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# Daliuquan-Hexiwu structural oil and gas migration model and migration characteristics of the plane

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**Abstract:** in order to Daliuquan-Hexiwu structural oil and gas migration process, through comprehensive analysis of geological factors, determine the distribution of oil source faults, cover thickness limit, lower limit of oil and gas filling. Thus precondition of oil and gas in different ways migration were summarized in this paper. The results show that the study area, there are two kinds of oil and gas migration model: (1) Oil and gas migrated vertically along faults, meet to cover rear split mode. (2) Oil and gas directly from source rock to the reservoir migration pattern. For oil and gas migration characteristics of the plane, think that oil and gas along the tectonic highs and advantage of the sand body composition of the dominant migration pathway into the traps, and the formation of oil and gas reservoirs. The research results provide the basis for further search for favorable block.

***Keywords:*** *migration model, migration characteristics of plane, Daliuquan-Hexiwu structural, caprock thickness.*

## I. INTRODUCTION

Study on the migration of oil and gas is one of the important content in the study of petroleum geology, that process and influence factors on hydrocarbon migration have been studied in the previous development. Fu Guang through the accumulation of Nanpu Sag Es1, with Es2 and Es3 two sets of cover, when the ratio is larger than 20%, oil and gas from the oil source faults into formations on both sides, reflects the influence on properties of oil and gas lateral diversion[1]. Zeng Jianhui believed the transporting ability of sand transportation system is mainly affected by the connectivity and the properties of sand body in micro[2]. Luo Xiaorong used to characterize the porosity of sandstone thickness and sand transporting capacity[3]. Ma Zhongliang believes that oil and gas migration to two carrier bed interchange dominant channel depends on the choice of the comprehensive effect of the sand layer and angle, the oil and gas channel advantage, transport layer properties and formation of complementary angle, high angle, good transport layer are more likely to become the preferred choice of the oil and gas migration channel[4]. Fu Guang pointed out that the dominant position of fault and sand lateral migration must have the following 4 conditions in Nanpu Sag: (1) the oil source fault is the vertical transport channel, and in the oil and gas accumulation period open; (2) in overlying strata exist high-quality capping layer; (3) faults and sand configuration type is reverse normal faults (fault hanging wall) or clockwise (normal fault footwall); (4) the reservoir sand ratio is greater than 20%, which has good physical properties and reservoir connectivity[5]. The author based on the results of previous studies[1-6], study on Daliuquan-Hexiwu structural oil and gas migration model, the author thinks that the region has two kinds of transport mode: (1) oil and gas began to transport vertically along faults, followed by lateral diversion mode; 2) oil and gas directly from source rock to the reservoir migration pattern. And the plane and oil and gas migration characteristics are analyzed.

## II. OIL AND GAS MIGRATION MODEL

Daliuquan-Hexiwu structure located in Jizhong depression in Langgu depression, the Paleogene strata in Langgu sag developed in Es3 and Es4 two sets of effective source rocks. The hydrocarbon source rocks for the Es3 to cover the whole area, hydrocarbon source rocks, there are different degrees of Es4 mixed source rocks. The main oil-bearing layer is Es3 and Es4, the output of oil source rock of oil and gas, upward migration along the oil source fault, when the regional cap layer in the vicinity of the fracture reservoir or the short lateral shunt accumulation. Analysis of the area of oil and gas migration patterns and conditions is acquainted with one of the important research contents of rich oil and gas distribution and prediction of favorable areas.

1) oil and gas began to transport vertically along faults, followed by lateral diversion mode

Formation reservoir, oil and gas generated by the source rock, oil source faults were mainly through vertical migration, when the cover is blocked, the lateral migration to the reservoir. The premise condition of lateral filling mode has three: (1) the development of oil source fault; (2) the overlying caprock quality; (3) the development of the reservoir.

Daliuquan-Hexiwu developed several oil source fault reservoir, for the vertical migration of oil and gas

provides a good channel conditions. When you encounter quality cover layer will occur after the shunt can be through thickness reflects the cover layer purity, the higher the value, the stronger the caprock sealing ability, sealing ability is not easy to be damaged. The Daliuquan Es3z cover as an example, do distribution of cover thickness, can clearly see the cover distribution and regional advantages (Fig.1). Daliuquan provided area develops many sets of regional caprocks, which on oil and gas vertical to distribution is the most important of the three sets of cover layer for Es1x, Es3z and Es3x. Hexiwu area for oil and gas are mainly distributed in the Es3x layer under the cover, the cover layer is the development of oil and gas to the lower lateral reservoir filling the premise. The big willow area in the North developed local seal, oil and gas mainly concentrated in a sand layer beneath the cover.

