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Reliability analysis of seismic inversion results of complex lithology reservoir in the area of the Wang Fu

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Abstract: **-**In this study,based on the research of strata,structure,sedimentary facies and sand body distribution,the reservoir inversion technique is used to study the seismic results,combined with sedimentary facies and sand body characterization,and implement the reliability analysis of seismic inversion results based on the results of seismic inversion.

Keywords: - *Reservoir prediction,Geological statistics inversion,Reliability evaluation*

I. INTRODUCTION

In order to understand the overall potential of clastic reservoir in the area of the palace area,we need to carry out the research on the characterization technique of gas reservoir,the formation of stratigraphic division,sedimentary characteristics,reservoir characteristics and reservoir characteristics.Therefore,it is necessary to carry out seismic inversion and prediction in the study area.

II. RESERVOIR PREDICTION DATA BASE

2.1 BASIC PRINCIPLES AND METHODS OF RESERVOIR INVERSION

Seismic inversion technique is to reveal the spatial geometry (including target layer thickness,the top structural shape,the extension direction,the extended range,the tip location,etc.) and the target layer.It is a process of matching,converting and combining with high resolution well logging data.The process can be divided into: seismic,well logging,geological data analysis,geological modeling,seismic inversion,reservoir parameter extraction,lithology analysis,and so on.

2.2 INVERSION BLOCK DATA STATUS

The inversion block 225km2,the inversion of the target layer for the formation of the spring head and the formation of the reservoir sand body identification.Load inversion commonly used curve: sound wave 49,resistivity of 49,natural gamma 49 (Figure 1).

III. EARTHQUAKE PREDICTION AND RELIABILITY ANALYSIS

3.1 INVERSION PREDICTION METHOD OPTIMIZATION

For this block,the single sand body in the block has the characteristics of lateral variation and severe heterogeneity.The conventional wave impedance inversion resolution is slightly higher than the original seismic resolution,which is not enough to distinguish the thin reservoir,but it is very important to ensure the inversion results of the conventional wave impedance inversion.

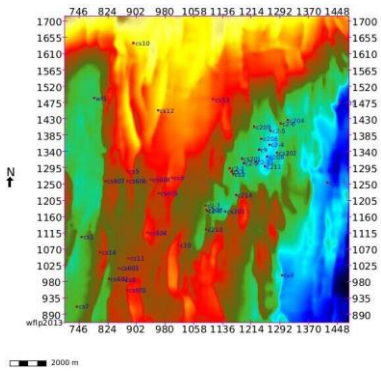

Fig 1 overview area

3.2 LOGGING CURVE ANALYSIS

For the same block,the same as the sedimentary environment,sedimentary environment,and the formation of the same nature,so that the distribution of the histogram is similar to the same type,which can be used to adjust the pattern of different wells,and then achieve The purpose of realizing multi well curve standardization.The deviation value of each well is corrected by the statistics of histogram distribution of the target layer.(Figure 2,3).So the seismic inversion is carried out by using wave impedance,resistivity and natural gamma curve,and the reservoir distribution is identified.In the first part,the sensitivity analysis of several curves of seismic inversion is carried out (Figure 4),and the resistivity and gamma are sensitive to reservoir.

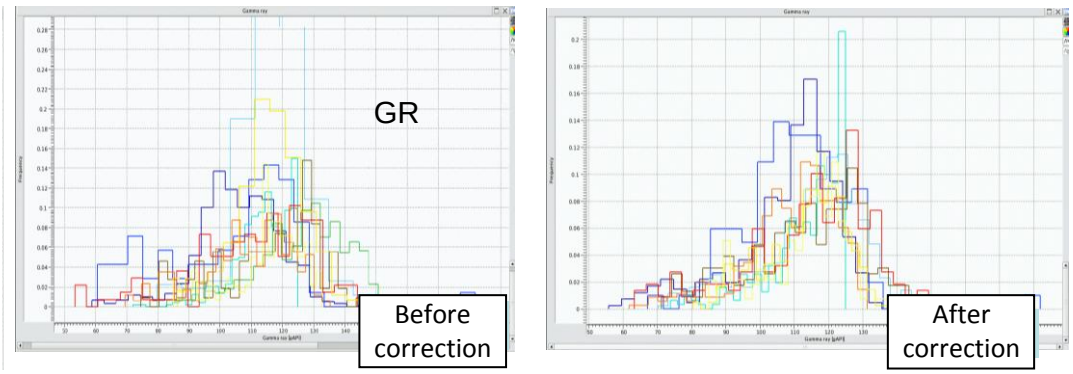

Fig 2 Before and after the natural gamma curve of standard curve shape and contrast histogram distribution

