Distribution and Major Control Factors of the Present-Day Overpressured System in Zhanhua Sag

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Abstract

According to the drilling stem test (DST) data, present-day overpressures commonly occur in the first, third and fourth members of Shahejie formation at depth between 2800m and 3800m. In this paper, the Eaton method is used to predict overpressure because of the obvious response between sonic transit times of mudstone and the overpressure. The reliability is verified by relationship between the predicted pressure of mudstone and observed pressure of sandstone, and the distribution characteristics and the controlling factors of the pressure distribution are analyzed. On the whole, in vertical two overpressure systems have been identified, including an upper system distributed in Es1, a middle Es2 formation is the distressed zone and a lower reservoir with primary overpressure in Es3 to upper Es4. The distribution pattern of formation pressure is controlled by tectonic, sedimentary and hydrocarbon generation. In plane, the overpressure is distributed in the east and the west subsags, the central low bulge has normal pressures. The faults and erosion can also lead to overpressure release, and the sedimentary facies and the thickness of mudstone are directly related to the material properties, affecting the overpressure preservation. In addition, the hydrocarbon generation also has the influence on the overpressure system.