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Petroleum Geology of the Oil and Gas Commercial Discoveries in Spanish Basins: Onshore Cantabrian basin

More than 70 exploratory wells have been drilled in the Burgos sub-basin (onshore Cantabrian ranges). This exploration activity led to a lot of oil shows, no commercial discoveries and only one commercial oil field (Ayoluengo), was discovered in 1964 and still producing, and with an estimate URR above 18 MMBO and 20 BCFG.

The petroleum geology of this small and isolated oil field can be summarized in several main concepts: (1) Source rock: Pliensbachian-Toarcian marine paper shale, K-II, TOC above 7 %, IH average 700, that reached the oil window in the Upper Cretaceous, before the structural traps were created by alpine compressive phase. (2) Reservoir: Fluvial channel facies and fluvio-deltaic channel facies in the Upper Jurassic, with porosities ranging 18 to 25 % and permeability up to 1 Darcy. Both reservoirs of the Purbeck facies have a limited volume, 6-12 m. thick and 25-40 m. wide. This lenticular reservoir distribution and the fault compartmentalization required 53 wells to develop the field (3) Trap: early diapiric salt dome with crestal collapse faults perpendicular to the compressive alpine fold. (4) Seals: intraformational food plain and abandonment channel facies shales. (5) Migration pathway: lateral short migration from the adjacent depocenters and perhaps minor vertical charge.

We think the local and isolated Ayoluengo oil field, located in an area with a regional source rock, structural closures and different reservoir-seals possibilities, represents a good example of an early migration, only effective for the previous traps.