

# **The Ultimate Expellable Potential of the Cretaceous and Tertiary Coals of the Great South Basin, New Zealand**

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The terrigenous deposits of the Great South Basin comprise thick sequences of organic-rich sediments interbedded with organic-poor siliciclastics. The potential for expulsion of significant volumes of oil (mmbbl/km<sup>2</sup>) and gas (mmboe/km<sup>2</sup>) is assessed for the source intervals intersected to date and mapped out across the basin using a geological model.

Geophysical logs, RockEval data, and an organofacies approach to source modelling are used to describe the volume of oil and gas that upon maturation would be expelled from the kerogen and supplied to the mineral matrix for migration. This is defined as the Ultimate Expellable Potential (UEP) and is calculated for the wells in the Great South Basin. As each source interval is modelled in an interbedded coal/siliciclastic sequence, the heterogeneity of the system is honoured. The results are compared to the effect of only using average data to assess the potential.

Taking into account the effects of vertical variations in thickness, TOC (total organic carbon) and HI (hydrogen index) of the individual source intervals, a geological understanding of the deposition is used to plot this variability laterally. The resulting UEP map quantifies the amount of petroleum that could be expelled from these source intervals upon maturing. The potential cumulative gas-oil ratio of the system is also presented. Finally the use of the organofacies approach with engineering correlations recorded in Kinex enables production of maps of physical fluid properties essential to quantifying the movement of petroleum through the sediment pile. The implications for petroleum exploration in the Great South Basin are discussed.