

The Controlling of Marine Donghe Sandstone Parasequence on Oil-gas Migration in Halahatang Area of Tarim Basin, China

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Many wells have seen numerous oil-gas shows in Carboniferous marine Donghe sandstone in Halahatang area of Tarim Basin, and their distribution is controlled by the high precision parasequence. Donghe sandstone is a set of quartz sandstone with foreshore and shoreface subfacies, with a good reservoir physical property and porosity of 11-20%. The marine Donghe sandstone can be divided into three parasequence sets. The upper parasequence set can be subdivided into four parasequences, overlying pebbly sandstone Member. The oil-gas show is concentrated in the upper parasequence set, and its position and degree is dissimilar in different wells. The wells with better oil-gas show are mainly distributed in the wells Ha7-9 and Ha16 of the northern Halahatang area, with 16m oil-bearing layer in the well Ha7-9. The northern oil-gas show is mainly located in the middle and lower parts of the upper parasequence set, and the southerly oil-gas show is gradually elevated, mostly at the top of marine Donghe sandstone Member, until it is seen in the pebbly sandstone Member. The distribution of the oil-gas show is generally characterized by migration from north to south. The organic geochemical analysis manifests that Hudson, Donghetang and Ha6 reservoirs are all conventional light crude oils with similar properties and equivalent wax, asphaltene and colloid content. The crude oil properties of Donghetang oilfield are homologous to that of Hudson and Ha6 crude oil, and these crude oils may be migrated from the north to the south by lateral adjustment.

Combining with the tectonic evolution and the analysis of the accumulation period, this area experienced a tectonic inversion from “low in the south and high in the north” to “lower in the north and high in the south” in the Late Himalayan period. Affected by this, oil and gas along sandbody drainage layer of the upper parasequence of Donghe sandstone Member, from the north to the south long-range lateral migration, the formation of multi-level oily, locally enriched lithological reservoirs. This understanding provided the geological basis for the next study of the reservoirs accumulation under the sequence framework, and has a certain guiding role in the next exploration.