

Main Controlling Factors and Spatial Distribution Model of Hydrocarbon Accumulation in Buried-Hill Weathering Crust and Bedded Karstification Carbonate Reservoirs, Halahatang Block, Tarim Basin

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Abstract

As marine carbonate rock in Tarim Basin becomes important areas for oil and gas exploration, a million-ton scale oilfield of carbonate rock has been put into production in Halahatang. However, the unknown key factors for oil/gas reservoir forming in buried-hill (weathering-crust) karstification belt of north part and bedded karstification belt slowed the integration degree of exploration and development. According to the difference analysis of these key factors, it can be concluded that faults played a very important role in reservoir development of carbonate rock, and the distribution of cap rock in the buried-hill area decided the preservation of oil/gas reservoirs. The pinched-out line of Ordovician Tumuxiuke Formation, south boundary of buried-hill (weathering-crust) karstification belt, and distribution characteristics of cap rock have been described and the karstification fractures-pores traps confirmed based on high-fidelity seismic data. Based on the fine structural analysis, faults-fractures identification by grades and paleogeographic reconstruction using geophysical technologies, such as multi-azimuth generalized Hilbert transform, carry out, it shows that the stages and properties of faults in this area have been clarified, fracture corridor formed by Caledonian-Hercynian NW compressive-torsional strike-slip faults controlled the development of karst reservoir and the NW strike-slip faults also formed many high-effective oil/gas charging points by developing the predominant pathway for oil/gas migration and accumulation in early stage. Himalayan NE tensile shearing strike-slip faults were the key for oil/gas adjustment towards the structural highs in the later stage. The two sets of them, which formed four predominant oil/gas migration systems, became the oil/gas abundant belts together with the local highs in the two sides of faults and large cave-cleft bodies of karstification remnant-hill among paleo-channels. Hereby, a spatial reservoir-forming model is set up and will guide exploratory drilling effectively.