Section 3. Technical sciences

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GEOLOGICAL AND TECHNICAL ANALYSIS FOR THE DEVELOPMENT OF THE DEPOSIT BY THE METHOD OF DUAL COMPLETION

Abstract. the article highlights the geological structure, stratigraphy, tectonics and reservoir properties of rocks of the Northern Goturdepe field. Hydrodynamic analyses of the reserves of horizontal wells at the Goturdepe field and productive layers extracted from previously operating wells, as well as the presence of several productive layers in them and their properties, were carried out. In order to successfully implement the method of dual completion (DC) of several layers, calculations were carried out for the correct development of the well design and the difference in drilling technology by the method of dual completion of several layers in its structural composition from other simple wells.

Keywords: seismic exploration, well design, colmatation, shoe, conductor, hydraulic fracturing, oil and gas manifestation, emulsified system.

The results of seismic work carried out by the Western Geophysical Expedition (currently the Balkan Geophysical Expedition of the State Corporation "Turkmengeologiya") served as the basis for exploration drilling in the Ovvaltoval and Bankaly areas.

For the development of the North Goturdepe multi-layer deposit, the general information of the deposit has been studied and scientifically analyzed. The geological structure, stratigraphy, tectonics of the Northern Goturdepe deposit and reservoir properties of the rocks of this deposit have been fully studied. Hydrodynamic analyses of reserves of horizontal wells at the Goturdepinskoye field and productive layers extracted from previously operating wells were carried out.

The analyses carried out in the work on the geology and hydrodynamic reserves of the formations, as well as on the productivity of these formations of the Goturdepinsky field, forming the deep essence of future work, laid the foundation for a highly effective correct development of the well design for the method of DC of several layers, successful drilling of wells to the design depth, selection of appropriate solutions for the purpose of uncolluting in the discovery of productive layers, achieving their high productivity in the process of development [1].

The geology of the deposit and the hydrodynamic reserve of productive layers, as well as the analyses carried out on the productive capacity of these layers, the successful drilling of 4 wells to the design depth and their commissioning during testing for

the method of DC of several layers according to the results of the work proved their correct execution.

The technical and technological differences of the method of DC of several layers from the currently operating method of development of productive layers are scientifically analyzed, and detailed theoretical and practical materials about this method are also collected and the results are obtained.

In order to introduce into production the method of DC of several layers, the necessary exact geological and expected during operation parameters of each layer of the developed field have been fully studied.

In the work with the calculations, the correct design of wells has been developed for the method of DC of several horizons.

The calculation of the depth of the installation of the conductor's shoe in the conditions of preventing hydraulic fracturing during the liquidation of oil and gas occurrences is made according to the following formula (1):

$$H = 100 \times \frac{P_W + P_{W1}}{\gamma_{b.m.} - \gamma_{f.1}}. \quad (1)$$

Hydraulic fracturing pressure is determined by the following formula:

$$P_{grad.} = 0.0083H + 0.66P_{layer.} \quad (2)$$

Based on the parameters of changes in reservoir pressures at the corresponding depths, calculations were made separately for wells № 147, № . 37, № 200 and № 156 of the values of the equivalents of reservoir pressure gradients according to the formula (3):

$$P_{grad \cdot layer} = \frac{P_{layer}}{0.01 \times H}. \quad (3)$$

The hydraulic fracturing coefficient for each well under study is determined separately according to the following formula (4):

$$K_{grad.} = \frac{P_{gid.}}{0.01 \times H}. \quad (4)$$

Based on the calculation results, combined graphs were compiled separately for each well under study and their designs were developed.

A special distinguishing feature of the developed structure from previously used structures is that in order to secure several productive layers, an increase in the depth of descent of a technical column with a diameter of Ø244.5 mm was achieved and this technical column was used as an operational column [2].

The fastening of the lower productive layers in the two tested wells in the form of an operational shank without cementing was achieved by packers equipped externally on special filters, inflating under the influence of the solution used, and in the other two tested wells by cementing the production column Ø139.7 mm and Ø177.8 mm in the form of an operational shank.

The economic calculations carried out based on their results showed high economic efficiency.

The main essence of this technology was the purpose of descent into the operational column of 2-row parallel tubing, differing in length, short and long types. In this case, the productive layers were separated by a packer device, which ensured their separate operation and separate accounting of well products for each reservoir used.

For the opening of productive formations, a hydrocarbon-based drilling mud "Wersadril" was used. Due to its resistance to high temperature, the Wersadril hydrocarbon-based drilling mud was chosen for the purpose of crushing unstable clay formations in the lower red-colored thickness to maintain them in a stable position without movement and, when opening productive formations, to prevent their contamination and stabilize the wellbore [3].

The choice of a hydrocarbon drilling mud consisting of diesel fuel with a highly emulsified system used in scientific work was chosen taking into account high temperature resistance and at the same time does not lose the stabilizing properties of the solution and is successfully used for drilling deep wells in world practice.

Hydrocarbon-based drilling fluids provide the possibility of drilling unstable, swelling or expanding rocks in the aquatic environment. And also, prevent oil seal formation and tool grabs due to the pressure drop between the well and the formation. They have

the best lubricating properties, protect the tool from corrosion [4].

The state of modern foreign experience, directional and multi-barrel (downhole) drilling for DC of many layers is studied, and, having collected practical, technical and Internet materials, the task is analyzed on a scientific basis.

The difference between the drilling technology by the method of DC of several layers in its structural composition from other simple wells in the following factors:

– the presence of many productive layers;

– availability of compatible drilling conditions;

– stability of drilled rocks for the descent of the operational filter of the shank;

– it is necessary to connect two-lift pumping and compressor pipes at the wellhead with a casing string of at least Ø244.5 mm and use it as an operational column;

– after full establishment, the presence of several layers in all drilled wells, the possibility of commissioning with the first (short) two-lift tubing, necessarily produces the fastening of several upper layers with casing pipes Ø244.5 mm;

– after fixing the remaining lower productive layers with casing columns Ø177.8 mm, Ø139.7 mm or filters, the possibility of commissioning a second (long) two-lift pump and compressor pipe.

All of the above factors were performed on the basis of analyses conducted on geological and geophysical materials obtained during drilling, on previously operating wells and tested in all four drilled wells.

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