Research on Fine Reservoir Distribution Based on Computer Modeling of Horizontal Well Data

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Abstract. With the decrease of oil reserves, the difficulty of oil reservoir exploitation is increasing day by day. In this case, the development of oil reservoir research is becoming more and more important. There are more complicated continental reservoirs in Chinese oilfields, which makes the development of oilfields more difficult. The traditional way of describing oilfields can no longer accurately describe the complex petroleum geological environment. Therefore, a more efficient and detailed description of modern reservoirs is needed. Methods, using computer modeling to analyze horizontal wells and quantitatively study the reservoir conditions.

Keywords: Horizontal Well, Fine Reservoir, Analysis

1. Introduction

Compared with conventional drilling technology, the drilling of horizontal wells often requires some more complicated construction methods and consumes a relatively long time. People have to start drilling from multiple angles, which makes horizontal drilling more challenging. During the application of this technology, people need to adjust the trajectory of the borehole in a timely manner so that it can be better controlled and maintained in a more accurate range. The construction tools and technologies used in the drilling of horizontal wells should also be selected in accordance with the specific conditions, so as to improve the quality and stability of drilling and achieve the standards required by people for the degree of construction. There are bound to be many difficult problems in the drilling of horizontal wells. These problems must be combined with the application of multiple complex technologies in order to achieve better control and management of the technology and provide a reliable guarantee for people work. So as to give full play to the value of horizontal well drilling.

2. Horizontal well drilling process analysis
2.1. Underbalanced drilling technology

The staff usually use the balanced drilling technology and measures to carry out specific work. This technology mainly uses drilling fluid for killing treatment, so that it has higher strength and stability. However, in the process of use, it is likely to have a serious impact on the normal development of later work. With you, you can use the underbalanced drilling process technology\(^1\). The application of this new type of process technology can meet people's work needs and create a good working environment. To a certain extent, it can reduce the late pollution of the oil field and reflect the green Environmentally friendly construction concept. However, in the construction process of the application of this underbalanced drilling process technology, it is necessary to reasonably choose various construction equipment, in order to create a safer and more stable environment for construction, thereby providing a reliable guarantee for people's safety and reducing various The occurrence of this kind of dangerous accident makes drilling work smooth.

2.2. Application of wellbore trajectory control technology

During the drilling process of horizontal wells, the borehole may deviate from the normal track due to various reasons, which will have a great impact on the later work\(^2\). Therefore, if people want to make the drilling borehole follow the designed track and improve the quality of construction, they should adopt efficient technology to realize the control of the borehole trajectory. The vertical wells may be tilted. The inclination during the drilling process must be controlled to reduce various errors during the construction process. During the drilling of the inclined section, reasonable design and control of various parameters should also be carried out and various new technologies should be widely used to improve the efficiency and quality of horizontal well drilling so that it can better To meet people's actual needs, the control trajectory is shown in the figure below.

![Control trajectory](image)

**Figure 1.** Control trajectory

3. Horizontal well drilling data analysis process optimization

3.1. Optimization treatment of well location selection
Before drilling a horizontal well, conduct a comprehensive inspection of the construction site, based on the geological conditions of the oil layer and according to the actual situation of the engineering technology, the construction personnel will make a reasonable selection of the well location through a comprehensive evaluation of the drilling and completion capabilities of each well location. In order to avoid the negative impact of external factors on the drilling operation of horizontal wells during the drilling process, the drilling cycle of horizontal wells should be reduced to the greatest extent and the drilling quality and drilling efficiency of horizontal wells should be further improved\(^3\).

3.2. **Optimization treatment of drilling section**

When selecting a drilling profile, it is necessary to base on the actual situation of the geological structure and combine the existing process technology and drilling equipment to provide a relatively safe construction operation environment for horizontal well drilling, so that the drilling operation can be safe, stable and orderly. Development to achieve the drilling goal of horizontal wells. During the entire drilling activity, the operator should ensure that the drilling trajectory is smooth, the curve is controlled of the shortest distance and the drilling slope is reasonably controlled to minimize the occurrence of drilling failures and avoid wear of the drilling tool during drilling. Improve the efficiency of drilling operations\(^4\).

