

PERTEMUAN PERSATUAN Meetings of the Society

Ceramah Teknik (Technical Talk)

Outcrop analogues of subsurface reservoirs in NW Borneo

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Laporan (Report)

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Abstrak (Abstract)

Neogene strata that outcrop in NW Borneo represent the same successions that occur in the subsurface where they include important petroleum reservoirs. By integrating sedimentology, ichnology and microfossil analysis, nine sedimentary environments that contribute to the stratigraphic architecture have been characterised. They consist of fluvial channels, distributary channel fill, tidal flats, tidal channels and embayment mudstones plus upper shoreface, lower shoreface, and shelf deposits. Of these, upper shoreface sandstones and tidal sand complexes that include both tidal channel and tidal flat sandstones are the best reservoir facies based on their abundance and sedimentary characteristics; the other facies are either too muddy or uncommon. The sand body geometry and reservoir properties of tidal sands are considerably different from those of upper shoreface sands.

Three depositional settings with radically different hydrodynamic regimes are recognised within which the various sedimentary environments occurred. Interpretation of depositional setting was based on outcropping facies associations and was greatly assisted by observations of comparable modern environments and settings on the NW Borneo margin. There is not a one-to-one relationship between depositional setting and sedimentary environment; some facies occur in more than one setting whilst others are restricted to one setting only. Two of the settings, open marine shorelines and tidal embayments, account for nearly all of the outcropping strata. The third setting, large deltas based on the modern Baram Delta, has been widely used as a model for much of the Miocene strata. However, the results of this study suggest that similar systems may not have contributed significantly to the depositional Miocene sands.

The ideal stratigraphic succession for a progradational parasequence in a tidal embayment differs from that on an open marine shoreline. Generally, the shelf and lower shoreface strata that form the basal part of the shoreline succession appear similar to the embayment mudstones that are their tidal embayment equivalents. The main differences appear in the shallow water to coastal facies where upper shoreface and beach deposits occur on open marine shorelines whilst tidal flat and tidal channels occur in tidal embayments. Therefore, the two most important reservoir facies, upper shoreface and tidal sandstones, are stratigraphic equivalents in different depositional settings.

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