

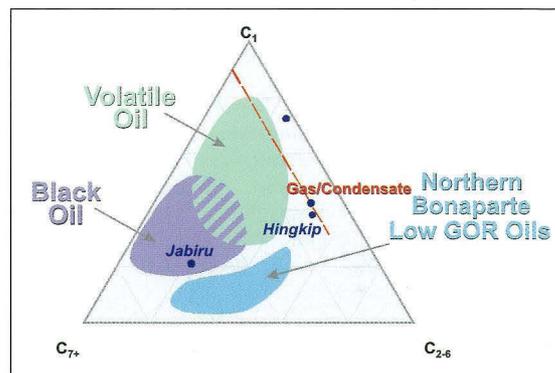
Hydrocarbon Depletion In The Northern Bonaparte Basin; An Alternative View

Presented by Noel Newell, geological consultant specialising in geochemistry (Vic/Tas Branch Luncheon Meeting November 15th, 2000)

The discovery of 11 oil fields and one gas field in the northern Bonaparte Basin since 1994 has established a new petroleum province. While explorers initially enjoyed success with discoveries such as Elang, Laminaria, Kakatua and Bayu-Undan, there have been no new discoveries in more recent times. Under-filled and dry 'valid' structures and the perceived cause, post-pooling losses, have been the Achilles heel to exploration. Long residual columns are often observed beneath field fluid contacts, and in dry wells. While the integrity of fault seals has, until now, been the primary focus to understanding the underlying cause, this talk proposed an alternative mechanism for depletion of hydrocarbon accumulations within the northern Bonaparte Basin.

geological provinces together with regional geological evaluations. Since graduating in 1979 with a BSc in Geology from RMIT, he has worked principally with BHPP and Petrofina in their exploration efforts in Australia and Southeast Asia.

Fig. 1. Comparison of northern Bonaparte Basin oils with typical reservoir compositions.



The initial observation that, while the oils in the basin are so light that they are almost condensates, they are also extremely low in volatile content, flagged a possible fractionation process. This phenomenon strongly suggests selective removal of compounds. The identification of this process as **water washing** was based on the relationship between the light aromatic content of the oils, and their gas-oil ratios (GOR) and bubble-points. Within the oils characterised by very low GORs, highly soluble light aromatics, such as benzene and toluene, are almost completely absent, whereas under conditions of evaporative fractionation by fault leakage, these compounds tend to be enriched in the residual oil. The fact that methane, ethane and propane are also highly soluble, and have therefore also been removed, accounts for the low volatility of the oils. The lightness of the original hydrocarbons has probably disguised the process of water washing, as only the very soluble components have been removed.

This talk explored the process of water washing and the impact it has on the hydrocarbon accumulations within the regional aquifer of the northern Bonaparte Basin. The proposal that water washing can remove significant volumes of hydrocarbons from traps does not appear to have been previously documented. The recognition of the process is hopefully a significant advance in quantifying the under-fill risk within the basin. It also provides a strong incentive to explore for an alternative play type, as non-degraded oil has been recognised within traps not in communication with the aquifer.

Biography

Noel Newell is a geological consultant specialising in geochemistry. In recent years he has primarily worked within BHPP, modeling and evaluating the charge history and reservoir geochemistry of a variety of