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Oliynyk I.K., master of specialty 185 Oil and gas engineering and technologies
Scientific Supervisor: Pashchenko O.A., Ph.D., Associate Professor of the Oil and Gas Engineering and Drilling Department
(Dnipro University of Technology, Dnipro, Ukraine)

COIL TUBING IN TECHNOLOGICAL PROCESSES OF WELL OPERATION

Coiled tubing technologies are widely used in the development of hydrocarbon deposits – during drilling, major repair of wells, waterproofing works, and others. In recent years, almost all oil companies pay great attention to the quality of well construction and discovery of productive reservoirs. And that is why new progressive drilling technologies are widely involved. One of these technologies is drilling on balance or depressions on formations. Dissection of layers under conditions of depression creates prerequisites for preserving the natural state of the productive rocks that are exposed. Traditionally, drilling is carried out on repression, when the pressure of the flushing fluid in the well is higher than the reservoir pressure. The consequence of this is the penetration of the washing fluid (PL) into the formations and their clogging. Drilling under depression conditions, on the contrary, causes formation fluid to flow into the well, preserving the natural reservoir properties of the rocks. The depression drilling mode is also the most optimal for geochemical research. One of the most technological methods of drilling, which ensure the opening of productive layers in the depression, is the use of coiled tubing.

The technology of coiled tubing drilling can be used both for drilling new wells and for drilling lateral shafts and horizontal members of wells. To make a decision on the possibility of application, it is necessary to evaluate the following parameters of the well:

1. Diameters of wells. If it is not desirable to remove the pump-compressor pipes in the wellbore, then coiled tubing can be carried out through these tubing. To do this, they must be at least 88.9 mm (3 inches) in size. According to foreign researchers, the drilling of new wells using CTB from existing wells through 88.9 mm tubing has become widespread in Alaska. However, working through 114.3 to 139.7 mm (4½ to 5½ in) diameter columns is found to be more advantageous in terms of simulating coiled tubing forces and barrel clearance rates. In many cases, it may be appropriate to use 152.4 mm (6 in.) or larger HT string when drilling vertical wells;
2. The length of the NT column. Based on industrial experience, the optimal length of the NT string for drilling is estimated to be approximately 460 m. However, the actual values for specific conditions depend on several variables, such as the pipes, the profile of the inclined well, the availability of GIS results and the expected work program, the lithology of the intervals through which it is expected to drill well bore. So, for example, the length of the lateral shafts, which are carried out today in various deposits using the KTB technology, according to experts, is usually from 300 to 1200 m. 33 exceeds 1200 m;
3. Depth. The range of depths for the application of the technology can be determined on a specific material using available modeling tools and field tests. Known experience of drilling two wells with a depth of more than 4,700 and 4,800 m, respectively, as well as conducting a successful technological operation at a depth of 4,816 m (Colombia);
4. Intensity of distortion. When designing the profile of an inclined well with the use of a NT column, taking into account the restrictions caused by the use of a certain layout of the bottom of the drill string (KHBC), it is permissible to predict the intensity of the set of curvature with a radius of up to 35 m;
5. Breakout temperature. All elements of the composition of the bottom of the NT drill string must be sufficiently resistant to 121°C. The reliability of a standard reciprocating turbine engine stator made of rubber (a nitrile rubber vulcanization product) may degrade at

temperatures above 121°C (250°F). For such conditions, the use of special high-temperature elastomers for the stator of a knock-out turbine engine should be provided. Many downhole survey systems are designed for temperatures up to 150 °C (302 °F), and some have shown high reliability at temperatures as high as 175 °C (347 °F). The use of the coiled-tubing layout of the bottom of the drill string, which descends on a cable and is mainly used in depression drilling, is expected at an operating temperature reaching 150°C, therefore, the permissible temperature for the cable should correspond to a temperature of 150°C. Coiled tubing rigs are also used for drilling new vertical wells. To increase the load on the bit and ensure the stability of the flexible pipe, it is provided with a heavy bottom of weighted drill pipes.

A similar technique is used when drilling using traditional drilling rigs, but replacing the main part of the drill pipe column with a flexible pipe allows:

1. Exclude all operations related to building up the string;
2. Conduct drilling in depression mode.

As a result, it becomes possible:

1. Increase the drilling speed of the well;
2. Reduce the time of deployment and collapse of the drilling complex;
3. Reduce the labor intensity of drilling operations and the number of personnel;
4. Increase the safety of work;
5. Significantly improve the environmental indicators of the drilling process, completely eliminating the spillage of oil, chemical reagents and other types of environmental pollution;
6. To reduce the total time of setting up the well and speed up its commissioning.

The drilling of lateral shafts with an inclined or horizontal profile is performed in an already existing vertical well through a pre-cut window in the production column. After cutting the side window (or several windows), the drill pipe is pulled out and a column of lift pipes is lowered down the well. After drilling, this column is used to operate the well. During the drilling process, a continuous pipe descends through the lift column. The compatibility of the drilling fluid with the formation fluid and drilling in the depression mode excludes the clogging of the pores of the productive formation and allows periodic exploration of the well for inflow. After drilling a lead of a given length, a perforated production column is lowered into the well. Limited by the hydraulic resistance of the continuous pipe and its strength, the maximum supply of drilling fluid can lead to a decrease in the efficiency of removal of particles of drilled rock by the upward flow of liquid.

Directional coiled tubing drilling provides the following advantages:

1. Increasing the mechanical penetration speed;
2. Reduction of required volumes of process fluids;
3. Stability of depression parameters due to continuity of drilling;
4. Preservation of the reservoir properties of the near-stem part of the formation;
5. The possibility of estimating reservoir parameters directly during drilling;
6. The possibility of conducting a wellbore through layers of small thickness with high accuracy/

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