperature. Chemical effects are not analyzed in this paper. Some conclusion related to reinjection processes have been included based upon own observation of injection processes in Poland.

*Keywords: geothermal waters, reinjection,*

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**Nagy S., Soboń J.: Geothermal Waters ReInjection into Sandstones and Carbonate Reservoir Rocks • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Exploitation and reinjection of geothermal waters after partial recuperation of their enthalpy has become a world's common practice since the 1970s. Recently the "used" thermal waters have been usually injected to the pore- and fracture-type collectors. There are two reasons for which injection methods are applied in low: to maintain the formation pressure (especially important for high enthalpy resources), and secondly, because of environmental problems with discharging great amounts of saline waters (low enthalpy resources). Two types of reservoir collectors can be encountered in the geothermal formation in the Poland: pore- and fracture-type collectors. Physical phenomena related with the injection of fluids to the pore- and fracture-type medium can be divided into hydrodynamic (re-pressure and fracturing effects) and chemical/thermodynamic phenomena connected with a change of temperature and chemical composition of fluid. Some conclusion related to quality of re-injected waters has been included based upon literature and own observation of injection process in Poland.

*Keywords: exploitation, geothermal waters, reinjection*

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**Oracz H., Kalinowski K., Olma T.: Risk and Risk Management of Transmission Capacity on a Gas Market • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

This paper is aimed at showing relations between securing gas supplies continuity and the cost of purchase of rights to the transmission capacity in the process of international gas trade and transmission. The importance of the transmission system for the process of creating an international (European) gas market has been described as well. It also presents the significance of effective connections between gas trade and transmission capacity reservation in the transmission system which guarantees the safety of gas supplies from exploring companies to the end user. The key role of the connections between different transmission systems was significantly stressed in this paper as it should result in complete supplies diversification and the competition on the gas market.

*Keywords: risk management, gas market, gas*

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**Pinka J., Sidorová M., Vizi L., Wittenberger G.: Russia is a Major Player in World Energy Markets • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The Russian Federation is a major player in world energy markets. It has more proven natural gas reserves than any other country and is among the top ten countries in proven oil reserves. It is the world's largest exporter of natural gas, the second largest oil producer and exporter, and the third largest energy consumer. But Russia may be "number one" in oil production and get ahead of Saudi Arabia. Over 70 percent of Russian crude oil production is sent directly abroad for export, while the remaining 30 percent is refined locally. Russia's oil exports are sent via the multiple-branch Druzhba pipeline to Belarus, Ukraine, Germany, Poland, and other destinations in Central and Eastern Europe (including Hungary, Slovakia, and the Czech Republic). The remaining crude oil exports are sent to maritime ports in the Black Sea and Baltic Sea and are sold on world markets.

*Keywords: energy, energy market, oil production*

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**Pinka J., Wittenberger G., Sidorová M., Vizi L.: Utilization of Geothermal Energy for Electric Power • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The geothermal energy is gaining more and more attention today. The geothermal energy is an energy derived from the heat of the earth's core. It is clean, abundant, and reliable. If properly developed, it can offer a renewable and sustainable energy source. There are three primary applications of geothermal energy: electricity generation, direct using of heat, and ground-source heat pumps. The results of geological research put Slovakia to the regions with the high geothermal potential. The project for the geothermal energy utilization in the area of east Slovakian Neogen is coming in to the phase of production tests these days. The article is also focused on the descriptions of every phase of geothermal water utilization.

*Keywords: geothermal water, geothermal well, heat pumps, geothermal reservoir, geothermal power plant, steam, electricity*

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**Pokrzywniak C.: Analysis of Technical Solutions and Efficiency of Glycol-based Processes of Natural Gas Drying • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Gas extracted from a deposit contains a number of contaminations. One of them is water. The main technology of gas drying presently applied worldwide is based on glycol. The most important technological schemes of drying used in the Polish gas fields are presented and the basic processes related with the lowering of glycol losses in gas and increasing the efficiency of drying processes are discussed. The efficiency of methods in view of the obtained dew point of water vapor is presented in the paper.

