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# Factors of oil and water distribution analysis of Pubei oilfield

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***Abstract: -*** Through the analysis of sedimentary microfacies, sand-body distribution, structural and fault, and the impact of oil-water distribution of the study area, we think the study area's oil-water distribution regularity is controlled by the fault-sand disposition relationship of regional tectonic. Tectonic block controls the oil enrichment degree and the oil-water envelopment. Oil horizontal distribution is controlled by the fault of WWE and WEE. The well controlled by sand body high angled with fault has best oil production test conclusion.

***Keywords: -*** *Pubei oilfield; Sedimentary microfacies; Oil-water distribution; Controlling factor*

## I. INTRODUCTION

For oil and gas accumulation in the study area and the distribution of oil and water on the factors of system is based on careful division of tectonic units, tectonic characteristics analysis and the analysis of the sedimentary reservoir characteristics[1-3]. The accumulation is also combined with reservoir analysis and the distribution of oil and water.

## II. THE ORIENTATIONAL DISTRIBUTION OF THE OIL AND THE WATER

From the oil water zone can be found on the corresponding relationship between reservoir section that the orientational distribution of tectonic belt controls it of the oli and water. The control effect of tectonic zonation and oil-water relationship is obvious[4]. In the study area, the mainly factor of control is structure,Constructed mainly reflected a relatively high portion of pure oil-based, contrary to aqueous layers with the main. As can be seen from the comparison of oil production and water production of the test wells, oil and water distribution was a significant zonation and seriously controlled by tectonic action. The maximum daily oil production appears in west Tainan belt. From the pure oil belt in North Putaohua oil-rich belt to West Tainan belt, average oil production present reduce then rise again. The maximum of daily production of water present in the lower part of water belt, and the average water production in that area present rise and reduce again(Fig.1). It can be found form the comparison of well production that high oil production wells is mainly distribute in North Putaohua oil-rich belt(94%), medium distribute in transition zone(53%)and less distribute in West Tainan belt(18%). The distribution of low production oil Wells in contrast.

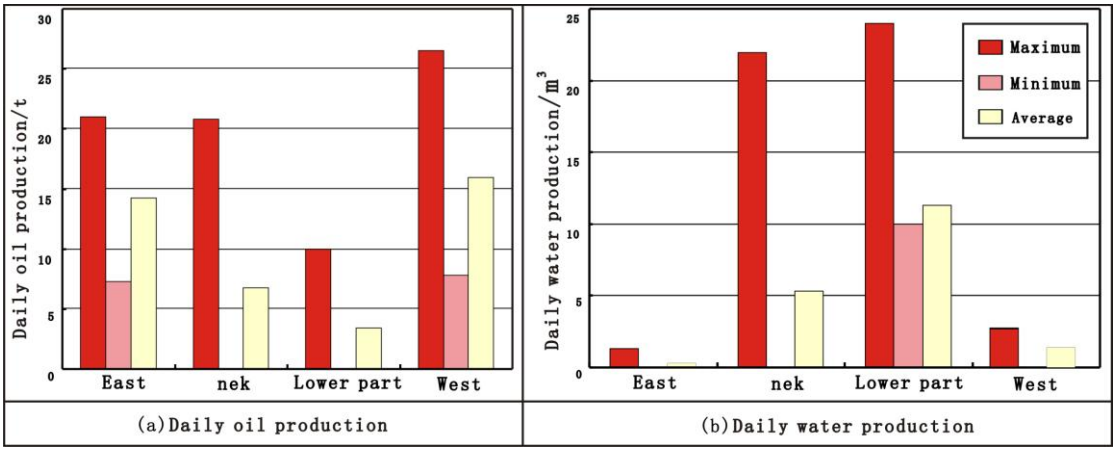


Fig.1 The daily oil production and the daily water production

A typical comment from the probe can be seen in the distribution of oil and water wells that oil reservoir mainly distribute in North Putaohua belt and West Tainan belt. Oil and water layers coexist in transition region and the relationship between oil and water is the most complex. The lower portion of the water district is primarily water reservoir layer. North Putaohua oil belt is located in the high parts of the structure with a low dip. It has a easy conditions for oil and gas retention, so the turning is a pure oil zone and mainly controlled by

tectonic. Dip the value of a wide range of changes in the transition zone area, coexistence with oil reservoir and water reservoirs. From a macro dip contrast to the situation with the oil test statistics showed that test oil reservoir for the well point corresponding to the relatively more moderate dip, test oil wells point of the water layer corresponding to relatively steep dip, suggesting that slow dip easily formed oil and gas retention, on the contrary easy dip steeper hydrocarbon migration. So that the underlying fault or inverter traction flexing deformation results in the underlying inclination becomes smaller, then forming a composite stranded favorable for hydrocarbon traps. Therefore, the transition zone more affected by oil and gas-rich structure, fault and lithologic composite reservoir-based control(Fig.2). The lower portion of the main regional water reservoir, reservoir conditions are relatively slow wing requirements are higher, in order to control the position of lithology, followed by the construction, fault complex control reservoir.

