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Tianguang Xu¹, Yongtai Yang², Shuhao Xue³ (1) Syracuse University, Syracuse, NY (2) RIPED, CNPC, China, Beijing, China (3) Research institute of Petroleum exploration and development, Beijing, China

Two Different Types of Nonmarine Source Rocks and Reservoirs of Jurassic Deposits of the Northern Qaidam Basin, NW China

The Qaidam basin, a nonmarine petroliferous basin, is located on the northeastern margin of the Tibet Plateau. It is roughly a diamond shaped, surrounded by the Altyn Tagh Shan Mountains to the northwest, Qilian Shan Mountains to the north, and Kunlun Shan Mountains to the south. Jurassic sedimentary rocks are widely distributed in the northern part of Qaidam Basin, especially in the Lenghu structural belt. The depositional systems of the Northern Qaidam basin during the Jurassic were predominately alluvial, fluvial, deltaic, and lacustrine.

Reservoirs and two different types of source rocks (coals and coaly mudstones versus mudstones without a coal component) were identified through analysis of outcrops, core samples, well logs, and seismic data. The distribution of source rocks and reservoirs is related to the depositional system. Non-coal-related source rocks are semi-lacustrine deposits, which are good potential hydrocarbon generators. Reservoirs are channel, point bar, river mouth bar, and turbidite deposits. Except for turbidite deposits, they contain a mixture of primary and secondary pores. Coal-bearing source rocks and coal-related reservoirs are controlled by delta and offshore lacustrine depositional systems, formed under acidic water conditions. The properties of sandstone reservoirs related to coal-bearing strata were characterized by low carbonate cement, high siliceous cement, and high kaolinite contents. Diagenesis, especially compaction and siliceous cementation, in the sandstone reservoirs causes low porosity and low permeability. The secondary pores, formed by the solution associated with organic acid, were predominant.