Analysis of main controlling factors and identification method of Jurassic low resistivity reservoir in Huanxian area, Ordos Basin

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The Ordos Basin is located in the central and western part of China, which is rich in oil resources in Mesozoic strata. Huanxian area is located in the west of the Ordos Basin, covering an area of about 3000 km^2. With the wide distribution of Jurassic low resistivity reservoir, it is difficult to identify reservoir fluid by logging, which restricts the efficient promotion of oil resources exploration and development in this area to a certain extent.

Based on the basic geological law, this study makes full use of the data of oil test conclusion, production performance and formation water analysis to deeply analyze the genesis of low resistivity reservoir in this area. The average formation water salinity of Jurassic in Huanxian area is 63.5g/l. Through the correlation analysis of mathematical methods such as fitting and regression, the formation water salinity and reservoir apparent resistivity show a good negative correlation in the semi logarithmic coordinate, and the correlation coefficient is 0.78. Therefore, it is considered that the main controlling factor for the widespread development of low resistivity reservoir in this area is the high formation water salinity. Irreducible water saturation, clay mineral content and nose bulge structure amplitude are the secondary controlling factors for the development of low resistivity reservoir in this area, and their correlation coefficients with apparent resistivity are 0.23, 0.25 and 0.31, respectively.

On the basis of clarifying the genesis of Jurassic low resistivity reservoir in Huanxian area, the comprehensive identification of reservoir fluid type by logging is carried out. For the whole area, there are obvious differences in geological characteristics, so conventional methods such as cross plot method of acoustic time difference and apparent resistivity can not effectively identify reservoir fluid. According to the main controlling factors of reservoir apparent resistivity, the salinity of formation water is combined with apparent resistivity and resistivity index of reservoir respectively to establish the cross plot. Using these two kinds of cross plot, the accuracy of reservoir fluid type identification is 62.9% and 88.6% respectively. This method can meet the accuracy requirements of reservoir fluid identification, realize the rapid identification of reservoir fluid types in the whole area, and provide technical support for efficient exploration and development of Jurassic low resistivity reservoir in this area.