CONTROLS DESTROYING A FLUVIAL RESERVOIR IN CAMEROS BASIN, SPAIN

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The Cameros Basin, located at the NW sector of the Iberian Chain in Spain, is a rift basin that was filled up during Late Jurassic to Early Cretaceous times. In spite of not being too extensive (30-80 Km wide and about 150 Km long), Cameros Basin overwhelmed very high subsidence and sedimentation rates, reaching up to 5 Km of vertical thickness of sediments. According to Mas et al. (2003) a succession of eight depositional sequences has been distinguished. The studied deposits range between Late Berriasian-Early Aptian (DS 4, 5, 6 and 7) displaying a record which varies drastically in thickness from 100 m in the marginal areas of the basin to 2200 m in depocentral areas. The clastic record of these deposits is essentially formed by fluvial facies associations of sandstones and conglomerates, which evolve from braided systems in the southern area of the basin to meandering fluvial systems in the northern area. Provenance of original sands was mainly from coarse crystalline rocks. A humid, close tropical climate is deduced during sedimentation, that produced an intense weathering of K-feldspar. Thus, a mature rigid framework with high porosity values was generated. Early Cretaceous fluvial sandstones could have constituted a high quality hydrocarbon reservoir. The deduced source rocks are Callovian (marine) and Early Cretaceous (lacustrine) organic marls. The timing of hydrocarbon generation would correspond to Early Albian times (Mas et al., 2003).
At present, the porosity of the reservoir is negligible. Destruction of porosity took place by several processes. Diagenetic processes, as (1) mechanical compaction (i.e. crushing of metamorphic lithic grains) and chemical compaction, (2) early quartz cementation, and (3) replacements of K-feldspars by kaolinite, were not became enough to close completely porosity. A low grade hydrothermal event, reaching greenschist facies in the depocentral sector of the basin, took place during Late Cenomanian. This event produced the destruction of hydrocarbons and the closure of the reservoir porosity Hydrothermal processes affecting sandstones include (a) re-compactional processes; (b) silicification of remaining feldspars; (c) chloritization of feldspars, metamorphic lithic fragments and intrabasinal argillaceous grains; and (d) growth of cloritoid crystals on argillaceous material (intrabasinal, extrabasinal or even diagenetic in origin). Nevertheless, hydrocarbons that migrated to the margins of the basin could still be preserved as they were not affected by hydrothermalism. Therefore, this is an appropriate example of how a suitable reservoir can be completely destroyed by the effects of hydrothermalism processes, and throw light about the preservation of hydrocarbons in satellite basins surrounding metamorphosed areas. This study was supported by the Spanish DGICYT project BTE2001-026.

Mas et al., 2003. Geol. Field Trip, 11. AAPG Int. Conf. and Exhib. Barcelona, Spain