Research on the Sedimentary Characteristics of Braided Fluvial Delta on the Gentle Slope Belt of Rift Lake Basin: A Case Study of the First Member of Shahejie Formation of the South Slope Area in Nanpu Sag in Bohai Bay Basin

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ABSTRACT

Based on sequence stratigraphy and studied facies from single well to joint well then to plane facies, the first member of Shahejie Formation(Es1) of the Southern Slope in Nanpu Sag in Bohai Bay Basin was a braided fluvial delta-shallow lacustrine/turbidite sedimentary system which developed on the background of the gentle slope belt of continental rift basin. By means of core observation, logging, and seismic,the braided fluvial delta sedimentary facies of the gentle slope of rift lake basin that controlled by various factors(including tectonic movement, sediment supply and lake level fluctuation, etc.) was researched. In Es1 stage, Nanpu sag was in strike-slip faulting period with lacustrine deepened. The base was lower in NW and north, and relatively higher in NE and south. According to the SW-NE direction paleocurrent, the sediment source was claimed to originate from Shaleitian Heave in the SW direction by analysing the distribution of light minerals and heavy minerals. The abundant sources and relatively high topographic condition led to the SW-NE dirction thicken braided fluvial delta front deposition: the granularity got finer from bottom up: from sandy conglomerate to medium coarse sandstone to fine sandstone and carbonaceous siltstone; the seismic showed foreset facies and filled facies. In the south, the main deposition of delta front was underwater distributary channel: the grain size probability plots mainly developed two-segments(the suspension components and the jump components); the sedimentary structure was mainly oblique bedding, wave bedding, and scour surface appeared in the sandstone bottom. Towards north, the mouth bar facies gradually developed, displaying obvious reverse grain size sequence and funnel-shaped logging curve. Between distributary channels, a large amount of underwater inter-distributary bay mud developed. On the gentle slope of rift lake basin, the relatively high terrain location blocked the transportation deposition of sediments and resulted in: shallow beach bar deposition with gray thick sandstone developed near source area; gravity flow deposition, commonly sandy debris-flow in the north abyssal region. At the mountain exit, alluvial fan was not developed because of the gentle slope belt background. Finally, a “south--braided fluvial delta; north--shallow lacustrine/turbidite” sedimentary system on gentle slope belt established and could be applied into further oil exploration.