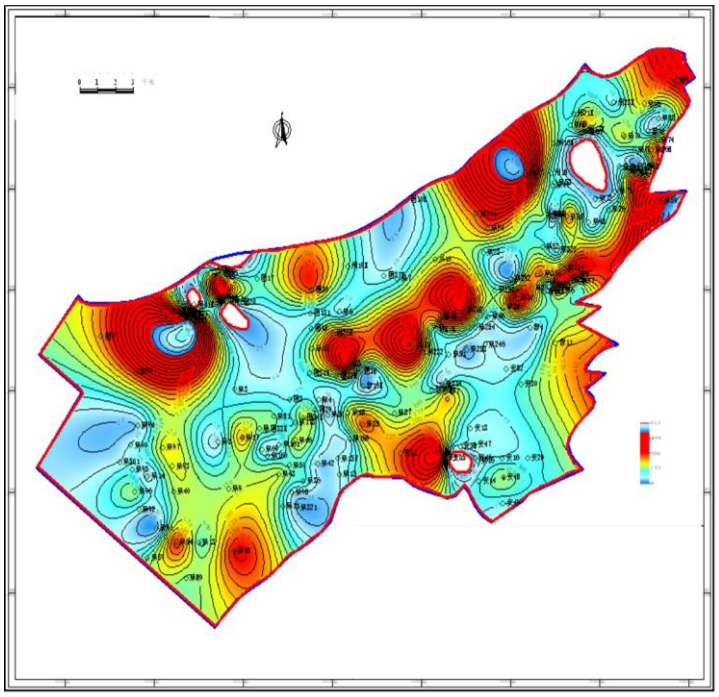

Fig.1：Daliuquan Es3z caprock thickness distribution in the plane

In study area is not all reservoirs are able to shunt accumulation, needs to satisfy two conditions: first of all, sandy than oil and gas filling line, when sandy than oil flushes the lower limit note, oil and gas to lateral diversion, after shunting encounter traps and accumulation; of Es3, Es4 is six layer of Sandy than with oily contrast analysis shows that: Oil-bearing (industrial oil flow or oil-water layer) most wells are distributed in the sand ratio is greater than the lower limit value, indicating that the reservoir sandstone percentage is greater than that of oil charging limit property, displacement pressure is relatively low, easy fault reservoir lateral diversion, and sandy ratio is high, the oil and gas is easy to wash. Below is the ES3s sand than plan (Fig.2). Secondly, the thickness of single sand body reservoir layer is larger than 4m, the formation of lithologic reservoirs. Of Es3 lower segment of sandy ratio less than rushed the lower limit note well the thickness of single sand body and oil production of oil quantity of analysis shows that under oil source faults and cover layer is not damaged condition, Es4 formation of hydrocarbon source rock of oil and gas in Sha3 lower quality caprock barrier to oil source faults along the transport, only to cover layer at the lower part of the recent sand 3 reservoir charging, when reservoir of single sand body thickness to 4 meters, oil and gas can also lateral diversion.

