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Functions of the well flushing process. Requirements for drilling fluids

When drilling wells, the flushing fluid must circulate in a closed hydraulic circuit. Depending on the type of hydraulic circuit, all existing flushing systems are divided into two groups: 1) flushing systems with solution output to the surface; 2) flushing systems with downhole circulation. Depending on the direction of movement of the flushing fluid relative to the drilling tool, flushing with its output to the surface is carried out according to one of the schemes shown in the figure.

The combined flushing system is divided into periodic (sequential) and combined (parallel) according to the execution technology. Both options can be implemented both in a direct and reverse way. When using periodic flushing, the flow direction of the drilling fluid changes from direct flushing to reverse flushing and Vice versa. The direction of movement of the solution supplied to the bottom of the well changes on the surface when the pump and the wellhead are properly strapped.

Drilling mud functions. All drilled rock must be effectively removed from the face and from the trunk to avoid over-grinding of the sludge and additional wear of the rock-breaking tools and drill pipes. The quality of bottom-hole cleaning depends on the degree of turbulence of the liquid in the bottom-hole zone. The higher it is, the better and faster the bottom of the well is cleared of drilled rock. The nature of fluid flow in the bottom-hole zone of the well is significantly affected by the frequency of rotation of the drill shell, as well as the design and location of flushing Windows in the rock-breaking tool.

The ability of the drilling fluid to remove sludge from the well into the sump depends partly on the characteristics of the solution and partly on the rate of circulation in the annular space between the drill pipe and the well wall. When the power of the drilling pump is not sufficient to provide the necessary upstream flow

rate of the drilling mud for effective removal of sludge, it is possible to increase the viscosity of the mud, especially the yield strength. However, this leads to a deterioration in the conditions for cleaning the solution and an increase in hydraulic resistances in the well circulation system.

If the pressure in the well is greater than the reservoir pressure during drilling, there will be a leaching of the washing liquid into the reservoir-absorption. This leads to various kinds of complications in the drilling process:

- the level of liquid in the well decreases, which can cause wall collapses,
- expensive washing liquid is lost;
- control of the washing process is complicated;
- underground water is polluted.

If the reservoir pressure is greater than the hydrostatic pressure of the washing liquid, a water phenomenon occurs - the liquid from the well enters the surface. This also leads to undesirable consequences: the area adjacent to the well is polluted, the quality of the flushing fluid sharply deteriorates, which causes the collapse (or heaving) of the well walls.

After drilling a well in loose sandy soils, a stage begins aimed at strengthening the casing pipes. At the same time, you should protect the trunk from damage, aggressive effects of ground water, corrosion and other negative phenomena. We are talking about such a process as well cementing.

Well cementing is a process that follows immediately after the completion of drilling operations. The cementing procedure consists in introducing a cement solution into the annulus or inter-tube (if the casing pipe is placed in turn in a wider polyethylene pipe), which eventually hardens to form a monolithic wellbore. In this case, the cement solution is called “plugging", and the process itself is called "plugging". A complex engineering process, called well cementing technology, requires certain knowledge and special equipment.

In most cases, water sources can be plugged with your own hands, which is much cheaper than attracting specialists.

Properly performed water well plugging contributes to:

- ensuring the strength of the well structure;

- protection of the well from ground and surface water;

- strengthening the casing and protecting it from corrosion;

- increase the service life of the water source;\

- elimination of large pores, voids, gaps through which the water-bearing

- - the horizon can be exposed to unwanted particles

- displacement of drilling mud with cement, if the first one was used during drilling.

The quality of the produced water and the operational characteristics of the well will depend on how well the cementing is carried out. Also, cementing is performed for liquidated wells that will no longer be used.

Grouting solution for cementing a well must meet a number of requirements and have:

-high adhesive properties with any type of surface;

high strength after solidification, resistance to mechanical stress;

- plasticity and good fluidity to fill all cracks and voids;

- chemical neutrality in relation to the soil layers to be plugged;

- resistance to erosion by ground water;

- no shrinkage during solidification.

Also, the solution must have such a consistency that it can be easily delivered to the well and pumped. The solution should be well washed off from the equipment, not be chemically aggressive towards it, and have a minimum loss coefficient during transportation to the well.