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## **Jurassic terrigenous deposits of the Bukhara-Khiva region – a reserve of exploration in oil and gas**

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**Abstract.** The article discusses the geological and geophysical prerequisites for the oil and gas potential of the Jurassic terrigenous deposits of the Bukhara-Khiva oil and gas region. Lithological and stratigraphic subdivision of terrigenous formation deposits, facies conditions of sedimentation along the section and space, as well as the nature of the distribution of capacities and the placement of productive horizons. Zones of development of channel sand deposits with good reservoir properties were found, and areas were identified where the presence of traps associated with anticlinal structures, as well as the wedging out of individual horizons with sand bars, was identified.

Based on the analysis and generalization of the results of geological-geophysical, lithofacies and hydrogeological studies within the study area, areas were identified that are most characteristic in terms of hydrocarbon accumulation in various traps associated with tectonic and lithological screens - favorable zones for the accumulation and preservation of hydrocarbons - deposits.

In conclusion, the relevant conclusions are given with an assessment of the prospects for the oil and gas potential of the Jurassic terrigenous deposits of the study area and specific recommendations are given for further prospecting and exploration.

**Keywords:** *terrigenous formation, region, trough, area, structure, section, well, horizon, trap, hydrocarbon, deposits, reservoir, migration*

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## Potentiality of producing Sulfur-Free Gas from productivity Horizons of the Cretaceous Deposits of Uzbekistan

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**Abstract.** This article is devoted to scientific research in the field of production at horizons above the productive, which are considered to be complex and costly and do not always allow to obtain the desired result. At time of setting tasks and determining the prospects of research, industrial enterprises do not show proper attention and interest in the scientific developments of research institutes, due to the usual views and skills of work, as well as reluctance to work on new innovative methods and technologies. This includes the oil and gas sector. Proposals for geological modeling of proposed productive horizons often do not find support from production structures. In this connection, in the period of rapid growth and application of information and communication technologies and digitalization, it is expedient, contrary to the outdated views, to move to forecast planning and conduct scientific research on geological modeling of these processes, using modern software and space monitoring capabilities. This will allow solving multivariate tasks with minimum labor and financial expenses. Creation of the so-called "digital twin" or "digital clones" for analytical works, and also development of the most optimal variant of the decision of a task not always and immediately gives the desired result. There is also a need for scientific recommendations for the development of digital technologies. In this case one of the main arguments is "diversification of production", where "profit" should be the basis of exploration production, affecting the development and replenishment of the mineral resource base of the country. The main factors for such development should be the knowledge, professionalism and skills of scientists of research centers, geologists-producers, as well as their competence in strategic planning, accumulated experience and skills on modern equipment, software in order to implement fundamental, applied and innovative projects. All of the above reflects the relevance of the chosen topic of the study. With this in mind, the authors of this article set goals and objectives, carried out scientific research, obtained results in order to determine the prospects for the development of productive Cretaceous deposits. The studied sediments as an object of study are now at a level above those horizons, which are exploited on a commercial scale. The existence of sulfur-free or low-sulfide gas reserves in the subsurface create new opportunities for diversification of production and exploitation with appropriate infrastructure at the planning sites and determine the prospects for further geological exploration work.

**Keywords:** *diversification, without sulphur dioxide, sulphide impurity, area, structure, section, well, horizon, hydrocarbon, deposits, Cretaceous deposits, Bukharo-Khiva oil and gas region, reservoir, migration*

**For citation:** S.S. Khabibullaev, Sh.A. Umarov, A.U. Mirzaev., I.N. Khakimzyanov Potentsial polucheniya bessernistogo gaza iz produktivnykh gorizontov melovykh otlozheniy Uzbekistana [Potentiality of producing Sulfur-Free Gas from productivity Horizons of the Cretaceous Deposits of Uzbekistan]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 21-46. DOI <https://doi.org/10.25689/NP.2023.2.21-46>. EDN EBMKSG (in Russian)

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## **Structure and conditions of formation of oil and gas reservoirs in the Triassic deposits of Southern Mangyshlak**

