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ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫ
Satbayev University

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ
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КАЗАХСТАН
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O.G. Khaitov*, A.A. Umirzokov, E.N. Yusupkhojaeva, S.P. Abdurakhmonova, N.G. Kholmatova

Tashkent State Technical University named after Islam Karimov,
Tashkent, Uzbekistan.
E-mail: o_hayitov@mail.ru

ASSESSMENT OF THE DENSITY OF THE WELL GRID IN THE SOUTHEASTERN PART OF THE BUKHARA-KHIVA REGION

Abstract. The article is devoted to assessing the degree of influence of the well grid density on the oil recovery coefficient for gas oil deposits in the southeastern part of the Bukhara-Khiva region. The attribution to the category of hard-to-recover reserves of well development facilities that are difficult to operate due to gas breakthrough from the gas mantle and plantar deposits to the well faces is justified. It established that during the development of the field using the technology of oil displacement by various agents, the oil recovery coefficient (KIN) calculated according to the modified formula of A.N. Krylov.

The dependence of oil recovery on the density of the well grid (PSS) shown. Dependencies compiled both for specific fields and for oil-producing areas, and their disadvantages caused by the complexity of determining the parameters included in them disclosed. The necessity of developing a hydrodynamic model of the deposit that correctly reproduces the features of the structure of the deposit is established and the role of the guidance document RN 39.0-105:2012 in this process shown. Which allows accelerating the process of introducing advanced computer technologies into the practice of designing and managing the development of oil and gas and oil fields in Uzbekistan.

Studies of the influence of the well grid density on the KIN based on the use of statistical methods that allowed not only to state the facts, but also to find out the reasons for the influence of the well grid density in the mining and geological conditions of oil deposits. Numerical experiments carried out to assess the degree of influence of the well grid density on the KIN value using statistical models obtained because of generalization of geological and field data of long-term deposits developed. Based on the analysis of the results of assessing the degree of influence of the well grid fee on the KIN, proposals were made that should be taken into account when designing the development of sub-gas oil deposits in the south-eastern part of the BHR.

Key words: sub-gas oil deposits, reserves, coefficient, oil recovery, well, hydrodynamic model, statistical model, development, grid density, nrojection.

О.Г. Хайитов*, А.А. Умирзоков, Э.Н. Юсупходжаева, С.П. Абдурахманова, Н.Г. Холматова

Ташкент мемлекеттік техникалық университеті,Ташкент, Өзбекстан.
E-mail: o_hayitov@mail.ru

БҰХАРА-ХИУА ОБЛЫСЫНЫҢ ОҢТҮСТІК-ШЫҒЫС БӨЛІГІНДЕГІ ҰҢҒЫМАЛАР ТОРЫНЫҢ ТЫҒЫЗДЫҒЫН БАҒАЛАУ

Аннотация. Мақала Бұхара-Хиуа аймағының оңтүстік-шығыс бөлігіндегі газ мұнай кен орындары астында мұнай өндіру коэффициентіне ұңғымалар торының тығыздығының әсер ету дәрежесін бағалауға арналған. Газ жармасынан және ұңғымалардың кенжарларына табан астында газдың жарылуына байланысты пайдалану қиын ұңғымаларды игеру объектілерінің алынуы қиын қорларының санатына жатқызу негізделген. Әр түрлі агенттердің мұнайды ығыстыру технологиясын қолдана отырып кен орнын игеру кезінде мұнайды алу коэффициенті (КИН) а.н. Крыловтың модификацияланған формуласы бойынша есептелгені анықталды.

Мұнай шығарудың ұңғымалар торының тығыздығына тәуелділігі көрсетілген (PSS). Нақты кен орындары бойынша да , мұнай өндіретін аудандар бойынша да тәуелділіктер құрылды және оларға кіретін параметрлерді анықтау күрделілігінен туындаған олардың кемшіліктері ашылды. Кен орнының құрылымдық ерекшеліктерін дұрыс көрсететін кен орнының гидродинамикалық моделін әзірлеу қажеттілігі анықталды және RN 39,0-105:2012 басқару құжатындағы рөлі көрсетілді, бұл Өзбекстанның Мұнай және газ-мұнай кен орындарын жобалау және басқару практикасына озық компьютерлік технологияларды енгізу процесін жеделдетуге мүмкіндік берді.

