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## **Hydrocarbon potential and global energy transition. Carbon neutrality challenges: beneficiaries and payers**

*R.Kh. Muslimov*

*Academy of Sciences of the Republic of Tatarstan, Kazan, Russia*

**E-mail: [davkaeva@mail.ru](mailto:davkaeva@mail.ru)**

**Abstract.** “Out of the blue”, the European Union has declared on a transborder hydrocarbon tax on foreign products with high green gas emissions that has to come into effect in 2023. It implies that the Russian exporters will have to pay to EU up to €30 billion annually, with the emission limits imposed and the issues of emission over-limits dealt by our “partners” rather than the Russian authorities, at that!

Russia with its gigantic mineral resources, which can be cheaply made into energy and supplied to domestic industry at prices just slight exceeding the net cost remains, evidently, Number One Threat.

What should Russia do to counterpose the aggressive and unconsidered climate policy of the governments ruling Western nations whose ultimate aim is to redistribute for their own benefit hydrocarbon resources and other natural wealth of resource-rich countries? We should prevent the deindustrialization planned by the collective West in the interests of transnational companies, we should preserve our hydrocarbon sovereignty, we should not follow the West’s policy of wide-scale introduction of the so called “green energy”. To steer this course, Russia has ample opportunities.

**Key words:** *resources and reserves of oil, gas, fuel and energy resources, primary energy resources, primary hydrocarbon resources, conventional and nonconventional hydrocarbon resources, heavy oils, natural bitumen, shale oil, enhanced oil recovery (EOR), renewable energy sources, gas emissions, carbon footprint, decarbonization, hydrocarbon tax, crystalline basement*

**For citation:** R.Kh. Muslimov Uglevodorodnyj potencial i global'nyj jenergeticheskij perehod. Problemy uglerodnoj nejtral'nosti – postradavshie i vygodopriobretateli [Hydrocarbon potential and global energy transition. Carbon neutrality challenges: beneficiaries and payers]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 1-32. DOI <https://doi.org/10.25689/NP.2022.1.1-32> (in Russian)

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УДК 551.242.23

## Deep Degassing as a Temperature Factor on the Earth Atmosphere

V.L. Syvorotkin

*Moscow State University, Moscow, Russia*

**E-mail: [hlozon@mail.ru](mailto:hlozon@mail.ru)**

**Abstract.** I suppose the main claims to the global hydrocarbon energy sector made by the Paris Climate Agreement of 2015 are not substantiated. The real cause of modern climate change dwells on the planetary intensive process of the hydrogen degassing which generates a complex of physico-chemical effects emitting heat.

1 - negative throttling effect, i.e. the very release of hydrogen on the daytime surface leads to heating of the surface air.

2 - exothermic oxidation of hydrogen and methane in the atmosphere.

3 - the air ionization effect by radioactive gases released from the ground together with hydrogen lead to condensation of water vapor with the heat release.

4- the destruction of the ozone layer causes an increase in the flow of ultraviolet light to the Earth's surface, which, in turn, triggers ozone-forming reactions. The ground-level ozone increases by 2-3 times, the decay of its molecules occurs with the release of thermal radiation.

**Key words:** *Paris Agreement, climate change, hydrogen degassing, choke effect, hydrogen oxidation, air ionization, ozone layer destruction, ground-level ozone*

**For citation:** V.L. Syvorotkin Glubinnaja degazacija zemli kak faktor temperaturnogo vozdejstvija na atmosferu [Deep Degassing as a Temperature Factor on the Earth Atmosphere]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 33-48. DOI <https://doi.org/10.25689/NP.2022.1.33-48> (in Russian)

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## Directions for optimization of carbon emissions of oil and gas companies

*V.A. Karasevich, K.A. Melikova, S.D. Cherdyntseva*

*Gubkin Russian State University of Oil and Gas, Moscow, Russia*

**E-mail: [crucian-74@mail.ru](mailto:crucian-74@mail.ru)**

**Abstract.** The Paris Agreement signed in 2016 has promoted activities related to reduction of greenhouse gas emissions. Following the adoption of Russian and international regulations designed to monitor and reduce greenhouse gas emissions, all Russian oil and gas companies are currently putting an increased focus on this issue.

