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Source rock characteristics of outcrop samples from Klias Peninsula, Sabah

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A field study of the Klias Peninsula, the onshore part of SSPC's Block SB-301 PSC, was undertaken in 1998–99. The objectives included:

- An assessment of representative key outcrop sections of their significance as analogues for the various West

Sabah play types;

- Evaluation of the litho-stratigraphic sequences and collection of samples for biostratigraphic determination; and
- Evaluate of the source rock (SR) potential of selected outcrop sections to determine the hydrocarbon characteristics of the oil stains found in tar sands (oil seeps).

This paper discusses only results of the SR characterisation study.

A total of 14 outcrop samples were collected from the following three environments of deposition:

- pre-DRU TB1.3–2.3 deepwater sediments (Stage II/III Crocker, Temburong and Setap Shale formations);
- post-DRU TB2.4–2.5 lower coastal plain sediments (Stage IVA Belait formation); and
- post-DRU TB2.4–2.5 shallow marine sediments (Stage IVA Belait formation).

The samples were sent to Petronas Research and Scientific Services Sdn. Bhd. (PRSS) for geochemical analysis and University of Malaya (UM) for thermal maturity measurements. The analyses included TOC, Rock-Eval pyrolysis, %VRo measurement, liquid chromatography, GC (saturates), GCMS (saturates and aromatics), hydrous pyrolysis and hydrocarbon content.

The results of the geochemical analysis indicate encouraging source rock potential. SR quality varies from organic-rich (mixed Type III/II kerogen) to organic-poor (Type III/IV kerogen). Due to prolonged surface exposure and weathering, the SR potential may be under estimated. The samples contain a predominance of higher plant biomarkers in the bitumen characterisation. The SR geochemical parameters indicate a major input of terrigenous (land-plant derived) organic matter from fluvio-deltaic depositional setting. The facies of SR that generated the oil stains on the tar sands are very similar to the source facies of the SR analysed. The SR analysed are not sufficiently mature (immature to very early mature) to have generated significant quantities of hydrocarbon. However, if such rock (SR) is laterally extensive and more deeply buried away from the sample locations, they could have generated oil (stains) similar to those found in the tar sands.