Lithology recognition method research

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Abstract: Evaluation of reservoir lithology recognition technology, is the foundation of reservoir and the reservoir comprehensive evaluation, and its precision directly affects the effect of reservoir evaluation, determine the level of fluid identification, capacity evaluation and precision. Portugal's west oil field, the black temple putaohua reservoir sedimentary environment is complex, because of its sedimentary environments and different hydrodynamic conditions, cause different sand body on the rock constituents, lithology involving powder sandstone and argillaceous siltstone, silty mudstone, mudstone, etc. Based on Portugal's west oil, the black temple putaohua oil layer in the particularity of geographic, sedimentary environment, cannot copy and paraphrasing from other parts of the existing interpretation result. In the understanding of the black temple, putaohua reservoir characteristics on the basis of sedimentary environment and establish corresponding relations between logging data and rock lithology lithologic identification methods should be a more suitable research train of thought.

Keywords: Pu Xi oilfield, PutaoHua oil layer, crossplot.

RESERVOIR PROPERTY ANALYSIS

Putaohua reservoir porosity is mainly distributed in the 8.5% to 20%, belong to low hole (fig1).Permeability distribution range (fig2).

THE MAIN LITHOLOGY LOGGING RESPONSE ANALYSIS

The resistivity curve

Under the condition of the fluid property fairly, rock particles from fine to coarse, arrangement structure from loose to tight, resistivity amplitude can present the change trend from low to high. Because of fine grain, arranging the loose strata structure has strong adsorption ability[1], the reservoir pore contains a lot of bound water conductivity is strong. Lithology from mudstone, siltstone and fine sandstone to glutenite, rock grain fine to coarse, resistivity curve has an increasing trend. When rock containing gravel will make rock resistivity value increases, when the rock after calcium also can make rock resistivity value increase[2].

Natural gamma curve

Almost every kind of rocks can show some radioactive. In the natural gamma radioactivity of rock, is made up of rock containing uranium (U) and thorium (Th), the content of potassium (K) and gamma ray energy spectrum is determined[3], the second is the rock from scattering and the absorption effect. When ignore the borehole and formation absorption effect, layers of radioactive intensity depends mainly on radioactive intensity of various minerals and mineral content. In general, the lithology from powder sandstone and argillaceous siltstone, silty mudstone to mudstone, radioactive mineral content is increasing. So in several typical lithologic[4], siltstone minimum value of the natural gamma ray, the argillaceous siltstone, silty mudstone natural gamma ray value center, mudstone natural gamma ray value is highest. When the rock containing calcium, natural gamma ray value has a tendency to decrease. As part of the glutenite belongs to collapse accumulation formation, some containing mud gravel strata can make the natural gamma ray value is on the high side[5].

Compensated sonic curve

Compensation acoustic logging measurement is per unit length of rock acoustic wave propagation in the time it takes the acoustic time difference. In fact, acoustic time log value of the rock mineral composition, degree of rock density, structure and the influence of rock pore maybe wrong on Under the condition of the same property, rock particles more coarse[6], the faster sound wave propagation, acoustic time difference value is smaller. When rock skeleton particles combined with compact will lead to sound waves spread faster, acoustic time difference is small. In buried in shallow strata, therefore, powder sandstone and argillaceous siltstone[7], silty mudstone, mudstone of acoustic move out value showed a trend of increase gradually, and the buried depth deeper strata, powder sandstone and argillaceous siltstone, silty mudstone, mudstone acoustic time values are present decreasing trend[8].

