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ASSESSMENT OF GEOLOGICAL MODELS RELIABILITY WHILE CALCULATING HYDROCARBON RESERVES AND DEVELOPING DEPOSITS (p. 5)

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Reasons for uncertainty of geological models building by means of "Geopak" software are analyzed with the example of Yu1 formation.

Key words: geological model; discrete system; deposit; efficient thickness; oil-water contact; oil-gas contact; reservoir’s properties.

UDC 550.8.072

SOME SPECIFIC FEATURES OF Yu1 FORMATION THAT AFFECT DISTRIBUTION OF OIL-SATURATION (p. 7)

Druzhil Vitaly Sergeevich, Panov Stanislav Fedorovich, Arzhilovskaya Natalia Georgievna, Khylozov P.V., Muzhenko Alla Alexandrovna

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A two-stage scheme of Yu1 formation sedimentation is proposed. First of all the upper zone interval is saturated by oil due to the location of the source Bazhenovsky suite above the formation. Saturation of the lower zone interval occurs in zones where there are no capillary barriers between the upper and lower zone intervals. Oil migration of in the lower zone interval is hampered by significant facies variation of the formation. The identified sedimentation peculiarities and the presented scheme of oil tank filling by oil explain the inclined position oil-water contact, found out during the exploration and development drilling.

Key words: formation; sedimentation; zone interval; oil migration; deposit; oil-water contact; oil saturation.

UDC 553.98(571.1)

REGIONAL SPECIFIC FEATURES OF SEDIMENTATION DYNAMICS OF THE JURASSIC DEPOSITS AND CHANGES OF OIL-WATER CONTACT IN THE NORTHERN PART OF SHAIM REGION (THE WESTERN SIBERIA) IN THE VIEW OF FURTHER PROSPECTS OF OIL AND GAS POTENTIAL (p. 20)

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Identification of some new oil-perspective areas is possible on the basis of development of a unified zonal geological-geophysical model, which was developed for the northern part of Shaim region became possible at the latest stage of after-exploration activity of Shaim region fields. The information obtained allowed specifying the morphology and borders of wedging of productive layers Yu4, Yu5, Yu6, YU7, Yu8, Yu9, Yu10, Yu11, and KV as well as studying regional specific features of sedimentation dynamics and WC level changes in the region, thus, in the whole, providing clarification of oil-bearing potential contours of the deposits already discovered and prediction of the newones.

Key words: Shaim oil- and gas-bearing region; conditions of sediments accumulation; paleo-geo-morphological and paleo-tectonic reconstructions; oil-water contact; exploration.

UDC 550.8.072

PREDICTION OF FLUID-DYNAMIC MODEL OF SEVERO-DANILOVSKY FIELD BY THE RESULTS OF SEISMIC SURVEY AND EXPLORATORY AND OPERATIONAL DATA OF DRILLING WITH ESTIMATION OF FLUID’S SOURCES AND PARAMETERS (p. 26)

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Hydrocarbon reserves calculation of Druzhny field is based on almost homogeneous model of BS1u formation. The character of producing wells water-flooding and the reserves extraction state witness unfavorable trends in the deposit development and unconformity of permeability distribution fixed by the geological model. Alternative petro-physical dependences allowing to detail the distribution of permeability and to specify the distribution of residual oil reserves by the results of the hydrodynamic model setting are developed on the basis of core data and GIS.

Key words: permeability; dynamics of water-flooding; reserves extraction; petro-physical dependences; geological-filtration model.
The problems of petroleum potential estimation in the areas with a long history of studying the geological structure and development of oil and gas fields such as Severo-Danilovsky oil and gas field, located in the north-western part of the Shaim group of oil fields within the limits of Shaim petroleum district of the Western Siberia are touched in the present article. An algorithm for oil and gas potential estimation in the areas of oil production strategy (DFM) aimed at building of some required promising objects in the view of prospecting for oil and gas under consideration becomes the urgent one in the areas of oil production.

The study of tectonic-dynamic environment as well as determination of some specific features of tectonic models in the view of occurrence of sub-vertical destruction zones responsible for increase of oil fraction content in the liquid are considered in the present article.

