ABSTRACT

The increase in hydrocarbon production in the Republic as a whole and in the South-Eastern part of the Bukhara-Khiva region is largely determined by the degree of discovery of new fields and the increment of hydrocarbon reserves. The main volume of production and growth of hydrocarbon reserves here is associated with the Jurassic carbonate formation, which for more than 40 years has been the main target object of prospecting, exploration and development of deposits. Due to the relatively high degree of study of the carbonate formation, the probability of discovery of large and medium-sized hydrocarbon deposits in the South-Eastern REGION is low. At the same time, hydrocarbon is increasing the share of small deposits being discovered. To improve the efficiency of development of these deposits and the degree of recovery of hydrocarbon reserves, it is necessary to justify new modern technologies. Since fields with oil deposits have specific features, we will consider this problem separately for oil and gas and gas condensate fields.

KEYWORDS

Hydrocarbon, oil, gas, deposit, deposits, development efficiency, stage.
INTRODUCTION

Analysis of the current state of development of hydrocarbon deposits. Currently, there are several stages in the development of hydrocarbon deposits. At the same time, there are three stages for fields with gas deposits, and 4 stages for oil deposits. Each selected stage of development of hydrocarbon deposits is characterized by certain patterns of changes in technical and economic indicators.

The first stage is the field development stage with drilling of the main well stock and implementation of the reservoir pressure maintenance system. It is characterized by an annual increase in oil production, with a slight water cut of the output of wells. The stage ends when the maximum annual oil or gas production is reached. The second stage is the stage of high extraction rates, varying within ±5% of the maximum annual oil and gas production. At the end of this stage, there is usually an increase in the water cut of the produced products and the transfer of the well to a mechanized method of operation.

The third stage is a decrease in oil and gas production and a rapid increase in the water content of produced wells. At this stage, annual oil production is 2% or more of the initial recoverable reserves. The fourth stage is the stage of low rates of oil and gas extraction, high water content of wells produced. At this stage, the rate of oil extraction is usually less than 2% per year. In practice, the term “late stage” is also widely used, which includes the third and fourth stages of development. As can be seen from table 1, the hydrocarbon fields discovered on 01.01.2020 are at the spill stages of development.

MATERIAL AND METHODS

This makes it possible to evaluate the effectiveness of implemented development systems at long-term fields and develop recommendations for improving the efficiency of extracting hydrocarbons from objects at the initial stages of development. From table 2, it can be seen that there are hydrocarbon deposits in the South-Eastern REGION with both normal hydrostatic pressures and avpd. The current rates of extraction from the initial geological ones are: gas -1.00%; condensate -0.35% and oil-0.21%.
Table 1 Initial geological and recoverable hydrocarbon reserves of the YWCHBHR fields

