

Identify Interlayer Insulation by Using Logging Data

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Abstract: - Interlayer insulation of the reservoir is one of the important factors on influencing fluids in the reservoir. From observation and identification of coring well, the interlayer insulation of the reservoir in Xinli oilfield can be divided into three categories: Argillaceous interlayer, Calcium interlayer and Physical interlayer. study the method of using logging data to identify interlayer insulation. Through different types of logging response characteristics of interlayer insulation analysis and comparison, the region of interlayer identification standard is established. Good results have been achieved in the recognition of single well longitudinal sandwich insulation, a train of thought for every identification of interlayer, at the same time, laying the foundation for middle and surplus oil distribution and the development plan.

Keywords: - Insulation Sandwich

I. THE TYPES OF INSULATION SANDWICH

It is limited by the most underground intuitive and accurate core number and some advanced logging technology. However, borehole vertical continuous well logging information can indirectly reflect the sedimentary characteristics, such as amplitude, shape, and combination characteristics of well logging curve., which can reflect underground lithologic characteristics and their combination. Comprehensive analysis of these data will be able to improve discriminant accuracy of the insulation sandwich. Through the statistics of lithology, physical property, electric property of interlayer insulation in Xinli Oilfield VI Block, using limited core calibration logging data to set up different types of interlayer insulation logging identification marks. The interlayer insulation of the area is divided into the following three types:

- (1) The argillaceous interlayer: mainly including mudstone and silty mudstone, argillaceous siltstone, etc. This kind of sandwich insulation on the whole is weakened due to hydrodynamic, fine suspended load of sedimentary formation. The main performance on the well logging curve is that the potential and microelectrode has no separation or separation is small. The ratio of SP curve return values and sandstone analogy is less about one third, the high GR values, hole enlargement, $\Delta t > 400$ us/m;
- (2) Calcareous intercalation: this kind of sandwich has main cementation with carbonate sediments and has something to do with dissolution of inhomogeneity with strong randomness. The well logging curve shows microelectrode curve peak and amplitude difference is small, Δt is abnormal low with less than 220 us/m;
- (3) Physical intercalation: lithology is given priority to oil spot fine sand and silt with high shale content, and poor physical property. The logging curve, which is characterized by micro potential and microelectrode on return or rise at the same time, has certain separation, SP has a small return.

II. THE INFLUENCING FACTORS OF RECOGNITION ACCURACY OF INSULATION SANDWICH.

When sandwich types are simple, several curves can be enough to identify sandwich insulation, but for some complex type of interlayer insulation, comprehensive materials should be used to achieve the purpose of identification of interlayer insulation. The information application level has a great influence on insulation sandwich recognition accuracy. There is a lot of information which can be used to identify the sandwich insulation, such as the core, conventional log and FMI etc. and among them conventional log data includes natural potential and natural gamma ray, resistivity, density, neutron and microelectrode, sound, etc.. These data each has their own advantage in the study of identification of interlayer insulation. Only make full use of all kinds of data, compensate for each other, can make each data exert its maximum to achieve the objectives of the interlayer insulation recognition accuracy.

- (1) All Kinds of Information Application Degree is not Enough

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(2) The Instrument Longitudinal Resolution is not High

Most of the conventional logging instrument sampling interval is 0.125 m, which means thin layer thickness with less than 0.125 m characteristics often cannot be reflected well. The vertical resolution of the conventional logging methods range from 2 cm to 80 cm, microelectrode curve vertical resolution is the highest with 2 cm, which has a certain advantage on the division of thin interlayer insulation , but due to the limitation of sampling interval, the interlayer insulation of deduction standards generally is 0.2 m, which causes the the interlayer insulation with less than 0.2 thickness leakage rowed

(3) Logging Series is not Complete

Logging series refers to a set of economy applicable comprehensive logging method to complete a predetermined geological or engineering tasks under a given hole. Choosing reasonable, effective and comprehensive logging series is to guarantee the effective identification of lithology and dividing permeable formation, calculation of reservoir parameters and evaluating oil and gas, etc. Logging curve is not complete, logging series are unified, lacking the necessary interlayer insulation instructions curve in some extent , especially the old wells with less logging projects, low well logging quality . some wells only have 2 to 3 curves, which seriously affects the log evaluation results.

