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The Evidence of sedimentary facies in Niu 74 of the Liaohe Depression

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Abstract: The study area is located in the north eastern depression of Liaohe rift. Before most of the scholars, according to the tectonic setting of Niu 74, holds that Niu 74 block is located in the eastern depression, in the block, and only in Niu 74 pieces of reservoir development, therefore, the alluvial fan deposits. In order to study the eastern depression, liaohe Niu 74 pieces of Sha 2 section of sedimentary facies, Niu 74 pieces of sand in eastern sag of liaohe depression do the stratigraphic classification and correlation, the background in the studied area, lithology, bedding structure to do the research, the results showed that the eastern depression, liaohe Niu 74 piece of Sha 2 section of fan delta sedimentary. This paper finishing Niu 74 pieces of sand secondary evidence of fan delta sedimentary.

Keywords: *Sedimentary facies: Stratigraphic contrast；Fan delta*

I. REGIONAL GEOLOGICAL CONDITIONS

The study area is located in LiaoZhong city，Liaoning Province, the structure of the block in the north eastern depression of Liaohe rift, in the middle of the Niuju Qinglong structural belt, the construction area is 15 km^2, oil-bearing area is 2.63 km^2, oil geological reserves reached 4.9125 million tons [1,2].The fault block put into productio in 2005 with 235 m well spacing, in the same year in August to waterflooding development. The main oil-bearing target strata is sha 2 section (E_s^2).

II. STRATIGRAPHIC CLASSIFICATION AND CONTRAST

At present,the strata in the study area has drilled are of Fangshenpao Formation, sha 3 section (E_s^3)、sha 2 section (E_s^2) and sha 1 section(E_s^3) of Shahejie Formation, Dongying Formation, Guantao Formation, Minghuazhen Formation, and Quaternary strata.

The purpose of this study is sha 2 section of Xinglongtai reservoir. Further divided into two section of the upper part of E_s^2, the middle part of E_s^2, the lower part of E_s^3. According to the sedimentary features of stratigraphic sequence and cyclicity, it can be further divided into 17 sub layers of 7 sandstone groups.

III. THE RESEARCH OF SEDIMENTARY FACIES

Oil and gas is sedimentary organic minerals, its formation and development is mainly affected[1] by sedimentary facies and diagenesis and control[3-6].

According to the lithology and electric property of information was collected, we had the single well facies analysis, divides the sedimentary microfacies. Through the study of lithology and electrical, we set up the relationship between the logging facies sedimentary microfacies.

The study area is located in the eastern depression of Liaohe rift in Bohai Gulf Basin. Before most of the scholars, according to the tectonic setting of Niu 74, think 74 block is located in the eastern depression, downdip to the west and the rest on three sides disconnected by fault, in fault block, and only in Niu 74 pieces of

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reservoir development and without sand body development around it, therefore, defined as the alluvial fan sedimentary[7].

We through regional sedimentary background, petrology, single sand body characteristics, puts forward the E_s^2 of Niu 74 pieces in Liaohe eastern depression, belongs to fan delta sedimentary system point of view. The main development subfacies of E_s^2 are fan delta plain facies and fan delta front subfacies. The fan delta plain subfacies between distributary channel microfacies, back swamp microfacies; fan delta front subfacies developed underwater distributary channel microfacies, underwater distributary interbasin microfacies, river mouth bar microfacies, natural levee microfacies. The main evidence is as follows:

3.1 The sedimentary background

The sedimentary background in Liaohe Depression in Bohai Bay Basin fault depression period in Paleogene lake development, show the rift lake basin, extensive development half deep lake - deep lake sedimentary;In Neogene, into the overall slow depression stage, stable structure, basament decline, lake water expanded.The mudstone in the study area is mainly dark gray and light gray, but sometimes it can be seen that the purple-red mudstone, sandstone is mainly light gray, interbedded with sandstone and mudstone. Both water deposits, and underwater deposits, but is given priority to with underwater deposits.In general, the study area development fan delta and shallow lake sedimentary system.

3.2 The lithological characteristics

Sandstone coarse particle size, and reflects the strong hydrodynamic environment: sediment in E_s^2 had coarser granularity, textural maturity and compositional maturity is low. Reservoir lithology is mainly fine sandstone and siltstone, rock particle size is 0.03~2mm, sorting is better. Particles are in a round shape, point and line contact (Fig.1). Reflect the glutenite debris after a short distance transport, experienced a relatively large buried depth. Mineral composition is mainly feldspar content (33.8%), quartz content (32.8%) and lithic content (22.2%) (Fig.2), plus a small amount of mudstone and carbonate interstitial material.The lithologic features are reflected the lithologic characteristics of fan delta.

