Archinsckoe field for inhibiting on paraffin crystallization the best additive was HPP-007 with a concentration of 200 g / t, this inhibitor significantly reduces the viscosity of this oil. These inhibitors are not suitable for the oil of the Yuzhno-majskoe field, since none of them reduces viscosity compared to the breakdown of oil without additives. Least of all, the viscosity of this oil increases the inhibitor on paraffin crystallization SNPCH-IPG 11A with a concentration of 200 g / t.

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HYDRAULIC FRACTURE CRACK REDESTRIBUTION BY OPTIMIZATION OF THE RESERVOIR PRESSURE MAINTENANCE SYSTEM

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The purpose of the article is to highlight the importance of the development a technology to control the direction of hydraulic fracturing cracks. Article includes an analysis of existing technologies and offers new possible solutions.

The great part of oil and gas fields in Russia is being developed in final stages. These stages are characterized by a strong decline in oil production, a reduction in the well stock and an intensive increase of water cut. The most effective geological and engineering operations are now beginning to be used to fully develop oil and gas reserves [7].

Hydraulic fracture is one of the commonly used ways to intensify an oil production. According to statistics for 2018, only 66% of hydraulic fracture operations in OAO “Tomskneft” were successful. The reported statistics are also influenced by the following factors: [7]:

1. Non-compliance with the technology of hydraulic fracture operation
2. Low knowledge of the developing object
3. Man-made reasons that are not amenable to outside control
4. Wrong choice of hydraulic fracture parameters

A crack is one of the key parameters that defines hydraulic fracture success. The result mainly depends on the crack propagation in the reservoir. In most cases a crack direction is not controlled in any way. Failure of fracture direction control also leads to an error in the design of hydraulic fracture. As a result, we can get an incorrect calculation of additional oil production and economic evaluation [2].

For the direction of hydraulic fracture group of authors from the China University of Petroleum offer to install the ABAQUS extended final element [8]. This end element helps to redirect the crack through radial holes. However, this technology does not work at great depths.

In our researches, we exploited the laws of solid mechanics, then a hydraulic fracture crack should go along the maximum line of tension. The smaller the horizontal stress difference is, the easier the hydraulic fracture tends to be perpendicular to the natural fracture, and the direction of propagation of hydraulic fractures is easier parallel to the natural fracture in the natural [5] For the most cases this line coincides with the line of regional tension of the rock. Using the system of maintenance formation pressure it is possible to locally and temporarily redistribute pressure in the reservoir. It will help change the azimuth of the tension line and therefore the direction of the crack [3]. Azimuth of the regional tension line of a rock was taken as a 120°.

To test this theory we created a sector deposit model with a row development system using “tNavigator” software [4]. The average parameters of reservoir properties and physicochemical properties of a fluid were taken as a basic. The amount of water injection into the reservoir was chosen as a variable parameter. The pressure isoline map changes when the injection wells change [6]. The result of injection change is the redistribution of tension lines. Picture 1 shows the change in crack propagation depending on different levels of fluid injection into the reservoir.

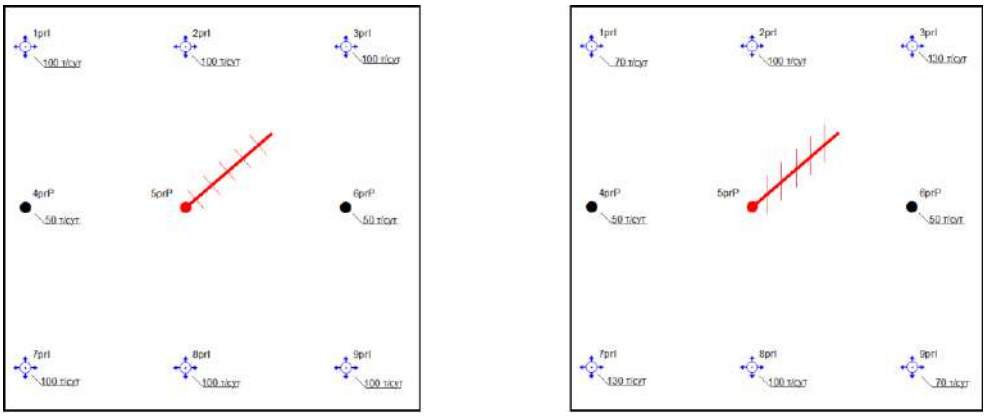

Fig. 1 Dependence of the direction of crack propagation relative to the horizontal shaft depending on the level of the injected agent: a) the direction of cracks along the line of regional rock stress, b) the change in the azimuth of the crack direction due to the redistribution of the injection.

As can be seen in figure 1, when the levels of the injected fluid change, it is possible to redistribute the pressure locally. Therefore, we can change the spread of the crack during hydraulic fracturing. This fact allows us to orient the crack as needed. This technology of crack propagation control will improve the effectiveness of ongoing hydraulic fracture activities.

The technology of redistribution hydraulic fracture crack using the maintenance formation pressure system is the way to optimal orientation f a crack, taking into account the properties of the reservoir, the feature of the development object and the mode of operation of the reservoir. Oil companies and institutes will be able to reduce the risk of error in the planning and design of the hydraulic fracture. This method of crack direction control will increase economical and technical efficiency of hydraulic fracture.

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