

AAPG HEDBERG CONFERENCE
“Paleozoic and Triassic Petroleum Systems in North Africa”
February 18-20, 2003, Algiers, Algeria

The Ordovician Tight Gas Reservoir of the Ahnet-Timimoun Basin

Nasser Mokhtari, DES, Sonatrach/Exploration

Significant resources of gas are probably still not assessed in the Ordovician reservoirs of the Ahnet-Timimoun Basin. The Ordovician sandstones consist of Low Porosity Low Permeability tight gas reservoirs. The porosity ranges from 3% to 12% and permeability is much less than 0.1md with high capillary pressure greater than 1000psi. These apparent low quality reservoir properties are essentially related to the depositional conditions and the diagenetic alterations (mechanical and chemical compaction and quartz overgrowths cement). The distribution of pressure with depth shows clearly that these reservoirs are abnormally under-pressured compared to the hydrostatic gradient.

In regard to matrix permeability, the initial gas-flow rate of the exploration wells during testing varies from 0.06 Mcfd to up to 8.47 Mcfd. Therefore, it is interpreted that the fracture networks control gas production in commercial rate by enhancing permeability. Mud losses during drilling, core fractures analysis and well-bore images show that many wells had intercepted fractured zones. From the study of cores, we noticed different types of fractures that could have contributed to significant gas flows, such as open natural fractures, quartz partly cemented fractures, partly cemented breccia fault zone at metric scale, induced fractured and re-opened natural fractures during drilling.

The Ordovician is mainly charged by the type II Silurian Hot Shale source rock which are assumed to generate (with the Frasnian Hot Shale) most of the total gas resources in the basin. The different studies give a total generated gas volume vary from 17,655 to up to 35,310 Tcf.

A recent basin evaluation has proposed the existence within the Ordovician Formation of an indirect type Basin Center Gas Accumulation (BCGA). Based on this emerging concept of gas play and when comparing the small volume of discovered gas in place to date with the total gas generated in this basin we can imagine that significant resources of gas are still not assessed in the Ordovician tight gas reservoirs. This will be the future challenge to explore and test the existence of such Unconventional Gas Accumulation play in this basin and in many western Algerian gas prone basin where the Ordovician gas bearing sand stones identified as a tight gas reservoirs.

$$1\text{Tcf} = 28.32 \times 10^9 \text{ m}^3$$

$$1000 \text{ m}^3 = 0.945 \text{ TEP}$$

Coefficient d'expulsion Ahnet 90%

Quantités piégées Par / au Qunatité expulsées = 2 à 15 %