The Structural Characteristics of Salt Rocks and Their Impact on the Oil and Gas Distribution in Yingxiongling Area, Qaidam Basin

Wu Na
CNPC, research institute of petroleum exploration and development, Beijing, China (tuzi0619@petrochina.com.cn)

Qaidam Basin is located at the northern Tibetan Plateau, western China. It is a rifted basin bounded by the Alkin, Qilian and Kunlun Mountains and filled by well-developed Cenozoic strata. The study focus is the Cenozoic upper and lower Ganchaigou formations which have significant influence on hydrocarbon distribution. The exploration discoveries in recent years are mainly concentrated in the sub-salt traps within lower Ganchaigou Formation.

The salt rock of the lower Ganchaigou formation have multiple unique structural characteristics. First, these salt rocks have a wide distribution and a large thickness. they are mainly distributed in the western part of Yingxiongling and Youyuangou area, with a stable thickness up to 300m, which are caused by extrusion due to major orogeny. Second, these rocks are characteristics by strong fluidity and plasticity. Influenced by tectonic movement, the salt strata show “dual structure”, as slide above and deep thrust below. Several traps are developed within the slide structural above and Layered or massive fractured carbonate rock traps are developed below and within salt strata in the lower deep trust belt. Third, salt rock has strong sealing ability. The widely distributed salt strata blanket the traps with lower Ganchaigou Formation. During the extrusion tectonic, the flow and wedging of the salt rocks expand the distribution area of the original salt depositions, resulting in enhancement of cap rock effectiveness.

The salt rocks of the lower Ganchaigou formation have significant impact on the oil and gas distribution. First, the slide movement formed two layers of deep and shallow oil and gas systems, and the widely developed structural traps are good hydrocarbon reservoirs, providing high-quality resources for multiple exploration. The seal ability of rock salts has a greater impact on reservoir performance. Second, the deep and high-yield oil and gas reservoir in the western part of Yingxiongling area mostly distribute within the lower salt rocks. Compared with the upper shallow reservoirs, they have higher reservoir pressure and higher single-well production. At the same time, the area of a single reservoir under the salt is also large.