| №№ | №№ | Field | Productive horizon | Date openings | Date Introduction to development | Initial geological reserves | Stage of development |
|----|----|-------|-------------------|---------------|----------------------------------|-----------------------------|----------------------|
| 1  | 2  | Khanabad-N | XV-HP            | 2002          | 2018                             | -                           | In the concentration camp |
| 2  | 3  | Sulliger-N | XV-HP            | 2016          |                                  | -                           | The first |
| 3  | 4  | Germiston-N | XV               | 1986          | 1992                             | -                           | Third |
| 4  | 5  | Feruza-N     | XV+XVa           | 2002          | 2005                             | -                           | First |
| 5  | 6  | Maisonminutes, NGC | XV-HP         | 2000          | 2010                             | -                           | First |
| 6  | 7  | Karatepa-NGK | XV-P+HP         | 2011          | 2013                             | 2012                        | Fourth |
| 7  | 8  | Yangi Karatepa-NGC | XV+XV-PR+XVa   | 2003          | 2005                             | 13182                        | Second |
| 8  | 9  | Shakarbulak NGK | XVa, XV-HP+P   | 1987          | 1991                             | 9071                        | Fourth |
| 9  | 10 | Turtsari-NGK | XV-HP+P+PR      | 2009          | 2010                             | 5142                        | Second |
| 10 | 11 | Kumchuk-NGK | XV+XVa          | 2000          | 2009                             | 151                         | In the concentration of |
| 11 | 12 | SEV. Shurtan NGK | XV-HP+P      | 1987          | 2005                             | 3357                        | Fourth |
| 12 | 13 | Ilim-NGK     | XV+XVa          | 2007          | 2007                             | 3067                        | Fourth |
| 13 | 14 | Darakhtli-NGK | XV              | 2011          | 2018                             | 1792                        | In development |
| 14 | 15 | Kamashi-NGC | XV+XVa          | 1970          | 2008                             | 2408                        | Third |
| 15 | 16 | Beshkent-NGK | XV+XVa         | 1974          | 2007                             | 11588                       | Third |
| 16 | 17 | Sherkent-NGK | XV+XV-PR+XVa   | 2011          | 2011                             | 345                         | Third |
| 17 | 18 | Rubaii-NGK  | XV+XV-PR+XVa   | 2011          | 2011                             | 2134                        | The first |
| 18 | 19 | Aknazar-NGK | XV-XVa          | 2004          | 2012                             | 6382                        | The First |
| 19 | 20 | PWM. Aknazar-NGK | XV            | 2002          | 2012                             | 1085                        | First |
Notes—the table was compiled by the applicant for geological and field materials of the Shurtan and Mubarek oil and gas production departments listed in the annual geological reports for 2017-2018.

**continuation of table1**

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |
| 20 | Mirmiran-NGK | XV-HP+P | 2007 | 2017 | 639 | - | 422 | In conservation |
| 21 | Namesby-GK | XV-XVa | 2011 | 2014 | 4346 | of 227.2 | - | Second |
| 22 | Oydin-GC | XV-XVa | 2005 | 2011 | 10209 | 393 | - | The first |
| 23 | Chungar-GK | XV-XVa | 2007 | 13647 | 1138 | - | Second |
| 24 | Shurtan-GC | XV-PP+XV-HP+P | 1974 | 1980 | 64138 | 37200 | - | Fourth |
| 25 | Ahirbulak-GC | XV-HP+XV-P | 9471 |   |   |   |   |   |
| 26 | Buzakhur-GC | XV-XVa+XVI | 1987 | 2005 | 6845 | 419 | - | Third |
| 27 | East Buzakhur-GC | XV-XVa+XVI | 1987 | 2006 | 4113 | 838 | - | Third |
| 28 | Tarnasky-GK | XV-XVa | ???? | 2012 | 4817 | 299 | - | First page |
| 29 | Tavakkal-GC | XV-P+HP | 2010 | 2010 | 6200 | 235 | - | In the exploration |
| 30 | Alachagikuduk-GC | XV-P+HP | 375 |   |   |   |   |   |
| 31 | Zafar-GC | XV-XVa | ???? | 1994 | 3059 | 877 | - | Second |
| 32 | SEV.NIshan-GC | XV-XVa+XVI | 1970 | 2007 | 30366 | 1761 | - | Third |
| 33 | Nishan-GC | XV-XVa | 2008 | 2011 | 2098 | ???? | - | Third |
| 34 | Sept.GuzarGC | XV-HP+P | 1992 | 2007 | 8471 | 1735 | - | Third |
| 35 | Hotelmarvarid-GK | XV | 894 |   |   |   |   |   |
| 36 | Topicxal-GK |   | 1072 |   |   |   |   |   |
| 37 | Giran GK | XV-XVa+XVI | 1979 | 1989 | 10604 | 625 | - | The Third |
## Table 2.

