The west Baram Delta, offshore Sarawak — new focus of exploration

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Exploration in the West Baram Delta commenced in about 1909. The first exploration well, Miri-1, drilled in 1910, resulted in the discovery of the Miri field which ultimately produced about 80 MMB of oil before it was abandoned. Since that time, a total of some 50 exploration wells have been drilled in the West Baram Delta, resulting in the discovery of some 1.4 billion barrels oil and 5.7 TCF gas in some 20 accumulations.

The West Baram Delta is characterised by the deposition of a northward prograding delta. Periods of delta outbuilding were separated by rapid transgressions, represented by marine shale intervals which form the base of the various sedimentary cycles recognised. The regressive sequences of each depositional cycle grade northwestwards from coastal-fluvio-marine sands to neritic, marine shales, and the depositional cycles become successively younger due to the overall outbuilding nature of the shelf systems.

Since Middle Miocene, the Baram Delta has been subsiding relative to the more stable Central Luconia Province along the major NW-SE trending West Baram Line. This line forms the carbonate palaeo-shelf edge. Within the Baram Delta, major increases in sedimentary thickness occur across growth faults which generally trend SW-NE in the main depocentre but swing towards the NW-SE direction, in trend with the West Baram Line in the west. Sediment supply was derived mainly from the south-southeast, and the southwest. The tectonic style of the West Baram Delta shows the interplay between two main types of deformation, namely gravity-induced syndepositional growth faults, and Late Miocene or early Pliocene wrench-induced compressional folding with NE-SW trending axes. The intensity of wrench-induced deformation decreases basinward and growth faulting is the dominant tectonic style in the outer part of the shelf.

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The conventional play in the West Baram Delta is Middle Cycle V to Cycle VI stacked topset sands in rollover and fault-dependent structures on the downthrown side of growth faults. The interference of post-depositional tectonics with the syndepositional growth fault systems results in a broad style of both fault- and dip-dependent closures. Traps may be enhanced by a stratigraphic component, e.g. lateral shale-out, shale-filled channel. The play types can be broadly classified as Cycle V and VI topsets in structural traps, hanging wall closures with topset and foresets juxtaposed, fault intersection or splay fault traps, combined structural and stratigraphic traps, near field potential, overpressure play, and turbidites.

Exploration in the West Baram Delta has essentially been focused on the conventional topsets in structural traps. This play has mostly been tested, and few untested prospects remain. However, to develop the other play types and reduce sub-surface risks would require the applications of the full spectrum of modern geological and geophysical technology which, to date, have not been fully exploited to explore the West Baram Delta. In June 1997, Carigali and Shell embarked on a joint venture to explore the West Baram Delta covered by Block SK307.