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**Abstract.** The study structures of hydrocarbon reservoirs and of the hydrogeological features of the Triassic section of the Yuzhno-Mangyshlak oil and gas bearing region showed that, unlike the overlapping deposits of the platform cover, they have a number of characteristic features that allow us to speak about the special hydrogeochemical and hydrodynamic conditions of these complexes, determined primarily by the secondary nature of their filtration-capacitance properties. The water saturation of the rock matrix, the focal nature of the development of secondary reservoirs against the background of extremely low permeability of the surrounding strata make it impossible to develop elysium flows. This causes the high sensitivity of the lower floor to various compression processes, including those caused by the intrusion of deep high-energy fluid flows. Fluid injection is accompanied by decompression of low-permeable strata, the formation of additional cracks, the formation of secondary voids of metasomatic origin. As a result, secondary reservoirs of complex morphology are formed, filled with hydrocarbons. The coincidence in terms of hydrogeochemical and hydrodynamic anomalies, areas of secondary reservoirs with distinct traces of metasomatism and associated accumulations of oil and gas indicate their genetic relationship.

The structure of oil and gas reservoirs, as well as accompanying hydrogeological anomalies, is considered on the example of well-studied Triassic hydrocarbon deposits of Southern Mangyshlak.

**Keywords:** *triassic, lithology, hydrochemical and hydrodynamic anomalies, deep fluids, reservoirs*

**For citation:** Popkov V.I., Larichev V.V., Popkov I.V. Stroenie i usloviya formirovaniya rezervuarov nefi i gaza v triasovyh otlozheniyah Yuzhnogo Mangyshlaka [Structure and conditions of formation of oil and gas reservoirs in the Triassic deposits of Southern Mangyshlak] Neftyanaya Provintsiya, No. 2(34), 2023. pp. 47-66. DOI <https://doi.org/10.25689/NP.2023.2.47-66>. EDN FVLRRRI (in Russian)

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## **Features of geological modeling of shelf reservoirs in the Surgut region: reserve assessment, ranking of facies**

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**Abstract.** Many fields in the Surgut oil and gas region are in the late stages of development. However, the assessment of hydrocarbon reserves is not always reliable, and geological and technological measures for oil recovery (GTO) show their effectiveness. This is due to approaches to geological modeling of reservoirs and complicating factors for conducting targeted well interventions (high drilling and depletion of reserves).

In this regard, there is a need for an accurate assessment of hydrocarbon reserves; localization of residual reserves by area and assessment of the success of geological and technical operations, which can be solved using the ranking of facies. The paper demonstrates the assessment of hydrocarbon reserves using the coefficient of layered clay content ( $\chi_{sh}$ ); the ranking of facies by oil-saturated thicknesses, porosity and permeability properties, initial oil production rates was carried out; cumulative production per well.

The simulation results showed that the use of the parameter  $\chi_{hl}$  leads to a significant refinement of reserves. The results of facies ranking showed that it is recommended to carry out geological and technical operations in the zones of development of facies of the I-II ranks (facies of the beach, mouth and barrier bars) in the presence of residual reserves in them.

**Keywords:** oil, facies, layered clay content, reserves, debit, production

**For citation:** A.G. Laptey, V.S. Druchin, A.S. Dotsenko Osobennosti geologicheskogo modelirovaniya shel'fovykh rezervuarov Surgutskogo rayona: otsenka zapasov, ranzhirovaniye fatsiy [Features of geological modeling of shelf reservoirs in the Surgut region: reserve assessment, ranking of facies]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 67-84. DOI <https://doi.org/10.25689/NP.2023.2.67-84>. EDN GPOBQX (in Russian)

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## Impact of saturating fluid on Cretaceous rock strength and elastic properties as exemplified in Sibneftegas production fields

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**Abstract.** Numerous recent studies demonstrate a substantial impact of saturating fluid type on rock strength and elastic properties [1-8]. Lack of experimental research and limited applications of results obtained pose the major challenges for further studies.

This paper reviews research efforts aimed to study the changes in rock strength and elastic properties caused by saturating fluid variations in different types of Cretaceous sediments and possibilities for application of resultant data to address specific production issues. Based on the experience in development of Cenomanian gas-saturated deposits, forecasting of safe underbalance conditions for different sediments and premature flooding are of primary concern while bringing into production Lower Cretaceous sediments.

Core studies have revealed that the effects of saturating fluid type on rock strength and elastic properties are less pronounced in Lower Cretaceous sediments compared to Cenomanian sediments [1-3].

