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Depositional System and Seismic Response of Subsurface Brines Reservoirs in Western Qaidam Basin, China

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It is a major continuous depocenter in Dalangtan area, western Qaidam basin since Early Cenozoic, which is most important Neogene salt deposits center in Qaidam basin. The Miocene Saline lake was developed firstly in northwestern Qaidam basin, which further formed 'Ground Potassium-rich brine in Qaidam' and Dalangtan potassium salt lake. It was drilled the sand-gravel strata hosting potassium-rich brine in Dalangtan area by China Geological Survey in 2012. Under the tectonic background of Eurasia Continental collision, the distance effect of northward compressive stress made the CaCl₂ brines-bearing reservoir to migrate and enrich from the deep Miocene and Pliocene strata to the shallow Early Pleistocene shore lake and pluvial facies sand-gravel strata since Quaternary, which is forming sand-gravel type Potassium-rich brine. Drilling data indicate there are abundant high salinity deep brine, and high grade Potassium, Boron and Lithium resources especially, in Tertiary strata in Qaidam Basin. It is almost being salting-out stage that underground brine and has more development and utilization prospect in western Qaidam.

The oilfield brine occurred the anticline structure position of fold structure system in the area, which are low mountains and hills geomorphology, the aquifer are composed mainly of slight cemented clastic rock and limestone. According to drilling record and logging data, the oilfield water accumulation strata including Pliocene Shizigou group and Upper Youshashan Group, Miocene Lower Youshashan Group and Upper Gancaigou Group, Oligocene Lower Gancaigou Group.

The sedimentary sequence model of different sedimentary facies drawn in the paper will provide with

some guiding significance in the searching for salt brine deposits in the terrestrial lacustrine and in the salt lake. Based on the numerous data and the use of the subjects and the methods of various kinds, the strata are divided near-source steep-slope type and far-source mild-slope type depositional System. The near-source steep-slope type are further divided alluvial fan, nearshore subaqueous fan, lacustrine depositional system and alluvial fan, fan delta, lacustrine depositional system, which distributed mainly on Qigequan, Shizigou, Gancaigou, Xianshuiquan, Honggouzi and Yueyashan Area; The far-source mild-slope type are further divided braided river, fan delta, lacustrine depositional system, which distributed mainly in Western Qaidam area. During the lake basin expanding period, clastic rock supply is insufficient and it developed internal source depositional system, which include mainly carbonate rock and gypsum salt rock.

There are 2D and 3D seismic Data covering the Youquanzi, Nanyishan, Xiaoliangshan, Dafengshan, Chahansilatu, Heibeiwadi and Kuntayi tectonic. By the quality analysis on seismic data, the data in Heibeiwadi and Chahansilatu area is relative better, where was drilling arranged, and it may meet the requirement for reservoir prediction and evaluation. The seismic data in the mountainous area and high zone of the structure are characterized by poor quality.

The strata bearing potassium brine has seismic response characteristics of strongly reflection intensity and relatively poor continuity seismic event on profile, and the reflection energy are fragment distribution in the seismic attributes profile of reflection intensity. By studying the seismic response and identification of the strata bearing brine, combined logging interpretation and drilling information, we further carried on seismic data interpretation and Reservoir bearing brine characteristics

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and prediction, the different characters of reservoir distribution are pointed out.

Key words: subsurface brines reservoir, depositional system, seismic response, western Qaidam

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