The paper analyzes the current trends and future activities of the leading Russian oil and gas companies aimed at decarbonization and reduction of carbon footprint. Carbon emissions of oil and gas companies can be cut primarily through implementation of new technologies with lower energy intensity and carbon footprint, application of renewable energy sources (including those in combination with energy storage) for power supply, industrial waste recycling (including treatment of greenhouse gases resulting from technological processes).

**Key words:** *decarbonization, carbon footprint, oil and gas companies*

**For citation:** V.A. Karasevich, K.A. Melikova, S.D. Cherdyntseva Napravlenija optimizacii uglerodnyh vybrosov neftegazovyh kompanij Rossii [Directions for optimization of carbon emissions of oil and gas companies]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 49-60. DOI <https://doi.org/10.25689/NP.2022.1.49-60> (in Russian)

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УДК 504.3.054

**Methodological aspects of accounting, reporting and monitoring of anthropogenic impact in the management of environmentally friendly economic development of the Russian Federation**

*V.V. Potapov*

*EVOS Center LLC, Moscow, Russia*

**E-mail: [vaselich2@yandex.ru](mailto:vaselich2@yandex.ru)**

**Abstract.** Various methodological tools and mechanisms for managing and regulating the volume of anthropogenic emissions and their absorption, developed within the framework of the Paris Agreement on Climate Change, do not solve the problem of the growing anthropogenic impact on the environment.

To calculate energy efficiency, resource efficiency, and economic efficiency of technologies in the process of economic activity, there are units of measurement of their quantitative indicators, and the volume of anthropogenic impact on the environment and environmental efficiency, as well as the volume of environmental capabilities to neutralize anthropogenic impact, currently there is no single unit of measurement of their quantitative indicator. We need universal measurement tools that will allow us to manage and restore the balance disturbed by man between the biosphere and the technosphere.

**Key words:** *Paris Climate Agreement, greenhouse gases, carbon dioxide equivalent, assessment, carbon footprint, ecological energy and economic efficiency, balance of technosphere and biosphere*

**For citation:** V.V. Potapov Metodologicheskie aspekty uchjota, otchjotnosti i monitoringa antropogennogo vozdejstviya v processe upravleniya jekologicheski chistogo jekonomicheskogo razvitija RF [Methodological aspects of accounting, reporting and monitoring of anthropogenic impact in the management of environmentally friendly economic development of the Russian Federation]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 61-90. DOI <https://doi.org/10.25689/NP.2022.1.61-90> (in Russian)

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## Prospects of hydrogen economy

*R.Z. Sakhabutdinov*

*TatNIPIneft Institute, Bugulma, Russia*

**E-mail:** [rifkat@tatnipi.ru](mailto:rifkat@tatnipi.ru)

**Abstract.** Over the past year, hydrogen economy has become the subject of extensive discussions in Russia. The paper considers hydrogen natural occurrence, generation, commercial production technologies, and the challenges associated with drastic expansion of hydrogen applications. Hydrogen is shown to be an energy carrier rather than a direct energy source despite its widespread use. Factors contributing to the rapid growth of hydrogen economy are considered. It is demonstrated that poor efficiency of renewable energy sources coupled with substantial expenses on green energy transition leave large-scale expansion of hydrogen energy projects in serious doubt.