*Keywords: natural gas, drying of gas, gas transport*

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**Prigorovska T.O.: Modelling of PDC Drill Bit Whirling • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

At this work it was made the attempt to explain the process of PDC drill bit whirling as an integral part of drilling in real conditions. It was shown that the causes of PDC whirling are not only the rock mass heterogeneity, but drill bit mass misbalance too and it is impossible to obtain absolutely stable drilling system. PDC drill bit previous models were based on the assumption all cutting forces are stable and that PDC drill bit oscillation is self appearable or stochastic. Based on the theory of probability it was defined the value of cutting forces on every PDC cutter and generalized drill face reaction and it was drill bit oscillation and whirling were analyzed.

*Keywords: drillstring, oscillations, PDC bit, whirling, kinetic energy, rock massive*

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**Qureshi A., Miska S., Miska W.: Analysis of the Use of a Down-hole Mechanical Cleaning Device for Efficient Wellbore Cleaning • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Field evidence indicates that in highly deviated and horizontal wells, cuttings tend to accumulate on the lower side of the annulus under the influence of gravity and eventually may form a non moving bed. This leads to considerable increase in equivalent circulating density (ECD) and drag/torque as well may result in a differential pipe sticking and wellbore stability problems. A good control of drilling fluid rheological properties, flow rate and drillpipe rotational speed may not be sufficient in some instances. Also, the commonly used techniques of circulation at high flow rates, using sweeps of high/low viscosity and high density may not be possible and, at times, prove to be ineffective. To overcome this difficulty, a down hole cleaning subs (mechanical cleaning devices – MCDs) are incorporated in the drill string to agitate the cuttings bed by bringing the cuttings into suspension for subsequent carrying out by the drilling fluid to the surface. These devices are furnished with “blades” which produce the desired hydrodynamic effects as the drill string is rotated and helps to dislodge the cuttings from the bed. The hole cleaning is thus governed primarily by the agitation created by the device, the rheological properties of the mud and the drilling fluid flow rate. Taking these factors into account, a study was conducted at Tulsa University Drilling Research Projects’ (TUDRP) large scale wellbore simulator to experimentally determine the cleaning efficiency of a Mechanical Cleaning Device (MCD). From the database generated through the experiments, correlations were obtained by performing regression modeling to extend the results to field applications. These correlations are based on dimensionless parameters and predict reasonably accurately the *in-situ* cuttings concentration when the MCD is installed in the drill string. The results are useful for designing of the optimal hydraulic program for extended reach, high angle and horizontal wells.

**Keywords:** *Drilling, Down-Hole Mechanical Cleaning, horizontal wells*

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**Rado R., Lubaś J.: A Concept of Drilling Production HDD Wells and Determining the Oil-Water Contour • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

With the advancement of drilling technology, directional wells became a commonly applicable solution for opening reservoirs. Lowering of capital costs of drilling and increasing the accuracy of a well can be obtained by using directional drilling with a pilot section. With this technology it is possible to accurately determine the oil-water contour, which in turn, increases possibility of drilling a directional well in an oil-bearing horizon. The technology of making a pilot well followed by a directional one is presented in the paper. The authors concentrated on presenting the HDD technology in view of its capital costs.

**Keywords:** *drilling, directional wells, oil-water contour*

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**Rado R., Lubaś J.: Attempt at Determining a Drilling Model with PDC Tools on the Example of Drilling in Selected Geologic Structures • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

PDC tools have high drilling advancement and footage. These tools are efficient and accelerate the drilling rate, thus lowering the cost of drilling. Proper determining of optimal parameters of drilling technology is related with the optimization process. For doing so, it is necessary to identify a mathematical model of drilling with given tools in a respective geologic interval. The mathematical model of drilling with PDC tools for the Carpathian Foredeep is presented in the paper.

**Keywords:** *PDC tools, drilling model, drilling of wells*

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Rybicki C., Blicharski J.: **Water Movement Problems in the Process of Gas Production and Underground Gas Storage** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

This paper concerns some problems of exploitation of water drive gas reservoirs. There are presented methods for defining drive mechanism of gas reservoirs and methods for estimation of intensity of water influx from adjacent aquifer. On the basis of presented mathematical model authors has made calculation for a chosen gas reservoir working in natural water influx conditions.

*Keywords: gas production, water influx, material balance, aquifer*

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Rzepka M., Stryczek S.: **Laboratory Methods of Assessing Durability of Hardened Cement Slurries Used for Sealing Wells** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The paper deals with laboratory methods of assessing durability of hardened cement slurries used for sealing drilling wells lie in evaluation of, e.g. strength parameters of hardened cement slurry, its porosity and gas permeability as well as the type of the formed microstructure. There are also presented exemplary results of analyses of hardened cement slurries obtained for samples long exposed to the simulated well conditions in highly mineralized waters and temperature 95–120°C.

