

The Albergaria-a-Velha Unit (Porto-Tomar shear zone): a potential source rock in Western Portugal?

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Abstract

The Upper Devonian/Lower Carboniferous Albergaria-a-Velha unit (AVU) crops out in several NNW-SSE trending, narrow and discontinuous areas between Porto (NW Portugal) and Tomar (Central Portugal). This unit is composed of heavily deformed black and grey shales and siltstones. Palynofacies analyses clearly show the AVU is a marine oil-prone source rock. On the other hand, OI/HI ratios point to a gas-prone source rock. This can be explained by the current thermal maturity of the AVU – dry gas generation zone – which would result in the observed OI/HI ratios. TOC values of this unit are rather low (around and below 1%) which must be considered as post hydrocarbon generation/migration lowered levels. The areal extent of the AVU is

significant (over 150km from Porto to Tomar) although its true volume and extension are still unknown. The surface expression of the AVU is associated with the Porto-Tomar Shear Zone (PTSZ). The units associated with this shear zone locally border the Mesozoic Lusitanian basin (which extends to the W) but are overlain by it in most areas. The AVU constitutes this basin's basement at least in the Northernmost areas (near Estarreja and Ovar) as indicated by well data. The potential hydrocarbon system formed by the AVU and Lusitanian basin lacks the correct timing of events within and near the PTSZ. Its potential is presumably greater as a dry gas(?) play in regions outside the influence of this shear zone. Oil and gas shows in the basal Triassic sandstones of the Lusitanian basin from on-shore wells suggest a Palaeozoic source-rock – most likely its basement.

Key-words: Source rock, Porto-Tomar Shear Zone, palynofacies, organic geochemistry, Late Devonian, Portugal.