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Analysis Of Distribution And Effection Of Oil-Water

Yue Fei
(1. College of Geosciences, Northeast Petroleum University, Daqing, Heilongjiang 163318 China)
136559496@qq.com

Abstract:- *Distribution of X oil field is complex in Chaoyanggou anticline, by using of two-divided and one-combination methods, analysis the oil-water distribution regularity with subdividing layer in vertical direction and subdividing fault block in horizontal direction, joining with structure map and sediment facies map. The result shows that the distribution of oil-water can be recognized as three kinds. First kind is that oil and water are existent in same layer and same fault block, the oil is higher than water. This is normal oil-water distribution as structural reservoir. Second kind is that water is higher than oil in different fault block in same layer. Third kind is that water is higher than oil in same fault block in same layer. Under studying, the fault and sediment facies and source rock are three key elements which effect the complex distribution of oil-water. The distribution result is used to new well drilling; the pay-layer--encountered rate is become higher than old one's, this application get good result.*

Key words: *distribution of oil-water, fault, sediment facies, source rock*

I. INTRODUCTION

Chaoyanggou oilfield construction is located on the northern Songliao Basin，where northwest is Sanzhao depression and Wangfu Depression is at southeast direction, mainly by Chaoyanggou anticline, Fanshentun anticline, Bohetai nose structure and other components construct. X well region is located in Chaoyanggou anticline south wing area , developing north west - south trending normal faults, the overall presentation northwest high, southeast low tectonic pattern.[1~3] The block began in 1989 to develop, block air permeability $5.2 \times 10^{-3}\mu m^2$, large underground oil viscosity 14.1mPa.s, ground oil viscosity, to 42.48mPa.s. Complex water distribution area, result in a significant impact on development and production. Therefore, analysis of the distribution of water distribution area guide further development of the oil field has important significance.

II. REGIONAL CONTEXT

The area along with the occurrence and development of the basin, has undergone preliminary heat arch fracture, rift phase, fault sag, depression and atrophy of pleated periods and a number of evolutionary stage .Though Jingyingcheng stage weak inversion, Nenjiang late reversal and Mingshui late reversal strong inversion three major reversal of tectonic movement, the area is constructed in the late Ming strong inversion of form and stereotypes.

Top-down development in the study area are mainly developed three sets of oil-bearing layers, Putaohua reservoir, Stratigraphic thickness of 30.0 ~ 34.0m;Quan three sections, the upper ~ Fuyu oil formation and Yangdachengzi reservoir, the total thickness of the formation 330.0 ~ 450.0 and the main oil is Fuyu oil.

As can be seen from Figure 1, the Fuyu oil layer at an altitude of 730 m to 1080 m water and oil layer coexist, and theoretical understanding of petroleum geology of the gas, oil, water and gas distribution of water is inconsistent. Vertically divided sandstone group, the group had 8 each sandstone layer of water on the whole formation from the upper to the lower layer formation water ratio increasing trend (Table 1). On the plane, the structure of the northwest, southeast of mono-clinic structure, in Chaoyanggou anticline zone south wing, there is a well in the middle (blue Wells) to the water layer, the south of the well (structurally low area), the north (structural high) wells (red wells) are the reservoir (Figure 2). Complex water distribution, making the part of the region new completed the drilling of oil drilling is low, the low yield of new wells, the production of a greater impact.

