Study of Fine Management Mode on Improving Potential Benefits of Measures

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Abstract. The oil field has entered the extra high water cut period, the oil well fracturing and oil increment have made great contributions to the fine tapping potential of water flooding. At the same time, the oil well fracturing and oil increment production has become an important part of the stable production of water flooding. Therefore, the fine oil well fracturing management mode and the improvement of oil well fracturing and oil increment effect are particularly important. Focus from the advance potential survey, the implementation of pre-pressure training; fine well selection and layer selection, optimize fracturing design ; strengthen process management, strengthen construction supervision ; do well after fracturing management, improve oil increment effect to fine oil well fracturing management mode. The comprehensive application of various technical means to continuously improve the accuracy of residual oil analysis is the basis to ensure the targeted fracturing measures; on the basis of the analysis of remaining oil, it is the prerequisite and necessary guarantee to improve the fracturing effect and prolong the effective period to do well in the pre-injection and post-injection recharge. The key to improve the fracturing effect of oil well is to combine the remaining oil potential and fracturing technology closely, design personalized scheme, refine the fracturing interval and expand the construction scale. Doing well in fracturing process management and refining each construction link is an effective guarantee to maximize the benefits of measures. On measures to tap potential, deepen potential research, optimize program design, give full play to the synergistic effect of measures, and strive to improve the pertinence of measures to tap potential in ultra-high water cut period, continuously improve the fracturing effect, improve the benefits of measures to tap potential, and achieve the goal of ' high efficiency, sustainable and guaranteed ' sustainable and stable production.

Keywords: Oil Well Fracture, Process Management, Potential Tapping Benefits.

1. Introduction

Fracturing, as an effective means of reservoir reconstruction and production increase, has been greatly developed both in supporting technology and application scale since the oilfield was put into development.
Especially in recent years, in the reservoir, the fracturing well selection criteria for different development blocks are studied and quantified. In the process, the matching fracturing technology suitable for different reservoirs and different residual oil types is developed, and the effective utilization of residual oil between layers and within layers is realized. When the oilfield enters the extra high water cut period, the oil production of oil well fracturing has become an important part of water drive stable production. Therefore, it is particularly important to refine the management mode of oil well fracturing and improve the oil production effect of oil well fracturing.

2. Main Practices

Facing these new challenges under the new situation, we should focus on the following aspects to fine oil well fracturing management mode:

2.1 Advance potential survey, pre-fracturing Culture

In the process of underground large-scale investigation, the layer by layer analysis was conducted to find out the well layer that may have fracturing potential. For the well layer that did not have fracturing conditions at that time, through the adjustment of injection-production structure, targeted pre-fracturing training was carried out, and the training situation was tracked and checked. The wells that did not have fracturing conditions were further cultivated, and the well scheme with fracturing conditions was prepared, so as to "mature batch, implement batch and cultivate batch ".

Establishment of a pool of potential measures. According to the potential size, well layer conditions and expected implementation effect, the measures potential classification standard is established, and the wells in the block are graded and evaluated according to the potential reservoir classification standard. The measure potential reservoir is maintained regularly to ensure that the number of measure potential wells remains at a certain scale.

The Culture of pre-fracturing. For the well group with imperfect injection-production system due to casing damage shut-in, the injection-production relationship of the well group is improved by means of water injection well overhaul and renewal ; for the wells with poor water absorption capacity of the target layer caused by interlayer interference of the surrounding wells, the water injection volume of the corresponding layer of the surrounding wells can be improved by adjusting the water injection scheme and increasing the injection volume of the corresponding layer. For thin and poor oil reservoirs and transition zone areas, due to poor reservoir physical properties, resulting in poor water injection efficiency of oil reservoirs, adjacent water injection wells can be fractured in advance to improve the permeability of the target layer ; for the oil wells with high water cut and high liquid volume, the interlayer contradiction is alleviated by controlling the main water breakthrough layer, water injection in the water direction, or blocking the liquid production in the high aquifer of the oil well.

2.2 Fine well and layer selection and optimization of fracturing design

With the continuous increase of comprehensive water cut in the block, the potential tapping objects continue to shift to thin and poor reservoirs. The original standard cannot meet the development needs and has poor applicability. It is necessary to explore new dynamic potential tapping standards.

The first is to break through the boundaries of water cut, change ideas, the whole well high water cut is not equal to the layers of high water cut, mining high water cut wells in low water cut reservoir remaining oil potential.

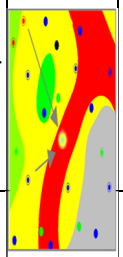
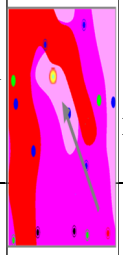
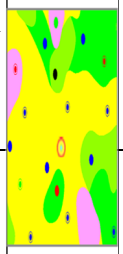
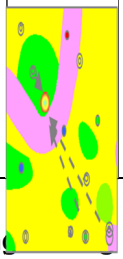
The second is to break through the thickness limit, do ' two combination ', weaken the thickness control, combined with the four types of monitoring data to optimize the vertical production difference horizon, combined with the four types of sand body morphology to optimize the plane low water content position.