**Key words**: sub-vertical destruction; dynamic analysis of wave field; faults; disjunctive tectonics; fracture zones.

**UDC 550.832.4**

**DYNAMIC ANALYSIS OF SEISMIC WAVE FIELD TO FIND OUT STRUCTURAL–TECTONIC PECULIARITIES OF PRE-JURASSIC DEPOSITS (OSG "A") AND SEDIMENTARY COVER (YaV, FORMATION) IN THE FIELDS OF TERRITORIAL–INDUSTRIAL ENTERPRISE "POVKhNEFTEGAZ" ("LUKOIL–THE WESTERN SIBERIA, LTD.")**

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The article discusses some optimized methodology of compression factor determination in the field of elastic deformations, static and dynamic strength characteristics of rock in formation conditions up to rock destruction, developed in the laboratory of "KogalymNIPIneft" affiliate. The article presents some results of experimental studies of rock's static and dynamic elastic modules from oil and gas fields of "LUKOIL–the Western Siberia, Ltd.".

Measurements (mono-axial or triaxial test before destruction, hydrostatic pressure test, velocity of longitudinal and transverse acoustic waves) were performed in thermobaric conditions fully corresponding to formation conditions.

Compressibility factors were determined by the results of direct measurement of samples' deformation and by measurement of the change of pore fluid volume both under hydrostatic and mono-axial compression.

"Strain–stress" diagrams were built by using the results of triaxial test. Static modules, elasticity limits and tensile strength of rocks were determined by means of the "strain–stress" diagrams.

Dynamic modules were calculated on the basis of running of ultrasonic waves' velocity and then compared with static modules.

**Key words**: static and dynamic elastic modules; Poisson's ratio; Young's module; shear module; compressibility; elastic strength; tensile strength; "strain–stress" diagram.

**UDC 622.276.031.011.43:550.822.3**

**DETERMINATION OF ELASTIC STRENGTH, ULTIMATE STRENGTH, STATIC AND DYNAMIC MODULES OF ROCK** (p. 35)

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The study of tectonic-dynamic environment as well as determination of some specific features of tectonic models in the view of occurrence of sub-vertical destruction zones responsible for increase of oil fraction content in the liquid are considered in the present article.

**Key words**: sub-vertical destruction; dynamic analysis of wave field; faults; disjunctive tectonics; fracture zones.

**UDC 622.24.084.34:622.276.038**

**USE OF DRILLING MUD OF DECREASED DENSITY TO ENHANCE THE QUALITY OF OPENING OF PRODUCTION FORMATIONS WITH ABNORMALLY LOW FORMATION PRESSURE** (p. 39)

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Due to the fact that more than 50 % of the deposits of "LUKOIL–the Western Siberia, Ltd." have low or abnormally low formation pressures, the most urgent appears the problem of raising quality of such formations opening. The authors analyzed application of emulsion drilling fluids in the given mining-geological conditions; the results of the analysis are submitted.
**Key words:** drilling; productive horizon; low reservoir pressure; the Western Siberia; emulsion.

**UDC 622.24.002.2**

**TECHNOLOGY IMPLEMENTATION EFFICIENCY OF CONSTRUCTION OF MULTILATERAL WELLS WITH HORIZONTAL ENDING AT THE FIELDS OF "LUKOIL–THE WESTERN SIBERIA, LTD."** (p. 42)

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At present increase of oil fields development efficiency is one of the major challenges of oil and gas industry. Construction of multilateral wells with horizontal ending is one of the methods applied for achieving this goal. The results of the analysis of the technology implementation efficiency at "LUKOIL–the Western Siberia, Ltd." oil fields are given in the present article.