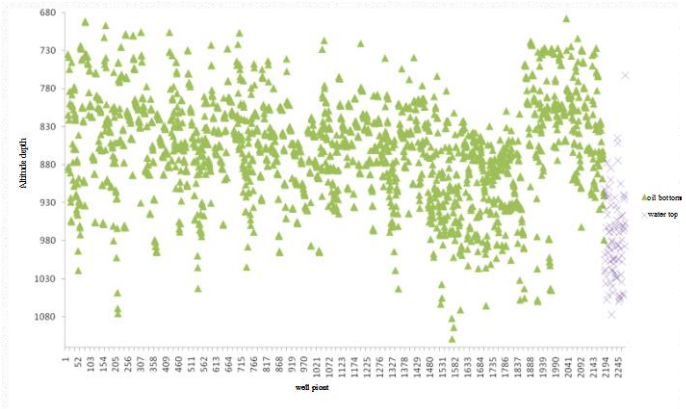

Figure 1 Fuyu reservoir water distribution scatter-plot

Table1 List of oil and water layer thickness distribution of the sandstone group

Sandstone	accumulated reservoir thickness,m	accumulated water layer thickness,m	oil layer ratio, %	water layer ratio, %
Fu first top	394.9	2.6	99.3	0.7
Fu first Middle	523.9	10.2	98.1	1.9
Fu first bottom	698.9	24.4	96.6	3.4
Fu second top	695.6	24.0	96.7	3.3
Fu second bottom	298.8	36.5	89.1	10.9
Fu third top	85.0	49.4	63.2	36.8
Fu third Middle	156.6	33.6	82.3	17.7
Fu third bottom	29.4	17.8	62.3	37.7

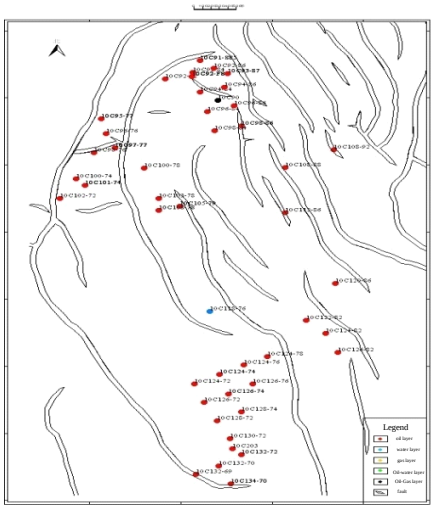

Figure 2 F131 small layer of oil and water plane distribution

III. OIL AND WATER DISTRIBUTION

From construction trend, combining oil and water layer logging interpretation results, the distribution of oil and water in the study area were analyzed.

A single-well water distribution Figure 3 shows that the presence of vertical single well on the whole oil, oil on the water, water around the oil three cases. Vertically sands region is relatively low, the thickness of sandstone from the development point of view is relatively thin layer between sandstone has a large set of mud.

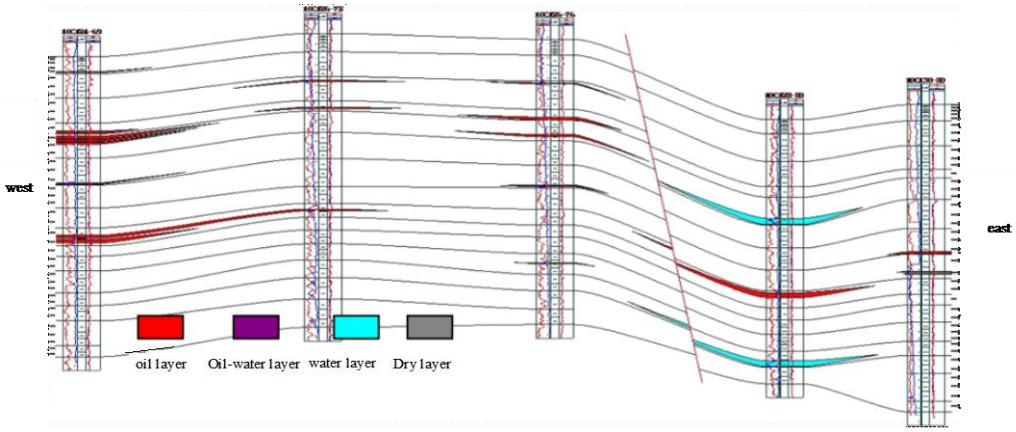

Figure 3 East - West sectional view of the reservoir

B Distribution of the small layer plane

according to the development of the situation the fault, the plane is divided block, to the plane of the same block are small layers of different statistical analysis is divided into three types (Table 2). Class Ⅰ, within the same block, while the development of oil and water layer, showing the distribution of high water low oil, typical reservoir structure, there is no contradiction between water distribution, most of the block of this type; type Ⅱ, the same a small layer of water between different block high oil bottom water layer alone in a block, the fault will be separated from the water layer with other oil; class Ⅲ, within the same block, while the development of oil and water layer, water exhibits high oil pan distribution, water distribution and theoretical contradictions.