Ұңғымалар торының тығыздығының КИН-ге әсерін зерттеу статистикалық әдістерді қолдануға негізделген, бұл фактілерді анықтауға ғана емес, сонымен қатар мұнай кен орындарының тау-кен геологиялық жағдайларында ұңғымалар торының тығыздығының әсерін анықтауға мүмкіндік берді. Ұзақ уақыт игеріліп жатқан кен орындарының геологиялық-кәсіпшілік деректерін жалпылау нәтижесінде алынған статистикалық модельдерді қолдана отырып, ұңғымалар торының тығыздығының КИН шамасына әсер ету дәрежесін бағалау бойынша сандық эксперименттер жүргізілді, ұңғымалар торының КИН-ге әсер ету дәрежесін бағалау нәтижелерін талдау негізінде БХР оңтүстік-шығыс бөлігінің газ асты мұнай кен орындарын игеруді жобалау кезінде ескеру қажет ұсыныстар енгізілді.

Түйінді сөздер: газ астындағы мұнай кен орындары, қорлар, коэффициент, мұнай өндіру, ұңғыма, гидродинамикалық модель, статистикалық модель, даму, тор тығыздығы, жобалау.

О.Г. Хайитов*, А.А. Умирзоков, Э.Н. Юсупходжаева, С.П. Абдурахманова, Н.Г. Холматова

Ташкентский государственный технический университет,
Ташкент, Узбекистан.
E-mail: o_hayitov@mail.ru

ОЦЕНКА ПЛОТНОСТИ СЕТКИ СКВАЖИН ЮГО-ВОСТОЧНОЙ ЧАСТИ БУХАРО-ХИВИНСКОЙ ОБЛАСТИ

Аннотация. Статья посвящена оценке степени влияния плотности сетки скважин на коэффициент извлечения нефти, под газовые нефтяные залежи юго-восточной части Бухара-хивинского региона. Обоснована отнесенность к категории трудноизвлекаемых запасов объектов разработки скважин сложных в эксплуатации вследствие прорыва газа из газовой манки и подошвенных под к забоям скважин. Установлено, что при разработке месторождения с использованием технологии вытеснения нефти различными агентами коэффициент извлечения нефти (КИН) рассчитывало по модифицированной формуле А.Н. Крылова.

Показана зависимость нефтеотдачи от плотности сетки скважин (ПСС). Составлены зависимости как по конкретным месторождениям, так и по нефтедобывающим районам, и раскрыты их недостатки, вызванные сложностью определения входящих в них параметров. Установлена необходимость разработки гидродинамической модели месторождения, корректно воспроизводящей особенности строения залежи и показана роль в этом процесс руководящего документа RH 39,0-105:2012,

позволявшего ускорить процесс внедрения передовых компьютерных технологий в практику проектирования и управления разработкой нефтяных и газонефтяных месторождений Узбекистана.

Исследование влияния плотности сетки скважин на КИН построено на применении статистических методов, позволивших не только констатировать факты, но и выяснять причины влияние плотности сетки скважин в горно-геологических условиях залежей нефти. Проведены численные эксперименты по оценке степени влияния плотности сетки скважин на величину КИН с применением статистических моделей, полученных в результате обобщения геолого-промысловых данных длительно разрабатываемых залежей, на основе анализа результатов оценки степени влияния платности сетки скважин на КИН внесены предложения, которые необходимо учитывать при проектировании разработки подгазовых нефтяных залежей юго-восточной части БХР.

Ключевые слова: подгазовые нефтяные залежи, запасы, коэффициент, извлечение нефти, скважина, гидродинамическая модель, статистическая модель, разработка, плотность сетки, проектирование.

Introduction. The bulk of oil reserves in the southeastern part of the Bukhara-Khiva region (BKR) are in the oil and gas fields, where oil deposits are located under the gas cap with a relatively thicker effective thickness (table). Because of difficulty of well operation due to gas breakthrough from the gas cap and bottom water to the well bottom, the reserves of these development objects belong to the category of hard-to-recover (Madumarova, Suleimenova, Pentayev, Baydauletova, Miletenco, & Tumazhanova, 2020:46 – 50; Merzlyakov, 2003: 267; Alexey, Zhanar, Genadiy, Kanat, & Rossitza, 2020:36 – 46).