A steady trend of changing rock strength and elastic properties, including rocks with low clay content, suggests that this problem is the subject of continuing research.

**Keywords:** *laboratory core analysis, geomechanics, strength and elastic properties, Young's modulus, uniaxial compression strength, angle of internal friction, thick walled cylinder strength*

**For citation:** M.D. Subbotin, V.A. Pavlov, D.O. Korolev, A.Yu. Kudymov, A.N. Mantorov, M.A. Skorobogach Vliyaniye flyuida nasyshcheniya na uprugo-prochnostnyye svoystva gornyx porod melovykh otlozheniy na primere ob'yektov AO «Sibneftegaz» [Impact of saturating fluid on Cretaceous rock strength and elastic properties as exemplified in Sibneftegas production fields]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 85-96. DOI <https://doi.org/10.25689/NP.2023.2.85-96>. EDN IVBULM (in Russian)

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EDN KFNLTR

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## Issues in saturation behavior determination in infill-wells

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**Abstract.** As the oil field development proceeds, more accurate subsurface information is acquired. At the same time, as reserves deplete, the current state of producing reservoirs changes. Wells drilled during the second or further phases of development tap reservoirs with oil saturation different from the initial one.

Considering possible discrepancies in depth measurements of highly deviated production wells, uncertainties in determination of top formation true depths occur, which, in turn, leads to doubts in correct distribution of residual oil reserves.

When creating geomodels or reservoir simulation ones during late stages of field development, it is necessary to not only determine current net pays based on log curves of the infill wells, but also it is vitally important to get back initial net pays to a reliable degree.

This paper discusses ways to re-confirm saturation behavior in wells drilled when production operations had already started and streamlines had already been active in the field. These approaches is based on open-hole and cased-hole logging data analysis, as well as the G&G study and well history analysis of the period of active oil production.

**Key words:** *geological modelling, hydrodynamic modelling, saturation behavior, water-flooded reservoir, deviation, oil displacement*

**For citation:** B.T. Makhmutov, R.Kh. Nizaev, M.V. Fedotov, R.R. Khasanov, V.A. Dekhtyarev, I.A. Musallyamov. Problema opredeleniya kharaktera nasyshcheniya v skvazhinah, proburenyh v processe ekspluatsii zalezhi [Issues in saturation behavior determination in infill-wells] Neftyanaya Provintsiya, No. 2(34), 2023. pp. 97-115. DOI <https://doi.org/10.25689/NP.2023.2.97-115>. EDN KFNLTR (in Russian)

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## Validation the lengths of the wellbores for multistage fracturing well

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**Abstract.** Currently, horizontal wells with multi-wellbores and multi-holes are becoming widespread. At the same time, there are problems associated with determining the lengths of such wells. The article considers the well, which exploits two formation. The well has two horizontal wellbores, one of them with the multistage fracturing and the other has liner-filter. The construction of the well does not have packer for independent production recovery from the two formation. We have a question of how to achieve proportional fluid recovery, which, in turn, puts the task of determining the lengths of the wellbores, the number of fractures and parameters of fractures. An equation relating the parameters of both wellbores it is obtained from the condition of equality production rates of resources of both wellbores. By varying the lengths of the wellbores, the number of fractures it is possible to achieve equality the rates of recovery current reserves in the drainage zones of both layers. The article gives the methods of calculating the specified parameters of the wellbores on the example of a specific well.

**Keywords:** *horizontal dual-wellbores well, proportional fluid recovery, multistage fracturing, liner-filter, the rates of recovery oil, Kogalymskoe oilfield*

**For citation:** V.F. Pyzykov, S.K. Sohoshko Obosnovaniye dlin stvolov dvustvol'noy skvazhiny s mnogostadiynym gidravlicheskim razryvom plasta [Validation the lengths of the wellbores for multistage fracturing well]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 116-129. DOI <https://doi.org/10.25689/NP.2023.2.116-129>. EDN LKOXFE (in Russian)

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EDN EGBFNY

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## Scaling of simulation results of a surfactant-polymer flooding on the core in transition to the field model

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**Annotation.** Today, more and more often one can find works on the design of waterflooding using EOR technologies, in which at the initial stages filtration experiments are reproduced on 1D models, and then, using the results obtained, a fullscale reservoir modeling of a field or deposit is carried out to predict the effects of the considered EOR. Undoubtedly, the simulation of filtration studies on the core makes it possible to improve the quality and reduce the degree of uncertainty in setting the properties of surfactant and polymer in reservoir modeling of surfactant-polymer flooding. However, this paper raises the question of the correctness of the direct transfer of the values of the properties of a surfactant-polymer solution used to simulate filtration experiments on a core in a model with a cell size of 1 cm to a full-scale model of a field or deposit with a lateral cell size of 50 m.

