OIL FLOW INTENSIFICATION TECHNOLOGIES

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Abstract: *Regulation of the filtration process and its control in an oil reservoir is possible only if there is a certain reserve in the productivity of production and injection wells, which is largely determined by the state of the bottomhole formation zone and its filtration characteristics. Thus, the state of the bottomhole formation zones of all wells affects the efficiency of oil field development.*

Key word: *Final oil recovery factor, hard-to-recover reserves, cost-effective, unconventional technologies, intensification, reagent injection*

High rates of development of oil fields and the final oil recovery factor (ORF) can be obtained only with the rational operation of the facility, corresponding to the effective regulation of the filtration process. Regulation is provided by changing the rate and distribution of fluid withdrawal among the wells, changing the density of wells, increasing the permeability of the bottomhole formation zone (BHZ), etc.

When developing an oil reservoir, the impact on the reservoir is carried out at discrete points - in injection and production wells. This effect leads to the emergence of filtration flows in the oil-saturated strata and the formation of both actively drained and "stagnant" zones that are not covered by the filtration process in the formation.

Currently, a large number of the most diverse methods of impact on the bottomhole formation zone are used at the fields: thermal, hydrodynamic, physicochemical. As a rule, the purpose of the currently performed well treatments is to influence individual wells, which, as it were, are "detached" from the entire reservoir and the set of injection and production wells involved in the development process. Taking into account the deterioration of the structure of oil reserves and the importance of maintaining good reservoir properties of the bottomhole formation zone of injection and production wells, it is logical to assume that the systematic application of existing technologies for treating near-wellbore formation zones will improve the regulatory capabilities of the set of injection and production wells, as well as reduce the material and labor resources required to solve emerging problems.

On the basis of numerous laboratory, theoretical and field studies, a systemic technology for stimulating oil reservoirs was proposed, which in a short time was widely used.

Unfortunately, in recent years, there has been a decrease in the activity of subsoil users in the testing and application of methods for increasing oil recovery. The volume of experimental-industrial work on testing new technologies has sharply decreased.

At the same time, at the present stage of the development of the oil industry and negative changes in the structure of reserves, both increasing the efficiency of development and the final oil recovery factor of productive formations, and reducing the cost of oil production, is of particular relevance. In addition, quite a lot of new methods and technologies for well treatment and stimulation of oil production have been developed and applied recently. In these conditions, system technology again acquires great importance, especially in view of its further improvement based on the latest achievements of petroleum science and practice.

Stimulation technology for oil inflow from shallow and low-permeability reservoirs.

The method is intended for treatment of the bottomhole zone of waterless and water-cut production wells that have penetrated heavily shaded and low-permeability formations.

The composition used uses a mixture of hydrofluoric and hydrochloric acids to create a hydrodynamic connection between the well and the formation. In order to reduce the skin effect, a solution of oxyalkylated alcohol and a demulsifier is used in certain ratios. To preserve the oil-saturated part of the reservoir, a polysiloxane-based hydrophobizator is used.

The method is intended for treatment of the bottomhole zone of waterless and water-cut production wells that have penetrated heterogeneous formations of medium permeability (50-200 mDarsi).

In the used composition, a mixture of hydrofluoric and hydrochloric acids is used to increase the hydrodynamic communication between the well and the formation. In order to reduce the skin effect, a solution of oxyalkylated alcohol, water repellent and demulsifier is used in certain ratios. To preserve the oil-saturated part of the reservoir, a polysiloxane-based hydrophobizator is used.

Increases in oil production rates are 10 - 25 tons of oil per day with the duration of the effect for 9 - 12 months.

Inflow intensification technology due to mud formation of the bottomhole formation zone.

The method is intended for treatment of the bottomhole zone of waterless wells in formations with a high content of clay particles and drilling mud filtrate.

In the composition used, weakly alkaline systems are used for the destruction and removal of clay minerals from the formation.

The use of hydrochloric acid leads to additional destruction of clay minerals and deeper treatment of the bottomhole formation zone.

Increases in oil production rates are 4-6 tons of oil per day for 4-8 months.

Well productivity recovery technology by the method of controlled cyclic pressure drawdowns.

The technology is aimed at increasing the productivity and development of wells by creating controlled cyclic drawdowns on the formation (DCU) using a cyclic stimulation unit (ATC) on the formation for the implementation of the following technological processes:

- stimulation of oil inflow from the reservoir;
- cleaning bottomhole formation zone of production and injection wells;
- assessment of oil and gas hazard when testing exploration wells;
- removal of reaction products from the bottomhole formation zone after chemical treatment of the well.

The following chemicals are used as a chemical solution: sulfanol, hydrochloric acid, hydrocarbon solvents, CMC or PAA.

Increases in oil production rates leave 10-15 tons of oil per day with the effect duration of 6-8 months.

Technology for increasing well productivity in low-permeability and shale reservoirs.

Well preparation for the operation is carried out by a workover team. The tubing is lowered into the well, the bottom of which is equipped with a special funnel, a tail of 8-10 m, a packer, the wellhead is equipped with a preventer, a vibration transducer is installed through a special sub. The packer is installed 10-15 m above the perforation interval. Before packing in the tubing, for circulation, a mud-clarifier (or any required liquid) is pumped in to the special. funnels, then the packer is packed, the pumping unit creates a pressure of 150-200 atm., a vibrating emitter is turned on, vibration vibrations are transmitted through the tubing to the sub-packer zone. The pressure and vibrational vibrations created in the sub-packer zone create an energetically saturated vibrational field, which with the injected fluid can spread into the formation up to 300 m, and possibly more, this is not possible to calculate since it depends on the rate of saturation of the injected fluid with formation fluid and associated gas.

The volumes of injected fluids depend on the task and the specific object of the well.

To work with the bottomhole zone, a 14% solution of clay acid is used in a volume of 0.5 to 2 m3 per one meter of perforation.

When working with a reservoir, to increase the filtration zone, a 0.5% surfactant-Sulfanol solution is used in a volume of 5 to 10 m3 per one meter of perforation.

APPLICATION AREA:

1. Declinization of clay reservoirs in order to increase the productivity of wells, while the flow rate of wells Q = 1-2 m3 / day.
2. Cleaning the bottomhole zone, bringing the well to the optimal operating mode.
3. Declinization of clay reservoirs in order to increase the injectivity of injection wells from 0 to 300-400 m3 /day.
4. Transfer of wells for injection in low-permeability undeveloped oil zones
5. Well development after drilling when clay mud enters the productive formation.
6. During isolation works, to ensure the necessary injectivity of the isolated formation for pumping a plugging compound into it.

The circulating valve is designed for temporary communication of the central passage of the string with the annular space when performing various technological operations for well workover. It allows you to maintain the design upward flow rate of the flushing fluid.

Literature

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