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Modern State And Methods Of Enhancing The Productivity Of Field Progress In The South-Eastern Part Of Bukhara-Khiva Region

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ABSTRACT

It is impossible to study the effect of PSS on CIN without using statistical methods that allow not only to state the facts, but also, what is especially important, to find out the reasons why the influence of PSS on CIN varies in different mining and geological conditions of oil deposits. To date, a huge amount of material has been accumulated on deposits that are at the late and final stages of development, the synthesis of actual data on these deposits is of particular value for solving many controversial issues in the field of assessing the impact of certain technological solutions on the efficiency of implemented development systems.

KEYWORDS

Hydrocarbon, oil, gas, deposit, deposits, development efficiency, sub-gas reservoir, water pressure mode, horizontal well, productivity coefficient.

INTRODUCTION

Numerical experiments were carried out to assess the degree of influence of PSS on the value of KIN using statistical models obtained as a result of generalization of geological and commercial data of long-term developed deposits [11; 253p.]. One of the main advantages of statistical models obtained

on the basis of multivariate regression analysis is that they allow us to determine not only the qualitative, but also the quantitative influence of a particular indicator on the process, while simultaneously influencing other factors. This is one of the main reasons why statistical models are used to estimate

the impact of PSS on the KIN in various geological and physical conditions of deposits, and not just dependences between PSS and KIN values, which practically do not involve other geological and technological parameters.

The experience of using these models for estimating the KIN shows that relatively reliable results are obtained when they are used in conditions similar to those for which they were performed. They are only applicable in the range of parameters of objects and development systems used in obtaining statistical-models. Therefore, the statistical models given in the table below are used to estimate the degree of influence of PSS on KIN in sub-gas oil-deposits. Methodological guide for calculating oil recovery coefficients from the subsurface [11; 253p.], as well as statistical models obtained for oil and gas facilities and fields with oil fringes of the South-West Siberian Federal DISTRICT.

MATERIAL AND METHODS

It is practically impossible to estimate the effect of the well grid density on the oil recovery coefficient using statistical models while simultaneously changing the value of all parameters, since this leads to multivariate calculations and POPs make it difficult to analyze the results obtained. In this regard, only the PSS value was changed in numerical experiments, and the other parameters of statistical models remained unchanged and equal to their average values. At the same time, the PSS value changed in the ranges used to obtain statistical models. The use of such a method is also explained by the fact that statistical models give the most reliable results when the parameters included in the dependencies are close to their average values [3; pp. 46-50, 5; c. 36-46].

The results of CIN calculations in the considered ranges of PSS change for each statistical model are presented in the form of dependencies shown in figure 1. At the same time for sub gas oil deposits with the prevailing water-pressure regime the have the form

$$KIN = a \cdot b \cdot (1)$$

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$$KIN = a \cdot b \cdot S + c \cdot S^2 (2)$$

(where a , b , C are the coefficients of dependencies) with sufficiently high correlation coefficients of 0.95-0.98 and a low standard deviation of 0.022-0.055.

Analysis of the results of the evaluation of the degree of influence of PSS on CIN allows to draw some conclusions that should be considered in the design of oil oil deposits UVCHBKHR.

III. RESULTS

First, the oil recovery coefficients obtained from statistical models given in the Methodological guide for calculating oil recovery coefficients from the subsurface are significantly higher in all PSS ranges than those expected at the South-West Siberian oil and GAS condensate field. Possible reasons for such a large discrepancy may be related to the following circumstances:

- the statistical models recommended in the Methodological guide were obtained in the period 1970-1980 for deposits with the best geological and physical characteristics, due to which high KIN values were determined for them;
- most statistical models in this period were obtained for the geological and physical conditions of deposits Ural-Volga region and

Azerbaijan. Using these dependencies for other regions, even if the parameters seem to

match, may lead to an overestimation of the design QIN value.

Fig.1. The dependence of the oil recovery coefficient on the density of the well grid for various types of sub gas oil deposits: 1 - for oil rims with the prevailing indonnaperna mode; 2 - oil rims with the prevailing gasanaboblack mode; 3 – UVCHBKHR for oil and gas deposits; 4 – oil rims UVCHBKHR.

Secondly, for oil fringes under the prevailing water-pressure regime, under other equal geological and physical conditions, the KIN is higher than under the gas-pressure-regime, which can be explained by a higher coefficient of oil displacement by water compared to gas.