(4) Complex Sandwich Types

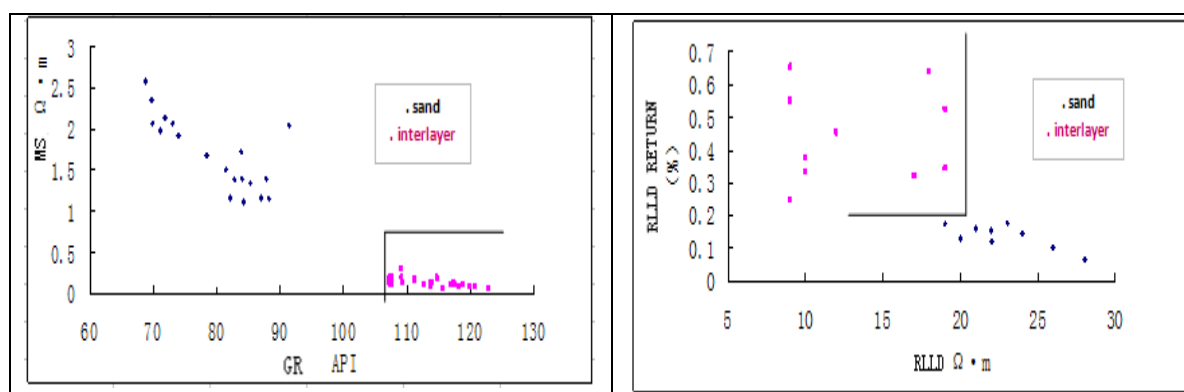
The distribution of interlayer has a very important influence on reservoir heterogeneity .Especially in meandering river, different types of interlayer insulation are influenced by its causes and have their unique distribution rule. It has a great guiding significance to research on the type of meandering river channel sandstone reservoir interlayer insulation, formation mechanism and characteristics to predict the distribution of remaining oil. The past interlayer insulation division which only provides interlayer insulation thickness, without detailed research on the characteristics and types of interlayer insulation sandwich and the control function of the oil and water distribution and so on, which causes insufficient understanding of interlayer insulation in the practical development program. Without considering the effect of interlayer insulation, the development effect. has been affected..

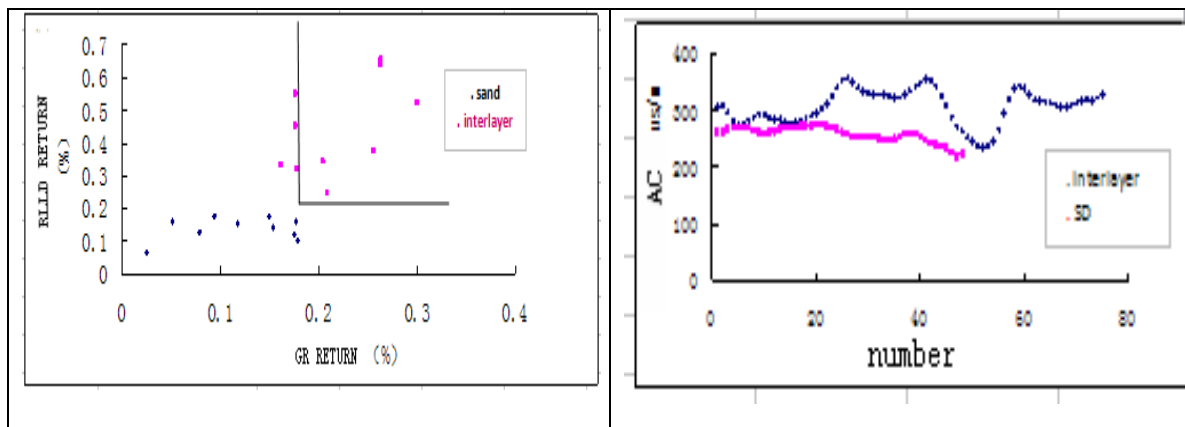
(5) Identification Method is Single

Identification method is very important for interlayer insulation precision .At present, Interlayer isolation identification is mainly qualitative combination of several single information or selecting a specific log interpretation method for logging data. But the logging curve as the main resources for interlayer insulation to deduct has multiple solution. So the combination qualitative and interpretation methods are highly affected by the human factors. If you can choose the appropriate method, quantitatively combining with various logging data, as well as reduce the influence of the artificial factor, and then it can greatly increase the accuracy and efficiency of insulation sandwich discrimination