The Hei Dimiao lithology identification chart

Using acoustic time - GR intersection chart to identify fine sandstone, siltstone, containing calcium powder sandstone, calcareous siltstone and mudstone, because argillaceous siltstone and silty mudstone which had no obvious boundaries, using SP - GR intersection chart to distinguish between them.(Fig. 3)
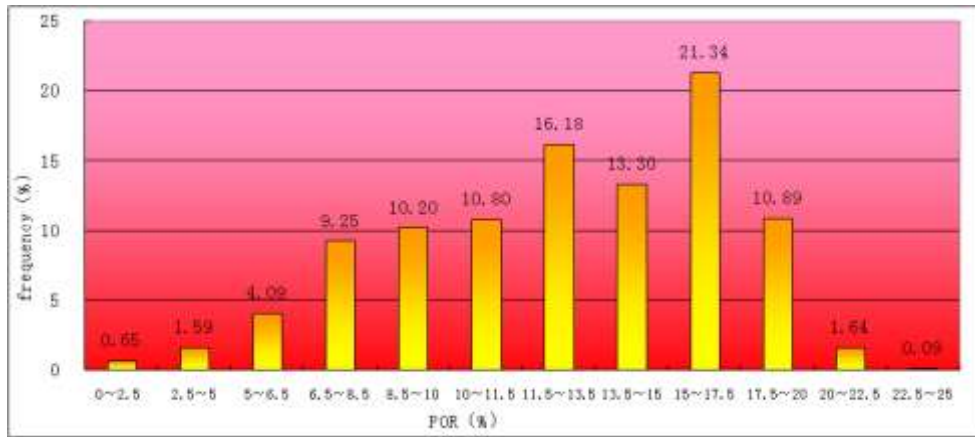

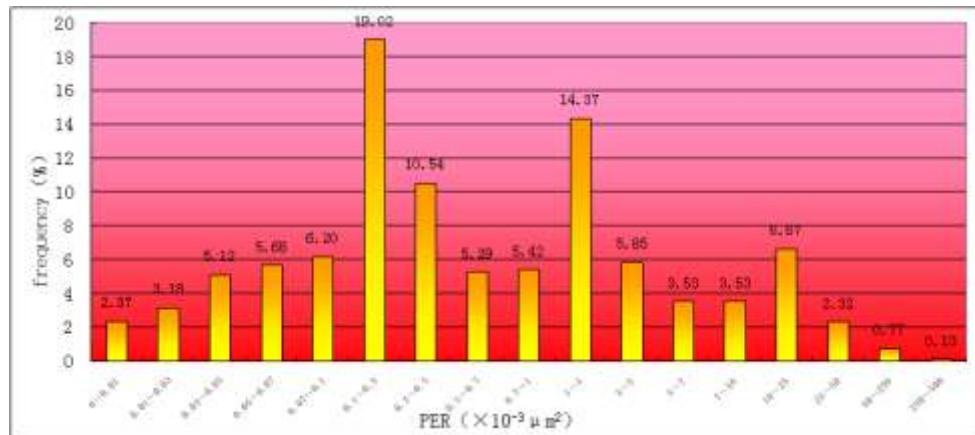**Fig. 1: Putaohua reservoir porosity statistical histogram**

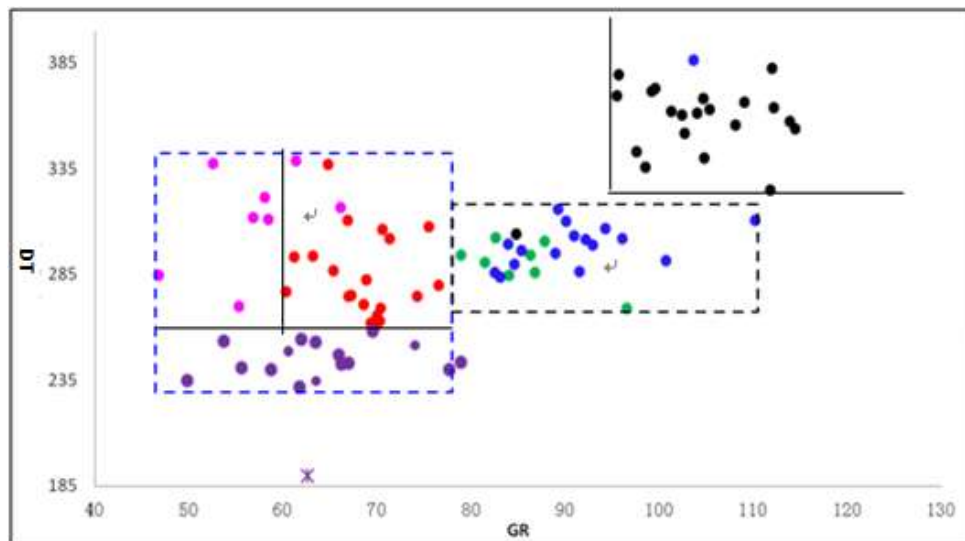**Fig.2: Putaohua reservoir permeability statistical histogram**