Third, a comparison of the oil recovery factor for oil and gas facilities and oil margins shows that the larger the volume of oil part, the higher the value of the KIN.

Thus it is not necessary to note that statistical models of KIN from PSS cannot replace the use of hydrodynamic models of the process of displacement of oil from the depths, carried out on the basis of three - and four-dimensional three-phase filtration, but they may be used when failure is the outcome of experimental data, especially in the initial stage of industrial evaluation of the field, i.e. in the drafting phase of the project experimental-industrial exploitation, and to assess the effectiveness of compaction the density of the grid wells.

Numerical experiments using formulas (2) and (3) show that the use of traditional technologies with drilling of vertical wells in the development of such facilities does not provide acceptable technical and economic indicators, and the predicted values of the oil recovery factor rarely exceed 0,11-0,15 (table 1).

In this regard, the strategic direction of increasing the efficiency of developing sub-gas oil deposits with a 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 20th century is the drilling of horizontal wells. The 21st century was marked by great achievements in the technique and technology of building such wells at sufficiently deep depths [2; p. 464].

Currently, there is a large number of works [12; c. 424, 13; c. 366, 14; c. 156 et al.], which cite positive and negative factors affecting the operation of horizontal wells. The main

advantage of horizontal wells over vertical wells is that a horizontal shaft with a length of tens to thousands of meters can open areas with increased productivity or strongly fractured zones in an inhomogeneous formation. This explains the increased flow rate compared to the surrounding vertical wells.

Z. S. Aliev and V. V. Sheremet, using theoretical studies and analysis of the results of drilling horizontal wells in various oil-producing regions of the world, have established that their productivity coefficient is most influenced by three parameters: thickness of the formation (h), the length of the horizontal trunk (L) and the coefficient of anisotropy (β) [15; c. 131]. In this case, under certain geological and physical conditions (combinations of h , L and β), the productivity coefficient of horizontal wells (q_{hg}) can be more than 15 times higher than vertical wells (q_{vc}) (Fig. 2). The ratio q_{hg}/q_{vc} increases as h decreases, β and L increases.

Fig.2. The dependence of the ratio of the coefficients of productivity horizontal C_r and vertical C_v wells from the horizontal wellbore length L , thickness h and the anisotropy parameter β : 1, 2, 3 - $h=6$ m; β , respectively 0,25, 1, 3; 4, 5, 6 - $h=30.5$ m; β - respectively 0,25,1, 3; 7, 8, 9 - $h=61$ m; β , respectively 0,25,1, 3.

Analysis of the results of oil reservoir opening by horizontal wells drilled by various companies, and comparison of the flow rates of these wells with the vertical

flow rates shows that in all cases the productivity of horizontal wells is 2-4 times greater than the flow rate of vertical wells (table 1).Table 1

Comparison of flow rates of horizontal and vertical wells

Location of wells	The company is	the Length of the horizontal part, m	Increasing the debit rate
Michigan, United	States "Trend-Hawk's Well OYL»	76	Previously unproductive well produced 97.5 m ³ /d of oil and 17.2 m ³ /d of gas
Utah, USA	"Skiline-oil»	67 and 145 (two horizontal barrels)	Previously unproductive well produced 13.5 thousand tons of oil in two years
Denmark	MAERSK line	460-760	Initial flow rates are 2-4 times higher than in wells with a vertical shaft
in the British sector of the North sea	" British Petroleum»	565	During the test' 955 m ³ /day of oil was obtained (much more than the flow rate of vertical wells)
Willistonbasin, USA	" Meridian»	610-1000	Получены 41-44 m ³ /day of oil and 9,5 thousand m ³ /day of gas were obtained (in vertical wells of 9,5 m ³ /day)
PradhoBay, Alaska, United	States " Standard-Alaska-Production house»	300-490	Initial productivity is 3.5 times higher than in vertical systems
Javasea, Indonesia	"Arco»	300-760 (thin layer)	Coefficient The productivity coefficient of horizontal wells is on average 5.4 times higher than that of vertical wells
Pearsell, Texas, United	States "Texenergo»	43-808	Oil production rate up to 218 t /day, gas 1.8-26.8 thousand m ³ /day

The world record for the length of the horizontal part of the barrel belongs to the company "Esso", which in 1980 in the Bass Bay of Australia, a well was drilled with a horizontal displacement of 46.66 m. In the North sea, this record is equal to 4023 m. Such a well was drilled in the Norwegian sector, and in the Gulf of Mexico, the largest length of the horizontal part of the trunk is 3379 m (the coast of Louisiana, 1983) [12; c. 424].

