

“Depositional systems and sequence stratigraphy of the Cretaceous Warnbro Group, Vlaming Sub-basin, Western Australia.”

To be presented by Noel Newell at Vic/Tas Branch Meeting, held Wednesday, 16th February, 1994.

This paper is authored by David Spring and Noel Newell and won the Best Paper Award at the 1993 APEA Conference. A full copy of this paper can be found in the 1993 APEA Journal.

Petroleum exploration of the Vlaming Sub-basin (offshore Perth Basin) has to date primarily focussed on targets sealed by the shale facies of the Early Cretaceous Warnbro Group, a predominantly marine succession. The Warnbro Group is formally sub-divided into the Gage Sandstone Member (base), South Perth Shale and Leederville Formation (top). However, owing to diachroneity between lithofacies, adherence to the formal nomenclature has rendered the prediction of shale facies at specific locations unreliable, resulting in a number of invalid exploration tests.

To resolve this problem, sequence and seismic stratigraphic concepts have been used within exploration permit WA-221-P to provide a framework for a new stratigraphic model for the Warnbro Group. Seven depositional sequences have been identified.

The model recognises that palaeogeography during Warnbro Group deposition was largely governed by tectonism associated with the Neocomian break-up event which produced a complex assemblage of fluvio-deltaic, shelfal and submarine fan systems. Sequence boundary development can be related to phases of tectonism following the Neocomian break-up as well as to eustatic fluctuations, while variations in base-level, subsidence rate, sediment supply, basin physiography and a basinwide marine transgression primarily control the environments of deposition and their spatial distribution.

The model has enabled the lithofacies of the Warnbro Group to be assigned to a predictable succession of associated systems tracts, providing a practical approach to understanding the distribution and geometries of Warnbro Group reservoir and seal facies within the Vlaming Sub-basin.