Fig. 3: Hei Dimiao reservoir lithology identification chart

The application of GR - SP intersection chart recognition argillaceous siltstone and silty mudstone (fig 4).
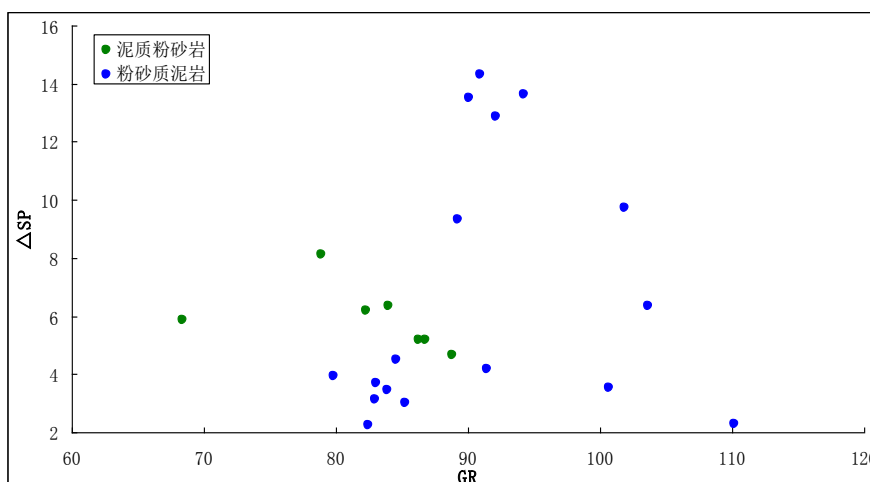
Fig.4: argillaceous siltstone and silty mudstone identification chart

The Putaouhua lithology identification chart

Using acoustic time - GR intersection set up lithologic identification chart, identify the siltstone, containing calcium powder sandstone, calcareous siltstone and pelitic siltstone, silty mudstone, mudstone.(fig 5)
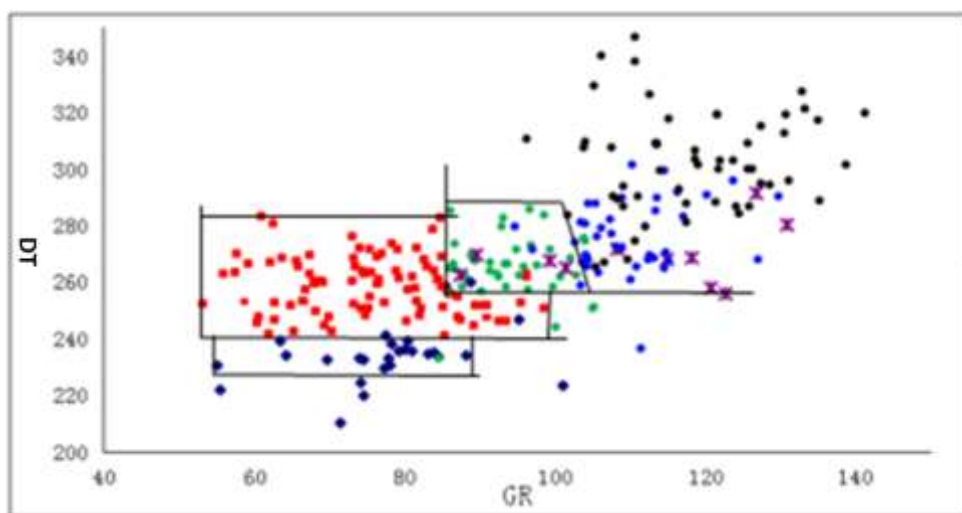

Fig. 5: Putaohua reservoir lithology identification chart

Siltstone: miss point 2 (2.2%), go point 1 (1%); Argillaceous siltstone: miss point 5 (10.4% into points in 8 (10.4%);

Siltstone: 53 API < GR< 85API ;245 um/m < DT < 283 um/m, 85 API < GR <98 API /m 245un/m<DT < 258 um/m;

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