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#### ABSTRACT

Author(s) : Chris Uruski  
Company Affiliation : Institute of Geological and Nuclear Sciences, NZ

### **Petroleum Potential of the Offshore East Coast Basin North Island, New Zealand**

The East Coast Basin has teased exploration companies for more than a hundred years. Its more than 300 oil and gas seeps and spectacular geological structure have been explored by more than 40 wells, only three of which have been offshore. Results have been tantalising, with more than 70% of the wells drilled yielding oil or gas shows. Westech's two gas discoveries onshore at Kauhauroa and Tuhara in northern Hawkes Bay remain un-developed at present.

There were strong gas shows in all three wells drilled offshore. Hawke Bay-1 was drilled in 1976 and it discovered a significant gas column. The well was never tested and was not logged for the 500 metres above TD. This section of the well was damaged when drill pipe became stuck in swelling clays.

Titihaoa-1 was drilled off the Wairarapa coast in 1993 to a TD of 2,743 m. Overpressure and a large gas kick were encountered below a Miocene marl at around 1700 m. Despite an increase of mud weight to control the overpressure, strong gas kicks were experienced for the next 500 m. The top 100 m of the overpressure zone was badly caved and logs in this zone are considered to be unreliable. The deeper gas is thought to be solution gas. Both of these wells were drilled during a time when the giant Maui field was supplying most of New Zealand's gas needs. The third well, Tawatawa-1 was drilled in late 2004, also off the Wairarapa coast and encountered "elevated gas readings", but poor reservoir.

Although the offshore East Coast Basin is still poorly covered by seismic data, more than 50 structures are recognised, many of them very large. Known source rocks such as the Whangai and Waipawa formations are of marine origin and capable of generating both oil and gas. However, much of the gas encountered in the wells and in some seeps is dry, giving rise to speculation that there may be a strong biogenic component. Many amplitude anomalies are observed and, in deeper water beyond the shelf edge the sparse seismic coverage shows extensive bottom simulating reflectors (BSRs) generated by gas hydrate deposits suggesting that there is abundant gas in the system.

Good reservoir facies are abundant in the East Coast Basin. A wide range of Miocene and Pliocene sands and limestones, with porosities of 20% and above are known from outcrop and have been drilled.

At the time of writing, the New Zealand government are planning a 4000 km high-quality 2D survey to cover some of the least well-known regions of the East Coast Basin. It is planned to release the data set, free of charge to interested exploration groups in advance of a planned licencing round. This paper will discuss some of the initial results of that survey.