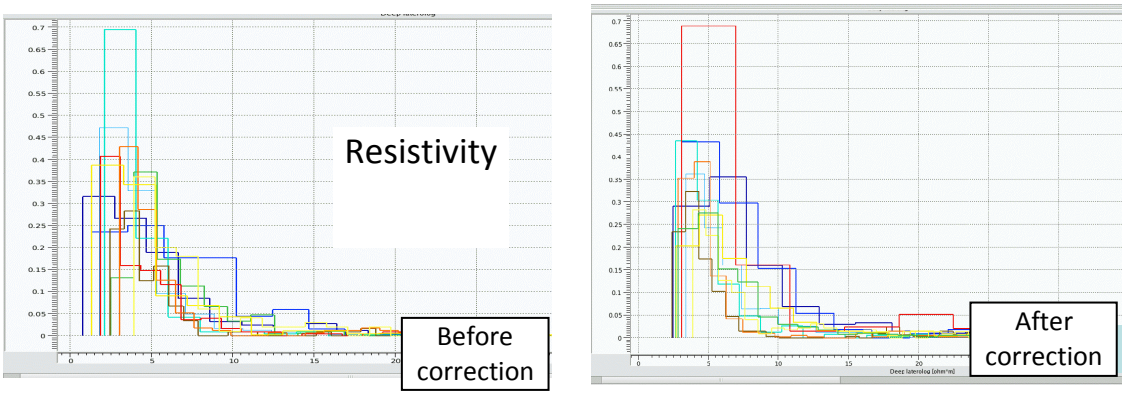

Fig 3 The resistivity curve standard before and after contrast histogram distribution

3.3 PARAMETER ANALYSIS OF RESERVOIR SENSITIVE LOG

After editing and correction of logging curves,the sensitivity analysis of the curve is carried out,and the sensitivity analysis is the basis of reservoir prediction.By multi well analysis,a single curve is difficult to distinguish sand shale.

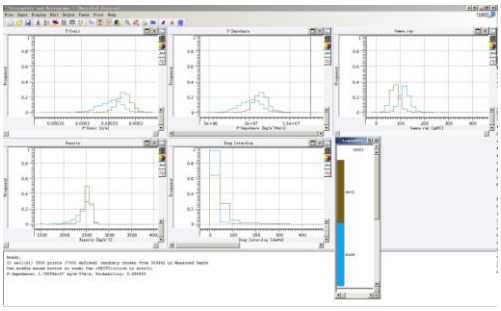

Fig 4 Sensitivity analysis of well logging curve sand mudstone and effective reservoir

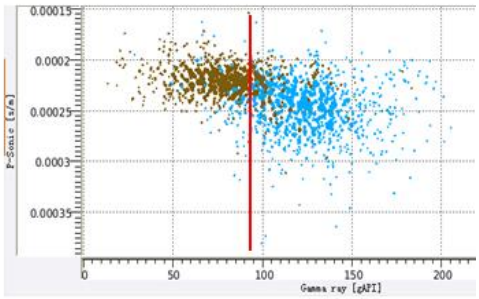

Fig 5 Logging curve sand - mudstone intersection analysis

From (Figure 4),the natural gamma and resistivity curves of the sand and mudstone are better,and a few of the sand and mudstone overlap,the effect of the wave impedance curve is slightly worse,the sandstone is located in the high value zone,and the part of the mudstone is overlapped.From the above analysis,it can be known that any single curve of the study area is difficult to distinguish the sand shale one one.Through the curve intersection analysis,the multi curve intersection makes the ability to distinguish the sand shale and the effective sandstone.First of all,using (Figure 5) to identify the sand and mudstone,on the basis of the identification of effective sandstone,to complete the high precision reservoir prediction.

