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EFFECT OF QUALITY OPENING PROCESSES OF PRODUCTIVE LAYER WITH HORIZONTAL AND SLOT WELLS ANALYSIS OF EFFECTIVE FACTORS

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Abstract
This article is based on the properties of the selected solution composition when opening productive strata with horizontal wells and the correct choice of the duration of its interaction with the stratum, the impact on well productivity and subsequent performance.

Klyuchevye slova: rock, layer, drilling, pressure, solution, well bottom, permeability, fluid, opening, horizontal

Introduction

It is important to increase well productivity through horizontal drilling of existing and newly opened oil and gas wells. Therefore, it is necessary to properly carry out the technical and technological processes of horizontal drilling, to study the negative impact of the selected solution in the neutral position and the well.

Main Part

Technological factors have a practical effect on the condition of the bottom zone of the productive strata in the drilling of rocks in oil and gas formations in the process of primary opening of productive strata. This occurs due to physico-mechanical and physicochemical interactions [1].

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Physico-mechanical effects are characterized by the following factors:
-unloading of rock mass by drilling the productive layer;
-pressure change when the productive layer is opened;
-changes in the temperature regime in the well;
-hydrodynamic and _ exposure to mexa k;
-hydrodynamic efficiency change (hydraulic shock during drilling and unloading-lifting operation);
-penetration of drilling mud components into the formation;
-exposure of the collector to vibration during the drilling of the seam.

The formation is characterized by the action of adsorption, capillary and diffusion forces on the components of the drilling fluid in the fluid-saturated layer due to physicochemical exposure to the zone around the well bottom.

The following factors affect the quality of the opening of the productive layer:

- type of drilling mud and its parameters (density, water content, chemical composition). As a result of the impact of solid particles of the drilling mud, the porous channels and cracks become blocked. Drilling mud filtrates cause the following conditions: swelling of the muddy particles of the productive stratum minerals; formation of insoluble sediments and emulsions as a result of the reaction of drilling mud filtrates with fluids of the coating.
- the magnitude of the pressure at the bottom of the well exceeds the formation pressure (hydrostatic k and hydrodynamics k);
- long-term contact of the drilling fluid with the layer;
- the emergence of a state of tension around the bottom zone of the well in the stratum;
- Geological and physical structure of the productive stratum and the characteristics of the location of the productive stratum.

As a result of swelling of the clay particles in the collector cavities, the permeability of the productive layer decreases. The decrease in permeability depends on the type of clay material, its degree of dimpersity, the nature of the exchange of cations and the properties of the filtrates. The main reasons for the decrease in permeability are the swelling of the interstices of the crystals and the inner crystals, and also the distribution of water molecules between the two layers in the plane range and in the plane of the particle itself. It should be noted that layer water does not reduce the permeability of the productive layer because the swelling of the particles does not occur due to the stability of the ionic balance.

The phase decrease of the layer fluid occurs due to the molecular-surface conditions and the capillary effect.

The decrease in layer permeability occurs mainly as a result of the interaction of drilling mud filtrates and formation water with the formation of insoluble sediments in pores (e.g., the reaction of alkaline filtrates with highly mineralized formation water).

Thus, the compatibility of the chemical composition of the drilling fluid with the formation fluids determines the effect of the rate of decrease in the permeability of the productive formation. In this case, the location of the productive layer, the structure of the geological structure, the composition of the formation fluids and the properties of the components that saturate it are taken into account when opening the productive layer. The water permeability of the drilling mud affects the depth of penetration of the filtrates into the formation[4].

The depth of penetration of drilling fluid filtrates into the formation affects the opening quality of the productive formation. The dimensions of the infiltration depth of the filtrates are determined as a result of geophysical survey of the wells. In this case, the diameter of the infiltration zone of the filtrates is determined by the ratio of the diameter of the drilled well using the diameter of the drill.

During the contact of the drilling fluid with the productive formation, the factors explained above reduce the permeability of the zone around the well bottom in the formation and reduce the reservoir properties. Together with the filtrates, a dispersed phase of solid-state particles of drilling mud enters the formation.

The fractional composition of solid particles determines the depth of penetration into the layer. Experimental and mining data conducted by various researchers show that the permeability of the productive layer decreases when solid particles enter the pores. It is advisable to form a collation zone in the perimeter zone of the wellbore to prevent deep penetration of the drilling mud components into the formation. The ingress of solid particles into the collectors is characterized by the ratios of the porosity and the size of the solid particles.

The condition for the penetration of solid particles into the porous space and the formation of colmatation layers is determined by the following formula ratios:

$$3d < d_n < 10d, \qquad (1)$$

where: d is the solid particle diameter; d_n is the pore diameter.

As can be seen from the above formula, the diameter of the pores should be 3 times the diameter of the particle and 10 times the diameter of the particle.

The stratification zone formed in the bottomhole zone of the formation plays a major role in the “well-layer” system, which has a significant impact on the technological processes in the continuation and completion of well drilling[5].

When the amount of repression applied to the formation during the opening of the productive strata increases (well bottom pressure is higher than the formation pressure), in practice, the stratum affects the well bottom zone (WBZ), increasing the deeper penetration of filtrate and solid particles.

The repression applied to the formation during the drilling process has a practical effect on the sharp decrease in the permeability and flow rate of the well. Scientific studies of mining wells in the fields have shown that the specific flow rate decreased by 2 times after the wells were put into operation when the repression of the formation at the opening of the formation exceeded the set value by 1.5 times.

At the same time, it should be noted that the high repression applied to the formation can in turn lead to hydraulic fracturing of the layer and cause difficulties in opening the productive layer and adversely affect the collector properties.

Processes of adverse effects of drilling fluids on the reservoir properties of the productive formation lead to the fact that the flow does not fully penetrate during the development of wells. Necessary treatment of WBZ (hydrochloric acid, hydraulic fracturing of the seam, etc.) will be carried out to clean the well bottom zone of the formation and ensure the planned well flow.

All this prolongs the development time of wells, reduces commercial speed, increases the cost of well construction. When the depressurization value applied to the formation is increased (the formation pressure is higher than the well bottom pressure), gas or water flows during the development of the wells.

Access to the productive layer may be blocked as a result of the closure of filtration channels in the search wells.

Conclusion

Thus, the requirements for the quality of drilling fluids at the opening of the productive formation are:

-the density of the drilling mud is minimal;

-the composition of the drilling mud should be consistent with the composition and mineralization of the formation water, to prevent the formation of insoluble sediments;

-should not allow the muddy materials in the collector pores located in the layer to swell;

-the drilling mud must create conditions for quality geophysical surveys in the productive stratum;

-wealth and environmental security of the environment.

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