THE INFLUENCE OF BIOTURBATION STRUCTURES CONTAINING *OPHIOMORPHA* ON PETROPHYSICAL PROPERTIES OF DONGHE SANDSTONE RESERVOIR IN CENTRAL TARIM BASIN CHINA

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Abundant bioturbation structures formed by *Ophiomorpha* are preserved in thick-bedded “clean” quartz sandstone in Donghe sandstone reservoir (Upper Devonian) of central Tarim Basin, China. The sandstone reservoir is interpreted as estuarine tide-bar sediments with low-angle bidirectional cross-bedding and tabular cross-bedding and has a good textural maturity and compositional maturity. Similar occurrences of *Ophimorpha* are reported from many localities (Bromley, 1990; Pollard et al., 1993; Anderson and Droser, 1998).

Based on the features of bioturbation and analysis of sandstone diagenesis and porosity structures, the bioturbation structures and the reservoir petrophysical properties appear to be a negative correlation. It means that the more intensely the bioturbation, the worse the petrophysical properties of the reservoir.

Bioturbation results in infilling of coarser•more permeable sediments within the bioturbation structures, rendering them more susceptible to be cemented by carbonate minerals in diagenetic stage. Because the quartz sandstone seems to resist mechanical compaction and has a high degree of mineralization, the mechanical compaction and carbonate cementation in early diagenetic stage is unclear, therefore, the original intergranular porosity is well preserved. The carbonate cementation in late diagenetic stage preferentially began within the more porous and permeable bioturbation structures, forming poikilotopic carbonate fabric. Cementation solidified sediments within the bioturbation structures with $CaCO_3$ precipitated from subsurface waters. The cements of ferroan calcite occupy the much pore space, consequently, the effective porosity and permeability is very low. The carbonate cementation in late diagenetic stage is not occurred in the places of no bioturbation or weak bioturbation, because the sandstones in these places have a smaller interconnected pore spaces than that of places of intensely bioturbation, therefore, the original porosity is preserved to the greatest extent. After the diagenetic reworking, the effective porosity in the place of no bioturbation or weak bioturbation is much higher than that of place of intensely bioturbation, so, oil preferentially flow into the no bioturbation or weak bioturbation sandstones with high effective porosity and permeability in the oil migration

process, oil migration is restrained in the intensely bioturbation sandstones with low effective porosity and permeability.