

Fault Seal Analysis, a Tool to Reduce the Exploration and Development Risks, a Case Study from Middle Indus Basin

Farrukh Daud, Attique-ur Rehman, Gulzeb Nabi Khan, and Asad Ilyas

OMV (Pakistan) Exploration GmbH, Islamabad

Farrukh.Daud@omv.com

The Middle Indus Basin of Pakistan contains some of the significant gas discoveries in Pakistan. Most of the discoveries comprise of the various sands of the early Cretaceous, Lower Goru formation which are sourced by the Sembar shales and the top seal is provided by the intraformational shales. Structurally the area is characterized by deep rooted NW-SE trending strike slip faults and associated normal faults. The strike slip faults are nearly vertical in the deeper sections and branch out in the shallower part (flower structure). These faults play an important role in the trapping as well as compartmentalization of the Middle Indus gas fields. Initially due to small vertical throw the faults were not considered as sealing faults. However, after the drilling of the appraisal wells the compartmentalization was identified due to the presence of different gas-water-contacts across the faults. The associated normal faults also play an important role in the trapping configuration of the fields. In view of the structural complexity of the area, detailed fault seal analysis study was carried out on the two gas fields, using Badleys Geosciences' Trap Tester 6 software. The detailed analysis included evaluation of several attributes like Shale Gouge Ratio, Clay Smear Potential, throws, dips, Threshold Capillary Pressure, Hydrocarbon Column Height etc. The study has helped in developing a better understanding of the sealing behavior of various faults. As a result this will help in the more precise identification of fault dependent traps as well as locating future development wells.