Currently, many firms are able to drill horizontal wells. Moreover, some of them, such as the firm "HPS(HorizontalProductionSystems)", have developed a technology for drilling multiple radial barrels from a single well. At the same time, first one horizontal well is drilled, after which radial trunks are drilled in the amount necessary for drainage of the formation. The company "HPS" drilled 10 radial wells with a total length of 1,275 m from the existing horizontal well bore in 1989 [12; p. 424].

We will show the high technological efficiency of horizontal wells in the studied sub gas oil deposits using the example of the Southern oil and gas condensate field Kemachi is also located on the UVCHBKHR.

Southern Field Kemachi was put into pilot operation in 1980 with wells Nos. 2 and 3. Until 2004, the development of the field was aimed at outstripping the production of the oil part of the Deposit. Because of the gas break to the current intervals of perforation in the oil part of the horizon, oil-producing wells were preserved. With such a system of development, the operation of the field became economically impractical. In this regard, to increase the production of liquid hydrocarbons in 2004, a decision was proposed to switch to joint development of the oil and gas condensate parts of the

Deposit, with one interval of perforation, a single grid of wells [16; p. 295].

The implemented development system as a whole proved insufficiently inefficient for the following reasons [17; p. 382].

- transfer of wells to the gas production Fund for the operation of the gas cap leads to irrational consumption of reservoir energy and as a result, a significant share of recoverable oil reserves may be lost;

- in General, the installation of down hole devices "CODS" (GMG International, USA) and down hole of the fittings had a positive effect. But the effect of their use was often short-lived. To extend the effect of the applied technology, it is necessary to systematically make changes in the operation of wells, including for wells where the technology in question was not used, to ensure an optimal technological regime;- the technology of works on isolation of waterflows, consisting in isolation of the existing and transition to the upper interval, with a small thickness of the oil border is ineffective. The oil and gas production interval is often transferred to the gas production Fund of wells. The absence of modern methods and means of selective isolation is accompanied by the loss of recoverable oil reserves.

In 2007, in order to increase the rate of selection and the final coefficient

oil recovery at the southern gas condensate field Kemachi has drilled horizontal wells no. 54g, 59g, 74g.

As can be seen from Fig. 3 horizontal wells were drilled in the oil bearing zone with a thickness of 8-10 m of the oil border.

The analysis of the efficiency of operation of horizontal wells № 54g, 59g, 74g by comparing their performance with the

performance of vertical wells located in similar conditions is presented in table 2.

Table 2

Table of comparison of performance characteristics of horizontal and vertical wells.

Indicator name	Average value for vertical wells no. 56, 58.61, 68.71, 73.94	Average value for horizontal wells no. 54g, 59g, 74g
Initial average daily oil production rate, t/d	13	55
Average water loss for the entire period, %	54	46
Average gas factor, thousand m ³ /t	23	9
Average well operation time, years	6	5

DISCUSSIONS

Analysis of the results of operation of medium horizontal and vertical wells revealed a greater efficiency of the first (table 1). 5). The initial average daily oil production rate of an average horizontal well is 4.4 times higher than that of an average vertical well. The accumulated oil production of an average horizontal well is 4.6 times greater than that of an average horizontal well, although the average operating time of a horizontal well is less (5 versus 6 years). In addition, the average gas factor and water cut (from the accumulated values) of horizontal wells is less by 2.6 times and 1.2 times, respectively.

Since horizontal wells had a lower rate of water flow and free gas breakout, i.e. their specific energy consumption is less, and their oil production significantly exceeded that of

vertical wells, the high efficiency of their application is obvious.

CONCLUSIONS

Naturally, in the initial stage, special emphasis is placed on the types of research aimed at determining and justifying the estimated parameters of carbon dioxide reserves. This leads to the fact that in the preparation of project documents for development of oil fields with application of hydrodynamic calculation methods, based on mathematical description of mechanism of process oil recovery and requires the use of a wide range of settings, acute lacked the ka of data on reservoir permeability, the change in the value of oil properties and gas pressure, phase and relative permeability, of the geological heterogeneity parameters of layers etc. Under

these conditions, the use empirical formulas becomes not only unavoidable, but also significant for making management decisions in the initial stage of development.

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