Wireline Evaluation of Key Parameters of shale rocks in LCG Formation, JMSR sag, Junggar basin, China

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High quality lacustrine shale rocks which average TOC was higher than 4% were developed in LCG formation, Permian system, JMSR sag, Junggar basin. Because of the lacustrine sedimentary environment changes rapidly, rock types are so complicated that there are 64 types of rocks from lab slice analysis in one well and thin layer (less than 0.5m). So, it is very difficult and also important to evaluate the shale rocks by wireline method. Multiple methods like combing core analysis, NMR and common logging data are used to set up common logging data evaluation model to obtain the key parameters of shale rocks in this article, such as the following. (1) According to the sedimentary structure, mineral composition, the TOC content, porosity and other factors, rocks in LCG could be divided into 5 types which are carbonate-rich mudstone, siliceous mudstone, carbonate rock, carbonate-rich sandstone and siliceous sandstone. (2) Cluster method is employed in lithology identification. Based on the system core description of two wells and combing with electrical characteristics of conventional logging data, cluster model is established. Matching model result with core, parameters are adjusted and a new model is formed. This new model can be applied to other wells. The predicted coincidence rate is over than 80%. (3) TOC evaluation model. For lower maturity area, △LOGR method is employed in TOC calculation. Regard to the formation’s characteristics of thin layer, low permeability and changing fast lithology, Rxo is adopted instead of RT (traditional use) because of its better depth investigation so that the result can be more accurate. (4) Porosity evaluation model. NMR porosity is interpreted by core calibration and then combining with result of mineral content measurement to establish common logging data porosity evaluation model. The model-derived porosity of other wells can also match core data very well.(5) Sw eavuation model. Linear relationship between total porosity and hydrocarbon porosity having been demonstrated by experiments, the regress equation can be used to calculate hydrocarbonate saturation. The Sw derived from the model matched the core data very well.