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RESERVOIR CHARACTERIZATION IN A SEQUENCE STRATIGRAPHIC FRAMEWORK, BELIDA FIELD, WEST NATUNA SEA, INDONESIA

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ABSTRACT

The Belida Field was discovered in November, 1989. Sandstones of the Lower Arang and Udang Formations form the productive reservoirs, which are pressure isolated by a regionally extensive shale unit, the Barat Formation. Recent studies have allowed the three major lithostratigraphic units to be subdivided into seven fourth-order depositional sequences, which define the reservoir architecture and control reservoir performance.

The Belida accumulation is controlled by pronounced middle Miocene structural inversion of a minor extensional system, located between and en-echelon to the regional West Natuna and Penyu Oligocene rift systems. The approximately 200 m thick gross interval, which includes the producing reservoirs, ranges in age from late Oligocene to early Miocene. The depositional environment was predominantly nonmarine to marginal marine and precise age determination is problematic. Syndepositional tectonic control on relative sea level and stratigraphic architecture includes the effects of differential compaction over the original extensional system and the late onset of subtle inversion. Low average accumulation rates for the gross interval of 4 cm/1000 years are attributed to limited accommodation space and extensive reworking. Productive reservoir facies include storm and wave-dominated lacustrine shelf, wave-dominated lacustrine delta front, and tidal and wave-dominated marine shoreface sandstones. The lithostratigraphic formations can be considered as the systems tracts of third-order depositional sequences. The Udang Formation displays lowstand affinities in that it is dominated by non-marine facies and high frequency depositional sequences, characterized by major basinward shifts and subaerial exposure. The producing units of the Lower Arang Formation consist of stacked marginal marine parasequences of third-order transgressive and highstand systems tracts. Major differences in reservoir and aquifer performance between the Lower Arang and Udang sandstones can be attributed to the different stratigraphic architecture and depositional processes within the third-order systems tracts.

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