Table 2 different types of small layer of oil and water distribution list

Layer number	type	Layer number	type	Layer number	type
F111	Ⅰ	F162	Ⅰ和Ⅱ	F312	Ⅰ和Ⅲ
F112	Ⅰ	F163	Ⅰ和Ⅱ	F321	Ⅰ
F113	Ⅰ	F171	Ⅰ和Ⅲ	F322	Ⅰ和Ⅲ
F114	Ⅰ	F172	Ⅲ	F331	Ⅰ
F115	Ⅰ	F173	Ⅲ	F332	Ⅰ
F121	Ⅰ	F211	Ⅳ和Ⅲ	F333	Ⅰ
F122	Ⅰ	F212	Ⅱ	F341	Ⅰ
F123	Ⅱ	F221	Ⅱ	F342	Ⅰ
F131	Ⅲ	F222	Ⅰ	F343	Ⅰ
F132	Ⅱ	F23	Ⅱ	F351	Ⅰ
F133	Ⅱ	F241	Ⅱ	F352	Ⅱ
F14	Ⅱ	F242	Ⅰ和Ⅱ	F353	Ⅱ
F151	Ⅰ	F251	Ⅲ	F354	Ⅲ
F152	Ⅱ	F252	Ⅰ和Ⅱ	F355	Ⅱ
F153	Ⅰ	F253	Ⅲ	F356	Ⅰ
F161	Ⅱ	F311	Ⅰ	/	/

IV. CAUSE ANALYSIS

A Fault

Although the area Fuyu fluvial strata formations, but the lower strata of the ratio of sand and mud, most formation of sand and mud ratio is less than 0.5, the lowest of 0.07, far below the average ratio of sand and mud fault sealing oil and gas; target layer is shallow (depth of burial less than 1100 m), large plastic, in the latter part of the transformation process is easy to tectonic movements tend to form closed lateral shelter closed. Meanwhile, the water-block complex formation water, some block of $NaHCO_3$ type, some block of $CaCl_2$ type, but also the presence of Na_2SO_4 type and $MgCl_2$ type, distribution changes rapidly, salinity difference from a few thousand to tens of thousands larger, but also that the fault between different block is closed. Controlled by

faults on water distribution between different faults exhibit different water distribution (Figure 3).Type Ⅱ water distribution is formed under the influence of faults

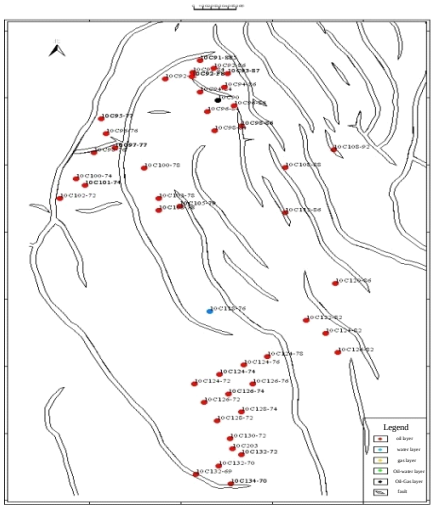

Figure4 F161 small layer of oil and water distribution

B sedimentary facies

The area experienced a feed product - Fast forward product - stable retrograding - fast retrograding the filling process, the sedimentary environment has also experienced a shallow lake - delta - fluvial - delta - shallow lake shore evolution phase. The study area is mainly affected by the impact of Southwest provenance, the reservoirs main river, the non-subject channel, crevasse splay micro facies of sand-based. From fig5, it can be seen that Well Point in the water in the southwest - the North East to extend the non-main river, south, north stable distribution floodplain mud to form a relatively closed region, and the southern and northern oil wells isolation layers; the northern part of the southern oil-containing bits They are in the same river, and would therefore be subject to the sedimentary layers water distribution controlled by micro facies. Statistics show that 69.3% of the oil located in the main channel sand, followed by non-subject matter better channel sand; the water layer mainly in the crevasse splay and poor material non-subjective river sand. Class Ⅲ water distribution main formed under the influence of sedimentary facies. This water distribution is essentially controlled by sedimentary microfacies, mainly due to large differences between different micro-phase material, hydrocarbon accumulation lead to large differences in the degree of difficulty; of which the main channel microfacies was better, for the quality of the reservoir, and the fault together creating a better fault - lithologic traps, hydrocarbon migration process easier in such traps aggregate formation reservoir; relatively speaking, the main river of non-physical medium, crevasse splay was the worst, hydrocarbon accumulation of the difficulty is relatively large, so this type of fault - lithologic traps in the water layer based.