Gas oil reservoirs usually developed under prevailing water-pressure, gas-pressure or simultaneous manifestation of both regimes. As is known, the oil recovery factor (ORF) for field development using the technology of oil displacement by various agents calculated by the modified formula of A.N. Krylov (Lysenko, 2006:15–17).

Methods and analysis. State of depletion of hydrocarbon reserves in the fields of the southeastern part of the Bukhara-Khiva region (O.G. Khayitov, 2020)

№	occurrence	Accumulated production			Current extraction rate, fractions of units		
		Gas, million m^3	condensate, thousand tons	oil, thousand tons	gas	conden-sate	Oil (petroleum)
1	2	3	4	5	6	7	8
1	Khanabad, N	-	-	1,524	-	-	0,044

2	Sovligar, N	-	-	3,951	-	-	0,072
3	Garmiston, N	-	-	524,615	-	-	0,265
4	Feruza, N	-	-	81,142	-	-	0,011
5	Maison, NGK	-	-	4,322	-	-	0,090
6	Karatepa, NGK	2713,103	340,6275	130,711	0,534	0,331	0,080
7	New Karatepa, NGK	2 741	341,070	130,712	0,2122	0,1990	0,3610
8	Shakarbulak, NGK	1632	33	697	0,180	0,029	0,021
9	Turtsari, NGK	850	25,164	117,984	0,1790	0,0629	0,1071
10	Kumchuk, NGK	-	-	8,671	-	-	0,001
11	Sev. Shurtan, NGK	766	31,004	1210,012	0,6978	0,6420	0,1574
12	Ilim, NGK	2098	114,563	-	0,6833	0,6160	-
13	Darakhtli, NGK	-	-	-	-	-	-
14	Kamashi, NGK	641	37,154	132	0,266	0,219	0,169
15	Beshkent, NGK	6190	466,062	181,101	0,534	0,192	0,206
16	Sherkent, NGK	169	5,649	178,823	0,4899	0,0926	0,2436
17	Ruboyi, NGK	48	0,727	27,650	0,022	0,002	-
18	Aknazar, NGK	56,593	-	1,776	0,010	0,004	-
19	North Aknazar, NGK	-	-	3,924	-	-	0,003

Table continuation

1	2	3	4	5	6	7	8
20	Mirmiron, NGK	-	-	-	-	-	-
21	Namazbay, GK	448	19718	-	0,1050	0,1084	-
22	Oydin, GK	105	5,024	-	0,0141	0,0244	-
23	Chunagar, GK	1367	60,543	-	0,1021	0,063	-
24	Shurtan, GK	501061	21242,212	-	0,7901	7165	-
25	Akhirbulak, GK	-	-	-	-	-	-
26	Buzakhur, GK	6739	331,646	-	0,9963	0,9476	-
27	East. Buzakhur, GK	1143	164,722	-	0,2906	0,3050	-
28	Tarnasoy, GK	228	3,544	-	0,0479	0,0142	-
29	Tavakkal, GK	77,184	2,527	-	0,012	0,010	-
30	Alachagikuduk, GK	-	-	-	-	-	-
31	Zafar, GK	772	111,888	-	0,2678	0,1955	-
32	Sev. Nishan, GK	14931	619	-	0,4917	0,3515	-
33	Nishan, GK	8,099	-	-			
34	Sev.Guzar, GK	2987	382,4	-	0,352	0,220	-
35	Marvarid, GK						
36	Topichaksoy, GK						
37	Girsan, GK	5835,4	192,9	-	0,551	0,310	-
38	North.Girsan GK	135	7,539	-	0,0289	0,0134	-
39	Divkhana, GK	316	16,552	-	0,1707	0,1602	-
40	Ernazar, GK	1704	73,754	-	0,3816	0,1715	-

41	Chigil, GK	31,4	0,9	-	0,002	0,001	-
42	Talimarzhon, GK	271,182	11,381	-	0,016	0,018	-
43	Nazarkuduk - GK	304,945	11,7897	-	0,0303	0,072	-
44	Kapali, G						

КИН (oil recovery factor) = $К_{выт} \cdot К_{охв} = К_{выт} \cdot К_{охв.п} \cdot К_{охв.\ т}$, (1)

Where $К_{выт}$ – is the coefficient of oil displacement by the working agent $К_{охв.п}$, $К_{выт.}$ – displacement sweep coefficients over the area and thickness of the reservoir, respectively.

