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PROBLEMS WITH DRILLING IN UNSTABLE CLAY DEPOSITS

When drilling oil and gas wells there are complications associated with the loss of stability of the shaft consisting of clay and clay shale. In a complex of sedimentary deposits clay rocks lie at different depths and make up 80-82% of the entire thickness of rocks.

By the nature of the behaviour in the process of drilling, these deposits are divided into 4 groups:

- tough rock;
- swelling, high-plastic and those that easily pass into a drilling mud, clay;
- soft rock, clay slates that fall down;
- strongly moistened clay with overlaps of salts that form cavities, bridges and downfalls.

These categories of sedimentary clay rocks cause complications; they often lead to the loss of shaft or to the elimination of wells.

The behaviour of potentially unstable clay is determined by two main factors: physical or physical and chemical.

Based on the analysis of possible causes of violation of the stability of well walls, they can be divided into three main groups:

- mining-geological (humidity, plasticity, texture, tectonic disturbances, corners of layers formation);
- physical and chemical (wettability of rock, mineralization of pore fluid and drilling mud, composition of the dispersed phase);
- technological (density, water efficiency, speed of drilling, hydrodynamic oscillations in the well).

At the moment, inhibitive drilling fluids (substances that slow down or stop the flow of chemical reactions, biochemical and physiological processes) are created to prevent accidents and complications associated with bridges and downfalls of unstable clay.

From a wide range of inhibitive drilling fluids, potassium, silicate, calcium, lime and gypsum solutions are the most widely used. But it should be noted that all inhibitive systems have a number of disadvantages:

- high materials content and cost of solutions;
- complicated regulation of rheological and filtration properties;
- the necessity to adhere to the strict technology of solutions preparation;
- possible overuse of weight;
- increased crust and foam formation.

Polymer and polymer-based solutions are applied now to improve the stability of clay on the well walls. These systems, due to the low solids content in drilling mud, can increase the mechanical speed of drilling, improve the wear resistance of chisels, and reduce the cost of sinking. The advantages of polymeric solutions are the following: improved antiwear and lubricating properties, a wide range of filtration properties, as well as inhibitive ability in relation to clay rocks.

Thus, at the moment, the optimal dealing with this problem is the use of polymer and polymer-based solutions. In comparison with other inhibitive solutions, mentioned above substances are of affordable price, they can regulate filtration properties and have good inhibitive ability.

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