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The utilizition of fault in controlling petroleum entrapment on the slope tectonic zone

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Abstract: Fault is a sigificant factor in oil-gas migration and petroleum entrapment.For instants,Pu-Group Weixing-field, Daqing.Fault has undertaken four aspects in controling,First of all, fault and oil resources expelling hydrocarbon at the same corresponding period,which in favor of primary migration of oil and reservoir forming.Second,the massive fault of cut-through source rock benefits the oil migration and reservoir forming.Third,different-oriented fault has different impact affect.Finally,provided well condition for oil-gas storage if fault and watercourse sand-body matching each other quit well.On the basis of these four controlling actions,we could prospect the favorable block in the research area,It had been verificated by well-spacing experiment, and the result we have got is fantastic.

Keywords: *fault,petroleum entrapment,slope tectonic zone,master control affect,Weixing field*

I. INTRODUCTION

Source-bed,oil-reservoir,caprock,migration,entrapment,safeguard,and such many valid configuration parameters are the significant condtion for oil-trap formation.oil field of Weixing is in the north of SongLiao basin,which belongs to Pu-Group while overflowed with deposit ,besides,full of production each well .It was the most reserve abundance and highest well yield field expect Changyuan,Daqing.That is based on the inclined direction of block is just around a bigger source-bed centre called SanZhao depression,that depression continously generated oil and provided it to the block nearby since the terminal period of Nenjiang-Group. The main north-south trend fault zone that generated at the same period with SanZhao depression provided powerful channel for oil gas vertial movement under float,from Qingshankou source rock.Neverthless the fault astrict oil gas crossrange migrate in some degree,so the oil prensented as charginglessness mode ,then performed as complicated Oil-Water distribution. In that case,the properties of fault make a significant role in reservoir forming of oil-gas field .with the analysis of intensive wells,combined with concret fault charicteristics,as well as researching the utilize of fault in Weixing Pu-Group field systematically, so much meaningful goals will be attained for exploiting capacity enhancing.

II. THE SYNCHRONISM BETWEEN FAULT ZONE FORMATION AND EPELLING HYDROCARBON PROCESS

 Weixing is a region located in north-west of SanZhao depression, experienced 4 mian tectonic movement during the Yaojia-Group front deposition to Nenjiang-Group last deposition,The formation movement decided the charicteristics of formation of Weixing.The first movement is Yaojia-Group front deposition.basement tuber is the reason why it was mainly on the centre-rumble strip of acient peirod.The second movement is Yaojia-Group early diposition,at that time acient centre-rumble strip began to broke up ,the terrace of Chaoyanggou-Changchunling in the southeast began to rise.The third movement is in Nenjiang-Group deposition period, ancient centre-rumble strip broke up constantly with the proccesing of sedimentation,east and west ancient depression connected,after that central depression generated.The fourth movement is the terminal

deposition of Nenjiang-Group,in terms of Songliao basin has torsional stress impacted from north-west to south-east.With the broke up of ancient centre-rumble strip and the development of Changyuan as well as Chaochang-terrace risen,Weixing build up high-west and low-east structural framework.At the same time,since intimate south-north-breakage incision ,the moat was interphased, then presented as north-south stripe distribution.

 The internal dipsition of Nenjiang-Group is Sanzhao-depression Qingshankou-Group hydrocarbon source rocks ,expelling mass hydrocarbon,which is the main oil source region,attached to Daqing.Weixing-field located at the slope of changyuan,taipingtun,Daqing,construction towards Sanzhao-depression,it is the connecting parts of Sanzhao-depression and Changheng,Daqing.Oil generated from Qingshankou-Group stratum migratied along with it fault zone to Pu-Group oil-rock rely on float.meanwhile,Sanzhao unboiled sunk oil and gas laterly migrated along the intacted single-ramp towards Changyuan Daqing which is in the west.It will store oil when facing blocked hinder on the way to Weixing.So the synchronism between fault and reservoir forming is in favour of primary migration and accumulation,which is happened in Pu-Group.Weixing feild.