In the development of fields with heterogeneous structure of reservoirs on the value of $К_{охв.п}$, mainly influenced by the density of the grid of wells (NWD) and patterns of their placement. That is why in some works this index is designated as a grid factor (Lysenko, 2006; 15-18), the value of which depends on density of the adopted well net, on zonal heterogeneity and discontinuity of oil reservoirs.

Many scientists and research centers have conducted studies to establish the dependence of oil recovery on the density of well set (LWD). According to the obtained dependencies both for specific fields and for oil, producing regions revealed shortcomings. They consisted in complexity of definition of the parameters included in them that is why they could not find wide application.

It should be noted that abroad to justify and analyze the potential of infill drilling. Methods of estimation of coverage coefficient of wells net as "Kho-ratio method" and "Stiles method" are used. Their main disadvantage is complexity of parameters definition, for example, uncertainty in constructing the relation connectivity – distance between the wells, caused by a big scatter of points received with the help of the proposed algorithms (Poluden, 1980; 34-37).

Determination of a more reasonable value of Cs is not difficult if a hydrodynamic model of the field, which correctly reproduces the features of the reservoir structure, is developed. In this regard, the development and approval of a guidance document (RH 39.0-105:2012) on creating a permanent geological and technological model of hydrocarbon deposits when designing the development of oil and gas fields in Uzbekistan is very timely. The use of this guidance document (RH 39.0-105:2012) will accelerate the process of implementing advanced computer technology in the design and management of oil and gas field development and operate the geological and technological information in its entire volume (3D), taking into account changes over time (4D).

Meanwhile, the uncertainty and lack of input data required to create a permanent geological and technological model and for their initialization may limit the use of 3D for predicting both oil recovery factor and well grid factor, especially in the stage of field development and hydrocarbon reserves estimation. In this connection, it is necessary to draw attention to one more problem, typical of the initial stage of the field development. As you know, the first document on the new field is a calculation of hydrocarbon reserves. Naturally, at the initial stage a special emphasis is made on the types of researches, aimed to determine and justify the estimated parameters of hydrocarbon reserves. This leads to the fact that when drafting design documents for field development using hydrodynamic calculation methods, based on mathematical description of oil recovery mechanism and requiring the use of a wide range of parameters. There is an acute shortage of data on reservoir permeability, changes in values of oil and gas properties from pressure, phase and relative phase permeability, parameters of geological heterogeneity of strata, etc. Under these conditions, the use of empirical formulas becomes not only inevitable, but also significant for making management decisions in the initial stage of development.

The study of influence of density of well net on ORF is impossible without application of statistical methods, which allow to not only state facts, but also, to what is especially important, to find out the reasons, why influence of density of well net on ORF (oil recovery factor) changes in different mountain-geological conditions of oil deposits.

By present time, a great amount of material has been accumulated for the deposits at the late and final stages of development. Generalization of actual data on these fields is of special value for solving many debatable questions in the field of evaluation of influence of some or other technological solutions on efficiency of implemented development systems.

Numerical experiments were carried out to assess the degree of influence of well grid density on the value of ORF using statistical models obtained as a result of generalization of geological and field data of long-developed deposits. One of the main advantages of statistical models obtained based on multifactor regression analysis is that they allow establishing the influence of a particular indicator on the process not only in quality terms, but also in quantitative influence with simultaneous influence of other factors. This is one of the main reasons why statistical models used for evaluation of the influence of well grid density on ORF in different geological. In addition, physical conditions of the deposits, rather than dependence only between the values of well grid density and ORF, in which other geological and technological parameters practically do not participate.

