Study on fine anatomy method of Offshore dam sand body

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Abstract: The offshore bar type sedimentary environment is generally formed under the conditions of gentle slope, rich sandy sediment, and strong wave action. It is a high-energy sedimentary body under wave action. The sediment is generally uniform in particle size, excellent in separation, less in argillaceous content and good in physical properties. This kind of sand body reflects on the sedimentary facies belt map that the sand body of the sand dam is connected and developed, the horizon is connected, and the surface is very homogeneous [1]. However, through the dynamic analysis in recent years, there is uneven effect. In this paper, block A is selected as the research block. On the basis of the thin-layer sand plane sedimentary model map controlled by the lithologic thickness, the energy phase distribution map of single sand body is drawn by referring to the permeability equivalent map and logging model map. It provides a powerful technical support for the analysis of remaining oil and the adjustment of measures.

1. Introduction

On the sedimentary facies belt map, the sedimentary environment of the offshore dam reflects that the sand body of the sand dam is developed in a continuous way, the layers are connected, and the surface is very homogeneous. However, through the dynamic analysis, there is a good contact relationship between the single layers on the surface of the sand body, but the effect results are quite different, and the internal seepage law of the sand body is unclear. Through the investigation, the field outcrop shows that the energy of the sand body in the same layer is not homogeneous on the plane, and the energy is weakened from the main sand body to both sides.

Block A is one of six water drive fine potential tapping demonstration areas selected by Oilfield Company. From the distribution of remaining oil after fine potential tapping, the distribution of remaining oil is relatively scattered after fine potential tapping. According to the classification of oil layers, they are mainly concentrated in the thin difference layer of outer front facies, and the remaining geological reserves account for 59.88% of the total area. The offshore dam belongs to the sedimentary environment with relatively large effective sandstone thickness in the thin layer sand of outer front facies and profound research significance. In this paper, through the fine anatomy of the sand body of the offshore dam, the connection between the sand bodies is clarified, the geological understanding is deepened, and the water drive adjustment and optimization of measures can be more accurately guided.

2. Determination of Energy Phase of Offshore Dam

Under the repeated action of waves, the sand bodies of offshore dams are distributed in parallel wave crests. Because of the strongest energy at the wave crests, the coarsest particles are transported [3]. Under certain conditions, the coarsest particles are deposited at a wave crest, forming the dam prototype; because the water body is slightly shallow, the wave energy at the lake bottom is stronger, the transported particles are coarser, and the increased lake bottom has greater resistance to waves, resulting in coarser particles deposition In this way, such repeated accretion not only forms the typical anti rhythm of the offshore dam, but also forms the highest energy facies deposition with the highest dam body, the shallowest water body, the highest energy, the coarsest particle size and the largest thickness at the nuclear dam. From the nuclear dam to the surrounding dam body, the water body is getting deeper and the energy is getting lower, which makes the

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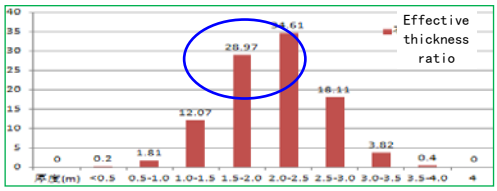
particle size getting finer, the separation getting worse, the mud content getting more and the thickness getting smaller, and then forms the energy phase deposition gradually lower, until the mud deposition becomes the lowest energy phase. This is the basic reason for the vertical and plane pattern of energy facies distribution in the offshore dam, and also the key factor for controlling the change of lithofacies, lithology and physical property.

The thickness of the sand body of the offshore dam in block a varies from 0.5m to 4.0m, with 0.5m as the equivalent distance, the lithologic thickness scale map (as in Figure 1) and the equivalent map (as in Figure 2) are drawn. According to the distribution proportion of the statistical effective thickness, the effective thickness is concentrated between 1.5m and 3.0m, with a proportion of 63.58% (as in Figure3). It can also be seen from the contour map of lithologic control that the places with large lithologic thickness are distributed in a lump shape, and the thickness outwards is gradually thinner, which is in line with the law of genetic analysis of the sand body of the offshore dam.



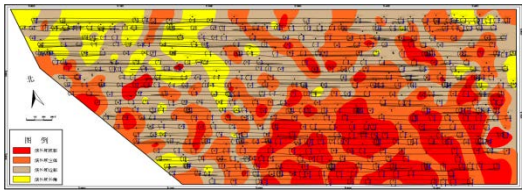


Fig. 1 Distribution proportion of lithologic thickness Fig. 2 Contour map of lithology control

The permeability of sandstone in block A is mainly between 120md and 300md, accounting for 68.82%.

