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Study on the method of remaining oil exploration in thin differential reservoir

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Abstract. It is difficult to excavate the remaining oil in the thin differential reservoir and the oil-water reservoir. The remaining oil can be excavated by means of static and dynamic analysis method and micro-structure method to continuously improve the recoverable benefit of the oilfield. Based on this, this paper studies the potential excavation methods of the remaining oil in the thin differential reservoir.

Key words: Oil-water layer; Thin differential reservoir; Remaining oil.

1. Introduction

By studying the sedimentary characteristics of thin oil layer, we can fully understand the characteristics of thin oil layer sand body and the distribution law of remaining oil, and do well in the preparation of drilling plan. According to the sedimentary characteristics of different thin reservoirs, selecting the right type of completion and perforation fluid can effectively develop thin reservoirs and fully excavate the remaining oil.

2. Fracturing technology of remaining oil in oil-water reservoir and thin differential reservoir

2.1 Flow-limiting fracturing completion technology

For new Wells that have not been perforated, the flow-limiting fracturing and completion technology can be used. Perforation is also an important part of the flow-limiting pressure completion technology. The flow-limiting fracturing and completion technology mainly controls the diameter of the fracturing purpose or the number of perforated perforations in order to maximize the displacement construction. Relying on the number of layers that have been previously opened, the bubbles generated by absorbing fracturing fluid continuously increase the pressure at the bottom of the hole along the module, so that the fracturing fluid can be divided and then a larger area of fracturing can be opened. The objective of treating all reservoirs during construction is to maintain fractures in each zone through Gaza.

2.2 Thin interval balanced flow limiting fracturing technology

In order to excavate the thin reservoir without perforation and the thin differential reservoir with high aquifer, the thin interlayer balanced linear flow method is mainly used. The purpose of protecting the thin interval during the fracturing process is to keep the fracture horizontal and to keep the staggered fracture harvest zone within the actual reservoir. The high aquifer and the high aquifer are continuously stabilized under the same pressure system by using the thin interval equilibrium flow limiting method, where the high aquifer and the fracture target are shot apart and then placed within the same fracture zone and re-fractured. At this time, the pressure above and below the thin layer is in a relatively balanced state, and will not be affected by the temperature difference between the cement ring and the thin layer, so as to protect the thin layer.

2.3 Ball-drop multi-fracture fracturing technology

In order to ensure the orderly production of the well after fracturing, it is necessary to plug the high aquifer continuously after the pressure. In the process of fracturing and reconstruction of the multi-thin and differential oil layer, which cannot be divided by the splitter, the ball-drop multi-fracture fracturing technology can be reasonably used to optimize. When the first layer of the oil layer is pressed open, it is reasonable to apply the gaza to maintain the fracture, and then press the high-strength plugging agent and fracturing slurry into the pressure fracture, so that the opening position of the fractured oil layer can be integrated, the suction channel can be blocked, and the direction of the fracturing fluid can be constantly pushed to continue the pressure and pressure opening of the target layer. Through this cycle, all the target layers achieve pressure balance.

2.4 Positioning and balancing fracturing techniques

In conventional perforated Wells, thin compartments and balanced linear flow are properly fractured to transform poorly permeable zones. In this process, the main application is positioning balanced fracturing technology, positioning balanced fracturing technology is mainly used in the downhole, that is, the use of positioning balanced pressure splitter, the use of positioning balanced pressure splitter in the telephoto cylinder and pressure balancer and sand blasting body, etc., to control the specific position of the target layer of pressure and control the number of vacuole holes. In this way, the target layer can be moderately aspirated to realize the location of cracks.

2.5 High sand ratio wide short fracture fracturing technology

The pressure balancer is similar to the actual quasi-high water content sandblasting body, which can not only contain the liquid, but also generate unsupported fractures, ensuring that the pressure target and high aquifer are always maintained within the same pressure range, thus ensuring that the thin barrier is always stable. The high sand ratio wide and short fracture pressure technology is mainly used in the construction of high sand ratio fracturing. The corresponding fracturing of pipe string can improve the concentration of mortar to a large extent, especially the concentration of tailings. In the process of using the flow limiting method for fracturing, the radius of the propped fracture should be controlled at about 10 meters in a reasonable way, mainly to manage and meet various requirements in the process of high sand ratio construction to the maximum extent.

2.6 Plug fracturing technology

In the process of converting stratified fracturing into multiple single pressures, the reasonable use of plug fracturing technology can continuously improve the multi-zone pressure difference ratio and meet the requirements of large span, which has a higher comprehensive advantage. The reasonable design of the bridge plug through finite element optimization can optimize the field application effect, the reasonable application of the bridge plug fracturing technology, there is no problem of clamping, can meet the specific pressure of height difference and other requirements of multi-level. At the same time, because the sand is not carried to the casing, the use of plug fracturing technology can greatly prevent casing impact and damage.

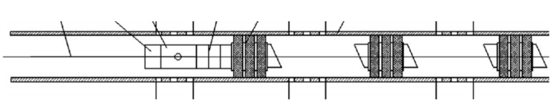

Figure 1. Plug fracturing technology

2.7 Hydraulic fracturing Technology

In the process of hydraulic fracturing technology, the reasonable use of pressure technology can better optimize the fracturing effect. The practical requirements of the application are to make reasonable use of the reservoir for dynamic simulation to predict the oil and gas production that can be met and achieved under different conductivity and fracture length, and then combine the data already used and measured to construct the corresponding fracture length to maximize the economic benefit and calculate the cost required for the actual operation. To improve the overall level of work. In the process of analyzing the corresponding influencing factors of fracturing construction, the most important thing is the fracturing fluid used and the actual performance. Nowadays, China has developed fracturing fluids with strong sand carrying capacity and good shear sensitivity, so the actual application cost and operation safety are guaranteed to a certain extent.

