Petrography and organic geochemistry of Tertiary coals from Mukah-Balingian, Sarawak

WAN HASIAH ABDULLAH & NUR SHARLIZA MOHD RAPI'AN

Department of Geology
University of Malaya
50603 Kuala Lumpur

A total of ten coal samples collected within the southern part of the Mukah-Balingian area, between the Batang Mukah in the west and Batang Balingian in the east, were subjected to detailed organic petrological and organic geochemical study. The aim of this study is threefold: to determine the thermal maturity of the coals, their depositional environments, and their hydrocarbon generating potential.

The coals analysed are low in rank, that is lignite to sub-bituminous C with mean vitrinite reflectance (% Ro) values in the range of 0.3 to 0.4%. On average they contain 56% vitrinite, 32% liptinite (exinite), 3% inertinite, and 9% mineral matter. All of these coals are of a humic type. Based on the TPI (Tissue Preservation Index) versus GI (Gelification Index) plot that was derived from the maceral analysis data, all of the samples studied were deposited in limnic and limno-telmatic regimes of a lower delta plain setting. Some of the samples may have been deposited under the influence of lagoonal brackish water conditions. The maceral-based interpretation of the environment of deposition is to a certain extent supported by palynological data as suggested by the presence of *Calophyllum* and *Palaquium* species that are commonly associated with wet peat swamp condition of deposition. XRD analysis performed on a clay sample that was beneath the coal deposit is shown to be rich in kaolinite: an association commonly observed within peat swamp depositional environments.

Based on the organic geochemical data, a high yield of extractable organic matter (EOM) of more than 2,000 ppm and hydrocarbon yield of more than 500 ppm were recovered. The average aliphatic hydrocarbon yield is 8%, aromatic yield 23%, and NSO compounds 69%. Triterpanes occur in high abundance relative to steranes. The hopane distribution is generally dominated by C_{29} or C_{31} hopane. C_{30} hopane occurs in low relative abundance compared to C_{29} hopane. The predominance of R isomers compared to S isomers of the C_{31} homohopane supports the immature nature of these coals as suggested by vitrinite reflectance data. At greater depth or upon reaching sufficient thermal maturity, good oil and gas generating potential can be expected from these coals owing to their high liptinite content. Based on coal facies interpretation, it is apparent that the coals possessing the greatest oil-generating potential were deposited within a limno-telmatic marsh sub-environment mostly under fluvial influence.