Discussion on comprehensive adjustment technology of weak alkali ASP flooding in stage development of second-class reservoir

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Abstract. The application of ASP flooding development by stages and comprehensive adjustment technology plays a very important role in the development of the second-class reservoir, which is directly related to the development effect of the second-class reservoir and also improves the development effect of the reservoir to a certain extent. In this paper, the author analyzes and studies the comprehensive adjustment technology of ASP flooding in different stages. Taking SD block as an example, the development of the second-class reservoir is expounded, and the weak alkali ASP flooding technology is applied in different stages of the development of the second-class reservoir in SD block.

Keywords: Class ii oil layer, Weak alkali ASP flooding technology, Stages, Adjustment.

1. Introduction
Oil resources are an important component of China's industrial production and people's lives, and they are non-renewable resources in nature. Therefore, in the current process of oil resources exploitation, the application of reasonable exploitation technology can not only improve the exploitation effect of oil resources, but also complete the protection of oil resources to a certain extent. In the current process of oil resource exploitation, weak alkali ASP flooding technology is applied in the second-class oil layer exploitation, and the oil exploitation efficiency is improved through technology application, which also plays an important role in the exploitation and utilization of China's oil resources.

2. Brief description of the second-class reservoir
In the process of oil exploitation, the exploitation of the second-class oil layer is a very important part, which also has an important impact on the oil exploitation in our country. In the current process of oil exploitation, through the analysis of different geological conditions, and taking the matching relationship of polymers as a distinguishing factor, the oil layers are divided into the first type, the second type and the third type. Among them, the first and second types of reservoirs are relatively high in oil recovery efficiency, while the third type of reservoirs are relatively low in oil content and quality, so they are called thin reservoirs. One type of oil layer is also called rich oil layer. From the perspective of oil exploitation, its underground burial is shallow, its temperature is relatively low, and its water
mineralization degree is relatively low, so its oil quality is higher and its exploitation efficiency is higher. In the second type, the buried depth is about 2,000 meters, the salinity of formation water is 10,000-15,000 mg/L, and the formation temperature is higher, but below 85°C, so its production efficiency is relatively poor compared with that of the first type. The three types are worse, especially the formation temperature is higher than 90°C, which affects the hydration viscosity of polymer and the oil recovery effect to some extent.

However, under the background of increasing oil resources, decreasing oil resources and decreasing oil exploitation efficiency, it is very important to develop the second-class oil layer reasonably. In the development process of the second-class oil layer, choosing to develop the oil layer in stages and applying weak alkali ASP flooding technology can improve the development and utilization effect of oil resources.

3. Brief analysis and staging of oil layers in SD block

3.1. Brief analysis of reservoir status in SD block
SD oilfield block is an oil development block that has been developed for a long time in China, and in the actual oil development process, its oilfield area has entered a period of extremely high water cut, which has seriously affected the oil exploitation in the oilfield area. In addition, in the actual oil exploitation process, the exploitation efficiency of the second-class reservoir is relatively poor, so in order to promote the oil exploitation efficiency and the recovery effect of the region as soon as possible, SD Oilfield decided to adopt ASP flooding technology to improve the oil exploitation efficiency. After the implementation of ASP flooding technology, the oil recovery effect in the oilfield has been obviously improved, and the experimental study shows that after the application of ASP flooding technology, its recovery efficiency has been improved by about 20%, which plays a very important role in oil recovery in SD oilfield block.

However, after the long-term application of compound flooding technology, there is also the scaling problem of excessive application of strong alkali, which not only gradually reduces the oil recovery effect, but also causes damage to the oil layer to a certain extent. Therefore, through the research and improvement of SD Oilfield Plant, it is found that the application of weak alkali ASP flooding technology can solve the problem and improve the oil production efficiency. The following is an analysis of its technical application effect.

3.2. Stage division of development process of weak alkali ASP flooding in SD block
The production efficiency of the second-class reservoir is relatively poor, and will change with time. Therefore, in the actual development process, the dynamic change analysis should be carried out for the second-class oilfield of SD Oilfield, and the oilfield development should be planned by stages in the actual development technology application process. The following figure 1 shows the four stages of reservoir exploitation according to the dynamic situation of water cut of ASP flooding in the second-class reservoirs in the region, in which the reservoir development is mainly divided into four stages: ineffective stage, water cut decline stage, low water cut stage and water cut recovery stage. The following is a concrete summary of the application of ASP flooding technology in the four stages.
4. Application adjustment analysis of weak alkali ASP flooding technology in different stages

The application of weak alkali ASP flooding technology in different stages plays a very important role in oil exploitation, and in the actual oilfield exploitation process, making good technical adjustment is the key to ensure the oilfield exploitation effect. The following is a summary of the technical application adjustment contents.

4.1. Adjustment of technical parameters of weak alkali ASP flooding

In the process of actual exploitation of SD oilfield, the parameters of weak alkali ASP flooding technology are adjusted at different stages, so as to optimize the oil exploitation effect of each exploitation stage of Class II oilfield.