Again is to break through the conventional fracturing design, according to the development of small layers in the fracturing layer, ' tailoring ', and ultimately determine the fracturing method, and finely quantify the amount of sand standard, increase the amount of sand per unit thickness, to ensure the fracturing effect laid a solid foundation.

Table 1. Optimization of vertical use difference layers based on four types of monitoring data.

	Three injection profiles		Three liquid production profiles		Logging Interpretation of New Well		Numerical simulation results		
Effective thickness	Water absorption times	Average relative water absorption	Number of liquid production	Average relative liquid production	flooding interpretation	water saturation	recovery percent of reserves	oil saturation	Layering Water
>1.0m	1time	<5%	1time	<15%	Unflooded	<40%	<40%	>50%	<90%
0.5~1.0m	≤2times	<10%	≤2times	<15%	Low flooding	<40%	<40%	>50%	<85%
0.2~0.4m	≤3times	<15%	≤3times	<10%	medium flooding	<40%	<40%	>50%	<80%
outside table layers	≥1time	<15%	≥1time	<10%	/	/	<40%	>50%	<80%

Table 2 Optimal Selection of Low Water Cut Area in Plane Combined with Four Types of Sand Body Morphology.

sandbody type	deposition diagram	Favorable distribution pattern	causes	Adjustment of well pattern
distributary channel sand		Narrow strip prominent parts or abandoned rivers	Well pattern cannot be controlled	basic well pattern
Main thin layer sand		strip or large area of lump Saddle or finger protruding parts	Vertical upper level interference Thin Injection Thick Mining on Plane	one encryption
Non-main thin sand		Banded Contact between lump distribution and main sand	Thick injection and thin mining area Interlayer interference	two encryption
outside table layers		Type II sandstone thickness greater than 2m Bridge with Interior Edge	Poor reservoir development There is a starting pressure gradient	three encryption

2.3 Strengthen process management and construction supervision

Strengthening the process management of measures is to strengthen the whole process management, that is, to pay attention to the whole process management of scheme design, team organization, operation construction, field supervision, tracking and evaluation. Firstly, it is necessary to clarify the working process and department responsibilities. Secondly, it is necessary to strengthen the supervision of the construction site. Finally, the responsibility is decomposed and the assessment objectives are formulated. In view of the actual situation of each block, the assessment objectives of measures to increase oil are formulated. In the quarterly or end-of-year performance appraisal, the effect of measures is taken as an assessment project, and the relevant responsible persons who fail to meet the standards are evaluated, and the corresponding rewards are given to the qualified personnel. The contribution rate of fracturing scheme and the compliance rate of oil increment effect of measures are mainly evaluated.

Well developed, can separate out of the layer, generally choose ordinary fracturing .

Large displacement fracturing is generally selected to increase fracture strength in thin and poor layers .

Multi - fracture fracturing is generally selected to increase the number of fractures by developing multiple thick layers in the surface .

Small Diameter Fracturing is preferred for casing wells with diameter more than 108 mm.

Table 3 Optimization of reservoir process parameters with different effective thickness

Effective thickness (m)	>1	0.5~1	0.2~0.5	0
Sand addition (m^3)	6~8	7~9	8~10	9~12
Displacement (m^3 / min)	2.4~2.8	2.6~3.0	2.8~3.2	3.0~3.5
Penetration ratio (%)	6~10	8~12	10~14	12~16

2.4 Do Well Post-fracturing Management and Improve Oil Increasing Effect

After oil well fracturing, it is not the termination of measures, but the start of production increase. The fracturing effect is finally reflected in the cumulative oil increase. Therefore, it is necessary to analyze the effect of production increase, the injection-production status and dynamic change of the well area, and take corresponding measures in time to extend the effective oil increase period.

For some wells with poor effect, we should carefully analyze the reasons, strengthen data acquisition and dynamic monitoring, and formulate targeted control measures

Table 4. Main means of tracking protection measures.

types	case analysis	governance ideas	main method
Low submergence depth, small liquid increase	insufficient for liquid	Strengthening fluid supply	measures to increase water injection
High submergence depth, small liquid increase	small Parameter	amplifying parameters	Adjusting parameters and changing pumps
High liquid increment and high water content	High aquifers	Water content control	water plugging of oil well

3. Some understandings

3.1 The quantitative standard of fracturing well selection can only play an auxiliary role, the real measures of well selection, or to rely on rich dynamic experience, which requires the design personnel to have a solid basic skills.
3.2 With the continuous increase of comprehensive water cut in oilfield, the remaining oil potential is continuously transferred to thin and poor reservoirs. The water cut limit and thickness limit should also be continuously broken through in the selection of fracturing wells and layers. The low aquifer should be found in high water-cut wells, the low water-bearing sand body should be found in high aquifer, and the low producing position should be found in high water-bearing sand body.
3.3 Based on the analysis of remaining oil, it is a prerequisite and necessary guarantee to improve the fracturing effect and extend the effective period to do well in the pre-injection training and post-injection supply.
3.4 Do a good job in the whole process of fracturing management, fine each construction link, is the effective guarantee to maximize the benefits of measures.

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