3.3. **Optimization treatment of well body structure**

Different well sections have different requirements for the horizontal wellbore structure. When the construction personnel deal with the wellbore structure, it is necessary to reasonably control the wellbore structure of the sidetrack horizontal well, select the appropriate tail pipe and use the screen completion method to deal with the horizontal well section to avoid the oil well out. Sand caused dangerous accidents. When designing the structure of a horizontal well, it is necessary to scientifically adjust the structure of the horizontal well according to the actual needs of continuous drilling operations. Treatment and then implement cementing construction to maximize the actual requirements and needs of the wellbore quality\(^5\). The horizontal well section has relatively high requirements for the oil layer casing. When carrying out the horizontal well construction operation, first of all, it is necessary to ensure that the horizontal well operation technology meets the relevant technical requirements and lay the foundation for the continuous production operation of the horizontal well.

3.4. **Optimization processing of wellbore trajectory**

Horizontal wells are extremely special. The entire horizontal well construction process requires operators to actively control well trajectory to ensure that the well trajectory meets the actual needs of horizontal well construction and further improve the quality of the horizontal wellbore. When controlling the borehole trajectory, it is necessary to timely understand the geological conditions of the construction site, adjust and control the borehole trajectory according to the geological changes and maximize the accuracy of the borehole trajectory, so that horizontal well drilling can be carried out smoothly. When performing drilling treatment on the vertical well section, it is necessary to reasonably control the inclination angle of the well to avoid multiple slopes during the drilling process. Even if the drilling difficulty coefficient of the vertical well section is relatively low, it is also necessary to carefully design the drilling trajectory of the vertical well section. Improve the drilling
quality of the vertical well section, so that the later drilling work can be carried out smoothly\cite{6}. When performing drilling work on the inclined well section, the operator needs to optimize the drilling tool and do a good job in the combination of drilling tools, scientifically control the drilling construction parameters and design an empirical trajectory that meets the drilling requirements of the vertical well section. Finally, according to the geological parameters provided by the logging while drilling, determine the various drilling parameters of the horizontal well section, choose the drilling technology reasonably, accurately drill the horizontal well section and maximize the drilling quality and state efficiency of the horizontal well.

4. Research on fine reservoir distribution

4.1. Reservoir as the primary basis for geological classification

Reservoir characteristics are classified according to the basic characteristics of oil reservoir development in China. For example, the analysis of the sedimentary characteristics of clastic rocks in the lake basin can clarify the basic structural form of the reservoir and the reservoirs formed under different deposition systems will form uneven Reservoirs with strong qualities and the heterogeneity of the reservoirs will affect other geological features of the reservoir. For example, the dominant layer in the reservoir is the layered edge water reservoir. The sedimentary cycle is basically the same as the oil-water system in the primary reservoir. The heavy oil reservoir is closely related to coarse rock and thick rock. Most of the loose are secondary oxidized heavy oil reservoirs. Condensate gas top reservoirs are mostly found in the delta front sand bodies. Reservoirs with large lake-shaped sand bodies contain light oil, composite rivers and deltas. The reservoirs formed in are mostly medium-viscosity crude oil. The schematic diagram of the geological distribution is as follows.

![Figure 2. Schematic diagram of the geological distribution](image)

4.2. Classification research on the nature of crude oil

For reservoirs with special crude oil properties, the development of crude oil must focus on the properties of the crude oil and the reservoir can be considered second. For example, the heavy oil
water injection development effect is not good and heavy oil thermal recovery must be implemented; when the gas-rich gas cap with more oil in the reservoir, attention must be paid to prevent the loss of condensate during production.

4.3. Analysis of reservoir structure types

Structural oil and gas reservoirs are caused by changes in geological structure, mainly anticline oil reservoirs, faulted oil reservoirs and fractured oil reservoirs; stratum oil and gas reservoirs are more difficult to find because they are formed by longitudinal sections of the reservoir and buried hill oil reservoirs are used Mainly, the rock formations are relatively complex, including magmatic rocks, limestones, metamorphic rocks and volcanic rocks. Because of the unconformity of oil and gas migration channels, the oil source fractures and there are unconfomed oil reservoirs and strata overlying oil reservoirs. Oil and gas storage space formed by geological changes. Lithologic reservoirs are concealed reservoirs, generally associated with rivers and lakes systems and paleotopography in the history of geological deposition and appear in groups or groups, which is beneficial to later exploration and development, mainly including lens reservoirs and lithologic peaks The oil reservoir is extinguished and the physical property is closed.

5. Conclusion

The application of horizontal well technology has significantly improved the development efficiency and development effect of oil and gas resources. However, during the drilling operation of shallow horizontal wells, due to various factors, it has become increasingly difficult to control the trajectory. If the trajectory cannot be effectively controlled, the later development effects will also be affected to some extent. Therefore, oil companies need to solve the difficult problems of drilling trajectory control, improve trajectory control capabilities and lay the foundation for the further development of oil and gas development.

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