



FESAus Monthly Technical Meeting

Faults- Are They Sealing or Leaking?

Bill Power

Abstract:

With exploration and production proceeding to more difficult resources, understanding of faults and how they control reservoir size and characteristics has become critical. This presentation will summarize some of the most important characteristics of faults, and then discuss how faults can impact key reservoir characteristics, including reservoir size, porosity, and permeability. The development of faults, either through initial failure or rock material in shear, or through the link-up of pre-existing flaws like natural fractures or deformation bands has important implications for fault roughness, size, continuity, and character. The damaged rock near fault zones typically includes both an inner core or gouge zone, and an outer damaged or fractured zone. These can be relatively simple and uniform, but very frequently do not have a simple geometry. Some faults present impermeable barriers due to juxtaposition of shales or other impermeable rocks against reservoir materials, and some faults may seal because the central gouge zone may contain smeared clay materials or finely ground material. There are a number of generalizations that can be made which interrelate or correlate fault zone thickness, fault zone size, and fault zone displacement or throw. These can be used to check and QC seismic interpretations. When it comes to geomechanics, the current *insitu* stresses can be such that faults are at frictional failure, or near to failure. When faults move even slightly, the permeability is affected, and thus faults can become a limiting factor on the heights and containment of hydrocarbon columns. Critical pressures for fault reactivation can be estimated, and then used to estimate the maximum possible hydrocarbon column height. Breaching mechanisms and the evolution and migration of hydrocarbons can be considered with respect to the fault history and character. Finally, we can consider the uncertainties inherent in seismic characterization, together with the uncertainties inherent in the geomechanical estimates of stresses and rock strengths, and arrive at likely values for hydrocarbon column heights and reservoir volumes.

About the Presenter:

The speaker: William (aka Bill) received his PhD in Geology and Geophysics from Brown University (Rhode Island, USA) in 1989. He says he is a geologist first, followed closely by geophysicist and structural geologist. He also admits to dabbling in rock mechanics, seismology, materials science, and fracture mechanics. Bill has worked with the CSIRO Division of Geomechanics, CSIRO Division of Exploration and Mining, Fractal Graphics, Fractal Geoscience, and Geoinformatics Exploration, Task Geoscience, Geomechanics International, and Baker Hughes Geomechanics.



DATE: Tuesday 8th March 2016, 12:00 – 1:30 PM **VENUE:** Hotel IBIS (Upstairs) - 334 Murray Street, Perth

COST: Members \$30.00; Non Members \$40.00; Students/Retirees \$10.00

Online registration at www.fesaus.org by Friday 4th March

Note: limited seats for unregistered attendees may be available: \$50.00 cash door charge

