

Cretaceous to Paleocene structural and stratigraphic leads in the Bass Basin

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Paleocene and Cretaceous hydrocarbon exploration plays have not been extensively tested in the Bass Basin. Only about half the 21 wells have penetrated to the late Paleocene (Lygistepollenites balmei) level and only about a quarter have penetrated the top Cretaceous.

Cretaceous to Paleocene leads for hydrocarbon prospectivity within the Bass Basin have been investigated by regional seismic mapping, using an approximate 15 x 15 km grid of BMR and petroleum industry multichannel seismic data. These leads are defined at Paleocene (L. balmei), Cretaceous rift unconformity and at prerift unconformity levels.

Both structural and stratigraphic leads occur at these levels. Structural leads are predominantly fault-bounded and are the result of normal faulting in longitudinal and traverse directions associated with rifting and extension in the basin at Middle to Late Cretaceous time. Growth on some faults from prerift unconformity to rift unconformity time indicates that the Cretaceous rift phase may have built on an earlier rift phase or at least on existing structural faults. Reactivation of Cretaceous rift faults occurs into the Paleocene, producing structural leads. However, it rarely extends as high in the section as the Eocene top Eastern View Coal Measures, where significant reactivation and reversal of rift faulting has formed structures at top Latrobe in the Gippsland Basin, with associated oil fields. At the equivalent level in the Bass Basin only minor closures occur and many of these were drilled unsuccessfully in the early exploration of the basin. Stratigraphic leads fall into two classes. The predominant type is associated with truncation of Paleocene and Cretaceous strata at the basin edges. These are considered to be lower-order stratigraphic leads. The more attractive stratigraphic leads are associated with clastic accumulations down-thrown to large faults.

The high component of transverse faulting in the Bass Basin has resulted in a large number of fault-bounded structural leads (a number with areas in the order of 100 sq kms), occurring at depths between about 3 and 4 kilometres in Paleocene and Cretaceous stratigraphy. Multiple stacked exploration targets at these levels are possible, since the strata penetrated are suggestive of suitable reservoir and source-rock facies. Maturation studies also suggest that these levels are more likely to be mature or to have access to mature source rock than are the traditional shallower Eocene Eastern View Coal Measures exploration targets.

Delineation of Paleocene and Cretaceous leads within the Bass Basin thus gives indications of substantial exploration potential in the mature strata of the Basin.

The analysis suggests that the Eastern View Coal Measures have a complex depositional history, involving sediments of alluvial fan, floodplain, lacustrine, and volcanic associations.