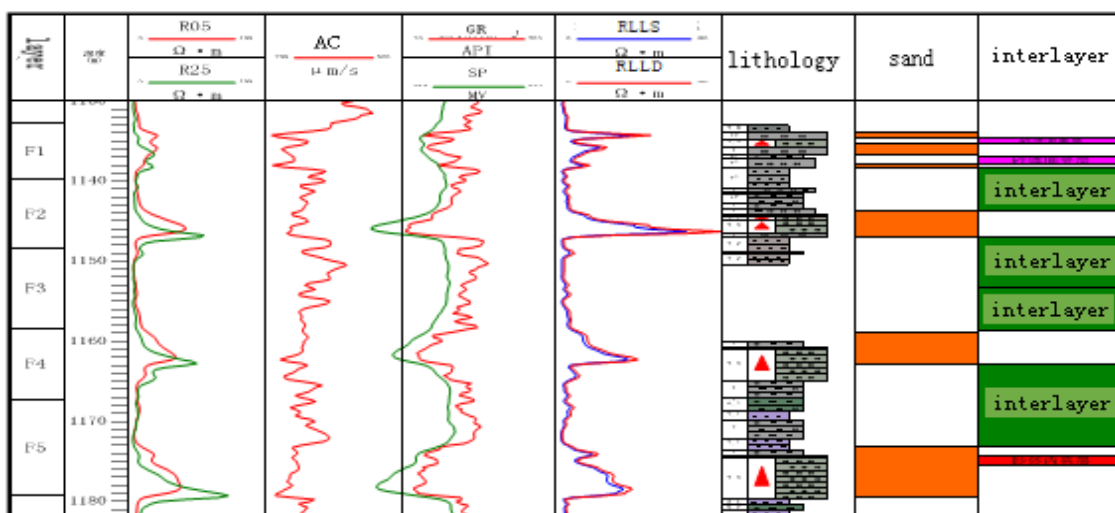
III. THE IDENTIFICATION OF THREE INTERLAYER INSULATION

Through the influencing factors of identification accuracy of interlayer insulation and all kinds of analysis of insulation sandwich logging response characteristics, select the representative logging data to establish the intersection chart of recognizing insulation sandwich, which is used to quantitatively identify interlayer insulation within the work area.





It can be seen from the diagram that natural gamma ray of gillaceous interlayer insulation is generally larger, which clearly distinguishes from other two kinds of sandwich insulation. The resistivity of calcium interlayer insulation is bigger, about more than $10 \Omega \cdot m$, while acoustic time is on the low side, which is also easy to identify. Property interlayer insulation in Rt, the distribution of AC, DEN is on overlapping with argillaceous interlayer insulation, which a single curve can't be used to identify characteristics. The permeability of the three kinds of interlayer insulation are also poor, and the distribution range is big. Among them the permeability of physical interlayer insulation is higher than other two kinds. Application effect can be seen as follows:



IV. CONCLUSION

According to core observation and analysis of data, the main insulation sandwich can be divided into three categories: argillaceous interlayer, calcium interlayer and physical interlayer. Different kinds of interlayer have different causes and control factors. Among them that Properties of argillaceous interlayer and physical interlayer. in the East river sandstone section develops well, while the distribution frequency of the calcium interlayer insulation is relatively low and more random. Affected by the vertical resolution of conventional logging curve, there is some error for relatively thin interbedded reservoir using the above method. At the same time, it needs further research. to continuously explore more effective methods because it is still a difficult task to identify the interlayer insulation.

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