Analysis of potential tapping and efficiency increasing measures of reservoir measures in late stage of oilfield development

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Abstract. In the process of oilfield development, with the continuous development of resource exploitation and oil transportation, the later exploitation is likely to reduce the potential energy of the oilfield, which has a serious impact on the oil exploitation. In order to make our oilfield development efficiency has been significantly improved, and effectively improve the comprehensive development and utilization efficiency of our oilfield, we must continue to use the oilfield potential enhancement technology. In the actual production process, we need to combine a variety of technologies, such as hydraulic transmission pressure fracture, water plugging, acidification and other technologies. Through the comprehensive utilization of these technologies, we can reduce the water content of comprehensive oil wells in the oilfield, effectively improve the production of the oilfield, bring greater economic benefits to the society, and promote the long-term, stable and healthy development of China's oilfield.

Key words: oilfield; reservoir measures; fracturing; acidizing; countermeasures.

In the late stage of oilfield production and development in China, the oil production capacity of oil wells is gradually declining, and the water content of crude oil of single well is constantly increasing. In order to greatly improve the production capacity of China's oilfields, the best oilfield stimulation measures
are taken to achieve the expected oil production and development efficiency of the country. Through the study of fine oilfield geological survey, the change law of geological distribution of remaining oil in the oilfield is refined, and fine geological adjustment and management measures are taken to improve the water injection effect of oilfield resource development in China.

1. Characteristics of the later stage of oilfield development

At present, with the gradual deepening of oilfield development and construction, waterflooding oilfield faces many challenges in the later stage of production. Especially because the water content of oil wells is constantly increasing, resulting in a sharp increase in the liquid production of oil wells. The water content of some oil wells has exceeded 95%, which will inevitably cause huge pressure on oil and gas gathering and transportation. At the same time, it will inevitably cause a lot of heat and power loss, which will cause a substantial increase in the cost of oilfield development.

Combined with the characteristics of the later stage of oilfield development, in the analysis of factors affecting production, it is mainly due to the existence of increasingly poor reservoir permeability. Generally speaking, in the late stage of oilfield development, in the case of poor reservoir permeability, it will cause the problem of insufficient reservoir pressure, obvious lack of oil well energy, and increasing downhole flow resistance, which will cause low production of oil wells. In order to effectively solve the above problems, we should combine with the requirements of improving the permeability of the reservoir, give enough energy to the formation to improve the fluidity of the bottom hole liquid, so as to achieve the expected requirements of high and stable production of the oilfield.

Combined with the distribution of remaining oil in the later stage of oilfield development, combined with the actual situation of oilfield development, only by constantly thinking about the optimization of the technical measures of increasing production and tapping potential, can we further tap the corresponding remaining oil and ensure the improvement of oilfield development efficiency. At the same time, technical measures should be taken to effectively control the problem of oilfield water injection, so as to meet the corresponding requirements of stabilizing oil and controlling water. Starting from the optimization of stimulation and injection technology measures, the related hydraulic fracturing and acidizing technology should be continuously optimized to realize low-cost oilfield development, which is the only way for the later stage of oilfield development.

2. Measures for tapping potential and increasing efficiency in the later stage of oilfield development

In view of the characteristics of the late stage of oilfield development, under the background of decreasing productivity increase, it is more and more difficult to apply the related stimulation technology, which requires the common optimization of geological design and oil production technology measures, so as to put forward the most effective stimulation measures and realize the expected development efficiency. In the late stage of oilfield development, appropriate technology should be selected in combination with reservoir characteristics. Only by ensuring the scientific rationality of stimulation technology, can relatively high production efficiency be achieved. For example, for sandstone reservoirs, hydraulic fracturing and matrix acidizing can be used to effectively achieve the requirements of production increase. For carbonate reservoirs, stimulation measures can be acid fracturing, matrix acidizing and hydraulic fracturing. It is through the above effective measures to tap the potential and increase production that the requirements of stable production can be guaranteed.

2.1. Hydraulic fracturing technical measures

Through hydraulic fracturing technology, it can further improve the permeability of low-permeability oilfield, achieve the high production requirements of oil layer, meet the requirements of improving the development efficiency in the later stage of oilfield development, help to achieve the goal of long-term stable production of oilfield, and also guarantee the smooth long-term sustainable development of oilfield. In the specific application process of hydraulic fracturing technology, the high-pressure pump truck unit on the ground can be used to inject fracturing fluid into the underground reservoir. Under the
action of high pressure, the corresponding artificial fractures will appear in the reservoir. At this time, the proppant can be injected to realize the support function of fractures and ensure that the fractures are not closed. The further improvement of the permeability of the existing reservoir is in line with the expected stimulation effect.