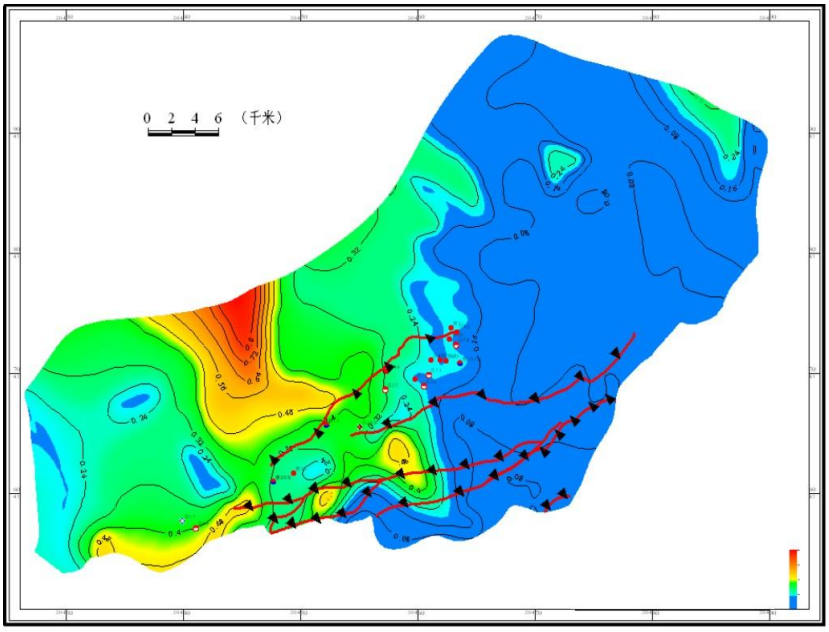


Fig.2：Daliuquan-Hexiwu structural Es3s sand ratio and oil source fault distribution

2) oil and gas directly from source rock to the reservoir migration pattern

Part of the oil and gas generation, migration to direct reservoir, the formation of lithologic reservoirs. Oil and gas directly from source rock to the reservoir migration pattern has three conditions: (1) source rocks; (2) the sandbody connectivity is poor; (3) reservoir overlying caprock quality. Es4s oil source faults in undeveloped regions of oil and gas wells has the following three characteristics: or lower part of reservoir are developed hydrocarbon source rock; reservoir conditions are poor, is a metamorphic rocks (mainly diabase); even if oil, yield is low (the highest Nissan 2t, generally less than 1t).

## III. OIL AND GAS MIGRATION CHARACTERISTICS OF PLANE

Sand body connectivity good area, oil and gas after the lateral diversion along the sand body with the structure connected to low potential area to meet the formation of reservoir migration, fault trap. The height of structure and high permeability sand body is composed of "transporting ridge" is oil and gas into the reservoir layer posterior to the migration of the dominant path, through filling point, conducting layer top surface structure characterization of oil and gas migration path. The sandbody connectivity is poor (except in the area of lithologic reservoir) wells, show of oil and gas wells are basically located in the vicinity of oil and gas migration path. Below is the ES3s oil and gas migration in the plane diagram (Fig.3).

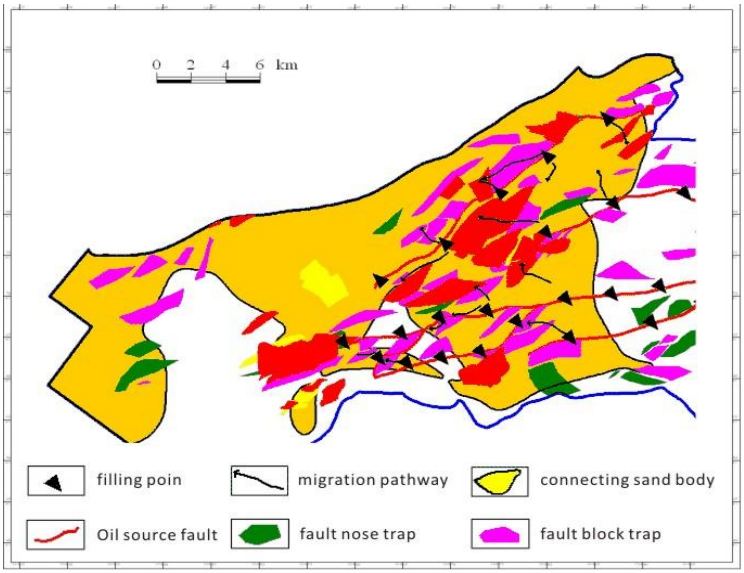


Fig.3：Daliuquan-Hexiwu structural ES3z oil and gas migration path diagram plane

## IV. CONCLUSION

(1) Daliuquan-Hexiwu structural belongs to source uplift, the types of oil and gas reservoir formation type. Oil and gas from source rock removed in two forms to the overlying reservoirs of oil and gas migration, one is oil and gas began to transport vertically along faults, followed by lateral diversion mode, the other is oil and gas directly from source rock to the reservoir migration pattern

(2) Oil and gas in the reservoir, in the connected sand body area, the dominant migration path into the traps, oil and gas path is constructed by high and high permeability sand body. By filling and transporting layer top surface structure can characterize the dominant migration path.

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