State of hydrocarbon production in the South CAUCASUS Federal district

| № | № Item no | Field                  | Reservoir pressure, kg/cm² | Fund of drilled wells | Annual production |
|---|-----------|------------------------|-----------------------------|-----------------------|-------------------|
|   |           |                        | Initial                     | Current state         |                   |
|   |           |                        | Total                       | Current               | Gas consumption, mln. m³ | Condensate, thousand tons of | Oil thousand tons |
| 1 | 2         | Khanabad-N             | 350                         | 281                   | 3                 | -                  | -                  |
| 2 | 3         | Soligor-N              | 310                         | 300                   | 5                 | -                  | -                  |
| 3 | 4         | Hermiston -N          | 352                         | 240                   | 17                | 6                  | 6,537              | 35,626             |
| 4 | 5         | Feruza-N               | 486                         | 292                   | 9                 | 4                  | -                  | 0,733              |
| 5 | 6         | Meson, NGC             | 317                         | 270                   | 4                 | -                  | -                  | 0,008              |
| 6 | 7         | Karatepa-NGK          | 503                         | 124                   | 14                | 11                 | 89,226             | -                  |
| 7 | 8         | Yangi Karatepa NGK    | 504,5                       | 124                   | 17                | 2                  | 27,515             | 0,44               | 1,238              |
| 8 | 9         | of Shakarbulak NGK    | 395                         | 296,8                 | 32                | 9                  | 71,099             | 0,751              | 18,872             |
| 9 | 10        | Curtsey-NGK           | 355                         | 218                   | 7                 | 5                  | 58,160             | -                  | 10,874             |
| 10| 11        | Kumchuk-NGK           | 381                         | 208                   | 5                 | -                  | -                  | -                  |
| 11| 12        | SEV. Shurtan NGK      | 387                         | 140                   | 25                | 9                  | 2,577              | 77,6               | 86,871             |
| 12| 13        | Ilim-NGK              | 383,5                       | 49,6                  | 7                 | 5                  | 93,013             | 3,6                | 1,012              |
| 13|           | Darakhtli-            | -                           | -                     | -                 | -                  | -                  | -                  |
| NGK        | Kamashi-NGC | 571.5 | 318 | 8 | 5 | 11,767 | 0.191 | 3,972 |
|------------|-------------|-------|-----|---|---|---------|-------|-------|
|            | Beshkent-NGK| 573.4 | 301 | 12 | 4 | 5,492  | 0.125 | 6,261 |
|            | Sherkent-NGK| 469   | 352 | 6  | 1 | 0.293  |       | 0.908 |
|            | Ruboi-NGK   | 486   | 361 | 8  | 6 | 29,205 | 0.424 | 6,626 |
|            | Aknazar-NGK | 623   | 182 | 6  | 1 | 4,906  | -     | 0.153 |
|            | PWM. Aknazar-NGK | 621 | 331 | 4  | 1 | -      | -     | 0.19  |
|            | Mirmiran-NGK|       |     |    |   |        |       |       |
|            | Namazbay-group of companie s 321 | 143 | 8  | 6 | 39 | 1,121  | -     |       |
|            | Oydin-group of companie s 271,6 | 181.7 | 3  | 1 | 7,315 | 0.20  | -     |
|            | Chunagar-group of companie s 344 | 91.2 | 17 | 2 | 42,860 | 1.4   | -     |
|            | Shurtan-group of companie s 349 | 44.2 | 239 | 151 | 6634,416 | 189 | -     |
|            | Ahirbulak-GC|       |     |    |   |        |       |       |
|            | Buzakhur-GC | 365 | 45,02 | 19 | 7 | 123,660 | -     | -     |
|            | East Buzakhur-group of companies | 76 | 12 | 2 | 28 | 1.3   | -     |       |
|            | Tarnasoy-group of companie s 368 | 87 | 2  | 1 | 28 | 0.398 | -     |       |
|            | Tavakkal-group of companie s 306,8 | 310 | 6  | - | - | -      | -     | -     |
|            | Alachagikuduk-GC |       |     |    |   |        |       |       |
|            | Zafar-GC | 431 | 50,9 | 12 | 2 | 25,200 | 0.7   | -     |
|            | SEV.NIshan-group of companie | 118 | 50 | 32 | 323,264 | 7.095 | -     |
RESULTS

Potential amounts of gas, condensate and oil extraction indicate a low intensity of development systems implemented at the fields.

The magnitude of the rate of gas and condensate without regard to the unique field of Shurtan is 0.93, and 0.70 percent respectively.