Experience of application of these models for evaluation of ORF shows that relatively reliable results obtained when they used under conditions similar to those for which they performed. They are applicable only in the range of parameters of objects and development systems used when obtaining statistical models. Therefore, to estimate the degree of influence of well grid density on ORF in under-gas oil reservoirs, statistical models given in the Methodological Guide for calculation of oil recovery factors from subsurface, as well as statistical models obtained for oil and gas objects and fields with oil rims of south-eastern part of Bukhara-Khiva region.

Estimation of influence of density of a grid of wells on coefficient of oil recovery on statistical models at simultaneous change of values of all parameters is practically impossible, as it leads to multivariate calculations and creates difficulties at the analysis of the received results. In this connection in numerical experiments only the value of density of wells net has changed, and other parameters of statistical models have remained unchanged and equal to their average values. At the same time, the value of density of wells grid changed in the ranges used in obtaining statistical models. Application of such methodological technique also explained by the fact, that statistical models give the most reliable results, when parameters, included in dependences, are close to their average values (Madumarova, Suleimenova, Pentayev, Baydauletova, Miletenco, & Tumazhanova, 2020:46–50; Merzlyakov, 2003: 267).

Results and discussion. The results of calculations of ORR in the considered ranges of changes in the density of well grid for each statistical model presented in the form of dependences shown in the figure. For sub-gas oil reservoirs with prevailing water pressure regime, the dependencies look like

$$ORF = \mathbf{ab^{s}}, \qquad (2)$$

And with the gas pressure mode

$$ORF = \mathbf{a - bS + cS^{1}} \qquad (3)$$

Where a, b, c are the dependence coefficients with rather high correlation coefficients 0.95-0.98 and low mean square error 0.022-0.055.

Analysis of the results of the evaluation of the degree of influence of the density of well grid on ORF allows us to make a number of conclusions, which should be taken into account when designing the development of sub-gas oil deposits in the southeastern part of Bukhara-Khiva region (8-13)

Analysis of the results of evaluation of the degree of influence of well grid density on ORF allows us to make a number of conclusions, which should be taken into account when designing the development of sub-gas oil deposits in the southeastern part of Bukhara-Khiva region.

First, the oil recovery factors derived from the statistical models given in the

Methodological Guide for calculating oil recovery factors from the subsurface in all ranges of well grid density are significantly higher than, those expected in the sub-gas oil reservoirs of the southeastern part of the Bukhara-Khiva region (14-19). Possible reasons for this large discrepancy related to the following circumstances:

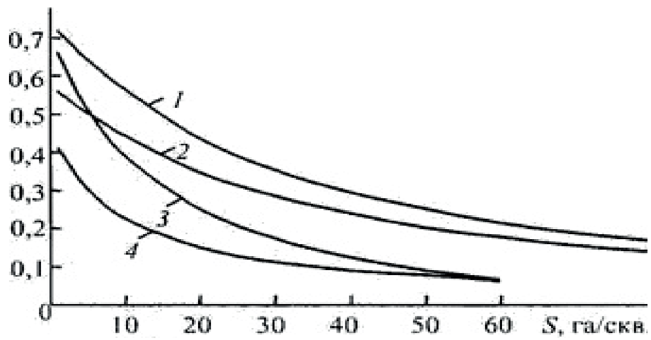
statistical models recommended in the Methodological Guide were obtained in the period 1970-1980 for the deposits with the best geological and physical characteristics, due to which high values of ORF were determined for them;

Most statistical models in this period obtained for the geological and physical conditions of the fields of the Ural-Volga region and Azerbaijan.

The use of these dependencies for other regions, despite the seeming correspondence of the parameters, may lead to an overestimation of the design ORF value.

Secondly, for oil rims with prevailing water-pressure mode, other things being equal in geological and physical conditions, the ORF is higher than for gas-pressure mode, which can be explained by higher oil displacement coefficient with water compared to gas.

Third, a comparison of the oil recovery factor for oil and gas properties and oil rims shows that the larger the volume of the oil portion, the higher the ORF value.



Dependences of the oil recovery factor on the density of the well grid for different types of sub-gas oil deposits.
1 - for oil rims with prevailing water-pressure regime;
2 - for oil rims with prevailing gas-pressure regime;
3 - for oil and gas deposits of the south-east part of the BHR;
4 - for oil rims of the south-east part of the BHR
(O.G. Hayitov, 2018)

Conclusion. It should be emphasized statistical models of ORF cannot replace hydrodynamic models of the process of oil recovery from the subsurface, carried out on the basis of three- and four-dimensional three-phase filtration. Meanwhile, they may well be used at insufficient initial data, especially at the initial stage of industrial evaluation of the field, i.e. at the stage of project development of pilot operation, as well as for evaluation of effectiveness of measures on densification of well grid.

