

GWF9107.009-RJS

SOURCE ROCK:

The primary source rock interval in T/25P is the Eastern View Coal Measures. The source potential of the Otway Group has not been tested in the permit and is unknown. Analysis of samples from the Eastern View Coal Measures has identified samples with good to very good gas richness ($C_1-C_4=10,000 - 180,000$ ppm) throughout the Eocene and Palaeocene intervals. Wet gas (C_5+) yields in excess of 1000 ppm occur at two levels which produced hydrocarbons on test. Total organic carbon values are high because of the presence of abundant coal seams. TOC values range between 1.10-79.2% in the Eocene, 0.96 - 47.0% in the Palaeocene and 0.82 - 13.7% in the Late Cretaceous. Potential hydrocarbon yields (oil and gas) are very high in the Eocene and Palaeocene ($S_1+S_2 > 6-366$ kg hydrocarbons/tonne). However, much of this genetic potential is likely to be for gas and condensate. Cuttings from the Late Cretaceous were contaminated by cavings. One carbonaceous claystone at 3846m gave a S_1+S_2 ratio of 24 kg hydrocarbons/tonne, whilst sidewall core data indicated poor source richness from the Late Cretaceous section ($S_1+S_2 < 2$ kg hydrocarbon/tonne).

In the Eocene coal in the dominantly carbonaceous lithofacies, two main types of organic matter were identified, a good quality oil and gas-prone type II-III kerogen and a poor quality dry gas-prone type IV kerogen. The major kerogens are vitrinite (45-85%) and exinite (10-40%). The exinites include resinite and subertinite which are potentially generative at low maturities (vitrinite reflectance, 0.45% for oil generation).

In the Palaeocene the source rock consists of more mature oil and gas-prone type II-III kerogen. Coal is less abundant, and the major exinite is sporinite.

In the Late Cretaceous source rocks shale appears to be the most common organic-rich rock type. Many shales are very rich in exinite (up to 85% of DOM). The oil deadline for this exinite which is dominantly bituminite is a vitrinite reflectance of 0.9% and therefore most of these shales are now post-mature for oil. Earlier in their history they were probably prolific sources of liquid hydrocarbons.

Source affinity studies were conducted on samples of liquid hydrocarbons recovered from Pelican 5. A condensate sample from 2788.2m has an alkane composition and aromatic content which reflect derivation from land-plant organic matter. The $C_{12}+$ composition also attests to a terrestrial source affinity as shown by dominance of C_{29} in the $C_{27}-C_{29}$ sterane and diasterane distributions, high pristane/phytane and pristane/n-heptadecane ratios. These ratios also indicate that the organic matter was exposed to oxic conditions prior to being reworked in a peat swamp by anaerobic bacteria.