SUMMARIES

Śliwa T., Gałuszka Ł.: **Study of the effect of medium flow parameters on heat transfer in the laboratory coaxial model of a borehole heat exchanger** • AGH Drilling, Oil, Gas 2013 • Vol. 30 • No. 4

Reynolds number defines the fluid flow character. Three types of flow are distinguished: laminar, transitional and turbulent flows. By changing the flow conditions in the coaxial vertical borehole heat exchanger, a research was carried on energy (heat) exchange. The authors analyzed the flow of fluids through a model of concentric vertical heat exchanger in the Laboratory of Geoenergetics in AGH University of Science and Technology, Faculty of Drilling, Oil and Gas. Measurements for different materials and dimensions of internal column were performed.

Keywords: *borehole heat exchanger, flow character, geoenergetics*

Cieślak K., Hendel J., Kuczyński S.: **An overview of coal bed methane potential in Polish coal basins** • AGH Drilling, Oil, Gas 2013 • Vol. 30 • No. 4

Coal bed methane (CBM) may become an important source of energy in Upper Silesian Coal Basin. Coal bed methane in Poland occurs within three coal basins of which the best recognized and most promising is the Upper Silesian Coal Basin. Approximately 80.1% of proved balance of coal deposits resources in Poland occurs in the Upper Silesian Coal Basin, where 50 fields are operated by 28 mines. Thus, since early 90s of the 20th century the USCB is attractive for foreign companies which perform evaluation of coal bed methane obtaining possibility as main fossil. However, all previous attempts to commercial production of CBM did not bring expected results, but they constitute extensive information database for current and future research towards CBM exploitation. Prognostic resources of coal bed methane in USCB are estimated to 107 bln m^3. Recoverable balance resources are estimated to 87.6 bln m^3. Much smaller perspectives are related to the poorly identified regions of Lublin Coal Basin and Lower Silesian Coal Basin. It is estimated that balance resources of hard coal in LCB, represents approximately 19.2% of Polish hard coal balance resources.

Keywords: *Coal Bed Methane (CBM), Upper Silesia Coal Basin (USCB), Lower Silesian Coal Basin (LSCB), Lublin Coal Basin (LCB), RECOPOL*

Szczesiul P., Paluch M., Złotkowski A.: **Research on cement recipes for CCS application** • AGH Drilling, Oil, Gas 2013 • Vol. 30 • No. 4

The technology of CO_2 sequestration is connected with the necessity of drilling wells, which construction is adapted to aggressive CO_2 rich environment. Recipes of cement slurries, used nowadays in carbohydrates production wells, are prepared without considering corrosion occurrence caused by affection of acidic environments originating from carbonate acid radicals. Although increased resistance to sulfates is typical for these cements, this does not guarantee any resistance to corrosive effects of CO_2.

Density, fluidity, filtration, Marsh Funnel viscosity and rheological parameters measurements (with a twelve-ranged viscometer FANN) were carried out. Using Rheosolution Software, a proper rheological model for each recipe was matched. Corrosive effect on cement rock was obtained through keeping samples in pressure tanks containing compressed CO_2 for the period of 180 and 360 days. Directly after taking the samples out of the tanks, flexural and compressive strength tests were carried out with the use of hydraulic press. The results were compared and differences between the samples from CO_2 and samples taken from water environment according to API recommendations were presented. The corrosion effect on the samples from both environments was presented with microscopic images. Lengthening of the slurry thickening time and improvement of the slurry fluidity were obtained thanks to adding the third generation superplastifier produced by BASF Polska Sp. z o.o. As a research result a slurry recipe of the best strength has been developed. It can be used for proper sealing in CO_2 sequestration well technology.

Keywords: *CO_2 sequestration, cementing well, CCS application*

Piotrowska N., Tępka P., Talar D.: **Geochemical analysis and preparation the well abandonment projects on the Polana Ostre field** • AGH Drilling, Oil, Gas 2013 • Vol. 30 • No. 4

This article covers the methodology of geochemical analysis, interpretation of results and solution that was proposed to abandon a depleted oil reservoir Polana Ostre, Poland.
Polana Ostre as a reservoir was discovered in the 19th century and in 1870 the main facilities were built. Several dozens of wells were drilled and their depth varies between 60–497 m. Furthermore, on the field many hand-drilled wells are located. Oil was produced through the 60 years with breaks. After the 2nd World War the facility was suddenly discarded due to political and economic reasons. As a result of inadequate operation, oil leakages can be observed. It causes an environmental pollution and a serious hazard.
The remains were recognized and documented. A series of geochemical measurements were taken to indicate gas concentrations throughout the field. An analysis of the results showed significant concentrations of hydrocarbons in the soil. In order to mitigate the threat, a proper plug and abandonment operation of the deepest well was designed. Project executors hope to attract the attention of industry and academia to the problems depleted reservoirs that were not correctly abandoned.

Keywords: *Polana Ostre, hydrocarbons, liquidations, surface geochemical survey, gas and oil leakage*

Złotkowski A., Szczesiul P.: **Analysis of temperature change in a cross-section of borehole heat exchanger** • AGH Drilling, Oil, Gas 2013 • Vol. 30 • No. 4

Underground heat exchangers (BHE) are used witch elements to transport energy between the ground and other objects on the surface of the land. For simplification described in mathematical apparatus, they works are explain how linear heat source. The temperature is the same in all bodies of this model. This reduction to let easy describe theoretical changes temperature in BHE through transporting energy to / from rock in analytic mathematic method. The bad effect of this method is present by the same value of temperature in horizontal cross-section and along BHE. The analysis of change of temperature field in the sealing cement BHE is a possibility for numerical simulation or laboratory model. Computer simulation needed according energy transport law. It to say about quantity of energy conducting between horizontal cross-section of BHE cells, on which is divided. The second method obtains value of temperature points of the sealing cement. This is to be realized by sensors set up in to the horizontal cross-section of BHE of laboratory model. This is possible thanks constructed the model of cross-section of BHE.

Keywords: *borehole heat exchangers, heat pump, transport of heat*