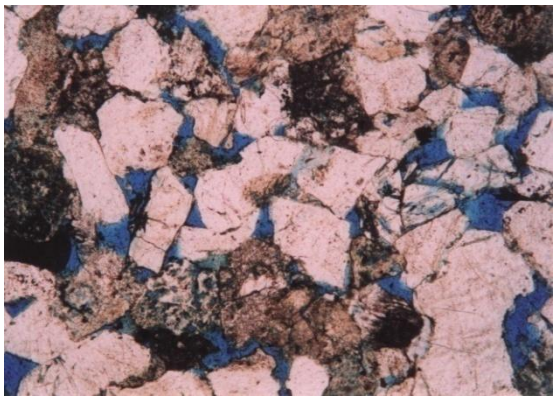

Fig.1 Niu 74-12-16，3074.81m，Semiround～Semi-edge-angle，Point and line contact

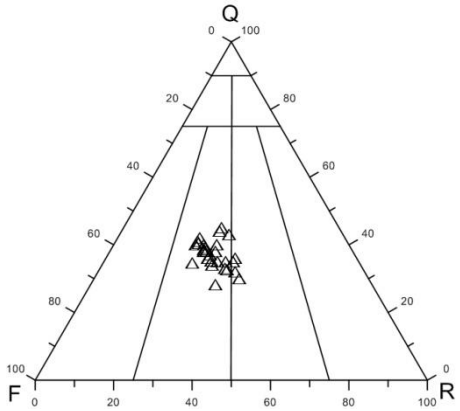

Fig.2 Triangular diagram of Niu74

3.3Grading curve

Cumulative probability curve is generally divided into three segments, one of the lines represent a general, namely a way of handling, suspension components (handling), jump components (handling) and traction components (handling).Each line at the same time, also reflect the sedimentary characteristics of the sorting characteristics, line steep said sorting is better, gently line said sorting is poor. Shahejie Formation Es2

fan delta and underwater distributary channel of cumulative probability curves of mainly two sections (Fig.3), jump component content at 80%, suspension components by about 20%.

C-M diagram is the application of each sample value of C and M value are plotted in the graph, C value is the particle size on the cumulative curve corresponds where particle concentration 1% placed, and M value is the particle size of particle concentration 50% placed. C values equivalent to the sample of the coarse particle size, represent the largest energy of hydrodynamic agitation start handling;M value is the median that represents the average energy of hydrodynamic. C-M diagram in the study area (Fig. 4) reflects the characteristics of the traction current. From Fig.4 PQ section C value is high(1000-2500μm), reflect the high flow velocity and big traction force. C-M diagram reflects the characteristics of a fan delta hydrodynamic characteristics of traction current, and if it is alluvial fan would had the characteristics of gravity flow.

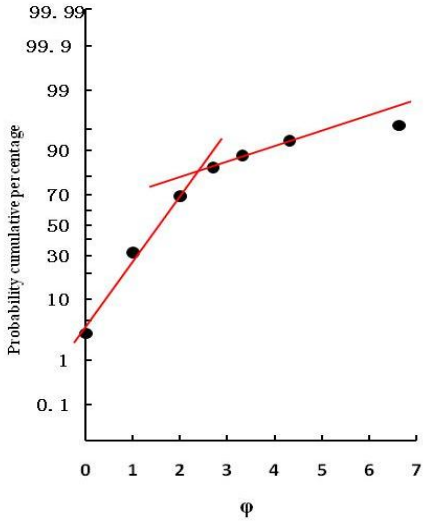

Fig.3 Cumulative probability curve of Niu74-12-16

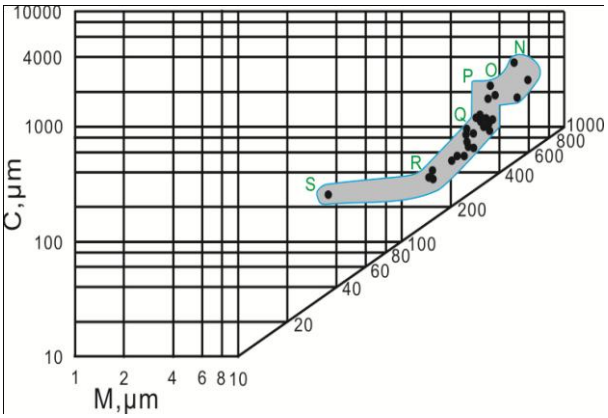

Fig.4 C-M diagram of Niu74-12-16

3.4 The bedding structure

The development of E_s^2 glutenite in this area, reflecting the traction current bedding structure. For example: oblique bedding, parallel bedding, scouring structure, also have bedding structure reflect the lakes sedimentary, such as: wave bedding.Found no typical bedding structure reflects the gravity flow, such as graded bedding, tear structure and covolute bedding, etc.

IV. CONCLUSION

(1) Sediment in E_s^2 had coarser granularity, reflects the strong hydrodynamic environment

(2) E_s^2 development fan delta sedimentary in the study area.

(3)It can be further divided into distributary channel microfacies, back swamp microfacies, underwater distributary channel microfacies, underwater distributary interbasin microfacies, river mouth bar microfacies and natural levee microfacies.

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