**Key words:** drilling; multilateral wells; efficiency; the Western Siberia.

**UDC 550.822.3:665.666.002.8:613.1**

**USE OF DRILLING CUTS FOR GETTING CONSTRUCTION MATERIAL FOR SLUDGE PITS REMEDIATION AT OIL FIELDS OF "LUKOIL–THE WESTERN SIBERIA, LTD."** (p. 46)

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The article presents an overview of existing technologies for disposal of drill cuttings generated at the raw hydrocarbon fields as well as analysis of the efficiency of decisions made to process drilling cuts. Some innovative technology of drill cuttings usage in order to get construction material suitable for sludge pits remediation at the fields of "LUKOIL–the Western Siberia, Ltd." is suggested as an alternative variant.

**Key words:** drilling cuttings; sludge pits; construction material; remediation; technology.

**UDC 622.276.1/4"712.8"**

**FROM GEOLOGICAL UNCERTAINTY ASSESSMENT TOWARDS STRATEGY OF A FIELD'S PART DRILLING (EXPERIENCE OF THE APPROACH APPLICATION WHEN PLANNING DRILLING OF AV₁₂ FORMATIONS OF NIVAGALSKY FIELD** (p. 50)

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Drilling in the marginal zones and in the areas of complex structure of the fields, developed for a long period of time, is associated with big risks. "Carpeted technique" of drilling in these conditions leads to a large number of "dry holes". When planning a new drilling it is necessary to apply more innovative approaches that will allow minimizing the risks.

The two-year drilling experience on the basis of probabilistic geological models, presented in the paper, was practically introduced at Nivagaltsky field, which is has been developed for about 30 years. Some approach based on the definition of an uncertainty corridor for the selected geological parameters by "rationing against the fact," the creation of multi-variant geological basis, the development of alternative scenarios of project fund placement was applied when fulfilling the work. The suggested approach, maximally accounting of any possible risks, associated with the uncertainty, allows choosing the optimal strategic variant of each local area development out of the calculated "fan" of decisions as well as improving the production forecast quality in the whole.

**Key words:** field; deposit; formation; object of development; model; uncertainty; channel bodies; heterogeneity; sand content; seismic attribute; detailing; probability; drilling; risk; scenario.

**UDC 622.276.43**

**DEVELOPMENT OF THE ALGORITHM OF COMPONENT-BY-COMPONENT DISTRIBUTION OF LIQUID HYDROCARBONS AND GAS ON THE BASIS OF PROCESSING OF FIELD REPORTING INFORMATION BY WELLS** (p. 58)

Solyanov Sergey Anatolievich, Mavleddinov Mikhail Grigorievich, Zaitev Alexander Viktorovich

The article presents an overview of existing technologies for disposal of drill cuttings generated at the raw hydrocarbon fields as well as analysis of the efficiency of decisions made to process drilling cuts. Some innovative technology of drill cuttings usage in order to get construction material suitable for sludge pits remediation at the fields of "LUKOIL–the Western Siberia, Ltd." is suggested as an alternative variant.

**Key words:** drilling cuttings; sludge pits; construction material; remediation; technology.
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The urgency of the algorithm development of component-by-component production distribution is associated with the necessity of correct accounting of reserves extraction of oil, condensate, free and dissolved gas. Justified planning of production in accordance with the forecast as well as possibility of reserves’ localization in order to increase oil recovery factor is the consequence of the correct accounting of hydrocarbons extraction. The algorithm, developed by the experts of “KogalymNIPIneft”, was programmed and tested at BP84 formation of Severo-Gubkinsky field. Component-by-component distribution of produced products with addressable wells’ identification, where physically impossible off-take of gas was fixed, is presented in the article on the basis of calculation results.

Key words: liquid hydrocarbons (LHC); hardly-recoverable oil reserves; enhanced oil recovery; component-by-component production distribution.

UDC 622.276.43

ANALYSIS OF WATER-FLOODING SYSTEM EFFICIENCY WITH APPLICATION OF MATERIAL BALANCE METHOD (p. 63)

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The article describes the developed method of determining compensation of each well selections which participated in the production, based on the definition of affecting wells and injection volume distribution on reacting wells applying the material balance method. Calculation on the basis of the above-mentioned method allows assessing the efficiency of the existing water-flooding system of any part of the deposit and the deposit in the whole as well as identifying areas with specific dynamics of indicators that will serve the basis for planning further measures to improve the system of formation pressure maintenance.