**Key words:** *Surfactant-polymer flooding, core, hydrodynamic model, laboratory studies, filtration experiments, scaling, capillary number*

**For citation:** L.I. Minikhairov, A.V. Nasybullin Masshtabirovaniye rezul'tatov modelirovaniya PAV-polimernogo zavodneniya na kerne pri perekhode na model' mestorozhdeniya [Scaling of simulation results of a surfactant-polymer flooding on the core in transition to the field model]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 130-136. DOI <https://doi.org/10.25689/NP.2023.2.130-136>. EDN EGBFNY (in Russian)



## Method of placement of project horizontal wells realized by Epsilon program package

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**Abstract.** The paper describes a method of computer-aided generation of project horizontal wells realized by the in-house Epsilon program package.

For each development target, the horizontal wells are placed downwards, once the “drilling carpet” has been generated. Conventionally, as a horizontal wellbore trajectory, a segment connecting a couple of points representing positions of the previously generated project vertical wells is taken. The horizontal wells’ generation method includes the following stages:

- generation of the project horizontal wells considering the trajectory acceptability,
- checking of well candidates to ensure they meet geological criteria,
- analysis of economic performance and comparison with the only-vertical-wells drilling scenario,
- checking of advisability of placement of horizontal wells in zones where vertical wells alone do not make economic sense.

Based on a field’s proxy models, the Epsilon generates a “drilling carpet”, that is, a stage-wise placement of project wells by an irregular maximum-density drilling pattern that satisfies the geological, operational, and economical restrictions.

The aim of the study was to develop methods and algorithms to place automatically horizontal wells in all Company’s assets that to-date include 240 productive formations of 85 fields.

**Key words:** *Epsilon program package, proxy model, horizontal well, vertical well, stage-wise placement of project wells, horizontal well production rate, specific area, Joshi productivity equation, horizontal wellbore trajectory, NPV, profitability*

**For citation:** M.I. Mannapov, V.V. Yemelyanov, Ram.Z. Sattarov, M.A. Sharifullina, F.F. Latifullin Planirovaniye razmeshcheniya proyektного fonda gorizonta'nykh skvazhin v programmnom komplekse «Epsilon» [Method of placement of project horizontal wells realized by Epsilon program package]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 137-149. DOI <https://doi.org/10.25689/NP.2023.2.137-149>. EDN NHZLJU (in Russian)

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## Analysis of field experience in sidetracking operations using equipment of different service companies at Tatneft's fields

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**Abstract.** The paper presents a comparative analysis of equipment and technologies provided by Russian and foreign service companies for milling the casing exit and drilling sidetrack holes out of parent wellbore. The major disadvantages of existing deflection wedges, milling cutters and drilling equipment, particularly large diameter and rigidity drill pipes, are identified. Heavy-wall 89 mm drill pipes (TBT-89) installed above the milling assembly do not enable deflection of the latter in the direction of wedge groove, thus resulting in cutting through wedge body rather than casing wall. Pieces of casing and debris accumulated in the lower portion of casing window do not allow to continue milling operation. To improve casing exit process performance, it is necessary that smaller diameter and smaller rigidity drill pipes be used. Recommendations are provided for wedge and cutter design improvements to increase the performance of sidetracking operations, eliminate emergencies and reduce the overall tripping time.

