

THE POST MAUI CHALLENGE; PRE-NEOGENE FRONTIER PLAY CONCEPTS, TARANAKI BASIN

G P Thrasher, P R King, H F Mingard, J M Beggs, R A Cook
Institute of Geological and Nuclear Sciences
P O Box 30368, Lower Hutt

Abstract

Taranaki Basin is still only moderately explored for hydrocarbons. Discoveries large enough to replace depleting Maui Field reserves are possible, but will depend on the development of new play concepts. The pre-Neogene sequence contains thick and laterally extensive potential reservoir units, in proximity to thermally mature, organic-rich source rock strata, and large structural and stratigraphic closures. Deep burial, and consequent reservoir degradation, are considered to be major obstacles to exploration in pre-Neogene plays in Taranaki Basin, but good quality reservoirs at depth cannot be ruled out. In keeping with the distribution of mature source rocks and known occurrences of petroleum, pre-Neogene plays are concentrated in the southern and eastern regions of the basin.

Play types in the pre-Neogene sequence can be subdivided by stratigraphic unit as follows:

Kapuni Group Plays: The main reserves of Maui, Kapuni and McKee fields are reservoired in Eocene-age Kapuni Group sediments, therefore it is a fairly well explored unit. Additional exploration potential lies in flank plays, especially around the periphery of the Maui Field, in plays associated with Mt Egmont, along the inferred extensions of the McKee Formation (especially to the south and west), and along the southward pinchout of the sands within the group onto basement.

Moa Group Plays: Although numerous shows have been encountered in the Paleogene Moa Group, no production has been established from this mainly fine-grained marine sequence. Exploration in the Moa Group depends on locating anomalous sand bodies, such as the Tangaroa Fan play. Paleogeographic reconstructions suggest other Paleogene fans should be present southward and landward from the Tangaroa Fan. The Turi-1 well may have intersected one such fan. Other Moa Group plays worthy of consideration include detached low-stand shorelines seaward of the Kapuni Group shoreline trend.

Paleocene Basal Sand Plays: Transgressive shoreline sand deposits, usually resting on residual basement highs, have been encountered in many places in Taranaki Basin. These sand units yielded shows in the Tangaroa-1 and Witiora-1 wells.

North Cape Formation Plays: This widespread, sand-dominated shallow-marine system is perhaps the most under-explored unit in the basin. Restricted to the latest Cretaceous, the North Cape Formation has considerable potential, but is often very deeply buried. The formation has not been penetrated by any well drilled on the Taranaki Peninsula, although closure exists under many onshore fields and prospects. Offshore areas where the North Cape Formation warrants close scrutiny include the southern pinch-out trend and the anticlinal folds of the south.

Rakopi Formation Plays: The Rakopi Formation is a late Cretaceous, sand-rich fluvial sequence which is largely untested and often deeply buried. Seal is a problem for many Rakopi Formation plays, but intraformational seals are possible. Significant shows have been encountered in this formation by the Maui-4 and Cape Farewell-1 wells, both of which are in anticlinal folds of southern Taranaki, but out of structural closure at Rakopi Formation level. Stratigraphic pinchouts of this unit are common throughout south Taranaki, and some potential exists for deep plays under the Taranaki Peninsula.

Authors

GLENN THRASHER was educated at the University of Alaska, Oregon State University and Victoria University of Wellington. He joined the New Zealand Geological Survey (now the Institute of Geological and Nuclear Sciences) in 1982 and is presently Section Leader for Sedimentary Basins.

PETER KING holds an MSc (Hons) from Waikato University. He has worked as a production geologist for Shell International, and is currently a scientist with the Institute of Geological and Nuclear Sciences, specialising in Taranaki Basin geology.

HUGH MINGARD obtained his BA in Geology from Oxford University. He has 6 years experience in petroleum exploration and is presently with Cairn Energy in Edinburgh.

MAC BEGGS was educated at Otago University and University of California, Santa Barbara. He has 7 years experience in North American petroleum exploration, followed by 5 years of research on New Zealand sedimentary basins. Mac is presently Group Manager, Hydrocarbons, for the Institute of Geological and Nuclear Sciences.

RICHARD COOK received his PhD from Victoria University of Wellington. He had 4 years of international exploration experience with Texaco, prior to joining the Basin Studies Group of the Institute of Geological and Nuclear Sciences (then NZ Geological Survey) in 1978. He has published papers on basin studies, petroleum geochemistry and resource evaluation.