As you know, the generally accepted indicator for evaluating the efficiency of hydrocarbon field development is the recovery coefficients of gas, condensate and oil from productive formations.

The values of углеводородов these indicators vary within very large limits depending on the stage of their development at the Yakh hydrocarbon fields of the South Siberian oil and gas industry (table 3), averaging: gas recovery factor (GRI) - 0.626; condensate recovery factor (CIC) – 0.429; oil recovery factor (OC) – 0.037. Current (as of 01.01.2020), KIG and KIC values excluding the Shurtan field are 0.224 and 0.168, respectively. The obtained values of KIG, KIC and KIN indicate that the development systems implemented in the YVCHBKHR hydrocarbon fields were generally ineffective.

In this regard, we will consider the reasons for the low efficiency of field development and
possible ways to improve them. Analysis of the current state and ways to increase the efficiency of oil and gas fields development in the South-Eastern part of the Bukhara-Khiva region.

Oil and gas fields account for the majority of oil reserves on the territory of the South Caucasus Federal DISTRICT. In which oil deposits are located under a gas cap relatively with a more powerful effective thickness.

Table 3
The state proficiencies of depletion of hydrocarbon reserves in the South West of the RUSSIAN Federation

| №   | № Item no. | Field     | Accumulated production | The current recovery factor, fractions of one. |
|-----|------------|-----------|-------------------------|-----------------------------------------------|
|     |            |           | Gas, million m³³       | Condensate, thousand tons of Oil, thousand tons of gas. | Gas | Condensate's. | Oil |
| 1   | 2          | Khanabad-N| -                       | -                                           | - | - | 0.044 |
| 2   | 3          | Sovligar-N| -                       | -                                           | - | - | 0.072 |
| 3   | 4          | Garmiston-N | -                       | -                                           | - | - | 0.265 |
| 4   | 5          | Feruza-N   | -                       | -                                           | - | - | 0.011 |
| 5   | 6          | Meson, NGC | -                       | -                                           | - | - | 0.090 |
| 6   | 7          | Karatepa-NGK | 2713,103                | 340,6275                                    | 130,711 | 0.534 | 0.331 | 0.080 |
| 7   | 8          | Yangi Karatepa-NGK | 2741                   | 341,070                                    | 130,712 | 0.2122 | 0.1990 | 0.3610 |
| 8   | 9          | Shakarbulok NGK | 1632                   | 33                                           | 697 | 0.180 | 0.029 | 0.021 |
| 9   | 10         | Tursari-NGK | 850                    | 25.164                                      | 117,984 | 0.1790 | 0.0629 | 0.1071 |
| 10  | 11         | Kumchuk-NGK | -                      | -                                           | 8,671 | - | - | 0.001 |
| 11  | 12         | SEV. Shurtan NGK | 766                   | 31,004                                      | 1210,012 | 0.6978 | 0.6420 | 0.1574 |
| 12  | 13         | Ilim-NGK   | 2098                   | 114,563                                     | - | 0.6833 | 0.6160 | - |
| 13  | 14         | Darakhti-NGK | -                      | -                                           | - | - | - |
| 14  | 15         | Kamashi-NGC | 641                    | 37,154                                      | 132 | 0.266 | 0.219 | 0.169 |
| 15  | 16         | Beshkent-NGK | 6190                  | 466,062                                     | 181,101 | 0.534 | 0.192 | 0.206 |
| 16  | 17         | 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 | PWM. Aknazar-NGK | - | - | 3,924 | - | - | 0,003 |