*Keywords: cement slurry, well, pipe cementing*

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Sabyrova M.: **Exploitation of Petroleum and Gas in Kazakhstan** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The article describes the extraction of petroleum in Kazakhstan. This is an important part of the national industry, providing economic safety and independence of the country. The article also describes an international collaboration in the extraction of raw materials. It characterizes the dynamics of extraction and transportation of raw materials in Kazakhstan.

*Keywords: exploitation oil and gas, transportation, petroleum industry*

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Škvareková E., Kozáková L.: **Possibilities of Sanation Methods of Rock Surroundings Pollution of Oil Products** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

With an escape of oil products can come to a threat eventually to disadvantages of environment. Presence of oil products in underground water and in rock surroundings activates unfavourable changes of physical and chemical structure of watered surroundings. At contamination of areas it is necessary to choose a suitable sanation method. The methods of sanation at contaminated areas can be dealt according to various criterias. In the article sanation methods, procedures of their interpretation and the visual example of results through the medium ecoprobe 5 at locality Lom Včeláře are described.

*Keywords: oil products, underground water, sanation methods*

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Solecki T.: **Use of Absorptive Wells for Environmental Protection Purposes on the Example of Ustroń Resort** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

An absorptive well (C-1) was implemented in the 1990s. It was designed in co-operation with the workers of the Faculty of Drilling, Oil and Gas AGH-UST as the first in Poland absorptive well for removing after-therapeutic bath brines from the active biosphere. The use of well C-1 as a recuperator of after-therapeutic bath brines made it

possible to protect the surface water of the Vistula River with its rich biological life in its upper course, thus contributing to the fame of the place, now also recognized on Europe's scale. The operation of the absorptive well was presented in view of the operations aimed at increasing the absorptive character of the near-well zone and the geologic conditions.

**Keywords:** *absorptive well, environmental protection, after-therapeutic bath brine*

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Steliga T., Kapusta P., Jakubowicz P.: **Ex situ Bioremediation of Soil from Classic Gasworks Area Polluted with Petroleum Hydrocarbons • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

This paper undertakes issues related to the problem of purification of soil contaminated as a result of classic gasworks activities, which are now longer in use. Prepared chromatographic methodologies which allow for qualitative identification and quantitative determination of individual aliphatic and aromatic (TPH, PAH) hydrocarbons in soil from selected gasworks are presented. The results of the research on remediation of soil polluted with petroleum hydrocarbons (TPH, PAH) in semi-field scale with application of basic bioremediation and bioaugmentation with indigenous microorganisms are discussed. The research allows controlling a progress of remediation, selecting optimal doses of biogenic compounds and setting up duration of the process. The whole cycle of soil remediation was monitored with the use of gas chromatography (GC). Estimation of biodegradation degree of individual aliphatic hydrocarbons was based on changes in their soil concentration and accepted biodegradation indicators: C<sub>17</sub>/pristane and C<sub>18</sub>/phytane ratios. Particular attention was paid on biodegradation of PAH which were present in substantial concentrations in polluted soil. The elaborated chromatographic methodology for the determination of PAH in soil allowed for estimation of biodegradation referring to individual compounds. Moreover, an attempt of preparation TPH and PAHs degradation model with the use of 17 $\alpha$ (H),21 $\beta$ (H) – hopane was undertaken.

**Keywords:** *bioremediation, petroleum hydrocarbon, remediation*

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Stopa J., Rychlicki S., Kosowski P.: **Forecast of Economics of Underground Gas Storages in Poland • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Issues related with economics of underground gas storages in Poland are presented in view of the situation in Europe. The basic analyzed topic is prices of commercial gas storing. This type of activity is not presently carried out in Poland, though it might be if the available storing space was increased, and competition of Polish Oil and Gas Company came on market. Selected prices in some Europe's countries are presented, whereas the variants of forecast commercial prices are given in view of the economic and technical assumptions. The results of calculations reveal that the prices of UGS in Poland could be competitive in relation to the West European prices.