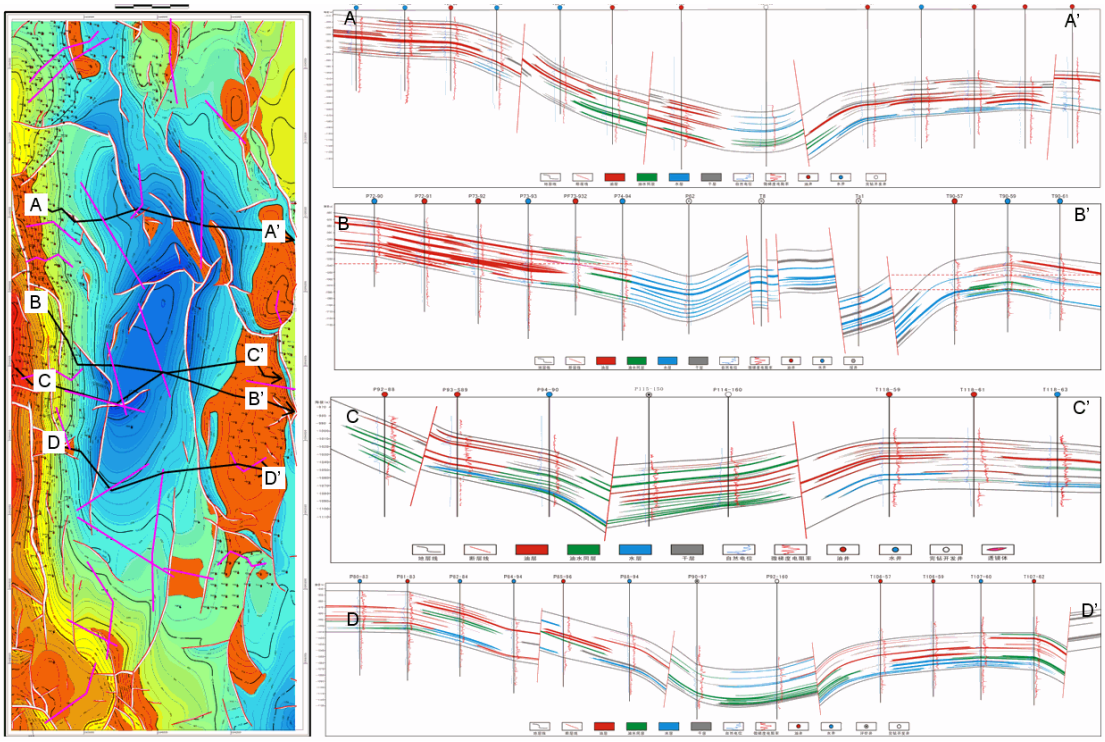


Fig.2 Corresponding relation between oil water zone and reservoir profile

## III. IMPACT ON THE CONSTRUCTION OF OIL-WATER INTERFACE BLOCK

Faults developmental control the feature of tectonic units in the study area, while controlling the formation of traps. Regularity fault developed in the eastern part of Pubei Oilfield[5-7]. The mainly developed was NNW faults, the rest was NNE. According to the distribution of the oil-rich eastern and western division is divided into 10 cells, statistics oil and water interface of each block and tabulated, it can find that there is no consistent macro oil and water interface, different blocks holds different oil-water interface. The maximum height of the water in south is lower than the lowest depth of oil in north , and from the east wing to the west, oil and water interface as a whole is reduced. One of the most bottom depth in T190 block oil and water interface surface oil is -1079m, the top of the depth of water is -1085m. While in T70-31 block, the oil and water interface surface oil is -1077m and the top of the depth of water is -1082m. In P128 block, the oil and water interface surface oil is -1044m and the top of the depth of water is -1053m. In P157 block, the oil and water interface surface oil is -1007m and the top of the depth of water is -1012m. In P88-93 block, the oil and water interface surface oil is -1045m and the top of the depth of water is -1050m. In T191 block, the oil and water interface surface oil is -1020m and the top of the depth of water is -1030m. In T232 block, the oil and water interface surface oil is -1046m and the top of the depth of water is -1052m. In T130-62 block, the oil and water interface surface oil is -1038m and the top of the depth of water is -1044m(Fig.3). On the macro level, the fault plane of the oil and water distribution division has a certain effect, result in different oil and water interface divided in different fault blocks.

