

## **Ayoluengo: The Only Oil Field Onshore Spain**

**Jorge Navarro Comet<sup>1</sup>**

<sup>1</sup>Geosciences, CEPSA E.P.,S.A., Madrid, Spain.

### **ABSTRACT**

Ayoluengo is commonly cited as the only oil field in onshore Spain. It is located about 300 km north of Madrid, in the Basque-Cantabrian Basin, a region which concentrated most of the hydrocarbon exploration effort during the mid-20 century. In the early 1960s, seismic allowed identify an anticline below an Upper Cretaceous carbonate plateau, where the exploration well Ayoluengo-1 was drilled. On June 6th 1964, Ayoluengo-1 tested 85 barrels oil per day from a 5-meter thick sandstone bed of Late Jurassic-Early Cretaceous age located at 1350 meters depth. It was the first significant oil discovery in Spain after more than 100 exploration dry holes. It brought great expectations in the region, presumed to become a prolific 'black gold' province. Ayoluengo structure is a faulted anticline. Oil and gas are reservoired within a series of thin lenticular sandstone packages of Late Jurassic-Early Cretaceous age. More than 50 separated reservoir beds have been identified. Reservoir properties are fair to good, with porosities commonly ranging 12 to 18%. Most of the individual reservoirs layers are isolated by shales and compartmentalized by faults, which makes Ayoluengo to be considered as not a single field but the grouping of more than 100 independent small fields. Commercial production started in 1967. Peak production at 5200 barrels of oil per day was reached in 1969 and since then production has gradually declined. Oil is produced by rod pumps, powered by the small amount of produced gas. A total number of 52 wells have been drilled, but at present time only a few are active. The oil has relative high arsenic and vanadium content, which makes it inadequate for refining, so it is sold as fuel oil to local industries in northern Spain. Now, 50 years after the first oil, the field is still active with an average production of some 100 barrels oil per day and a cumulated oil production of 17 million barrels of oil. The Ayoluengo discovery revitalized the seismic and drilling activity in the region, but subsequent exploration drilling only tested uncommercial oil flow rates. Today, surprisingly the Ayoluengo field still remains as a unique oil discovery, being the only onshore commercial oil field in the entire Iberian Peninsula. This anomalous geological singularity has brought recurrent discussions among petroleum geologists because it is difficult to explain why an oil petroleum system is uniquely working at this particular field within a vast land territory.