(1) Technical adjustment in ineffective period

After the ASP flooding technology was applied in SD oilfield, it was found that the inter-well pressure was too high during the oil exploitation in the ineffective period, and the pressure difference reached 5.53Mpa, which led to the imbalance between injection and production of oil wells. In the actual oil exploitation process, the number of oil wells with injection-production ratio above 1.3 was 17.7%, which also affected the oil exploitation effect. Therefore, in the actual oil exploitation process, ASP flooding technology is selected to adjust the oil exploitation parameters reasonably, so as to promote the pressure balance and injection-production ratio balance in the oil well exploitation process and improve the exploitation effect [1].

(2) Technical adjustment of water cut decline period

The water cut decline period is a very important stage in the production process of the second-class reservoir, and it also plays a very important role in improving the oil production efficiency. In the process of applying weak alkali ASP flooding technology in the water cut decline period, there is still a problem that the pressure difference between wells is too large, which reaches 2.9Mpa. In addition, nearly 32% of oil wells in the oilfield have experienced water cut decline, which exceeds 11%. In addition, 35% of oil wells have water cut decline below 3%, which seriously affects the production effect of oil layers. In this environment, the mining personnel made corresponding technical adjustments, among which the suction profile of weak alkali ASP flooding technology was adjusted, and the swept volume was expanded to a certain extent to promote the oil production effect.

(3) Technical adjustment in low water cut period

In the application process of weak alkali ASP flooding technology, the main problems in SD oil area are that the number of oil wells is increasing gradually, the injection-production capacity of oil wells is
declining, and the content quality of its oil layer is declining in the actual production process, thus affecting the actual production of oil. However, the mining personnel have made corresponding adjustments to the main problems of technical application in the low water cut period, including increasing injection-production end cleaning, scale prevention and improving the separate injection effect, so as to make technical adjustments in the low water cut period and improve the oil production effect in the low water cut period.

(4) Adjustment of technical parameters in water-bearing echo period

Water-bearing echo period is also a very important production stage. During the application of weak alkali ASP flooding technology, it is found that the water recovery rate increases during oil production, which affects the actual oil production effect. Therefore, in the process of technical adjustment, reverse the profile and control the water recovery rate, so as to improve the water recovery efficiency.

4.2. Tracking adjustment of weak alkali ASP flooding technology

In the application process of weak alkali ASP flooding technology, necessary tracking adjustment should be made to promote the application effect of technology and maximize the oil exploitation effect. The following is an analysis of the effect of technology application in the process of weak alkali ASP flooding technology application, so as to complete the adjustment of technology application and maximize the reasonable control of weak alkali ASP flooding technology [2].

1. In the actual technical application process, in order to effectively prevent the problem of oil layer blockage in the technical application process, the method of gradually increasing viscosity is selected for technical adjustment to ensure the oil recovery effect. According to the statistics of technology application in SD oil area, after the application of compound flooding technology, it has carried out 1088 well adjustments in total, among which the times of well adjustment in four stages have reached 260, 150, 347 and 32 times respectively, which has improved the efficiency of technology application by 7% and played a very important role in secondary reservoir exploitation in SD oil area.

2. In the process of practical technology application, reasonable adjustment is also made for injection wells and production wells in the process of oil well exploitation. Table 1 below is the statistical table of oil well adjustment. Through good adjustment of injection wells and production wells, the production effect of oil wells is ensured to be higher, and at the same time, the application of weak alkali ASP flooding technology is ensured to be more efficient, and the production effect of oil wells is promoted to the greatest extent.

| Table 1. Statistical table of oil well adjustment of weak alkali ASP flooding technology |
|---------------------------------|-----------------|----------------|-----------------|-----------------|-----------------
| Development stage               | Injection well   | Production well | Total           |
|                                 | Divided note     | Profile control | Filling holes   | Unblocking Fracture | Fracture | Unblocking Filling holes |
| Ineffective period              | 0                | 0              | 18              | 0                | 0            | 0                | 20              | 44              |
| Water cut decline period        | 0                | 0              | 0               | 0                | 7            | 4                | 0               | 11              |
| Low water cut period            | 34               | 10             | 10              | 61               | 37           | 8                | 0               | 159             |
| Water cut recovery period       | 0                | 0              | 0               | 1                | 17           | 0                | 0               | 18              |
| Total                           | 34               | 10             | 18              | 10               | 74           | 85               | 8               | 20              | 232             |

In the exploitation process of the second-class oil layer in SD oil region, the combination flooding technology can improve the oil exploitation efficiency to the greatest extent, and in the actual application process of combination flooding technology, the combination flooding technology can be effectively exploited according to different oil layer exploitation stages, which can control the effect of technology application to a certain extent and ensure more efficient application of driving technology [3].
5. Conclusions
In the exploitation process of the second-class oil layer in SD oil region, the combination flooding technology can improve the oil exploitation efficiency to the greatest extent, and in the actual application process of combination flooding technology, the combination flooding technology can be effectively exploited according to different oil layer exploitation stages, which can control the effect of technology application to a certain extent and ensure more efficient application of driving technology [3].

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