Numerical experiments by formulas and show that application of traditional technologies with drilling of vertical wells at development of such objects does not provide acceptable technical and economic indicators, and predicted values of oil recovery factor rarely exceed 0.1-0.15 (see table).

In this connection, the strategic direction of increasing the efficiency of development of under-gas oil reservoirs with small oil-saturated thickness is the use of new technologies. One of the most important achievements of oil and gas production in the world practice in the XX century was drilling of horizontal wells. The XXI century marked by great achievements in the technique and technology of drilling such wells at sufficiently great depths.

Information about authors:

Khaitov Odiljon Gafurovich – Doctor of geological-mineralogical sciences, academician of the Turan Academy of Sciences, head of the Mining Department, Tashkent State Technical University, Tashkent, Republic of Uzbekistan; o_hayitov@mail.ru, https://orcid.org/0000-0002-7735-5980;

Umirzokov Azamat Abdurashidovich – doctoral student at Tashkent State Technical University, Tashkent, Republic of Uzbekistan; a_umirzoqov@mail.ru; https://orcid.org/0000-0002-9609-179X;

Yusupkhojaeva Elleonora Narimanovna – Associate Professor, Department «Life Safety» Candidate of Chemical Sciences, Tashkent State Technical University, Tashkent, Republic of Uzbekistan; yusupxodjaeva@tdtu.uz, https://orcid.org/0000-0002-2684-2471;

Abdurakhmonova Surayyo Pulatovna – Associate Professor, Department «Commissioning and operation of oil and gas fields», Tashkent State Technical University, Tashkent, Republic of Uzbekistan; surayyoa03@gmail.com, https://orcid.org/0000-0001-9470-8576;

Kholmatova Nargiza Giasovna – Senior Lecturer, Department «Life Safety», Tashkent State Technical University, Tashkent, Republic of Uzbekistan; xolmatova@tdtu.uz, https://orcid.org/0000-0003-0818-1793.

REFERENCES

Absametov M.K., Shagarova L.V. & Gafurov A. (2019). Digitalization of hydrogeological surveys results in ArcGIS. News of the National Academy of Sciences of the Republic of Kazakhstan: Series of Geology and Technical Sciences, 3(435), 14-20. DOI: 10.32014/2019.2518-170X.62.

Alexandrovich A.V., Leonidovna T.N., Leonidovna I.E., Nikolaevna G.T., Petrovich K.V. & Erikovna N.D. (2020). Hydrolytic regulation of component properties. News of NAS RK. Series of Geology and Technical Sciences, (6), 23-28.

Alexey R., Zhanar K., Genadiy R., Kanat A. & Rossitza M. (2020). GEOLOGICAL STRUCTURE OF SOILS AND RICE YIELD IN THE ILI RIVER BASIN. Известия НАН РК. Серия геологии и технических наук, (5), 165-171. DOI:

Gafurovich Kh.O., Tulkunovich Z.R., Avazovich A.O., Odiljonugli G.S., Abdurashidovich U.A. (2022). CLASSIFICATION OF HYDROCARBON DEPOSITS IN THE SOUTH-EASTERN PART OF THE BUKHARA-KHIVA REGION, JUSTIFICATION OF ITS METHODOLOGY AND ANALYSIS OF THE RESULTS. News of NAS RK. Series of Geology and Technical Sciences, (1), 46-52. doi.org/10.32014/2022.2518-170X.139.

Hajek P. (2021). GEOSTABILIZATION OF ECOLOGICAL EQUILIBRIUM AS A RESULT OF FOREST FIRES. News of NAS RK. Series of Geology and Technical Sciences, (5), 84-93.doi.org/10.32014/2021.2518-170X.102.

