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Sequence Stratigraphy and Sedimentary Facies Analysis of Shahejie Formation in Nanpu Sag of Bohai Bay Basin,China

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Nanpu sag in Huanghua depression of Bohai bay basin is trapped in the northern part of an oil and gas tectonic units, in the north China platform basement, classics, in the new generation of fault block movement and the development of a north-south, east-west ultra-broken composite basin depressions, Formations of the bottom-up developed Shahejie, Dongying, Guantao and Ming town. It is based on a review of 2400 feet of core data from 15 wells, outcrop, logs from 200 wells and high precision 3D seismic data of 160 square kilometers that the Paleogene Shahejie formation in the Nanpu depression can be researched as three-grade sequence and divided into two system tracts: transgressive system tract and regressive system tract.

Transgressive fan delta is a subaqueous depositional body formed at the transgression phase with a fining-upward sequence. The characteristic of dark mudstones reflects the depositional environment is mainly shore-shallow lacustrine. This type of fan delta appears in the early filling stage of monocyclic basin or transgression phase of polycyclic basin. Based on the study of depositional environment, lithology, sedimentary sequence and seismic reflection characters, it can be further divided into 3 sedimentary microfacies: proximal fan, middle fan and distal fan. Proximal fan is formed by intermittent water flow and braided channel sedimentation with conglomerate of poor sorting and layered property, imbricate conglomerate and gravelly sandstone with rough parallel bedding and, sometimes, large cross bedding. Middle fan front formed the main part of the fan delta with highly-developed braided channel, which can be divided into middle fan braided channel, the front of mid-fan and interchannel microfacies. The clastic rocks of the middle fan braided channel are mainly sandy conglomerate or gravelly sandstones. Its sedimentary structure includes massive beddings, graded bedding, parallel beddings, cross-beddings as well as an erosional basal surface. The braided channel extension towards basin forms the mid-fan front and changed into finer grains with better sorting and more cross bedding. The channel soursing decreased and wave energy increased. The middle fan interchannel is characterized by celadon to grey mud and thin sandstone with massive bedding and small cross-bedding and deformational structures. Distal fan is formed in semi-deep lacustrine and the lithologies are mainly grey mud with thin sheet sand.

When relative lake level drops, wave energy decreases, fluvial energy increases, the dereliction fan delta is formed. Facies distribution is complete on plain with a coarsening-upward sequence. It can be divided into fan delta plain, fan delta front and front delta facies. Fan delta plain is mainly composed of

conglomerate and glutenite clay brown, yellow, green and the variegated mudstone, and is braided river channel and paroxysmal water deposits. The braided channel developed imbricate structure, parallel bedding and cross bedding, spontaneous potential curve performed jagged box shape. The fan delta front deposits sandy conglomerate, sandstone with gray-green mudstone and a small amount of inferior oil shale, consisting of braided channel, bar and sand sheet spontaneous potential curve performed box shape, funnel-bell shape and finger shape. The fore-delta entered a deep lake and developed Sage green, dark grey mudstone.

Lacustrine Fan delta developed good reservoir rock facies, also can form structure and stratigraphic trap, combined with the downdip direction has plenty of oil source, so it has been the main target of oil and gas exploration.

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