**Key words:** *hydrogen, energy economy, hydrogen economy, electrolysis, methane, energy efficiency, decarbonization, renewable energy sources, carbon dioxide*

**For citation:** R.Z. Sakhabutdinov Perspektivy razvitiya vodorodnoj jenergetiki [Prospects of hydrogen economy]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 91-119. DOI <https://doi.org/10.25689/NP.2022.1.91-119> (in Russian)

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УДК 551.583

## **Anthropogenic warming on the Earth: myth or reality?**

*I.N. Plotnikova*

*Academy of Sciences of the Republic of Tatarstan, Kazan, Russia*

*Kazan National Research Technological University, Kazan, Russia*

**E-mail: irena-2005@rambler.ru**

**Abstract.** The paper discusses the problem of global warming and climate change. The effect of anthropogenic carbon dioxide emissions and the human role in the change of CO<sub>2</sub> concentration in the ground atmosphere are considered. Brief review of present-day views towards the role of greenhouse gases in the change of global temperature is presented. The estimate of anthropogenic CO<sub>2</sub> emission contribution to global climate change is based on the analysis of published literature and data from meteorological observatories.

**Key words:** *anthropogenic emission, carbon dioxide, global warming, greenhouse gases*

**For citation:** I.N. Plotnikova Antropogennoe poteplenie na planete zemlja: mif ili real'nost'? [Anthropogenic warming on the Earth: myth or reality?]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 120-137. DOI <https://doi.org/10.25689/NP.2022.1.120-137> (in Russian)

DOI: <https://doi.org/10.25689/NP.2022.1.138-151>

УДК 620.92

## **Renewable thermal energy sources as the basis for sustainable development of global energy sector of the future**

*V.V. Bessel*

*NewTech Services, Moscow, Russia*

**E-mail: [vbessel@nt-serv.com](mailto:vbessel@nt-serv.com)**

**Abstract.** Global economic growth at the current stage of technological progress is driven by increasing energy consumption. The paper considers the evolution of global energy consumption from 1981 to 2019. The analysis reveals a steady increase in the consumption of all types of fuel and energy sources attributed to the fact that the most developed countries' economies and the global economy are going through the so-called "industrial" stage of development, which requires increased energy consumption for sustainable development. It is demonstrated that over the past 40 years despite current prevalence of thermal energy in the global energy sector (particularly fossil fuels and nuclear power that make a total share of 88.5% in the global energy mix), consumption of renewable energy sources (hydropower, solar and wind energy) has grown at a blistering pace compared to thermal energy primarily due to substantial investments in renewable power generation.

However, given the fact that conventional renewables (hydropower, solar and wind energy) make up just 11.5% of global power generation, only thermal renewable energy sources, primarily MOX-fuel for nuclear power plants and controlled nuclear fusion, will be capable to meet the ever-growing energy demand in the future. In the mid-term perspective, "hybrid" technologies combining conventional energy sources (primarily natural gas, as the most efficient, environmentally friendly and widely available type of fossil fuel) and conventional renewable energy sources are likely to dominate energy supply sector.

**Key words:** *global energy consumption; energy consumption balance trends; fossil fuels; natural gas; energy transition; hydrogen economy; renewable thermal energy; hybrid energy generation technology*

**For citation:** V.V. Bessel Vozobnovljaemye teplovye istochniki jenerгии kak osnova ustojchivogo razvitija global'noj jenergetiki budushhego [Renewable thermal energy sources as the basis for sustainable development of global energy sector of the future]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 138-151. DOI <https://doi.org/10.25689/NP.2022.1.138-151> (in Russian)

DOI: <https://doi.org/10.25689/NP.2022.1.152-164>

УДК: 553.98.041:551.763 (575.17)

**A new look at the assessment of the oil and gas content  
of the cretaceous deposits of the Amudarya sedimentary basin**

*T.Kh. Shoimurotov, Sh.A. Umarov, F.T. Khalikulova*

*Institute of Geology and Exploration of Oil and Gas Fields (JSC «IGIRNIGM»)*

*Goskomgeologiya RUz, Tashkent, Uzbekistan*

**E-mail: [igirnigm@ing.uz](mailto:igirnigm@ing.uz)**

**Abstract.** The article examines the geological and hydrogeochemical prerequisites for the oil and gas content of the Cretaceous deposits of the Amudarya sedimentary basin. The indissolubility of the water migration of chemical elements, hydrocarbons and, in general, the unity of the dynamics and chemistry of underground fluids is an important point that, according to many, determines their oil prospecting value in specific geological conditions.