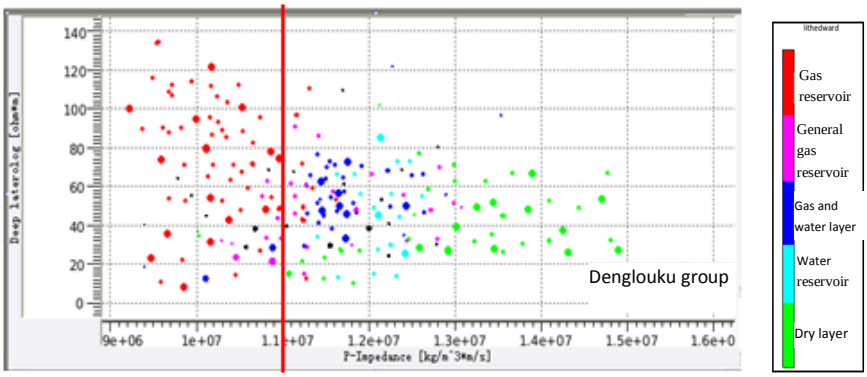

Fig 6 Threshold value of gas reservoir

Thus it can be seen that establishing well seismic relationship through conventional wave impedance inversion,based on,to the original seismic as constraint condition,high resolution wave impedance,resistivity and gamma ray geostatistical stochastic inversion,reuse between them the intersection relations delineated pickup range,oil-bearing sandstone and sandstone were extracted,and extract the effective reservoir thickness distribution,on the basis of mud and sand,distinguish the,under the background of high impedance low impedance region containing the reservoir wave impedance is less than 1.1e+0.7 identified as containing gas (Figure 6).

3.4 RELIABILITY ANALYSIS OF SEISMIC INVERSION RESULTS

The inversion method for the local area is determined and the data of the two dimensional seismic data is calculated by using the model.We are from qualitative to quantitative,from the profile to the plane to analyze the reliability of the inversion results.

3.4.1 Resolution analysis of seismic inversion results

Firstly,the accuracy of the inversion results can be determined by using the curve of the well and the shape of the curve.Only in the inversion of the inversion results,the accuracy of the results can be obtained.(Fig.7) for the accuracy and resolution of the inversion,we can see that the inversion can be seen from the lowest to 0.6 meters of the reservoir,and the inversion of the reservoir is in accordance with the geological law,and the location of the reservoir is in accordance with the well `data.

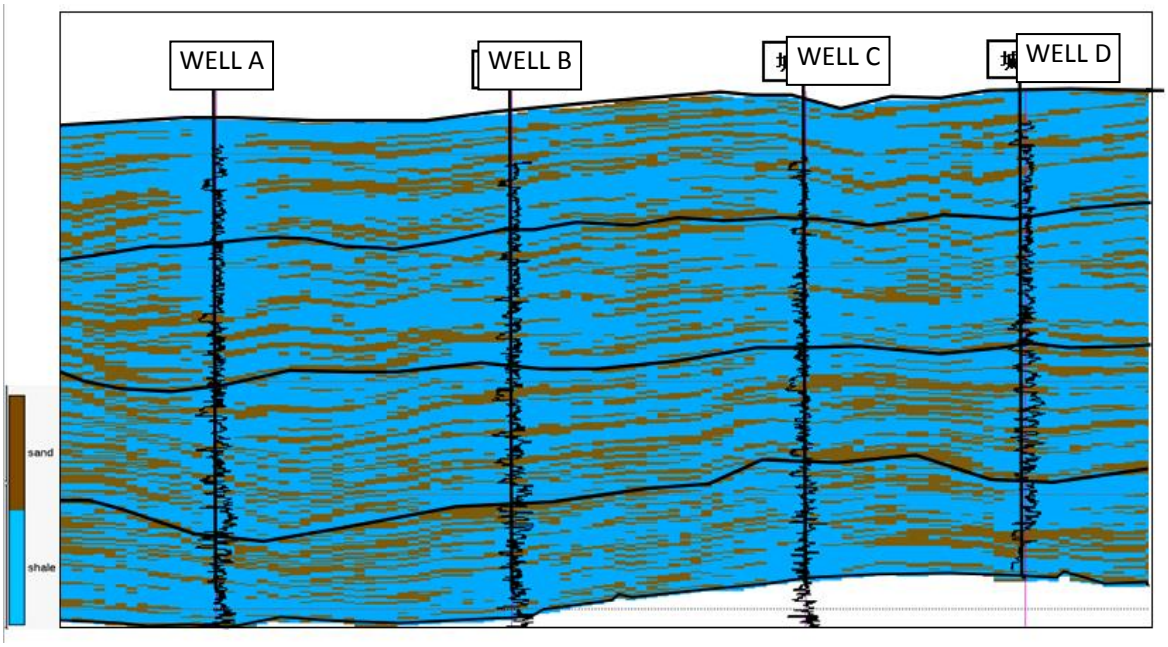

Fig 7 High resolution inversion profile

3.4.2 Qualitative analysis of seismic inversion results

In the plane,we can analyze and verify the results of the inversion results based on the geological background analysis and the seismic properties of the area.From (Figure 8) we can see that the distribution of sandstone in the graph is consistent with that of the area,and it can reflect the general rules of the reservoir development.