III. THE SCALE OF FAULT DEVELOPMENT

The most affective factor is these fault-group at the depth of layer(connected with Qingshankou-Group an Pu-Group),furthermore,it is a massive fault-group which extended to the subject reservoir forming region of Sanzhao,on the utilizition of fault explation seismic data ,picked up this scale of fault in the picture ahead of Pu,Weixing-field structural map.(Fig.1)In the period of primary deposition of Nenjiang-group ,the whole region sinked stabilized,neverthless in the last phase of deposition,As the torsional stress exerted from north-west to south-east on Songliao-basin, A structural framework that high-west and low-east gradually grow up in Weixing ragion, in the meanwhile, the acient-centre-rumble strip broke up while Changyuan,Daqing as well as Chaochang-terrace rose . Abundant of reservation was concentrated upon two sides of massive cracked or just near the inclined region.(Fig.2),The case account for the massive fault play a siginficant role in petroleum entrapment on this field.

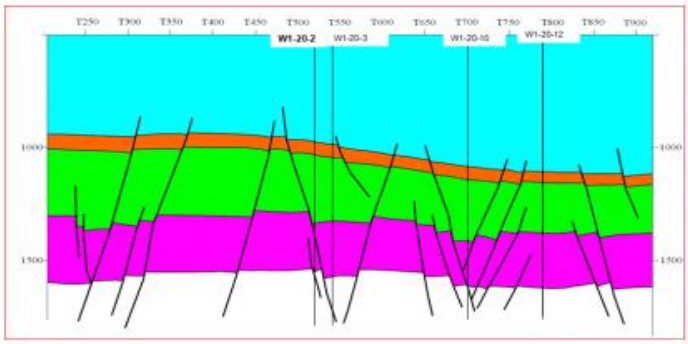

Fig.1 Putaohua formation of Weixing stratum and the development of construction

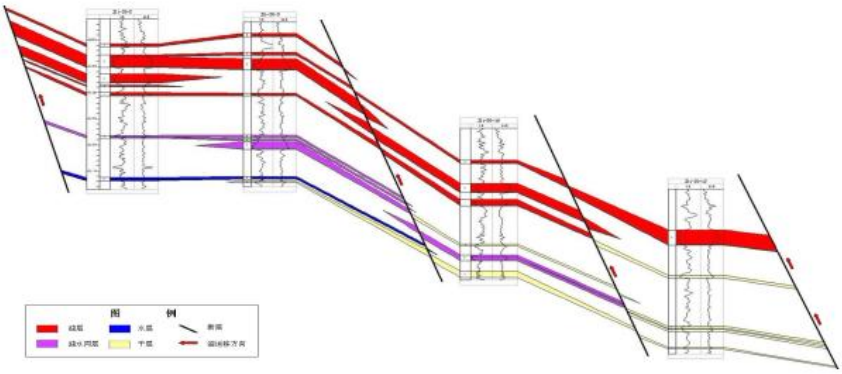

Fig.2 The effect of oil-gas vertical migration accumulation that in Weixing field large-scaled faults

IV. THE DEVELOPED DIRECTIONALITY OF FAULTS

Putaohua oil zones in Weixing oilfield are mainly developed the NS, NE and NNW faults, and a small amount of nearly EW faults discovered in the northeast in the study area.The effects of faults caused many fault blocks developed based on the background of low lying west to east's monocline on this area in general, and complicated the structures.Research suggests that the faults have different directions will cause a significantly different impact on accumulation: Only the faults which have obvious NS component can favor oil moving from Sanzhao hydrocarbon generating subject area to Weixing oilfield, and accumulated, such as the nearly NS, NE and NNW faults.; the nearly EW faults which lack of NS component will block the migration of oil towards its north and accumulation.There exist nearly EW faults in the northeast of the area, that is the primary reason of the oil content of the sand body development by the north of the faults is generally poor. Well #1* located in the north of a ES fault zone(figure 3), this well developed three sand bodies, Pu I_4, Pu I_7 and Pu I_9, the sand thickness, resistivity, water saturation and reservoir fluid properties of the sand bodies are shown in table 1.Table 1 shows that the three formations of this well developed very well, and all of them are water, declared that the nearly ES faults have a blocked effect on oil's migration.