**Key words:** *basin, region, area, structure, zone, well, formation water, mineralization, hydrocarbon, reservoir, trap, fluid, sediments, hydrodynamics, horizon, migration*

**For citation:** T.Kh. Shoimurotov, Sh.A. Umarov, F.T. Khalikulova Novyj vzgljad na ocenku neftegazonosnosti melovyh otlozhenij Amudar'inskogo sedimentacionnogo bassejna [A new look at the assessment of the oil and gas content of the cretaceous deposits of the Amudarya sedimentary basin]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 152-164. DOI <https://doi.org/10.25689/NP.2022.1.152-164> (in Russian)



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УДК: 550.812:553.98 (575.172)

**Development of an innovative methodology for searching for hydrocarbon deposits in the jurassic and paleozoic sediments of the Shagyrylyk-Shegeinsky group of deposits (Republic of Karakalpakstan)**

<sup>1</sup>*M.Kh. Iskandarov, <sup>1</sup>Sh.A. Umarov, <sup>2</sup>I.N. Khakimzyanov, <sup>1</sup>A.P. Abzalov, <sup>3</sup>Kh.Kh. Nurilloev*

<sup>1</sup>*Institute of Geology and Exploration of Oil and Gas Fields (GA «IGIRNIGM»)  
State Committee for Geology of the Republic of Uzbekistan, Tashkent, Uzbekistan,*

<sup>2</sup>*TatNIPIneft Institute, Bugulma, Russia*

<sup>3</sup>*IP «PETROMARUZ UZBEKISTAN», Tashkent, Uzbekistan*

**E-mail: shakhumarov@gmail.com**

**Abstract.** In this article examines a innovative method is proposed for searching for oil and gas promising structures in Paleozoic sediments by identifying and tracing submerged zones of local extension that control oil and gas shows and hydrocarbon deposits in Jurassic and Paleozoic sediments.

**Key words:** *Ustyurt, Shagyrylyk-Shegensky group of fields, oil and gas content, Paleozoic, deep blocks, zones of local extension, seismic CDP - 3D*

**For citation:** M.Kh. Iskandarov, Sh.A. Umarov, I.N. Khakimzyanov, A.P. Abzalov, Kh.Kh. Nurilloev Razrabotka innovacionnoj metodiki po poiskam zalezhej uglevodorodov v jurskih i paleozojskih otlozhenijah Shagyrylyk-shegeinskoj gruppy mestorozhdenij (Respublika Karakalpakstan) [Development of an innovative methodology for searching for hydrocarbon deposits in the jurassic and paleozoic sediments of the Shagyrylyk-Shegeinsky group of deposits (Republic of Karakalpakstan)]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 165-181. DOI <https://doi.org/10.25689/NP.2022.1.165-181> (in Russian)

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УДК 622.276.031.011.43

## Determining correlation between reservoir thermal characteristics and poroperm properties in heavy oil fields

*R.Kh. Sadreeva, A.A. Zalyatdinov, A.A. Alenkin, E.A. Burlutsky, E.N. Badretdinov*

*Almetyevsk State Petroleum Institute, Almetyevsk, Russia*

**E-mail:** [zalyatdinovaa@agni-rt.ru](mailto:zalyatdinovaa@agni-rt.ru)

**Abstract.** Reliable data on rock thermal characteristics (heat conductivity, temperature conductivity, and heat capacity) is required to solve a number of theoretical and practical technogenic problems, including those related to geothermal studies (as, for example, a reliable estimate of heat flows), interpretation of thermal logging results, application of thermal heavy oil recovery methods, etc. Solving of these problems requires development of thermal petrophysics experimental facilities, which is a separate scientific challenge. Regardless of the available guidelines and design solutions, search for the most suitable tools of studying rock thermal characteristics is still underway.

Rock thermal characteristics in Tatarstan oil fields have been studied by Yakovlev B.A., Nikolaev S.A., Lipaev A.A.

