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Research on the micro phase characteristics of the Eryuan experimental area in the western area of the development zone of SA

Liu Jiyu[1], Luo Rui[2]
[1,2]（College of earth science of Northeast Petroleum University, Daqing, Hei Longjiang,China）

Abstract: - According to drilling and logging data, on the basis of geology facies, logging facies analysis, using the high resolution sequence stratigraphy, sedimentology theory, through the high resolution sequence stratigraphy fine contrast, establish high-resolution sequence stratigraphic framework in the study area, according to the geological characteristics of Sazhong development area, determined the study area Putaohua reservoir microfacies types of distributary plain sub facies, flood plain meandering river facies, flood plain braided river facies and delta front subfacies. Based on the fine division and correlation of the Putaohua oil layer and the research of the single sand body, a detailed sedimentary facies study was carried out in the western area of the development zone of Sazhong, the development phase is determined, established the logging facies models of various microfacies, logging facies model of sedimentary facies of the study area division, drawing the sedimentary microfacies map.

Keywords: - *Oil layer division and correlation; Sedimentary cycle; Sedimentary microfacies; Songliao Basin; Sazhong development zone*

I. GEOLOGICAL BACKGROUND

Songliao basin is China's large-scale Cenozoic continental sedimentary basin in the northeast area, Daqing Changyuan is a secondary tectonic unit in the north of songliao basin is composed of lamadian, sal figure, almond, taiping chariot, high platform, putaohua, aobao tower seven anticline structure.Saertu oilfield reservoir belongs to the north of songliao basin sedimentary system and it is a large inland lake basin river - delta deposits.The river flows into lake basin from the north to the south, piled up a large amount of debris in the delta region.Sazhong development zone is located in the middle of Daqing Changyuan Saertu anticline, and the Pu I group has three river systems, respectively Lamadian river system, SaDong river system, Saxi river system.The western region of the study area is located in the west of the development zone. The P12a, P12b and P13 units are deposited by the Saxi river system, the Sadong river system and the Lamadian river system.

II. CONTRAST OF THE STUDY AREA OF RESERVOIR

Reservoir contrast is mainly on the basis of the regional stratigraphic contrast, in oil-bearing series of reservoir, classifying and contrasting reservoir group, sand group and single reservoir in oil bearing sequence. [1] The study area is mainly under the guidance of the principles of sequence stratigraphy, compared with the method of rock stratigraphy, and full application layer standard, cyclicity, according to lithology, electrical, which is revealed by the lithology combination characteristics and thickness ratio relationship as a basis for comparison. Compared with the principle of "cycle comparison, classification control and different treatment".

So-called cycle contrast, hierarchical control of reservoir comparison method is based on depositional cycle, from senior to junior step by step, the key point is using standard layer for long horizon control, standard layer and the secondary cycle of lithofacies section division of reservoir group, to three stage rotary to divide sandstone group, to fourth order cycle division and correlation of the layer. [2]

This study choose "start from the closed skeleton section" fine contrast, in determining the contrast skeleton profile is accurate, skeleton in the well for reference well compared to other wells (Figure 1). Due to coring data is very limited, subdivision is mainly using logging curve.

In the area of porosity and permeability reservoir, 2.5m resistivity log vertical resolution is too low, natural potential negative anomaly is obvious, microelectrode sandstone and mudstone distinguish clearly, and three lateral vertical resolution is high and detection range can really reflect the original formation characteristics and natural gamma can very good to distinguish between sandstone and mudstone and thin sandwich. But in the study area, only microelectrode and natural potential are all, and the natural potential curve is not obvious, so the deposition time unit is mainly based on microelectrode, with natural potential, natural gamma and three lateral curve as a supplement.