**Key words:** *milling assembly, deflection wedge, milling cutter, reaming mill, wedge guiding groove, anchor, profiled pipe, cement plug, casing window configuration, sidetracking, axial load*

**For citation:** A.L. Nasyrov, A.A. Mukhametshin, R.R. Saitbatalov, A.F. Garaeva Analiz promyslovogo opyta po zarezke bokovykh stvolov s primeneniym oborudovaniya razlichnykh ser-visnykh kompaniy na ob"yektakh PAO «Tatneft'» [Analysis of sidetracking experience at tatneft's fields using equipment of different service companies] Neftyanaya Provintsiya, No. 2(34), 2023. pp. 150-164. DOI <https://doi.org/10.25689/NP.2023.2.150-164>. EDN NRHGBX (in Russian)

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**Assessment of technological efficiency of cyclic directed  
hydrochloric acid treatment by displacement characteristics  
(by the example of the kizelovksy horizon of the Bavlinsky field)**

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**Abstract.** The paper presents the analysis of targeted cyclic hydrochloric treatment application in producing wells on Kizelovskian horizon of Bavlinskoe field. Process efficiency of reviewed targeted cyclic hydrochloric acid treatment technology is determined using decline curve analysis methods by Kambarov G.S., Kazakov A.A., Pirverdyan A.M. and Sazonov B.F. based on forecasting of basic operation conditions of producing wells with Pearson's correlation analysis on constructed dependencies (production decline curves) 12, 9, 6 and 3 months prior to targeted cyclic hydrochloric acid treatment of wells. Efficiency analysis of targeted cyclic hydrochloric treatment of producing wells on Kizelovskian horizon of Bavlinskoye field shows that implementation of this technology results in oil production increase. Based on performed evaluation this technology is recommended for further use. Incremental oil production using this technology is 16.4 thousand tons, specific incremental oil production in general is 297.4 tons per well. The highest specific oil production was observed in 2016 reaching as high as 384 tons per well.

**Keywords:** *targeted cyclic hydrochloric acid treatment, production decline curves, incremental oil production, Kizelovskian horizon, production enhancement operations, bottom hole treatment*

**For citation:** V.E. Alekseev, R.Kh. Nizaev Otsenka tekhnologicheskoy effektivnosti tsiklicheskoy napravlennoy solyano-kislotnoy obrabotki po kharakteristikam vytesneniya (na primere kizelovskogo gorizonta Bavlinskogo mestorozhdeniya) [Assessment of technological efficiency of cyclic directed hydrochloric acid treatment by displacement characteristics (by the example of the kizelovksy horizon of the Bavlinsky field)]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 165-172. DOI <https://doi.org/10.25689/NP.2023.2.165-172>. EDN NUCXQL (in Russian)

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EDN PWEPU

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## Study of recoverable oil reserve losses with account of structural phase transition of oil during field development using geological and reservoir simulation models

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**Abstract.** The paper presents an assessment of oil losses during injection of cold water into target reservoir of Nurlatskoye oil field. A fluid flow model for Nurlatskoye oil field was constructed using tNavigator software package. Cumulative oil production profile of Well1832 versus time is provided at different injection water temperatures with and without account of relative permeability hysteresis effect. Presented cumulative oil production variations versus injected water temperature cover a 6-years period.

**Keywords:** *tNavigator software package, cold water injection, evaluation of oil losses, oil saturation distribution, temperature of oil structural phase transition, relative permeability to oil, residual oil saturation factor, oil recovery factor, relative permeability hysteresis*

**For citation:** R.Kh. Nizaev, V.M. Khusainov, A.Kh. Kabirova, G.V. Aleksandrov, D.V. Kliymenko *Issledovaniye poter' izvlekayemykh zapasov nefi s uchetom strukturnogo fazovogo perekhoda v nefi v pro-tsesse razrabotki zalezhey s ispol'zovaniyem geologo-gidrodinamicheskogo modelirovaniya* [Study of recoverable oil reserve losses with account of structural phase transition of oil during field development using geological and reservoir simulation models]. *Neftyanaya Provintsiya*, No. 2(34), 2023. pp. 173-182. DOI <https://doi.org/10.25689/NP.2023.2.173-182>. EDN PWEPU (in Russian)

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## **In-site combustion processes during air injection in oil reservoirs with water-saturated interlayers**

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**Abstract.** The paper presents the results of thermal reservoir simulation modeling of air injection into reservoirs containing free formation water. Cumulative water production profiles at different initial oil saturations are presented. Simulations of larger air injection volumes to displace formation water result in oxygen concentration increase in the reaction zone to cause more oxygen to contact with oil in situ. The reaction rate between oxygen and hydrocarbons increases to boost low-temperature oxidation process. The paper describes temperature changes in the vicinity of injection well during air injection in Permian sediments and terrigenous sediments of the Carboniferous and Devonian at different initial oil saturations. Criterion of formation temperature increase up to self-ignition temperature right at the beginning of air injection into reservoirs containing free water is substantiated.