The paper discusses study of rock thermal characteristics using commercial tools – DSC 204 HP differential scanning calorimeter and LFA 467 complex designed for temperature conductivity measuring. The benefit of these tools is measurement rapidity and possibility of determining dependence of specific heat capacity and temperature conductivity of unconsolidated rock samples on temperature with actual rock pressure simulation.

**Key words:** *core material, rock thermal characteristics, reservoir rock, heavy oil, poroperm properties, core temperature, temperature conductivity coefficient, specific heat capacity, thermal conductivity*

**For citation:** R.Kh. Sadreeva, A.A. Zalyatdinov, A.A. Alenkin, E.A. Burlutsky, E.N. Badretdinov *Opređenje korreljacii mezhdu teplovymi i fil'tracionno–emkostnymi svojstvami porod-kollektorov zalezhej SVN [Determining correlation between reservoir thermal characteristics and poroperm properties in heavy oil fields]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 182-194. DOI <https://doi.org/10.25689/NP.2022.1.182-194> (in Russian)*

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УДК 622.276.1/.4(470.41)

## Technology selection for increase of coefficient of petroextraction on terrigenous deposits of the bobrikovsky horizon Southern Nurlatskogo fields

*I.N. Khakimzyanov, O.I. Khakimzyanova, L.V. Zatsarina, R.R. Shamsutdinova,*

*I.S. Kuchinskaya*

*TatNIPIneft Institute, Bugulma, Russia*

**E-mail: [khakimzyanov@tatnipi.ru](mailto:khakimzyanov@tatnipi.ru)**

**Abstract.** By results of the complex analysis of all existing information characterizing work of layers on wells, including and the reasons of high water cutting of production on terrigenous to deposits of Southern Nurlatskogo of a field, for further development of stocks of oil technologies on drilling of wells with the horizontal termination and on the organization of system of maintenance of reservoir pressure for the purpose of regulation of system of development and change of filtrational lines of current are offered.

**Key words:** *aleurolites, sandstones, operational ranks, oil production, water cutting, downloading regulation, non-stationary flooding, washing of a face of a well, focal flooding, change of filtrational lines of current*

**For citation:** I.N. Khakimzyanov, O.I. Khakimzyanova, L.V. Zatsarina, R.R. Shamsutdinova, I.S. Kuchinskaya Podbor tehnologii dlja povyshenija koeficienta nefteizvlechenija na terrigennyh otlozhenijah bobrikovskogo gorizonta Juzhno-Nurlatskogo mestorozhdenija [Technology selection for increase of coefficient of petroextraction on terrigenous deposits of the bobrikovsky horizon Southern Nurlatskogo fields]. Neftyanaya Provintsiya, No. 4(28), 2021. pp. 195-208. DOI <https://doi.org/10.25689/NP.2021.3.195-208> (in Russian)

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УДК 622.276

## Evaluation of Waterflooding Performance in Carbonate Reservoirs with High-Viscosity Oil in the Volga-Ural Petroleum Province

<sup>1</sup>N.A. Simonov, scientific supervisor: <sup>2</sup>V.A. Mordvinov

<sup>1</sup>LUKOIL-PERM LLC, Perm, Russia

<sup>2</sup>Perm National Research Polytechnic University, Perm, Russia

E-mail: Khrystal74@mail.ru

**Abstract.** The paper describes mathematical and statistical research methods based on the comprehensive analysis of field data as well as the value of such methods for characterization of flow connectivity. The definitions of rank correlation and correlation coefficient are presented, Spearman's and Kendall's rank correlation methods, application and computational algorithms are considered in more detail. An example of calculating Spearman's and Kendall's rank correlations for real field wells is provided.