Table1 The statistic table of well #1*'s developed sand bodies' logging message

Sand body No.	Thickness of sand（m）	Deep lateral（Ω m）	porosity（%）	Water saturation（%）	Fluid properties of reservoir
Pu I_4	2.8	11.4	20.3	97.5	water
Pu I_7	4	13.2	23.6	88.4	water
Pu I_9	3.8	14.9	21.5	91.6	water

V. WELL MATCHING BETWEEN FAULT AND WATERCURSE SAND

Putaohua oil zones in Weixing oilfield are sedimentation in north part, reservoir stretch in strips from north to sourth in coordinates with the main direction which the fault develops.The research figures out that watercourse sand was developed around the fault, analysis shows that the aspect to the watercourse of the fault developed successively in YI group sedimentation, thus reflect the scaled watercourse formed in YI group sedimentation, lithofacies transition zones in the edge has induction function to the faults generated in end of Nenjiang group sedimentation. The realization contributes to guiding the practice to search for the developed reservoir zones around the scaled faults.

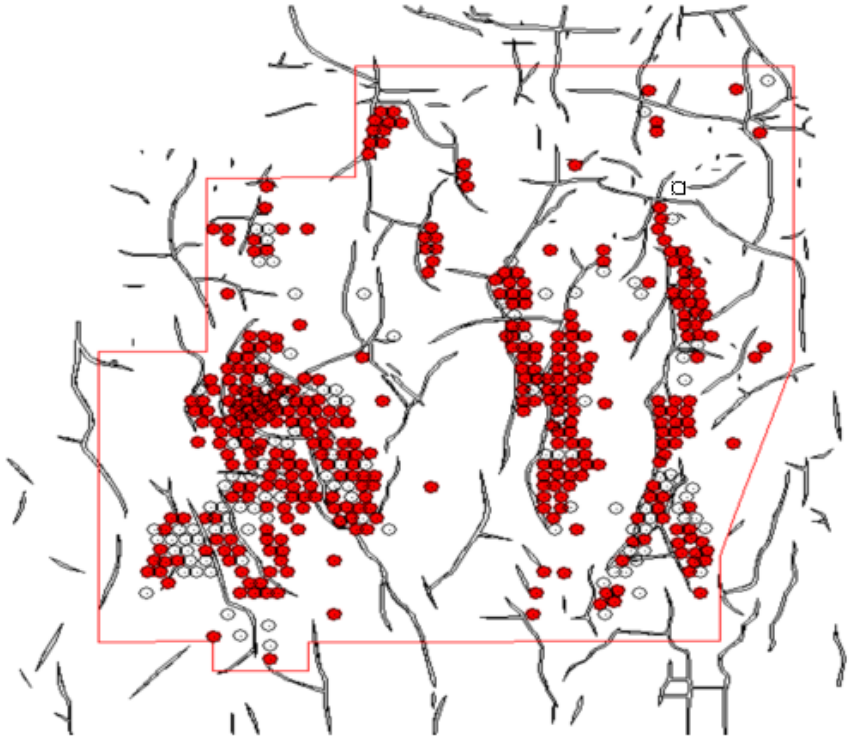

Figure 3 coincidence graph of watercourse and faults

Legend: ●wells with watercourse ○wells without watercourse ○well #1

VI. CONCLUSION

(1)According to the different oil deposit units of oil field which divided by the large-scale faults, Weixing oil field finish a wide range of "regional evaluation" stage which is carried out in exploration and development period, and start "zone evaluation" stage which is looking for small structures and lithologic reservoir, which is contributes to studying and summarizing the characteristics of oil and water distribution and accumulation pattern by treat zone as an unit.

(2)The scales and extending direction of fault development, make an practical meaning to improving the tracking and evaluation accuracy of sand bodies by treat watercourse as an unit.

Weixing oilfield Putaohua oil zones' watercourse have a limited width at EW, in the same fault zone, tracking and evaluating the sand body by treating watercourse as "framework", which can improve the precision of comparison and evaluation of the sand body.

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