**Keywords:** *in-situ combustion, air injection rate, high-viscosity oil, extra-viscous oil, thermal reservoir simulation modeling, low-temperature oxidation process, rapid increase of reservoir temperature, self-ignition point*

**For citation:** R.Kh. Nizaev, I.M. Bakirov, G.V. Aleksandrov Protsessy vnutriplastovogo gorenija pri zakachke vozdukh v oslozhnonnyye nalichijem vodonasyschennykh proplastkov zalezhi nefi [In-site combustion processes during air injection in oil reservoirs with water-saturated interlayers]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 183-190. DOI <https://doi.org/10.25689/NP.2023.2.183-190>. EDN QUBITA (in Russian)

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EDN SAKYQU

УДК 622.276.66

## Factors of reducing the informativity of test injections during proppant fracturing with water-based polymer fluids

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**Abstract.** The purpose of this study is to evaluate and classify the uncertainties arising from performing and analyzing test injections before fracturing. Pre-fracture test injection analysis is performed widely, but usually the values obtained are taken into account without reference to uncertainties. Existing hydraulic fracturing techniques identify multiple sources of uncertainty, and no evaluation and classification system has previously been proposed to determine the accuracy of the resulting data. Uncertainties of interpretation can be evaluated by the engineer performing the analysis, but such evaluation is subjective and difficult to measure. In the course of this study, a statistical analysis was performed to numerically estimate the level of uncertainty in the analysis. The proposed solution includes an assessment of the degree of reliability of the data obtained from the analysis, which allows for the introduction of refined adjustments to the parameters of the main stage of hydraulic fracturing.

The scientific novelty of the work lies in the evaluation and classification of uncertainties affecting the results of the analysis of test injections before hydraulic fracturing. For the first time, the classification is proposed and statistical analysis is applied, aimed directly at assessing the degree of reliability of test injection data, as well as proposed metrics that characterize the reliability and uncertainty of the analysis data. As a result, the proposed approach makes it possible to supplement the numerical values of the parameters obtained in the analysis with an assessment of their reliability, including those based on statistical data.

**Keywords:** *fracturing, test injection, Minifrac, Minifrac, Datafrac, sandstone fracturing, fracturing conditions evaluation, fracturing quality control, Minifrac accuracy metrics, Minifrac validity, Minifrac information reduction factors, fracturing risk assessment, fracture parameter forecast, correlation analysis*

**For citation:** A.V. Kochetkov Faktory snizheniya informativnosti testovykh zakachek pri provedenii propantnykh GRP s ispol'zovaniyem polimernykh zhidkostey na vodnoy osnove [Factors of reducing the informativity of test injections during proppant fracturing with water-based polymer fluids]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 191-207. DOI <https://doi.org/10.25689/NP.2023.2.191-207>. EDN SAKYQU (in Russian)

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EDN SKWYKH

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## **Determination of the efficiency of clay stabilizer component of fracturing fluid through coreflood experiments with terrigenous clay reservoir rock samples**

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### **Abstract.**

**Relevance of the research.** During hydraulic fracturing in clayed formations there is a problem of swelling of clays, which leads to a decrease in the permeability of rocks. It is necessary to reduce the effects of fresh water on the clay component of the reservoir. The negative impact of clays can be reduced by using special reagents - clay stabilizers.

**Research objective:** determining effectiveness of clay stabilizers "X" and "Y" on the consolidated core samples of wells 1,2,3,4,5 PJSC "Tatneft" in the composition of hydraulic fracturing fluid.

**Object of studies:** consolidated core samples from wells 1,2,3,4 of PJSC Tatneft.

**Research methods:** for the solution of the task were used filtration unit for high-temperature core tests PIK-OFP/EP-K-T. 2%, 3%, 4% solutions of clay stabilizers X and Y were tested by filtration through core samples. Pressure drop before and after filtration of clay stabilizer solutions and technical water through consolidated core samples was measured.