**Keywords:** *economics, underground gas storage, gas price*

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Stopa J., Rychlicki S., Wojnarowski P.: **Application of Multilateral Wells in Oil Fields at the Late Phase of Exploitation • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Multilateral systems as compared with the conventional wells offer a number of advantages, e.g. possibility of increasing resources through opening a part of the unproduced reservoir, acceleration of production, lowering the cost of realization of exploitation project owing to the use of a common vertical section for a number of horizontal or inclined branches. Thanks to the high oil price, now this type of wells is an attractive alternative of opening deposits at any stage of exploitation. The technical efficiency of a multilateral well was assessed on the example of a partly depleted oil field in Poland. Using computer simulation methods, a comparative analysis of vertical, horizontal and multilateral wells was carried. Moreover, the efficiency of these wells was evaluated. According to the simulation results, the use of a multilateral well significantly increased the production and uniform depletion. This was due to the fact that a large part of the field was being exploited.

**Keywords:** *multilateral well, oil exploitation, depletion index*

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Stopa J., Such P., Rychlicki S.: **Theoretical and Laboratory Analysis of Triazine Sorption in a Porous Medium** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Sulfate Reducing Bacteria (SRB) create considerable problems in oil fields and natural gas storages. Hydrogen sulfide (H<sub>2</sub>S) is their metabolic by-product, which linking with iron ions forms Fe<sub>x</sub>S<sub>y</sub> sediments. The results of research works carried out in co-operation with the Institute of Oil and Gas as well as Faculty of Drilling, Oil and Gas AGH-UST in Cracow are discussed in the paper. Laboratory experiments were based on the reservoir core material of one of the underground gas storages in Poland. Original experimental and interpretation methodics was presented. The sorption ability of rocks depending on the concentration of active components (sym-triazine) in the solution was determined. On this basis the dependence of injected biocide and the biocide concentration in the rock could be established.

**Keywords:** *gas exploitation, sorption, triazine, self reducing bacteria*

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Stryczek S., Gonet A., Rzyczniak M., Czekaj L.: **Swelling of Mineral-chemical-organic-ground Mixtures** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The results of studies of determining liability to swelling of chemically treated mixtures of waste drilling mud with organic and ground admixtures are presented in the paper. The investigations were carried out as a part of a project on methods of drilling waste processing and managing [5]. In the course of the analyses, the following parameters were determined: natural humidity, swelling humidity, swelling indices, degrees of swelling, mineral-chemical-organic ground mixtures. The trends of changes of swelling indices, depending on the composition of the mixtures, were also determined.

**Keywords:** *geoengineering, ground, swelling of ground, laboratory experiments*

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Stryczek S., Gonet A., Wiśniowski R.: **Influence of Temperature on Technological Properties of Sealing Slurries Used for Geoengineering Works** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Sealing slurry should meet a number of requirements resulting from the specific conditions encountered in the injection wells during rock mass sealing and reinforcing operations. Sealing slurries used in the geoengineering works should provide proper course of injection procedures and be resistant to the reservoir conditions. Owing to the atmospheric conditions in which injection is performed (high amplitude of temperature), this factor should be accounted for when working out recipes. The results of investigations of the influence of temperature (5, 10, 20°C) on the technological properties of sealing slurry based on the metallurgical cement CEM III/B – 32.5 and CEM III/C – 32.5 are presented in the paper.

**Keywords:** *geoengineering, sealing slurries, laboratory experiments*

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Stryczek S., Wiśniowski R., Gonet A.: **Influence of Plastifiers on the Rheological Properties of Sealing Slurries for Geoengineering Works** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Apart from the selection of proper method and technology, one of the most important factors affecting the efficiency of sealing ground and rocks with geoengineering methods (hole injection) is the selection of a sealing slurry having proper technological parameters adjusted to the existing geologic, geotechnic, mining and hydrogeologic conditions. One of the most important parameters of fresh slurry are its rheological properties (parameters and rheological model). With well selected rheological parameters it is possible to calculate flow resistivities in the circulation system, which in turn, results in: selection of technological parameters of injection (time and pressure of injection), range of penetration of the slurry in the injected medium. The results of analyses of influence of selected Polish plastifiers on rheological properties of sealing slurries are presented in the paper.

**Keywords:** *geoengineering, sealing slurries, plastifiers, rheological properties*

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Such P., Turkiewicz A., Kapusta P., Stopa Jerzy, Rychlicki S.: **Application of Biocides for Limiting the Development of Bacteriae in an Underground Gas Storage** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The technology of injecting biocides has been used in the Underground Gas Storage in Wierchowice for years. This was a response to the presence of biogenic hydrogen sulphide in the stored gas, caused by the metabolic activity of Sulfate Reducing Bacteria (SRB). The authors presented studies oriented to the use of biocides for limiting the development of bacteriae in the UGS in Wierchowice.

