Characteristics and Hydrocarbon Potential of the Fractured Puri and Mendi Limestone Reservoir in Papua New Guinea

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This study examines the reservoir potential of the Mendi and Puri Limestone, which developed on the northern Australian continental margin from the Middle Eocene to Miocene. The Puri limestones are dominantly a deepwater micritic foraminiferal facies type, contiguous with the platform carbonates of the Darai Limestone. Due to its fine grainsize, the Puri limestone has limited potential for secondary diagenetic induced matrix porosity development. The best potential for porosity development is therefore tectonic fracturing or enhancement of pre-existing systematic fracture sets during Late Miocene to Pliocene transpressional deformation.

The Puri-1, Bwata-1, Kuru-1 and 2, Moose-1 and 2 and Triceratops-1 wells have shown that fractured limestones exist, have good reservoir properties and represent attractive and viable hydrocarbon exploration targets. Given that fractures and faults have acted as fluid migration conduits, and have been the principal storage sites; fracture orientation, spacing and aperture have been quantified in surface and subsurface intervals of the Mendi-Puri sequence. Results from surface studies indicate a primary bimodal ENE and NW- trending fracture distribution, with a corresponding approximate calculated porosity of <5% and permeability of <180md. These data are comparable to calculations made directly on core from the Moose 1 and 2 wells, which yielded approximate calculated porosity of <7.3% and permeability of <136md. Core data has identified high and low angle fracture sets, with porosity and permeability increasing in zones of increased dolomitisation. Imaging logs, FMI and DSI, in conjunction with "combo logs" have further constrained subsurface fracture distribution, aperture, and fill type. Finally, a conceptual model for the origin and extent of fractures in these carbonates is presented for the eastern Papuan Basin.