**Research results:** the effectiveness of clay X and Y stabilizers is evaluated.

**Keywords:** *core, clay stabilizers, pressure drop, clay minerals*

**For citation:** A.V. Nasybullin, R.Kh. Sadreeva, E.A. Burlutsky *Opredeleniye effektivnosti stabilizatora glin v sostave zhidkosti GRP na obraztsakh kerna glinistyykh terrigennykh kollektorov na osnove fil'tratsionnykh issledovaniy [Determination of the efficiency of clay stabilizer component of fracturing fluid through coreflood experiments with terrigenous clay reservoir rock samples]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 208-226. DOI <https://doi.org/10.25689/NP.2023.2.208-226>. EDN SKWYKH (in Russian)*

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EDN THLONQ

УДК 622.24.085.2

## Development of equipment and technology for deflection wedge retrieval from wellbore

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**Abstract.** One of the most important process operations during construction of multilateral and multihole wells is retrieval of deflection wedge from the wellbore once sidetracking operations have been terminated to provide access to the main bore to continue construction of new lateral holes or allow for the passage of produced fluids through the existing one. Various devices are used for wedge gripping and retrieval. These are bell sockets, overshot tools, fishing hooks (remover tools). Foreign and Russian service companies engaged in manufacturing and application of retrievable deflection wedges develop proprietary remover designs that are mainly used in wells with casing diameter of 245 mm and larger. To improve wedge retrieval process TatNIPIneft Institute has proposed, developed and launched commercial production of wedge remover tools that enable sending a gripping signal to a drilling operator, reliably attach and press the wedge head against the remover body and safely pull the wedge out of the hole. Case studies of wedge remover applications are provided.

**Key words:** *remover tool, fishing hook, bell socket, retrievable deflection wedge, selection, anchor, drilled cuttings, swarf, multilateral well, multihole well, sidetrack*

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УДК 622.243.56+622.24.051

## Development and testing of drillable bit

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**Abstract.** A method of casing drilling using a drill shoe which is drilled out once reaching the target depth rather than retrieved is well known. Casing-drilling shoes are typically constructed of non-ferrous metals in the form of solid body or steel body with extendable blades and an inner section constructed of a readily drillable material. Pilot tests of drill shoe design with extendable blades revealed the following disadvantages: undesired activation of drill shoe prior to dropping an activation ball, extendable blades dropping down from annular space to bottomhole, and poor strength of low temperature solder alloys for soldering of the cutters.

Experts of TatNIPIneft R&D Institute came up with the solution to use ferrous material with peculiar properties for construction of drillable bit solid body. Bench and field tests provided evidence of the validity of selected bit design and material. Field tests have demonstrated that drilling rate is directly proportional to axial load, while drilling is initiated at unit load of 25 kg/cm<sup>2</sup>. At optimum unit load of 50 kg/cm<sup>2</sup>, the drilling rate is estimated at 15 m/h. Drilling was conducted using commercially available PDC bits. Selection of appropriate bit body material and optimal bit design provided a reliable drillable rock-cutting tool to enable implementation of casing drilling technology.

**Keywords:** *drill shoe, drillable bit, isolation of trouble zones by casing drilling, casing drilling*

**For citation:** A.S. Yagafarov, F.F. Akhmadishin Razrabotka i ispytaniye razburivayemogo dolota [Development and testing of drillable bit]. Neftyanaya Provintsiya, No. 2(34), 2023. pp. 242-251. DOI <https://doi.org/10.25689/NP.2023.2. 242-251>. EDN XRRNVU (in Russian)

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EDN YDEHGG

УДК 331.087

## **Gum formation susceptibility of diesel oil cut in presence of oxygenates and blends thereof**

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**Аннотация.** В данной статье рассмотрено эффективное и перспективное использование оксигенатов. Показано, что оксигенаты насыщены кислородом и не содержат серы, что обеспечивает значительное сокращение твердых частиц, оксида углерода (СО) и выбросов углеводородов, используемых в дизельных двигателях. В работе были исследованы характеристики процесса осмоления смесей дизельного топлива со спиртами и эфирами, при процентном содержании добавок от 1 до 5%. Эксперименты проводились на приборе ПОС-77 по методу Бударова.

**Ключевые слова:** *дизельное топливо, оксигенаты, спирты, эфиры осмоляемость, прокачиваемость*

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