**Keywords:** *underground gas storage, bacteriae, biocides*

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Tataru A., Piteiu M.A., Stefanescu D.-P., Vlasin I.: **New Technical Considerations of Romgaz Company Regarding Drilling, Completion and Testing of the Natural Gas Wells** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

In our specific activity especially designed for new gas reserves discoveries and also for the rehabilitation of the mature (brown) gas fields there are some special situations encountered in the current practice, beside the general and most common cases. The paper reveals our new experience in drilling, completion and testing the natural gas wells, through some case studies described in detail.

**Keywords:** *drilling, testing gas well, rehabilitation*

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Twardowski K., Drożdżak R.: **Determining Ground Water-tightness in Laboratory Conditions** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The literature devoted to methods of determining water-tightness of ground in laboratory conditions is surveyed in the paper. Basing on theoretical premises and experience, the most favorable conditions of applicability of specific methods are formulated.

**Keywords:** *water-tightness, laboratory conditions, hydraulic conductivity*

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Vasyuchkov Yu. F.: **Evaluation of Methane Extraction from Coal Fields** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Methane recovery from the coal fields (MRC) is the volume of the pure (100%) methane which is extracted from anything site and containing rocks of the seam. The conception "methane recovery" includes the economical aspect because the recovery of the fuel must be profitable.

**Keywords:** *coal field, methane extraction*

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Wilk S., Galas M., Traple J.: **Evaluation of Technical State of Exploited Steel Gas Pipelines** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The evaluation of technical state of steel gas pipelines after a long time of exploitation are presented in the paper. The evaluation methodics was exemplified. The field and laboratory results of evaluation of technical state of steel pipelines after a long exploitation time were quoted in view of the corrosion processes as well as strength tests on the pipeline material.

**Keywords:** *exploitation of gas pipelines, corrosion, strength tests*

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**Winid B., Brudnik K., Przybyło J.: Evaluation of Hydrogeological Conditions of Wieliczka Salt Deposit in the Region of Leak WVI-32, WVII-16 and WVI-6 Based on Chemical Parameters Changes • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

Leaks WVI-32, WVII-16 and WVI-6 are unsaturated as compared to halite. The analysis of chloride and sulfate content and hydrochemical sulphate ratio has been discussed in this paper. The range of  $\text{SO}_4^{2-}$  content is similar for all the investigated leaks and higher than the Cl content range. The quantity and differentiation of chloride content are various in the presented leaks. The correlation index value of the analyzed chemical parameters (chloride, sulphate and hydrochemical sulphate ratio) was used for estimating the hydrochemical state in the investigated region.

*Keywords: hydrogeological, salt deposit, leaks*

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**Wiśniowski R., Stryczek S., Skrzypaszek K.: Development of Investigations on the Rheology of Drilling Fluids • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

The development of investigations on the rheological properties of fluids applied for various engineering works is presented in the paper. A historical outline of measuring devices and research methods is given. The novel design of measuring apparatuses, with their advantages and disadvantages, are discussed. In view of the legal aspects for oil industry, regulations defining the principles of measuring and determining rheological parameters of fluids, the development of measuring methods and possible modifications of the existing procedures are outlined.

*Keywords: rheology of drilling fluids, measurement principle, measuring procedures*

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**Wiśniowski R., Ziaja J.: Designing Large Volume HDD Wells • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

HDD wells are made for various geoenvironmental purposes, e.g. geoenvironmental, geotechnical, hydrotechnical, construction, telecommunications works, engineering and environmental applications for hole and opencast mining. Owing to the technological and logistic variety of applications, HDD wells are divided into small-, regular- and large-diameter. The technology of performing the first two types has been fully perfected, the large-diameter HDD wells still require additional organization-technological procedures to be implemented. The lack of such solutions causes break-downs and complications, elongating the time technological operations and increasing additional costs of realization of the project. A methodology of designing and performing large-diameter HDD wells, elaborated in line with the UNIDO standards at the Faculty of Drilling, Oil and Gas AGH-UST is presented in the paper.