Continuation of table 3

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 20 | Mirmiran-NGK | - | - | - | - | - | - |
| 21 | Namazbay-group of companies 448 | 19718 | - | 0,1050 | 0,1084 | - | - |
| 22 | Oydin-group of companies 105 | 5,024 | - | 0,0141 | 0,0244 | - | - |
| 23 | Chunagar-group of companies 1367 | 60,543 | - | 0,1021 | 0,063 | - | - |
| 24 | Shurtan-group of companies 501061 | 21242,212 | - | 0,7901 | 7165 | - | - |
| 25 | Akhirbulak-group of companies | - | - | - | - | - | - |
| 26 | Buzakhur-GC | 6739 | 331,646 | - | 0,9963 | 0,9476 | - |
| 27 | East Buzakhur-group of companies 1143 | 164,722 | - | 0,2906 | 0,3050 | - | - |
| 28 | Tarnasoy-group of companies 228 | 3,544 | - | 0,0479 | 0,0142 | - | - |
| 29 | Tavakkal-group of companies 77,184,2527 | - | - | 0,012 | 0,010 | - | - |
| 30 | Alachagikuduk-group of companies | - | - | - | - | - | - |
| 31 | Zafar-group of companies 772 | 111,888 | - | 0,2678 | 0,1955 | - | - |
| 32 | SEV.Nishan-group of companies 14931 | 619 | - | 0,4917 | 0,3515 | - | - |
| 33 | Nishan-GC | 8,099 | - | - | - | - | - |
Due to the high complexity of the wells due to the breakthrough of gas in the oil of these objects wells due to the breakthrough of gas from a gas cap and bottom water to downhole stocks of these objects belong to the category of hard-to-recover [3; p. 46-50, 4; p. 267, 5; p. 34-36, etc.].

Sub-gas oil deposits are usually developed with the prevailing water-pressure, gas-pressure or simultaneous manifestation of both modes. As-is well known, when developing a field using the technology of oil displacement by various agents, the oil recovery factor (EIR) is calculated using the modified formula of A. N. Krylov [6; p. 15-17].

\[
KIN = K_{\text{быт}} \cdot K_{\text{ов}} = K_{\text{быт}} \cdot K_{\text{ов}, p} \cdot K_{\text{ов}, т},
\]

where Toinyt. - coefficient of displacement of oil by the working agent; KKHV. p, Kinyt. t - коэффициенты of displacement coverage in the area and thickness of the formation, respectively.

In the development of fields with heterogeneous reservoirs, the value OfCW. p is mainly influenced by the density of the grid of wells and the scheme of their placement. In this regard, in a number of studies, this coefficient is called the grid coefficient [7; p.15-18, 8; p. 34-37], the value of which
depends on the density of the adopted grid of wells placement (S - the area of oil content per well), on the zonal heterogeneity and discontinuity of oil reservoirs.

Due to the great practical importance of this issue, many scientists and research centers have conducted studies to determine the dependence oil recovery on the density of the well grid (PSS). Dependencies were obtained both for specific fields and for oil-producing regions. The disadvantages of these dependencies are the complexity of defining their parameters, which is why they are not widely used.

DISCUSSIONS

It should be noted that there are also such methods for estimating the coefficient of coverage of wells with a grid - the "kh-ratio method" and "method Stiles", which are used to justify and analyze the potential of compacting drilling. The main disadvantage of these methods is also the complexity in determining parameters, in particular the uncertainty in constructing the connectivity - distance relationship between wells, which is caused by a large spread of points obtained using the proposed algorithms [9; p. 40-45]. The determination of a more reasonable value of KC is not a big problem if there is a hydrodynamic model of the Deposit that correctly reproduces the features of the structure of the Deposit. In this regard, the development and approval of a guidance document on the creation of a permanent geological and technological model of a hydrocarbon field in the design of the development of oil and gas fields in Uzbekistan is timely [10; 80c.]. The use of this guidance document (RH 39.0-105:2012) will speed up the implementation of advanced computer technologies in the design and management of oil and gas-and oil field development, and allow for the operation of geologic and technological information in its entirety (3D), taking into account changes over time (4D).

However, the uncertainty and lack of input data required for a permanent geological and technological model and for their initialization may limit the use of 3D simulators for predicting both the oil recovery coefficient and the well grid coefficient, especially at the stage of field development and the calculation of hydrocarbon reserves. In this regard, it is necessary to focus attention on another problem - that is characteristic of the initial stage of field development. As you know, the first document on the new field is the calculation of hydrocarbon reserves.

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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