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The South African East Coast: Evidence for an Active Petroleum System within the Tugela Fan, Durban Basin

The offshore Durban Basin, located on the eastern continental margin of South Africa, developed during the end Jurassic to early Cretaceous break-up of Gondwana. The early Cretaceous was characterised by the movement of the Maurice Ewing Bank (Falklands microplate) from its original position adjacent to the Durban Basin. DSDP wells 330 and 511, located on the Maurice Ewing Bank, intersected thick oil prone source rocks of Kimmeridgian to Aptian age. Identical source rocks are postulated to occur within the Durban Basin in the rift and early drift succession that underlies the Tugela Cone.

The hydrocarbon potential of the Durban Basin has been tested by only four wells. Jc-D1 (2000), although classified as a dry well has provided the first evidence of the predicted Petroleum System.

Jc-D1 mud gas values indicate a trend of increasing wetness index {(C5/å(C1to C5)} with depth. Anomalies within this maturity curve correspond with thin sandstone units. At the base, the wetness index exceeds 25%. In addition, fluid inclusion studies of Jc-D1 samples reflect bacterial sulphate reduction in the presence of seeping light hydrocarbons. An extract at this interval yielded lightly biodegraded oil. Fluorescence was also observed at this interval. The basal section of the well is characterised by bitumen staining and fluorescence. An extract from this interval yielded light oil derived from a distal marine claystone of Cretaceous to Jurassic boundary age.

These results augur well for the future exploration of the large-scale channel and fan systems present in the Tugela Cone of the Durban Basin.