**Key words:** *high-viscosity oil, well production testing, waterflood system, connectivity, natural fracture network, carbonate reservoir, Spearman's rank correlation, Kendall's rank correlation*

**For citation:** N.A. Simonov, V.A. Mordvinov Ocenka jeffektivnosti sistemy zavodnenija karbonatnyh kollektorov s vysokovjazkoj plastovoj neft'ju Volgo-Ural'skoj neftegazonosnoj provincii [Evaluation of Waterflooding Performance in Carbonate Reservoirs with High-Viscosity Oil in the Volga-Ural Petroleum Province]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 209-222. DOI <https://doi.org/10.25689/NP.2022.1.209-222> (in Russian)

DOI: <https://doi.org/10.25689/NP.2022.1.223-237>

УДК 622.276.63

## Optimizing approach to selecting acid systems and injection conditions based on core acidizing experiments

<sup>1</sup>I.I. Mannanov, <sup>2</sup>K.S. Taipov, <sup>2</sup>A.G. Gilya-Zetinov, <sup>3</sup>D.I. Ganiev

<sup>1</sup>Kazan Federal University, Kazan, Russia

<sup>2</sup>Tagras-KhimServis LLC, Almetьевsk, Russia

<sup>3</sup>TatNIPIneft Institute, Bugulma, Russia

E-mail: [ildarmannanov@mail.ru](mailto:ildarmannanov@mail.ru)

**Abstract.** One of the ways to optimize matrix acidizing is its physical modeling under simulated reservoir conditions. The paper discusses the results of laboratory modeling of matrix acidizing during core flood tests using unique acid systems. Based on set of studies, various options of acidizing optimization are offered considering reservoir differentiation in terms of porosity and permeability and with regard to possibility of acid system properties control.

**Key words:** *rapid analysis, acidizing, flood test, properties control, injection rate, rate of reaction, stimulation optimization*

**For citation:** I.I. Mannanov, K.S. Taipov, A.G. Gilya-Zetinov, D.I. Ganiev Optimizacija podhodov k vyboru kislotnyh sostavov i vybora rezhima zakachki na osnove fil'tracionnyh jeksperimentov pri modelirovanii kislotnogo vozdejstvija na obrazcy kerna [Optimizing approach to selecting acid systems and injection conditions based on core acidizing experiments]. Neftyanaya Provintsiya, No. 4(28), 2021. pp. 223-237. DOI <https://doi.org/10.25689/NP.2021.3.223-237> (in Russian)

DOI: <https://doi.org/10.25689/NP.2022.1.238-256>

УДК: 622.576

## **Analysis of the efficiency of water shutoff technology in production wells**

*L.A. Makhmutova, G.R. Ganieva, I.F. Minkhanov, A.Z. Mustafin*

*Kazan Federal University, Kazan, Russia*

**E-mail: [liana.mah164@mail.ru](mailto:liana.mah164@mail.ru)**

**Abstract.** In this work, domestic and foreign literature on methods for limiting water inflow in production wells was analyzed. As a result of the analysis, a chemical method for limiting water inflow was studied.

Selection of the optimal composition or composition, which, due to the insulating barrier, contributes to the development of undeveloped oil-saturated low-permeability interlayers is an urgent task. Insulating compositions based on polymers, gels, foams, resins, emulsions and their compositions were considered as insulating agents.

**Key words:** *ORP, water cut, chemicals, surfactant, gel, polymer, biopolymer, emulsion*

**For citation:** L.A. Makhmutova, G.R. Ganieva, I.F. Minkhanov, A.Z. Mustafin Analiz jeffektivnosti metodov ograničenja vodopritoka v dobývajúšhich skvazhinah [Analysis of the efficiency of water shutoff technology in production wells]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 238-256. DOI <https://doi.org/10.25689/NP.2022.1.238-256> (in Russian)

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УДК 622.276.6

## Prediction areas of paraffin deposition in wells and pipelines using integrated modeling

A.A. Kamenskikh

*Perm National Research Polytechnic University, Master's student, Perm, Russia*

**E-mail:** kamenskikhwork@yandex.ru

**Abstract.** This article discusses a method for predicting areas of paraffin precipitation in wells and pipelines of a gathering and transport system based on an integrated model (IM) of a field. Well operation conditions are given and areas of formation of paraffin deposits in operating equipment are identified, as well as a comparison of the results obtained with actual field data. Recommendations and conclusions based on the results of the analysis of the results of forecasting the areas of paraffin precipitation are given.

