Molecular Geochemical Signatures of Mixed Oils from the Mosuowan area, Central Junggar Basin

J. CAO, G.L. TAO, W.X. HU AND X.K. GAO

Department of Earth Sciences, Nanjing University, Nanjing 210093, China; guoliang_tao@163.com

There are three source depo-sags around the Mosuowan area, central Junggar Basin (NW China): West Pen 1 sag to the east, North Dongdaohaizi sag to the east, and Changji sag to the south. Consequently, oils currently explored in the Mosuowan area show mixed molecular signatures of three possible source sequences, which preclude a very clear geochemical description of different oils. In this study, we carried out a comprehensive analyses on 44 oil samples, in order to identify what source sequence and what sag are associated with oils here.

Five oil groups were defined. The first is derived from the Lower Wuerhe Formation sources, with high maturity. They are only found in the west margin of the oilfield. According to the maturity variation of oils, this oil group is believed to originate from the West Well Pen 1 sag. The second is the Jurassic oil, with low maturity. This group is only located in Well Dongdao 2, and is originated from the Changji sag and/or North Dongdaohaizi sag. The third is generated from the Fengcheng Formation, with a high biodegraded level. This group is only found in the central part of the Mosuowan uplift. Actually, the Fengcheng biodegraded oils are widely distributed in the study area, but most of them mixed with the Lower Wuerhe oils. They are widely distributed in the west and middle part of the oilfield, and is believed to come from the West Well Pen 1 sag. Lastly, the fifth oil type is characterized by mixed sources of the Permian and Jurassic source rocks. This group is only found in Well Pencan 2, which is located in the middle part of the Mosuowan uplift. Thus, we can conclud that the mixed oils come from the Jurassic source rocks of the Changji sag and/or North Dongdaohaizi sag, and the Permian source rocks of the West Well Pen 1 sag.

Based on the above analyses, combined with petroleum generation history, the oil charge history was tentatively reconstructed. The Fengcheng oils generated in Late Triassic, and fed into the Carboniferous to Triassic reservoirs. In Mid-Late Jurassic, some of these oils migrated to upper reservoirs, and had been biodegraded. The third group of oils formed. During Early Cretaceous, the oils derived from the Lower Wuerhe Formation matured. Some of them mixed with early charged oils, and the first and fourth oil group were formed, respectively. Then, in Late Tertiary，the Jurassic oils mixed with early oils, forming the second and fifth oil groups.

Therefore, in future petroleum exploration, the south slope of the study area should intrigue more interests as the Jurassic oils sourced from the Changji sag may accumulate in large volumes here.