

### **Integrated Structural and Stratigraphic Analysis in PPL 175, Papuan Fold Belt, Papua New Guinea**

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The dominant hydrocarbon exploration risk in PPL 175 is trap definition; more specifically, the ability to assess reservoir involvement and predict subsurface reservoir position in an area where anticlines are not as well defined on the surface as elsewhere in the Papuan Fold Belt. To date, exploration using seismic data has not been successful, and consequently much effort has been expended on investigating structure via field data gained from surface geological traverses.

PPL 175 has rugged terrain with complex geology, and poses substantial technical and logistical challenges to exploration. Consequently it has not yet been fully explored for hydrocarbons. An exploration strategy has been formulated for the current exploration phase based upon the following principles: (1) utilise all previous basic data (predominantly in digital format); (2) develop a regional chronostratigraphic framework applicable across the whole of PPL 175; and (3) incorporate the stratigraphic framework into a regional structural evaluation.

Exploration emphasis within PPL 175 has been to incorporate all available surface and SAR data into a surface geological map. In an effort to increase surface mapping resolution and accuracy (and hence increase subsurface prediction capabilities), strontium (Sr) isotope analysis has been used to refine stratigraphic position within the outcrop belt of Tertiary carbonates. This provides a larger interpretative data set, with which to constrain structure, stratigraphy and subsurface

prospectivity. It also provides better correlation of surface faults, intra-carbonate contacts and control on stratigraphic thickness changes. Combined with current litho-stratigraphic and chrono-stratigraphic interpretations, the additional mapping of Sr defined units has enhanced surface geological mapping resolution in the PPL 175 area, and resulted in significant improvement to structural and stratigraphic models.

PPL 175 can be subdivided into four zones of varying hydrocarbon prospectivity. Subdivision of the zones is related to interpreted detachment levels and basement involvement in deformation. Mapping and structural modelling suggest that the most prospective zone contains structures where uplift has been accommodated, at least in part, by duplexing of Upper Jurassic and Cretaceous rocks. Thermal history modelling and organic maturity assessments indicate that favourable conditions exist in PPL 175 for hydrocarbon generation and entrapment. Toro Formation and Imburu Formation sandstones have been found in exploration wells and in outcrops across the northern flank of PPL 175. This indicates that reservoir quality sandstone is distributed across much of the licence area.

PPL 175 has all the components necessary for the entrapment of hydrocarbons. The challenge now is to apply the concepts derived from the integrated structural and stratigraphic analysis of the area, in order to determine where to drill to test the reservoirs in the largest possible closures.