Because of the mutual influence of fracturing technology, the vertical flow capacity of fractured reservoir can be further improved. Requirements for additional notes.

The optimized flow limiting fracturing technology can effectively control the number and diameter of perforations in the interval in combination with the actual situation of oil well reservoir, optimize the displacement of injected fracturing fluid, meet the requirements of formation fracture pressure, realize the optimization of perforations, smoothly realize the requirements of fracturing operation, and realize the primary fracturing under the optimized control. The requirement of fracturing multiple reservoirs.

In order to achieve the overall goal of oil well pressure construction, we should first combine the design requirements of oil wells, ensure the optimal configuration of fracturing construction equipment, reduce the failure rate of pump truck equipment, improve the operation efficiency of fracturing stimulation equipment, and meet the expected fracturing construction effect. Before the specific construction, we should first carry out the relevant evaluation of the formation. Only on the basis of the full potential evaluation of the formation and the comprehensive analysis of the formation energy, can we realize the optimization of the hydraulic pressure construction technology, put forward the best construction scheme, and meet the expected hydraulic fracturing effect of the oil well production and injection.

2.2. Application of acidizing technical measures

In the case of application of acidizing technology, it mainly depends on the chemical dissolution of various acids, which can be combined with the actual situation of oil wells to realize the dissolution of rock plugging, effectively deal with the plugging problem near the well zone, and ensure the continuous improvement of reservoir permeability. Using matrix acidizing and fracturing acidizing process and technology, through the optimal configuration of acid fluid, the problem of reservoir damage can be avoided, so as to actively lay favorable conditions for subsequent oil well development.

Combined with the development requirements of low permeability reservoir, through the relevant acidizing and hydraulic fracturing technical measures, it can effectively achieve the further improvement of the permeability of oil well reservoir and ensure the improvement of the internal liquid flow velocity of oil well. Especially for the thin and poor reservoirs, we should actively choose the appropriate stimulation technology to ensure that more remaining oil can be exploited and meet the actual needs of the late development of the oilfield.

2.3. Application of water plugging technical measures

In view of the problem of high water cut in the late stage of oilfield development, under the target requirements of stimulation effect, combined with the actual situation of oil wells, through water plugging technical measures to further control the rising speed of water cut in oil wells, effectively improve the oil production of single well, and meet the production demand in the late stage of oilfield development. Combined with the actual situation of oil wells, from the perspective of cost, chemical plugging agent and mechanical plugging agent are mostly used. In the mechanical water shutoff mode, reasonable packers are selected through well conditions to realize the separation of production reservoir and water layer, so as to avoid the appearance of a large amount of water from the wellbore in the production process, resulting in the sharp rise of single well water production. Generally speaking, selective and non selective water plugging methods can be used to meet the water plugging requirements of oil well production, effectively control the water content of single well, and meet the relevant requirements of oil well production.
2.4. Enhanced water injection technology

In the process of oilfield development, the oil production of oil field will decrease with the exploitation time. Through the statistical analysis of the variation law of the thickness difference distribution of the remaining oil, it can be found that the method of layered drilling and water injection with the thickness difference distribution in the oil layer can achieve the comprehensive development and utilization effect of oil water flooding. In the process of oil field exploitation, the use of enhanced water injection technology, including advanced oil layer water injection and enhanced oil layer water injection, can ensure the utilization of oil water the development direction and comprehensive utilization level of each oil layer. This kind of crude oil injection and production processing technology has been widely used in the field of oil exploitation. Based on the actual situation in the process of application, the corresponding fine structure adjustment between oil layers can greatly improve the oil production performance of the whole oil layer. And through a small well spacing test injection this way, can give full play to the potential utilization of remaining oil reservoir. In the process of mining, we need to pay special attention to the continuous improvement of China's enterprise management science and technology level, and then strengthen the degree of automation in water injection is also higher and higher. In the actual operation process, we should learn to use intelligent water meter control system, with the help of Science and technology to accurately control the oil water control, control the pressure and water injection of oil water injection pipe, so as to have a good effect Effectively promote the technical level of oil injection in China's oilfields, and fundamentally solve the problem of oil injection with high water cut in oil wells.

3. Conclusion

To sum up, combined with the characteristics of the later development of the oilfield, in order to ensure the realization of the potential and efficiency of oil wells in the oilfield, we should actively explore and develop the corresponding technological measures. For example, we can optimize the hydraulic fracturing technological measures to improve the oil well productivity. At the same time, combined with the actual situation of oil well development, we should adopt advanced scientific management technology measures to realize the optimization of technology, meet the fundamental goal of cost reduction and efficiency, and ensure that the oil well can produce more oil and gas, so as to meet the needs of sustainable long-term stable production development of the oilfield.

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