Key words: water-flooding; system of formation pressure maintenance; formation pressure; material balance; multivariable analysis.

UDC 622.276.66

DEVELOPMENT OF THE METHOD OF PREDICTING TECHNOLOGICAL EFFICIENCY OF REPEATED FORMATION HYDRAULIC FRACTURING PERFORMED ON THE OPERATING FUND (p. 66)

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Some method that allows highly-reliable prediction of technological operational parameters of the existing wells’ fund after performing repeated formation hydraulic fracturing in conditions of BV84 formation of Povkhovsky field is described in the present article. The results of the research served the basis for performing calculation of wells technological operational indicators of the of all the existing operating wells’ fund of the formation under consideration after the supposed carrying out of repeated formation hydraulic fracturing operations. The data obtained is recommended for use as one of the criteria when selecting wells-candidates for conducting repeated formation hydraulic fracturing.

Key words: formation hydraulic fracturing; additional oil production; regression analysis.

UDC 622.276.64

USE OF SURFACTANTS TO ENHANCE OIL RECOVERY OF FORMATIONS WITH HARDLY-RECOVERABLE OIL RESERVES (p. 69)

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Some specific features of extraction of hardly-recoverable oil reserves are considered in the present article. Some physical-chemical methods of enhancement of oil recovery (PhCh EOR) as a promising technique of enhancing oil recovery of formations with hardly-recoverable oil reserves are described. It is shown that the use of surfactants that are part of any technology of residual oil after-washing is most preferable in terms of maintaining the reservoir properties of productive formations. The results of PhCh EOR technique application at Yuzhno-Yagunsky oil field served the basis for giving recommendations that provide essential enhancement of oil reserves recovery at the oil fields of Territorial Industrial Enterprise (TIE) “Kogalymneftegas” even using the existing range of chemical compositions of formation stimulation when used correctly.

Key words: hardly-recoverable oil reserves; physical-chemical methods of oil recovery enhancement; after-washing technologies; surfactants.

UDC 622.276.66

SOME SPECIFIC FEATURES OF WELLS-CANDIDATES’ SELECTION FOR PERFORMING A FORMATION HYDRAULIC FRACTURING AT OIL FIELDS (p. 74)

Serebrennikov Ilia Valerievich, Malshakov Eugene Nikolaevich,
Generalized information about some specific features of some integrated approach to justified selection of wells for performing a formation hydraulic fracturing that includes 1) formation of wells (oil fields’ sectors) preliminary selection and ranking by applying "Data Mining" methods of data analysis and 2) expert assessment of criteria that nominate wells and oil fields’ sectors for performing a formation hydraulic fracturing.

The basic geological-technological and technical criteria determined empirically and used in the analysis, carried out by "Data Mining" methods, as well as factors formalization of which is a rather complicated problem are presented.

Key words: a formation hydraulic fracturing; wells-candidates; criterion; expert assessment.

UDC 622.276.66

REPAIR TECHNOLOGIES APPLIED WHILE PERFORMING OF A FORMATION HYDRAULIC FRACTURING IN VARIOUS GEOLOGICAL-FIELD CONDITIONS OF BIG OIL DEPOSITS BEING AT THE LATEST STAGE OF THEIR DEVELOPMENT (WITH THE EXAMPLE OF BV8 FORMATION OF POVKHOVSKY FIELD) (p. 76)

The article considers some repair technologies while performing a formation hydraulic fracturing in various geological-field conditions of BV8 formation of Povkhovsky field. Eight types of repair are revealed, four main types out of them are discussed in detail. Due to reserves’ uneven extraction along the vertical, repair-isolation work of highly-permeable formation cover and a formation hydraulic fracturing of its formation bottom boundary found their usage. It is shown that the effect of the work carried out with this technology application depends on the quality of the conducted repair-isolation work. Landing of smaller-diameter casing strings to provide isolation of highly water-flooded intervals is proposed as an alternative.

Key words: a formation hydraulic fracturing; repair-isolation works; reserves recovery.