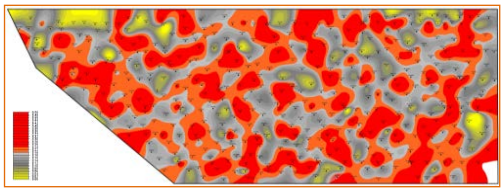


Fig. 3 Permeability distribution proportion Fig. 4 Permeability isogram

According to the sandstone thickness and permeability data proportion distribution of the offshore dam, the offshore dam is divided into six energy facies (as in Table 1): the core of the offshore dam, the main body of the offshore dam, the edge of the offshore dam, the main sheet sand, the non main sheet sand, and the surface reservoir.

Table 1 Classification of energy phase of offshore dam

Technological specification	Sandbank>=2.0		Main mat sand>=0.5		Non-main mat sand<0.5	untabulated reservoir=0
Energy unit	Dam core	Dam body	Dam sad	Main mat sand	Non-main mat sand	untabulated reservoir
Effective thickness(m)	>=2.5	(2.5~2.0]	(2.0~1.5]	(1.5-0.5]	(0.5-0)	=0
Permeability(mD)	>=230	180~230	120~180	<120	<50	
Mean permeability(mD)	338	201	53	70		
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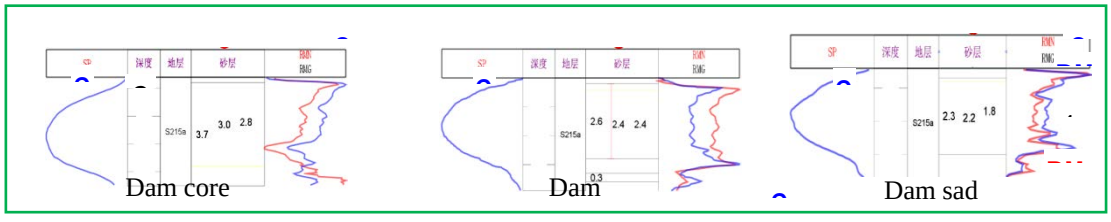

Figure 5 depositional model of energy facies in the offshore dam unit

The internal energy facies deposition model of the offshore dam microfacies is established (as in Fig. 5): the energy facies are in the form of irregular bands with parallel wave peaks, which are

nested from low energy to high energy; from the core to the surrounding, the energy is gradually low, the particle size is gradually fine, the bedding scale is gradually small, the shale content is gradually increased, the thickness is gradually thin, and the physical properties are gradually poor; the typical anti rhythm, top mutation, bottom gradient, wave bedding and mound are retained Shape and other common features of offshore dam.

3. Draw the Energy Phase Distribution Map of Offshore Dam

Based on the contour map of lithology control, the energy phase distribution map in the unit is drawn by referring to the permeability contour map and logging model map. If the well is 0.2m to the left and right of the boundary between the two energy phases, one energy phase can be moved up and down by referring to permeability contour map and well logging pattern map. For example, well x1, the effective sandstone thickness is 2.2m, which is subdivided according to the internal energy phase of the sand body and belongs to the main energy phase. However, because the permeability is 193md, lower than the average permeability of the main body (201md), and the curve shape is poor, the energy phase moving to the difference is classified as the edge sedimentary energy phase. The effective sandstone thickness of well X2 is 1.8m, which belongs to the edge energy phase. However, due to the permeability of 370md, compared with the average permeability of edge energy phase (153md), it belongs to the high permeability and good curve shape, so it belongs to the main energy phase.

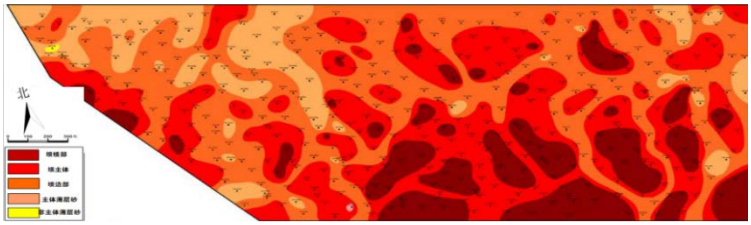

Figure 6 Energy phase distribution of offshore dam

4. Conclusion

Under the repeated action of waves, the sand bodies of offshore dams are distributed in parallel wave peaks and belts. According to the sandstone thickness and permeability data proportion distribution of the offshore dam, the offshore dam is divided into six energy facies: the core of the offshore dam, the main body of the offshore dam, the edge of the offshore dam, the main sheet sand, the non-main sheet sand, and the surface reservoir. When drawing the internal energy phase distribution map of the offshore dam unit, it is necessary to refer to the permeability equivalent map and logging model map on the basis of the lithologic control equivalent map.

5.Reference

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