

Conceptual Constraints on Fault Seal Potential of Contractional Faults

Keller, João V. A.¹, Titus Murray², Gillian Kovack³, John Warburton⁴, Alan D. Gibbs⁵ (1) Chevron Energy Technology Company, San Ramon, CA (2) FaultSeal Pty Ltd, Sydney, Australia (3) University of Adelaide, Adelaide, Australia (4) Executive Insight Pty Ltd, Sydney, Australia (5) Midland Valley Exploration Ltd, Glasgow, Scotland

Most of the published work to date on the role of faults as seals/baffles for hydrocarbon trapping/production has considered extensional faults. There are reasons to believe that fault seal process may be different in reverse and thrust faults. In this paper we will consider the theoretical differences between normal and reverse faults, and how these differences may impact on the sealing or non-sealing nature of reverse faults in clastic sediments.

Normal faults are usually formed when the maximum principal stress is orthogonal to bedding, with seismic-scale fault zones often exhibiting widths in the 10's of metres and fault spacing over 100's of metres. In many cases normal faults are integral in the trapping of the hydrocarbons forming the "4th side" of 3 way dip closures.

Contractional faults on the other hand are formed in tectonic regimes where the maximum and intermediate principal stresses are frequently horizontal and sub-parallel to bedding. It is very common for displacement to be accommodated by bedding-parallel shear, with large faults kilometres apart forming four-way closures. Reverse and thrust faults often have very narrow fault zones despite the large displacements.

In this paper we contrast and compare the role of faulting styles on fault seal potential. To study the potential difference forward kinematic models of inter-bedded clastic sediments will be compared with outcrop analogues to help compare the evolution of fault rocks through displacement in both styles of faulting.