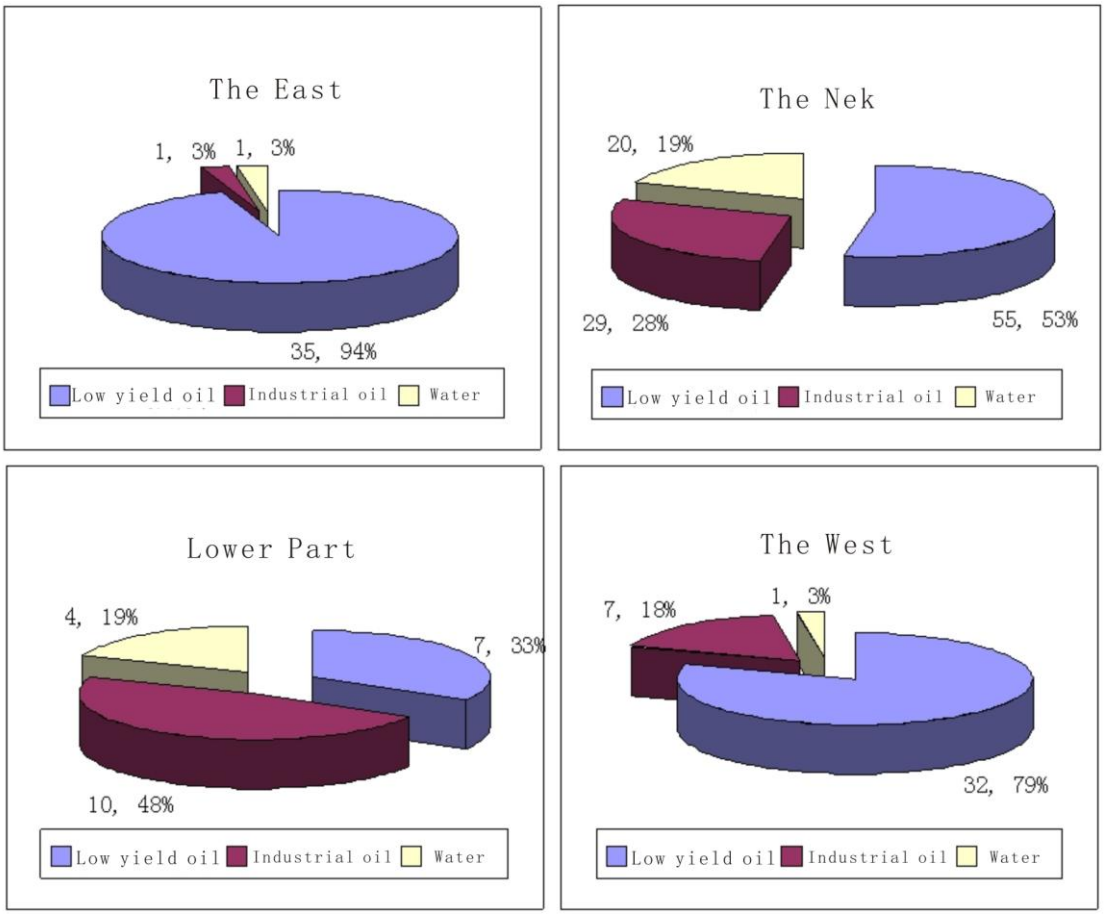


Fig.3 Different proportion of oil well

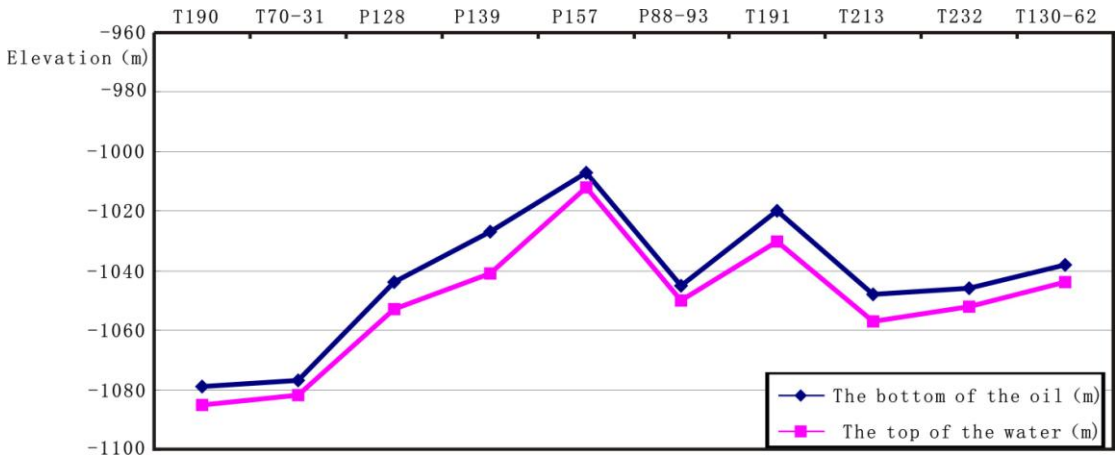


Fig.4 Distribution of oil-water interface in Pubei Oilfield

The above content shows that in dense well network area, different configuration of the block presents different oil and water interface. This is mainly impact was the underlying fault segmentation, so the trail around the strike of the fault, the fault inside the increase in search volume, and look for the deployment of high oil production target to guide the development of external expansion area oil deposits have the potential to guide role(Fig.4).

## IV. CONTROL OF MATCHING RELATIONSHIP OF FAULTS AND SANDBODIES OF WATER DISTRIBUTION

Oil and gas migration and accumulation is the key and core of hydrocarbon accumulation. Current research suggests that oil and gas migration conducting channel is mainly fault, sand body and unconformable

surface, oil and gas along the vertical fracture after conducting only into its effective matching on both sides of the sand body to form a reservoir[8]. So how to match the fracture and sand body is the key to form a reservoir. In this study, it was found by plotting the phase diagram of sedimentary micro combined oil testing conclusion, the way that faults and sand body matches is the main control factors in the study area, which affected oil well test NNE trending faults and Control NEE conclusions better.For example, inPU-434,PU124-150,PU128-158,PU47 , the sand trend in these wells intersect the trend of the fault at a high angle of intersection. Well PU-434 and PU128-158 was blocked by fault then formed fault - lithologic reservoir; Well PU47 was controlled by two NNE trending faults then formed fault trap reservoir. Equally affected by the fault of the NNE, well PU115-150 and well PU90-97 holds a low production due to the mismatch pf fault and sand body. Well PU-62 and well TAI-202 presents loe oil production due to the control of NNW trends fault and NWW trends fault(Fig.5). Well PU-62 cannot form an effective trap and sand off the mismatch causes this well only produced water while well TAI-202 holds a low oil production due to the mismatch of fault and sand body. It can be concluded, Oil flat distribution is mainly affected by north-east and north-east trending faults control, when the sand and high-angle faults intersect, oil test present the best conclusion.