3. Ways and methods of exploring remaining oil in oil - water and thin - difference reservoirs

3.1 Dynamic and static analysis

In order to prevent the expansion of clay minerals in thin oil layer and the dispersion and migration of formation particles, filter water suitable for this area was selected as the gas liquid of the perforating fluid, and clay stabilizer and stabilizer were added to inhibit the migration of formation particles, and the density of perforating fluid was adjusted according to the actual downhole conditions. In addition, studying the mineral sensitivity of the reservoir, the compatibility between the thin reservoir and various perforating fluids and selecting the appropriate perforating fluids can reduce the damage to the thin reservoir. Nowadays, the field usually chooses to use water-based fracturing fluid for fracturing, and usually uses the way of differential treatment and cycle contrast to compare the reservoir of lithologic structural oil. By measuring the scenic line, the contrast of the reservoir is further refined, and it is refined into a single reservoir. After the oil layer comparison, the thick coating is made according to the target layer to find out the inflammatory annihilation line, so as to obtain the optimal oil bearing area distribution map of the target layer. Then the actual collected development data are analyzed and sorted out to draw the specific distribution of the remaining oil and find the oil well with the most development value and economic benefits. Through scientific and reasonable way to excavate the actual residual potential and exploitable situation of thin inserted oil layer and oil-water layer, through this way can better provide a certain guarantee for the actual development of oil layer and the reasonable development of subsequent oil layer.

3.2 Electrical plate method

Logging interpretation can be used to analyze the content of sandstone oil and gas layers with poor permeability. Generally speaking, the interpretation of the content is

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relatively low. The main reason for this is that when argillaceous sandstone and silty sandstone are used as oil storage layers, the actual sandstone particles forming the formation are smaller in size and larger in area. And the actual inclusion of clay minerals in the rock that can be filled will cause the actual crevices to narrow. Sometimes the radius value will be very small, more than 10, which will also lead to the increase of the curvature of the micro-gap, the continuous development of the gap, with high hydrophilicity, but with very low permeability. Therefore, the high bound water content is actually proposed based on the main production layer of argillous sandstone and siltstone, which has the characteristics of high availability. The actual form of pore water is unable to flow, bound water. Therefore, even if the saturation of water has reached about 65%, there may still be a situation that only oil production cannot produce water. The rational use of microstructure method can better optimize the overall structure of oil field.

3.3 Microstructural method

The oil field itself is constantly undergoing subtle changes. The height difference between oil layers should always be controlled within 10 meters, and the scope of the structure should also be controlled within 0.3 square kilometers. The use of forward microstructures is actually to make the top of the reservoir undulation actually higher than the surrounding sedimentary bodies, and the forward microstructures can better collect oil and gas.

3.4 Sedimentary microfacies method

After water injection development, when the water saturation is relatively high, the forward structure will also become the main accumulation area and component of the remaining oil. The reasonable use of reservoir sedimentary crisis method can better optimize the corresponding configuration. The use of such a way is also based on the thin layer dust machine between diverges. The distribution form and actual thickness of the sedimentary branches of the delta front and the actual oil storage physical oil storage zone will also be different due to different image zones. Usually, the thin and sharp layers of distributive yarns may be tightly attached to the perimeter of the river sand, or may be distributed in the crossing zone of the river, or even distributed separately. The sand bodies are connected with each other, and different modern oil storage properties will also be different. Water injection is carried out in the middle of the plane, along the sand mouth of the river dam and the underwater distributary channel, so that the phenomenon of flooding continues to worsen, and the hookah of the thin layer yarn in the front will also appear lighter.

4. Countermeasures for remaining oil exploitation in oil-water reservoir and thin differential reservoir

First of all, for areas with many faults, there is no way to arrange injection Wells around the faults, and faults have the function of blocking, so there may be unsound housing and remaining oil. Therefore, oil, water change, injection or drilling supplementary Wells can be used reasonably to balance the relationship between injection and production, and the remaining oil can be excavated reasonably. Secondly, for the environment with poor relative conditions of thin differential oil reservoir, scenic spots with good residual potential can reasonably use pressure or optimize fracturing technology according to the actual situation to continuously tap the residual pressure potential and improve the thickness of the oil reservoir. However, the actual effect of using the corresponding way to apply the pressure of thin differential oil reservoir may be unsatisfactory. So the top layer needs to be chosen carefully.

Finally, the special technology of thin and differential oil reservoir should be used positively and reasonably. First of all, the test is carried out in the outer layer. When the well pattern density is relatively small and the scenic spot drilling is encrypted, only the surface layer is excavated. The test block is set, and the drilling with good residual potential is encrypted with water injection. In order to optimize the availability of the outer surface, define the injection pressure and the reasonable well tool, the use of advanced oil displacement agent, to find a certain way for the subsequent exploitation of the reservoir.

5. Conclusion

As can be seen from the above, in the late stage of development, the corresponding old oil fields mainly have fewer well tools and low oil storage and production. Therefore, it is necessary to optimize the development mode constantly to better replace the production capacity of thin and poor oil reservoirs and water-oil reservoirs. In this case, the actual remaining oil distribution of thin differential reservoir and the distribution of oil-water reservoir are usually affected by microstructure and sedimentary microdirection. Therefore, we can reasonably find and excavate the remaining oil and oil-water reservoir of thin differential reservoir by using microstructure method, sedimentary microdirection method, dynamic and static analysis method and telecom drawing board method. The corresponding practice shows that these methods can continuously improve the reservoir benefit and stimulation efficiency.

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