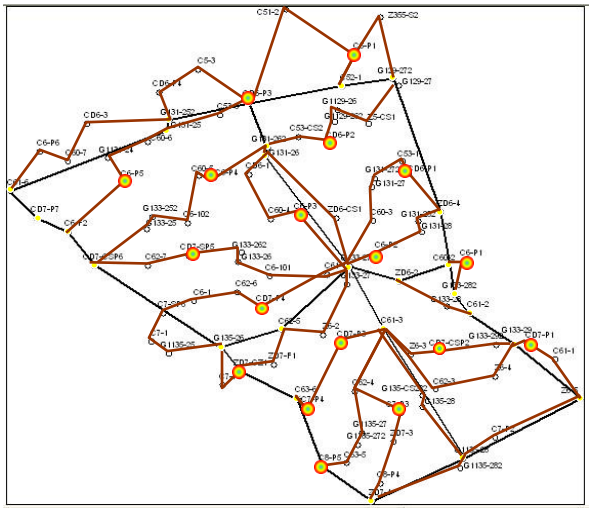


Figure 1 Comparison profile

THE ESTABLISHMENT OF HIGH-RESOLUTION ISOCHRONOUS STRATIGRAPHIC FRAMEWORK OF THE PUTAOHUA RESERVOIR

According to the theory of high-resolution sequence stratigraphy, using the "contrast method for reservoir under standard layer control based on closed section of regional framework" on the whole, the system and the fine contrast of the 5 time units of the 100 wells in the western area of Putaohua reservoir, the fine sedimentary time unit level stratigraphic framework of the study area is established.

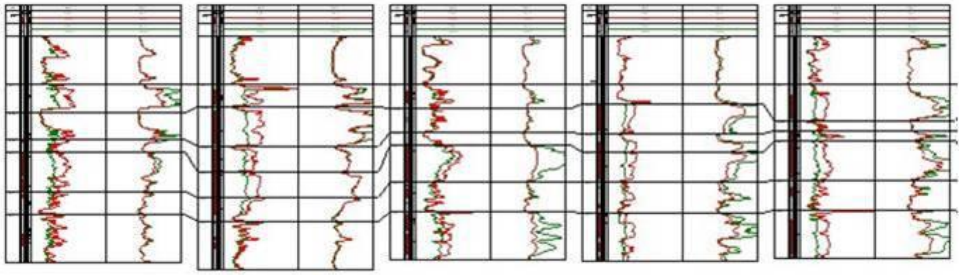
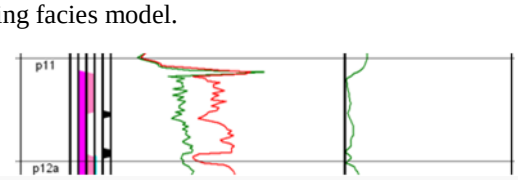


Figure2 Isochronous stratigraphic framework

III. THE ESTABLISHMENT OF WELL LOGGING MICRO FACIES MODEL

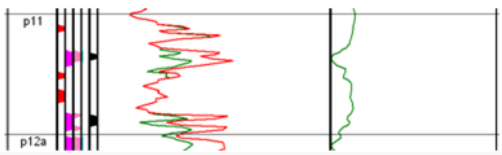
In the study area, the plane sedimentary microfacies of the study area are mainly used to use the well log data, so we need to establish a logging microfacies model. [3]

Well logging curve carrying the large number of underground information, can well reflect "3 sexes" (lithology, physical, oiliness) relationship, shale content, lithologic interface and the contact relationship between the top and bottomtop and bottom contact relationship, cyclicity and each well universality and high precision requirements. According to the well logging curve, we choosed natural gamma logging curve (GR), spontaneous potential (SP) and microelectrode, three lateral to other curves for reference, established different logging facies model.



(a) Stream channel

(b) Abandoned channel



(c) Overflow sand

(d) Diversion between the mud

Figure3 Micro facies model of well logging

IV. PLANE PHASE DISTRIBUTION AND MICRO PHASE CHARACTERISTICS

The plane distribution of sedimentary microfacies is the core of the research of sedimentary micro facies, based on the map of sand body and the plane of well logging facies, guided by the analysis of the sedimentary system and the phase diagram of the well log.