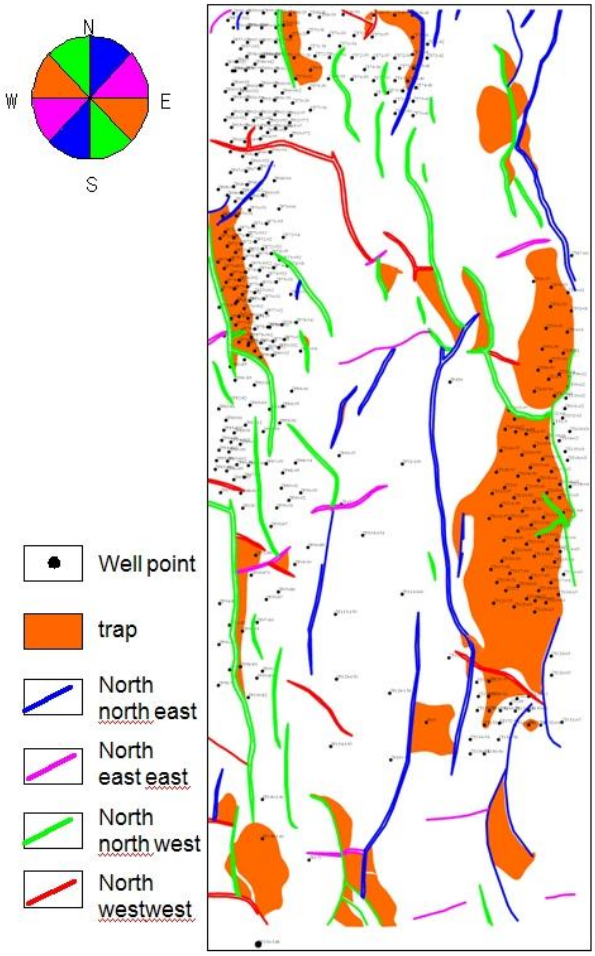


Fig.5 Distribution of Pubei oilfield fault strike

## V. CONTROL OF SEDIMENTARY MICROPHASE TO OIL AND WATER DISTRIBUTION

Deposition mode of Pubei Oilfield Pu Ⅰ oil formation is Delta front underwater distributary channel, it has repeatedly gyratory characteristics, there are five microfacies include body underwater distributary channel, underwater distributary shallow river, between the main sheet sand, non-body sheet sand and mud shunt. Due to the northern source control, deposited sand from north to south were banded distribution, while the PUI Ⅰ oil group was sandstone and mudstone based. Powder white sand is mainly sand body and porosity and permeability is better, oil sand deposits are mainly distributed in the water channel sand body.

Causes for sandstone reservoir sedimentary sand body of oil content has certain control function. Pubei Oilfield has a variety of sedimentary genetic types of sandbodies, mainly include sand sheet channel, main body and thin layer of sand sheet(Fig.6). Because of the different genetic types, its oil content exist a certain differences. 1131 m TAI225 Wells, for example, as the main body of a typical channel deposit, the lithologic body presents a reservoir, with good lubricity. 1161m of TAI72-42 Wells is a typical thin layer of sand sheet sedimentary, which is a water layer with bad oil content.

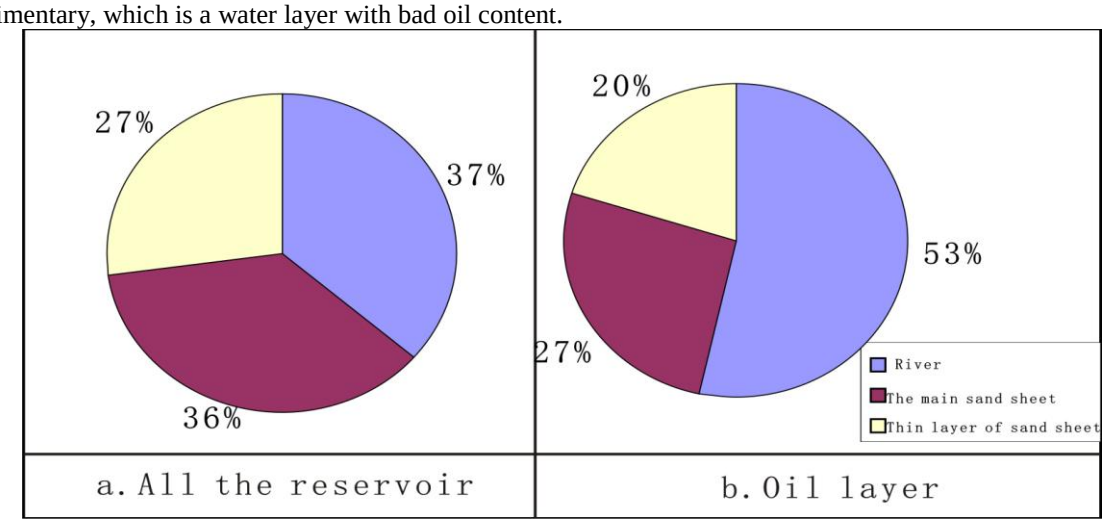


Fig.6 Different types of microfacies evaluation of well testing results

## VI. CONTROL OF SEDIMENTARY MICROPHASE TO OIL AND WATER DISTRIBUTION

Through the analysis of the study area try oil-bit analysis found that each microfacies of Putaohua formation has the same development, but its main oil sands deposits is river sand(53%), followed by the main sheet sand(27%). It shows the relationship between the distribution of sedimentary microfacies and the oil and water. Oil-bearing of channel sand body was better than any other micro-phase oil-bearing sand bodies. From micro sedimentary facies in the study area, river channel sand body is deposited body, channel deposit sandstones is quality reservoir of Putaohua formation.

## VII. ACKNOWLEDGEMENTS

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