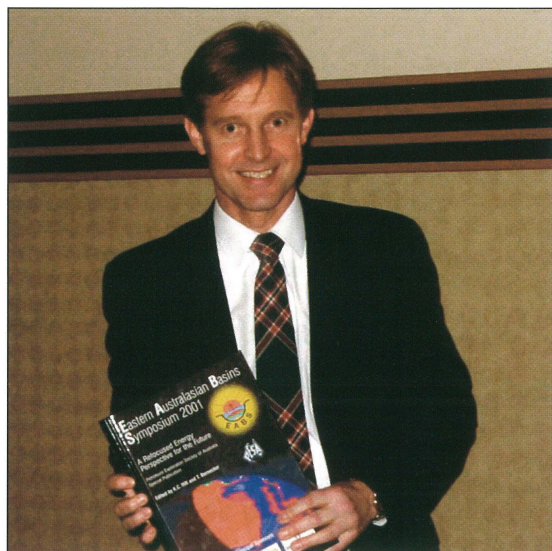


Practical Applications Of Geochemistry To Petroleum Exploration

By Jim Preston, Managing Director, Exploration Geochem Consulting Pty Ltd
Presented at the PESA (Vic/Tas Branch) Luncheon meeting, July 17th, 2002



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As most geochemists will have observed, there are those in the petroleum exploration community who are receptive to the idea that geochemistry can make a meaningful contribution to the exploration process, and there are those who are disinclined to credit it with such capability.

Indeed, while there are those among the doubters who might concede the necessity of geochemistry to the exploration process, tolerating it even if they do not fully understand its message, there are others who are content to dismiss it entirely as academic, obfuscatory and unhelpful. Overturning these prejudices is arguably one of the geochemist's greatest challenges.

Against this background, this talk is designed to demonstrate (to believers and skeptics alike) the practical application of geochemistry to exploration problem-solving and decision-making, sometimes when all other lines of geoscientific investigation have been exhausted.

The objective is achieved through the use of a number of case studies that illustrate not only the interpretative methodologies involved, but also how these were effective in arriving at robust conclusions that could then be integrated with other exploration data-sets.

The first case study shows how the oils of the northern Bonaparte Basin were geochemically typed to Middle to Late Jurassic source rocks, and how regional

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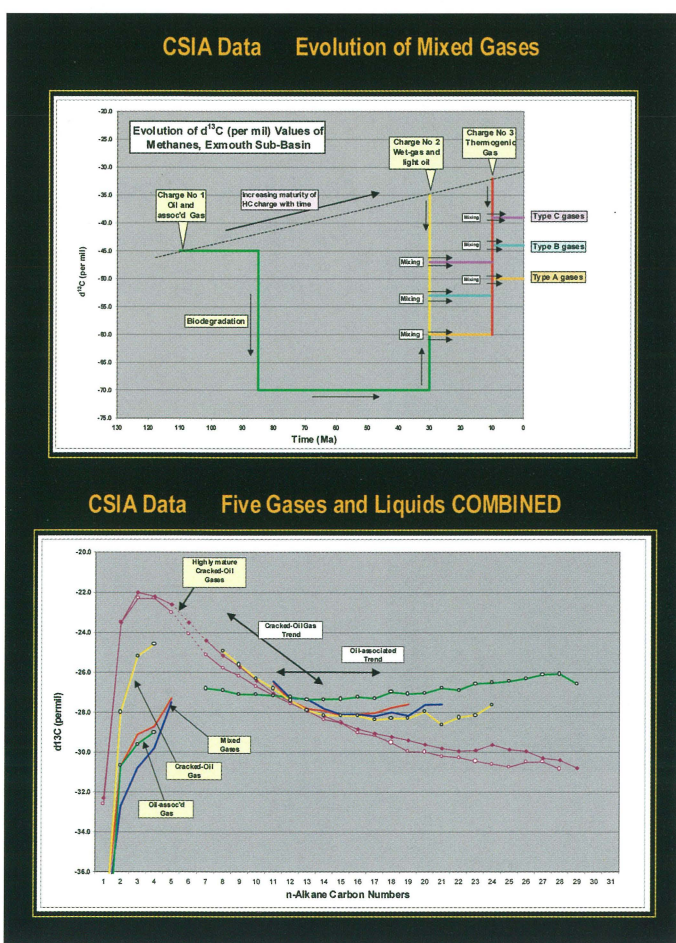


Fig. 1. The innovative use of carbon isotope data from gases and oils.

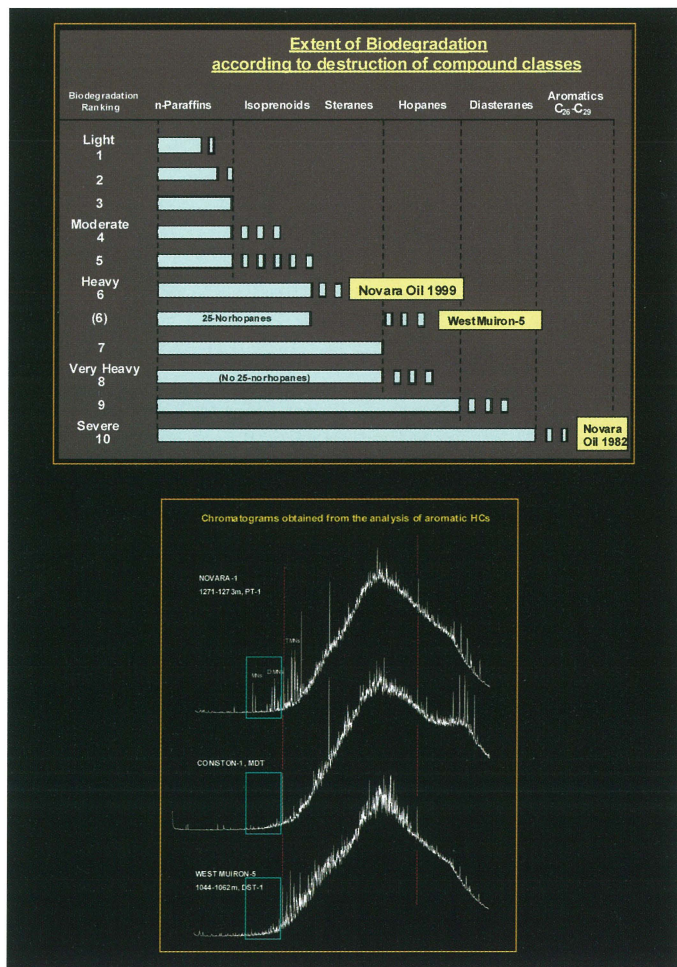


Fig. 2. The search for missing compounds in biodegraded oils.

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variations in the geochemistries of the oils were explained. The second study involves a biomarker correlation of five oils in China to reveal the odd-one-out. The third demonstrates how the interpretation of carbon isotope data from gases and oils can provide valuable insights as to their origins, thermal maturities and charge histories. The fourth is concerned with estimating the

relative degrees of biodegradation of oils, and how overturning a 17 year geochemical prejudice led to the drilling of a discovery. The fifth and final case study shows how recent observations of the controls on biodegradation were able to directly constrain burial history modelling, significantly reduce the exploration risk related to the timing of hydrocarbon expulsion and migration, and enhance regional hydrocarbon prospectivity.