**Key words:** *oil and gas industry, complicated stock, integrated modeling, component models, production optimization, well technological modes, forecasting the areas of paraffin deposition, wax deposition, wax appearance temperature, compositional models*

**For citation:** A.A. Kamenskikh Prognostirovanie uchastkov vypadenija parafinov v skvazhinah i truboprovodah s pomoshh'ju integrirovannogo modelirovanija [Prediction areas of paraffin deposition in wells and pipelines using integrated modeling]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 257-269. DOI <https://doi.org/10.25689/NP.2022.1.257-269> (in Russian)

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УДК 622.24(470.41)

## **System implementation for the potential drilling fund at the facilities of PJSC TATNEFT, depending on the risks**

*V.V. Emelyanov, B.G. Ganiev, I.R. Mukhliev, I.S. Karimov*

*JV Tatneft-Dobycha – PJSC TATNEFT, Almetьевsk, Russia*

**E-mail:** [zgeo\\_pn@tatneft.ru](mailto:zgeo_pn@tatneft.ru)

**Abstract.** Production drilling in the context of the investment portfolio of any large oil and gas company is the most costly and at the same time the most profitable geological and technical activity. The success of drilling mainly depends on the approaches used and the tools used at the planning stage. In addition to the currently used modern tools for various types of modeling and simulators, it is also important to assess and rank both projects for drilling a particular area in general, and project wells, in particular, according to the criterion for assessing existing risks.

**Key words:** *Well interventions, drilling, risks, success, ranking*

**For citation:** V.V. Emelyanov, B.G. Ganiev, I.R. Mukhliev, I.S. Karimov Sozdanie sistemy ranzhirovaniya potencial'nogo fonda bureniya na ob#ektah PAO «Tatneft» v zavisimosti ot riskov [System implementation for the potential drilling fund at the facilities of PJSC TATNEFT, depending on the risks]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 270-281. DOI <https://doi.org/10.25689/NP.2022.1.270-281> (in Russian)



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## Methodological approaches to additional exploration of oil fields

<sup>1</sup>*M.Ya. Borovsky, <sup>2,3</sup>B.V. Uspensky*

<sup>1</sup> *LLC "GEOFIZSERVICE", Kazan, Russia*

<sup>2</sup> *Kazan (Volga Region) Federal University, Kazan, Russia*

<sup>3</sup> *IPEM TAS, Kazan, Russia*

**E-mail :borvadus@rambler.ru**

**Abstract.** In connection with the 70th birthday, the scientific and production activities of one of the founders of the methodology for additional exploration of oil fields at the final stages of development in areas with a high degree of exploration of the subsoil, a well-known Russian oil geologist, representative of the Kazan Geological School, Associate Professor, Candidate of Geological and Mineralogical Sciences, Honored Worker of the Oil and Gas Industry of the Russian Federation, Honorary Oilman of the Russian Federation Alexander Sergeevich Yakimov.

The possibilities of geological and geophysical methods at the final stages of the development of oil fields in areas with a high degree of exploration of the subsoil are discussed. The methodology for additional exploration of oil fields is based on an unconventional combination of mobile methods (electrical prospecting EP, magnetic prospecting, geochemistry) and vertical seismic profiling, as well as the use of a complicated scheme (staging) of geological exploration.

A list of the main publications is given, which reflects the questions, tasks and results of the scientist's research.

**Key words:** *oil fields, methodology, development, mobile methods, geological exploration, magnetic prospecting, geochemistry*

**For citation:** M.Ya. Borovsky, B.V. Uspensky Metodologicheskie podhody k dorazvedke nefjtjanyh mestorozhdenij [Methodological approaches to additional exploration of oil fields]. Neftyanaya Provintsiya, No. 1(29), 2022. pp. 282-294. DOI <https://doi.org/10.25689/NP.2022.1.282-294> (in Russian)