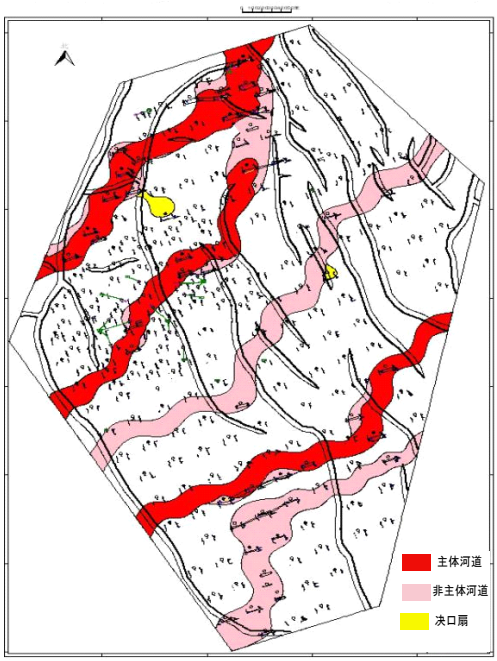

Figure 5 F131 small layer deposition microfacies Figure

C Oil supply source

Oil and gas in the study area mainly from the northern Songliao Basin Hydrocarbon Sanzhao recessed area CHAOYANGGOU anticline zone is located in southeastern Sanzhao depression, study area is located south of CHAOYANGGOU anticline, farther from the source rocks; the Sanzhao Depression hydrocarbon source rocks in a limited number of expulsion, through intensive fracture zone as the dominant migration path to move long distance transport of oil and gas CHAOYANGGOU fewer anticline belt, which determines the anticline belt south of smaller oil and gas accumulation , which is close to the source rocks in the northwestern region of high abundance of hydrocarbon accumulation, hydrocarbon source rock area away from the causes of low abundance of oil.

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V. EFFECTS APPLIED

The above analysis shows that the area of oil and gas mainly in the structural high, high-quality reservoir, on the basis of clear distribution of the oil and gas and influencing factors, fine production structure Figure, a small layer of sedimentary facies Figure by Figure Layering Two member, preferably a block of structural highs, the main river channel overlap region[4~7], the deployment of a new well log interpretation results aqueous layer is developed in the southeastern block showed southeastern block oil drilling rate from an average of 65.4% lift 78.6%, and achieved good results.

VI. CONCLUSION

1) The water distribution in the study area is divided into three categories, the first category is a typical high oil and low water distribution, and the second category is high water low oil among different block, mainly caused by the fault sealing segmentation; s three are in the same block water high oil bottom layer which is mainly caused by the different facies;

2) application of water distribution, the deployment of new wells in the southeast, so that oil drilling rate increased 13 percentage points, to achieve better application results.

REFERENCES

[1]. Rong Zhao, Shujiu Qi . Chaoyanggou oilfield Fuyu reservoir oil source and migration path simulation [J]. Science Technology and Engineering, 2011,11 (8): 1776 - 1779.

[2]. Yanping Guo. Chaochang regional Fuyang reservoir hydrocarbon accumulation pattern and controlling factors [J]. Oil and Gas Technology, 2010,32 (5): 171 - 174.

[3]. Zhaonian Chen, Yongzhuo Wang ,Xiaomin Wang . Chaochang area Songliao Basin Fuyu oil hydrocarbon migration patterns [J]. Block oil and gas fields, 2009,16 (6): 22-25. [4] Yin Daiyin, Zhang Qiang. Chaoyanggou oilfield block 55 toward infill study [J]. Block oil and gas fields, 2009,16 (2): 70-72.

[4]. Yongli He , Yanpeng Shang,Lijun Wang. Match reasonable relationship haoyanggou Oilfield net and sand body [J]. Daqing Petroleum Institute, 2010,34 (2): 68 to 70.
[5]. Zhengchen Li ,Shumin Zhong ,Yongjun Yang. Chaochang area Fuyu oil reservoir classification and productivity prediction [J]. Progress in Geophysics, 2013,28 (5): 2561 - 2564.
[6]. Lei Zhang,Shuangfang Lu,Weiming Wang. Fuyu Chaoyanggou Terrace, Songliao Basin - Yangdachengzi reservoir oil source and migration pattern analysis [J]. Geoscience, 2009,39 (2): 560 to 570