Hayitov O.G., Yusupkhodzhaeva E.N., Abdurakhmanova S.P., Halmatova G.N. ON THE STATE OF HYDROCARBON RESOURCE BASE IN THE BESHKENT TROUGH On the state of hydrocarbon resource base in the Beshkent trough.-P-23272331. DOI: 10.5373/JARDCS/V12SP7/20202360.

Lysenko V.D. Problemy proektirovaniya razrabotki zonal'no neodnorodnyh neftyanyh mestorozhdenij [Problems of designing the development of zonally heterogeneous oil fields] // Neftepromyslovoe delo. –2007. –№ 11. –S. 15–17.

Lysenko V.D. Zavisimost' nefteotdachi plastov ot plotnosti setki skvazhin [Dependence of oil recovery on the density of the well network]// Neftepromyslovoe delo. – 2006. –№ 6. –S. 15–18.

Madumarova G., Suleimenova D., Pentayev T., Baydauletova G., Miletenco N., & Tumazhanova S. (2020). MONITORING OF DISPLACEMENTS OF OBJECTS OF TERRESTRIAL SURFACES BY INTERFEROMETRY METHOD. OF GEOLOGY AND TECHNICAL SCIENCES, 106. DOI: 10.32014/2020.2518-170X.110.

Merzlyakov V.F. Obosnovanie i sovershenstvovanie tekhnologicheskoj razrabotki mestorozhdenij s trudnoizvlekaemymi zapasami [Justification and improvement of technological development of fields with hard-to-recover reserves]. –M.: OOO «Nedra-Biznescentr», 2003. –267s.

Metodicheskoe rukovodstvo po raschetu koefficientov izvlecheniya neft iz nedr [Methodological guidelines for calculating the coefficient of oil recovery from the subsurface] : RD39-0147035-214-86. –M.: VNII, 1986. –253.

Mordvintsev D., Barrier E., Brunet M.F., Blanpied C. & Sidorova I. (2017). Structure and evolution of the Bukhara-Khiva region during the Mesozoic: the northern margin of the Amu-Darya Basin (southern Uzbekistan). Geological Society, London, Special Publications, 427(1), 145-174.

Nasirov U.F., Ochilov S.A., Umirzoqov A.A. Theoretical calculation of the optimal distance between parallel-close charges in the explosion of high ledges. Journal of Advanced Research in Dynamical and Control Systems, 2020; 12 (7 Special Issue): pp. 2251–2257. DOI: 10.5373/JARDCS/V12SP7/20202351. 10.32014/2020.2518-170X.117.

Norov Y.D., Nasirov U.F. & Ochilov S.A. (2018). Investigation and development of high-bench blasting method with parallel close-spaced holes and wedging stemming. Gornyi Zhurnal, 9, 42-45.

Odiljon Hayitov A.X. Qarshiyev B.Sh. Xamroyev Analyzing efficiency of drilling horizontal borehole in South Kemachi deposit//Mining informational and analytical bulletin (scientific and technical journal) DOI: 10.25018/0236-1493-2018-8-0-71-76.

Poluden I.A. Vliyanie pogreshnostej v raschetah koefficienta setki na pokazateli razrabotki mestorozhdeniya [Influence of errors in calculating the grid ratio on the field development indicators] // Neftyanoe hozyajstvo. 1980. – № 3. – S. 34 – 37.

TEMİRBEKOVA L. (2021). MODULE OF THE GEOINFORMATION SYSTEM FOR ANALYSIS OF GEOCHEMICAL FIELDS BASED ON MATHEMATICAL MODELING AND DIGITAL PREDICTION METHODS. Известия НАН РК. Серия геологии и технических наук, (5), 137-145.doi.org/10.32014/2021.2518-170X.107.

Togizov K.S. (2021). IMPROVEMENT OF HYDRAULIC FACING METHOD TO INCREASE WELLS PRODUCTIVITY. News of NAS RK. Series of Geology and Technical Sciences, (4), 124-129. doi.org/10.32014/2021.2518-170X.106.

Togizov K.S., Zholtayev G.Z. & Isaeva L.D. (2019). The role of three-dimensional models of deposit and thermodynamic conditions of its formation at selecting and evaluating resources of perspective sites. News of NAN RK. Series of Geology and Tech. Scs, (5), 435. doi.org/10.32014/2019.2518-170X.139.

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