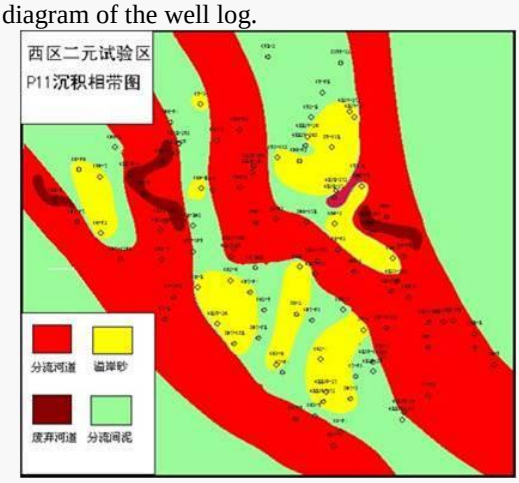


Figure4 Pu Ⅰ1 time unit sedimentary microfacies

5.1 Distributary channel

Obvious positive cycle, a typical river sedimentary binary structure, typical river vertical sequence and good physical properties. [4]Logging curve is like a box, the bottom and top of the curve are abrupt contact, microelectrode curve is high amplitude value, high amplitude difference, reflected high energy, rapid accumulation of environmental. Compared with the underwater diversion channel, it has obvious characteristics that it has the grain size, the sand body is thickness and the width, the erosion surface is obvious, it has lots of gravel (Kevin mud), bedding is in large scale, physical properties is good and symbiotic combination with other micro facies in the land.

5.2 Abandoned channel

Refers to deposition after the original river was abandoned, due to after river was abandoned, the river flow is greatly weakened. Therefore, general signs are grain size of sediments become thin, strong traction current bedding types became smaller or disappeared, the overall positive cycle containing mud siltstone and transitional lithology deposition.Logging curve in the lower channel is coarse sediment, microlog curves lower amplitude difference is big, developed better channel deposits, the upper part is serrated or linear, lithologic transitional deposition or argillaceous sedimentary and overall positive cycle containing mud siltstone and transitional lithology deposition.

5.3 Overflow shore sand

Large river flood period generally overbank, forming large area thin sheet sand, most are top and bottom mutation, thickness is relatively thin, generally less than 0.5 m, sediment grain size is fine, mostly siltstone and pelitic siltstone and silty mudstone. In the logging response, the response of resistivity, natural potential, microelectrode logging are in the middle amplitude, the finger like, the thin layer, the top and bottom of the mutation and so on.

5.4 Interdistributary mud

With relatively less thin sand, thick layer and single purple color, variegated, ash green, calcium tablets, rooted and wormholes, and little animals in the fossil record mudstone as characteristics, it is overflow their banks stay between distributary channel deposit, generally are mudstone and siltstone, logging response in resistivity, spontaneous potential, microelectrode logging curve amplitude value is very low, small amplitude difference, curve shape, flat, straight or fingers shaped, thick layer, it is low-energy stable sedimentary environment.

V. CONCLUSION

On the basis of regional geological characteristics and the characters of deposition in west of Sazhong d evelopment area. Applying cycle correlation, classification control and regarded differently in different facies t o stratigraphic division and correlation.Researched region are divided into five parts, the isochronal stratigraphi c framework of Putaohua reservoir isestablished. According to the regional geological characteristicas, draw a c onclusion that: P Ⅰ1 is delta plain subfacies of the distributary plain, P Ⅰ2a is The flood plain faces, meanderin

g fluvial subfacies, P I2b is delta plain subfacies of the distributary plain, P I3 is braided river subfaces of distri butary plain. P I4 is delta front subfaces. 14 sedimentary microfacies types are distinguished. provide some ver y favorable reference for guide infilling adjustment plan, assistant analysis of remaining oil distribution and blo cks practical development.

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