USE OF GEONAVIGATION SYSTEM IN CONTROLLING AND FAST CONTROL OF HORIZONTAL WELLS' STEM TRAJECTORY

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Abstrack

One of the most important issues in drilling horizontal wells is determining the optimal trajectory of the wellbore and its rapid implementation. The combination of a modern telemetric system and the use of improved techniques of well measurement in real-scale well drilling creates conditions for the optimization of inclined and horizontal drilling, as well as a quick assessment of the properties of the geological object to be opened, and as a result, increases the efficiency of well construction.

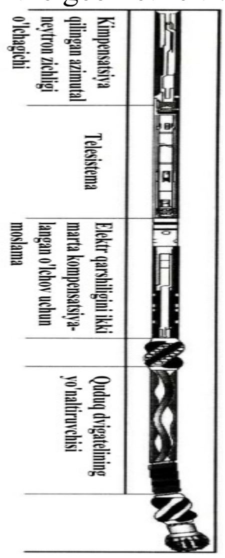
Аннотация

Одним из важнейших вопросов при бурении горизонтальных скважин является определение оптимальной траектории ствола скважины и ее оперативное внедрение. Сочетание современной телеметрической системы и использование усовершенствованных методик измерения скважин при бурении скважин в реальном масштабе создает условия для оптимизации наклонного и горизонтального бурения, а также быстрой оценки свойств вскрываемого геологического объекта. и как следствие повышает эффективность строительства скважин.

When drilling inclined and horizontal wells, their actual profile may not match the design profile located in a vertical plane. Usually, the trajectory is geometrically refined, that is, based on the processed data of previously drilled wells, it is carried out in accordance with the project route and the forecast of the underlying rocks. The determination uses only azimuthal and inclinometric measurements taken with modern instruments on a real time scale.

Such methods satisfy the requirements of drilling inclined wells in well-explored thick layers in uncomplicated deposits of large thickness. If the productive zone has a complex stratigraphic structure and the profile trajectory of the well is in the form of layers of small thickness that have not been studied enough to calculate, then the rapid control of the trajectory of the well when using "geometric refinement" can be less effective.

Thanks to the development of three-dimensional seismic exploration, mining companies are adding very complex structures to use and laying profiles with complex profiles. Here, the main problems are related to thin layers, complex layers and collectors of anomalies. In this regard, leading oil and gas and service companies are actively developing new directions for stratigraphic drilling or rapid trajectory management of geonavigation wells. Geonavigation is placed on the heavy drill pipes in the process of drilling. Geonavigation is placed on the heavy drill pipes during the drilling process. It is part of the geonavigation system in the management and quick control, and it provides the opportunity to obtain real-scale information about the parameters of rock, formation water, and in this case, according to the real geological parameters. only geonavigation is carried out due to the actual geological conditions without determining the trajectory of the wells. It will be possible to quickly obtain geophysical information about the rocks to be drilled using the materials of the Shlyumberje company, and geonavigation of the drill will be carried out. As an example, let's consider the data obtained as a result of drilling in the North Sea. The length of the horizontal section in the opened productive layer was 167 and 228 m, i.e. 73%, which is a very good result for the clarification of the geometric trajectory.



1 - picture.The option of placing cartage probes in the geonavigation system for control and rapid control.

The resistivity of the transition zone in the water-oil contact is about 0.6 Ohm • m., a deviation error in this value will cause the water to approach, or move away from the water-oil contact, and the wellbore will deviate down or up accordingly.

When drilling horizontal wells in a directional section, the difference from an obliquely oriented well is that it is very important to continue drilling the horizontal section at a specified angle without the need for the shaft of the well to exit from the specified coordinates at the design depth. Most profiles of horizontal wells are two different ways of obtaining a curvature plot. The presence of the average radius curvature of the second plot (the speed of the curve is 60 per 10 m.) allows to "plant" the straight-line inclined section (tangential) guiding part of the shaft of horizontal wells with high accuracy. In addition, the presence of a tangential section provides an opportunity to identify geological markers in real time and to carry out quick changes in the direction of the horizontal wellbore section by vertical design depth.

For example, the results of drilling Dunga-29 and Dunga-31 horizontal wells in the Dunga mine, Mangishloq region of the Republic of Kazakhstan can be cited. During the Dunga-29 well drilling, the main task is to open sandstones and siltstones located between the Aptian-A and Aptian-B zones. In this case, the material of Dunga-22 and Dunga-28 wells, which were previously drilled in the ceiling of the Aptian-A zone, was expected at a depth of 1676 m below the rotor table. According to the plan, the drilling of the guide section of the well shaft at the ceiling of the Aptian-A zone at an angle of 85 to 670 and an azimuth of 1040 will be completed, the shaft will be lowered and cemented, and then the horizontal inclined section will be drilled for 400 m during the completion of the construction of the well at the base of the Aptian-B zone. was considered and this zone was expected at a depth of 1706 m below the rotor table vertically.

As a result of the drilling of the guide section according to the gamma-coring data obtained during the drilling process at a precise time scale, the fact that the ceiling of the Aptian-A zone is located at a vertical depth of 1681 m of the rotor table required a quick change of the well profile. The total length of the guide section of the shaft was extended by 45 m, and the length of the horizontal inclined section was reduced to 380 m.

The main problem of drilling horizontal wells was to open a productive layer with a longitudinal shaft (according to stratification): it was necessary to match the geometric parameters of the horizontal section to the shape and structure of the productive layer. Analysis shows that the main reason for the failure of horizontal well drilling is considered to be insufficient effective control and horizontal section trajectory of the wellbore for horizontal drilling of the opened productive zone.

Effective indicators of control are the ratio of the total length of the horizontal section to the length of the opening of the productive zone, that is, its value can vary from zero to 100%.

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