*Keywords: horizontal directional drilling, unido standard, designing*

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**Wójcikowski M.: Novel Methods of Glycol Revitalization • Drilling Oil and Gas 2007 • Volume 24 • No. 1**

A brief analysis of the state of glycol revitalization in the Polish industry is given in the paper. The author presented advantages of microwave heating, indicating the possibility of using this method for TEG revitalization. A laboratory stand was made with the main components: a microwave boiler RM 800 produced by "Plazmatronika" in Wrocław, Poland, and a microprocessor apparatus for volumetric measuring water with Karl Fischer reagent DL 39 produced by the Swiss Mettler Toledo. The author described the obtained results and briefly analyzed them indicating very advantageous influence of vacuum in the process of glycol tri-ethylene revitalization with the use of microwave radiation.

*Keywords: oil industry, glycol revitalization, laboratory experiments*

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Wysocki S., Bielewicz D., Wysocka M.: **Research of New Cationic-starch Muds Influence onto Changes of Ceramic Filters Permeability** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

In this paper results of investigations of new drill-in muds with cationic polymers are presented. Rheological properties and influence onto permeability of rocks were research. Investigations were moved in simulated downhole conditions. In tests dynamic HPHT filter press and ceramic filters (as a rock simulator) were used. Research showed, that new cationic-starch drill-in muds cause smaller permeability damage than mud used in polish industry.

**Keywords:** *cationic-starch muds, drill-in muds, permeability*

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Zalewska E., Szuflicki M.: **Concession Procedure for Prospecting, Exploration and Production of Crude Oil and Natural Gas in Poland** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The article presents procedures of obtaining concessions for prospecting, exploration and production of hydrocarbons in Poland as well up-to-date status of granted concessions. The tender and non-tender areas, as well as the areas where administrative process are dealing with granting of new concessions are determined.

**Keywords:** *crude oil, natural gas, concession, mining usufruct agreement, "environmental" decision, prospecting, exploration, production*

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Zawisza L.: **Hydrodynamic Modelling of Hydrocarbon Migration and Accumulation in the Carpathian Foredeep Basin** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

The analysis of reservoir pressures and changes in mineralization and chemistry of groundwaters in the Miocene beds of the Carpathian Foredeep reveals that two different hydrodynamic systems exist there. Groundwaters in the north part of the Carpathian Foredeep run southward from the Miocene outcrop, whereas in the south part they go northwards from under the Carpathians. Then they join and run eastwards along the main axis of the foredeep, along the edge of the Carpathians. The flow of groundwaters in the external (north) part of the foredeep is centripetal, whereas in the central (south) part – they are centrifugal. Basing on the presented classification of petroleum basins, the Carpathian Foredeep can be classified as a transient between centrifugal and centripetal basins, and as highly perspective. Potential petroleum traps should be related with zones of increased salinity of waters, higher permeability and filtration velocity. These regularities can be confirmed by numerous natural gas fields discovered in the Carpathian Foredeep. The results of hydrodynamic modelling of hydrocarbons migration and accumulation in the Carpathian Foredeep petroleum basin are presented in the paper. On the basis of the distribution of hydrodynamic field, filtration velocity and changes in chemical composition of groundwaters the natural gas perspective zones were indicated.

**Keywords:** *hydrodynamic modelling, migration of hydrocarbons, accumulation of hydrocarbons, Carpathian Foredeep*

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Ziaja J., Wiśniowski R., Gościński Ł.: **Selection of Drilling Tools Used for HDD Wells Drilling on the Basis of a Computer Program "HORIZON"** • Drilling Oil and Gas 2007 • Volume 24 • No. 1

Over the last years HDD wells are more and more popular as a trenchless method of disposing underground utilities. The number of works adapted or designed for HDD technology is growing very fast. One of the most important elements safeguarding the success of the performed operations is the rational selection of drilling tools. When

choosing them one should account for a number of factors, e.g. price of the tool, availability, compatibility with other subassemblies and the rig itself. Erroneously selected tools may result in drilling complications, even failure to perform the undertaken tasks. No codification of drilling tools used for HDD wells was made as this is a case for clogged or diamond bits, i.e. IADC code. Therefore, the authors concentrated on working out guidelines for a rational selection of drilling tools for the HDD technology. Basing on the analyses and studies, the authors elaborated a computer program Horizon aiding the selection of the drilling tool.

**Keywords:** *Horizontal Directional Drilling, program, selection of drilling tools*