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PREPARATORY WORK FOR THE PREPARATION OF HYDROCARBON – BASED DRILLING FLUID

Abstract. The article considers the program of replacement of drilling fluid for inter-interval drilling for the technical and operational column of the directional rectilinear interval of an exploration well. The article describes in detail the procedure for replacing the ALKAR-3M drilling fluid with a "Versadril" type hydrocarbon base solution. This work can be used to conduct drilling operations in deep wells in fields with difficult mining and geological conditions, in order to eliminate complications associated with oil seal formation, absorption and accidents with the seizure of drilling tools during drilling.

Keywords: solid phase, fluid, regeneration, hydrotreated fuel, hydraulic funnel, vibrating screen, centrifuge.

Let's consider the preparatory work on the preparation of a hydrocarbon-based drilling fluid for the exploration well № 204 on the Northern Goturdepe area from a depth of 3000–4662 meters. The volume of the solution is directly proportional to the volume of the solid phase in the solution system. The increase in the solid phase content in the solution should be maintained at a minimum level in order to reduce the cost of drilling fluid and drilling in general. Removal of the solid phase from the solution can be achieved by using a double centrifuge system operating at low and high speeds to remove the fine solid phase and return the fluid to the system and regenerate the barite.

Diesel fuel L-0,2–62 is necessary for drilling fluid sealing due to the fact that the hydrotreated fuel does not provide the necessary parameters of the solution and requires a large consumption of chemical reagents.

When mixing, we recommend installing a shear agitator on the drilling rig (a hydraulic mixer with a high shear effect) to significantly improve the mixing of a hydrocarbon-based solution, which will significantly reduce the use of orgophilic clay at the initial stage of mixing the solution, which in turn leads to a high viscosity of the solution during drilling and requires dilution [1].

Circulation system – it is necessary to equip working tanks and storage tanks of the solution with high-pressure "pistols" for faster and more efficient sealing of the solution and its maintenance in working condition. It is also necessary to have a small capacity for the preparation of various kinds of packs for pumping into the well.

It is necessary to make the following update of the cleaning equipment:

– install high-speed centrifuges to return barite (regeneration) to the working system and remove the fine solid phase.

– install an additional «Mangust» vibrating screen (only 2 vibrating screens per 1 drilling rig) to ensure pumping of the required volume of liquid required for the operation of the downhole engine and effective cleaning of such volume immediately after its exit from the well.

– it is necessary to have a grid with the appropriate dimensions on a hydrocyclone installation for thorough cleaning of the solution from the colloidal solid phase.

When selecting the type of solution, the following main factors were used:

1. Complications related to the solution and conditions when drilling a curved hole.

2. Reactivity of clays.

3. Well manifestations and minor absorption.

4. Improving the practice and compliance with drilling modes, as well as the penetration rate to successfully achieve the design depth and shorten the well construction cycle.

5. Minimizing damage to the reservoir properties of the productive horizon.

The vibrating screen must be under constant control, including during lifting operations, until the reception of the solution from the well is transferred to the filling tank.

Pumping of heavy, viscous and any other bundles should be carried out after lifting the tool to the shoe of the column. When lifting, the first 2–3 candles should be pumped to avoid the effect of plunging/swabbing in the well [2].

The well, up to a depth of 3000 m, was drilled using an upgraded inhibited drilling fluid of the ALKAR-3M type.

When drilling a 295.3 mm bore, the well will be replaced with a solution of the Versadril hydrocarbon-based system, at a depth of 3000 m. Next, the 295.3 mm barrel will be drilled to a depth of 4450 m along the hole with a vertical depth of 4100 m. To drill this interval, equipment will be used to set the zenith angle and exit in the required azimuth direction, which requires special control of the rheological parameters of the drilling fluid. When drilling this interval, an inhibited hydrocarbon-based drilling fluid system «Versadril» will be used. The choice of a hydrocarbon system was based on the composition of this system, which is a direct emulsion, where the aqueous phase is a dispersed medium, which excludes the chemical reaction of the solution with rocks in the well.

Considering the fact that drilling fluid previously used in another well (№ .147 Northern Goturdepe) will be used to drill this well, it will be necessary to try to minimize the amount of solid phase in this solution by centrifuging it on high-speed centrifuges so that it can be used without complications when drilling at the well in question № .204 Northern Goturdepe field [3].

The 215.9 mm barrel will be drilled from 4450 m to 4662 m along the hole using the «Versadril» system. Part of the solution from the previous section will be used when drilling this section. The instability of the hole is possible due to decompressed layers and gas occurrence. The density of the solution must be maintained at the level of 1.35–1.45 g/cm^3. If the density regimes of the solution are not observed in this section, narrowing of the hole is possible, and when creating repression, absorption of the solution is possible. The narrowing of the barrel can lead to the seizure of the drilling tool. It is also necessary to apply an emulsion with a diesel/water ratio of 70/30.

Control of the volume of the solution is very important when drilling this well. It is necessary to have a work plan that will be constantly monitored and adapted in accordance with the current conditions.

Calcium Carbonate (Safe Carb) will be added to the solution to prevent filtrate penetration and minor absorption. The addition of Calcium Carbonate will stop the penetration of filtrate into microcracks and prevent instability of the borehole.

Sealed scales for determining the density of the solution should be constantly used to remove the exact parameters of the density of the drilling fluid.

Before the operation to replace the aqueous solution with the «Versadril» system, the following is necessary:

– to hold a meeting to instruct the work plan between the drilling crew and the drilling fluid engineer.

– to circulate the well with a water-based solution from the working tank to achieve the minimum acceptable parameters of viscosity and static shear stress.

– lower the chisel to the face as the new solution approaches the chisel.

– use large grids on the vibrating screen during replacement and after for 1–2 cycles.

– pump a buffer of at least 60–150 m of the borehole. The buffer must be prepared from diesel and VG-69.

Substitution sequence:

– Water;

– Viscous pack – buffer;

– A hydrocarbon-based solution «Versadril».

The pump feed rate must be adapted to create a turbulent flow.

In the process of replacement, do not stop the pump in any case and do not reduce the speed of its supply.

It is necessary to pace and rotate the tool during the replacement process.

After replacing the ALKAR-3M solution with a hydrocarbon-based drilling fluid «Versadril», perform a complete cleaning of the circulation system and cleaning equipment.

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