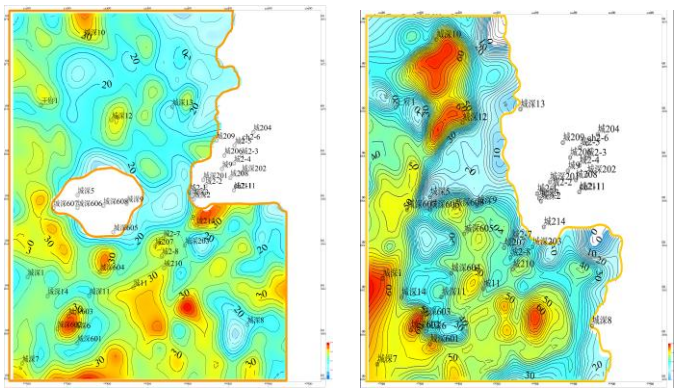

Fig 8 Deng three、two section of sand body thickness prediction

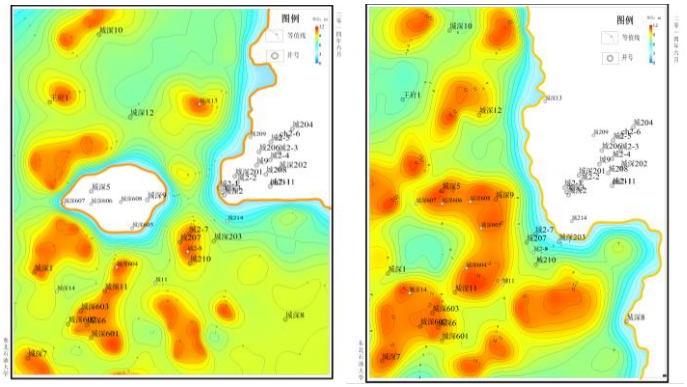

Fig 9 Deng two、the three segment effective reservoir distribution map

Denglouku formation sand bodies along the NE-SW to a banded distribution,ascend three stratigraphic changes greatly,the sand body controlled by sedimentary,thicker in the West and thinner in the East,small distribution range; Deng second period of sand body along the direction of the source is developed,sandstone thickness is larger,but the distribution is not uniform,deep city 6 well area,palace of a feudal prince 1 well area,the city deep 2 well section of sand bodies are developed; Deng three local strata have truncation,but also can obviously see the sand body along the direction of the source distribution.

The sand bodies of the Lou bank have the characteristics of thin thickness,poor continuity and heterogeneity,and have the characteristics of delta deposits.The study area is dominated by braided river delta plain and front deposition,and the individual development of Braided River Delta and shore shallow lake,sandstone development,but the sand body is not uniform distribution,the reservoir physical property is poor.

Comprehensive reservoir prediction method,the sand body prediction results are consistent,namely sand bodies along the North East Nancy provenance direction distribution,braided river,water diversion channel and mouth bar microfacies distribution area is the reservoir sand body development area; rock types of the area for tight clastic rock storage,reservoir physical property is poor,underwater distributary channel micro phase physical properties are relatively good.Prediction results show that the sand body thickness and actual drilling data are in good agreement with the development of sandstone in the northern part of the palace.

On the basis of the sand body prediction,the low impedance region of the high impedance background is the gas bearing formation,and the wave impedance of the spring is less than 1.05e+0.7.The impedance of the reservoir is less than 1.1e+0.7.The gas reservoir distribution map is consistent with the trend of the sand body prediction,which is relatively high (Figure 9).

IV. CONCLUSION

Through the application of the group of the Royal Palace in the palace of the palace,it is indicated that the geological statistics method can predict the reservoir effectively,and can clearly reflect the variation of the sand body in the well.The sand thickness prediction map is compared with the actual drilling data,the coincidence rate reaches 80%,and the thickness of the sand layer is consistent with the sand body distribution,and the thickness of sandstone is the distribution area of the braided channel and the water diversion channel and the mouth bar microfacies.So the results of this study can be used in the next step to guide the distribution of favorable areas.

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