

PART 2: VITRINITE REFLECTANCE AND KEROGEN TYPING

INTRODUCTION

Seventeen cuttings samples, one core sample, and six side-wall cores from Pelican-5 were analysed for vitrinite reflectance determinations and descriptions of dispersed organic matter.

ANALYTICAL PROCEDURE

Representative portions of each sample (crushed to -14+35 BSS mesh) were obtained with a sample splitter and then mounted in cold setting Glasscraft resin using a 2.5 cm diameter mould. Each block was ground flat using diamond impregnated laps and carborundum paper. The surface was then polished with aluminium oxide and finally magnesium oxide.

Reflectance measurements were made with a Leitz MPV1.1 microphotometer fitted to a Leitz Ortholux microscope and calibrated against synthetic standards. All measurements were taken using oil immersion ($n = 1.518$) and incident monochromatic light (wavelength 546nm) at a temperature of 23 ± 1 C. Fluorescence observations were made on the same microscope utilising a 3 mm BG3 excitation filter, a TK400 dichroic mirror and a K510 suppression filter.

RESULTS

Vitrinite reflectance determinations are summarised in Table 1. Figure 1 is a plot of vitrinite reflectance versus depth. Histogram plots of this data are presented in Appendix 1. Descriptions of the dispersed organic matter in these samples are presented in Tables 2-4.

DISCUSSION

Maturity

The vitrinite reflectance versus depth profile for Pelican-5 (Appendix 2) indicates that the Eocene section of the Eastern View Coal Measures above 1900 metres depth is thermally immature ($VR < 0.5\%$). However, generation of light oil from sediments of such low rank may occur where the DOM is rich in resinite (Snowdon and Powell, 1982; Powell, 1985), as appears to be the case at Pelican-5 (Watson, 1986).

Eocene sediments within the interval 1900-2800 metres depth are marginally mature ($VR = 0.5-0.7\%$). The presence of exsudatinite in coals and oil in sandstones and siltstones from this part of the section (Watson, op. cit.) suggests that mobilisation of liquid hydrocarbons has commenced.

The rank threshold for significant gas generation from terrestrial (woody-herbaceous) organic matter ($VR = 0.55\%$: Monnier et al., 1983) occurs at 2160 metres depth, coinciding with a five-fold increase in cuttings gas (C1-C4) yield between 2000 and 2200 metres depth in the Eocene sequence (Fig. 1).