

Application of Probabilistic Fault Seal Analysis in the Estimation of Reserves of the South Furious Field, Sarawak, Malaysia

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South Furious is a complex offshore field in Sarawak, Borneo Malaysia. It has been under production by Shell for 25 years. The hydrocarbon bearing sequence is 2500 ft thick and has 30 sands variously filled with water, oil and gas. It is structurally compartmentalised and each compartment is isolated.

Lateral variation in hydrocarbon fill between blocks, pressure gradients and calculated SGR initially indicated fault seal. The field is analogous to a Rubik Cube, except there are many tilted cubes. Development is challenging, in particular the block sizes limit ultimate recovery per well.

The process of predicting the distribution of oil sands and draining 1000 ft of pay from multi-layered, commingled, wells that cross-cut several compartments with the risk of depletion from adjacent producers, carries a high level of risk and uncertainty. As part of the planning for development extensions a probabilistic assessment of fault seal and breaching processes was carried out. The aim of which was explain the unusual distribution of fluids, and to predict fluids in un-drilled compartments. This study yielded a 3-D probabilistic fault connectivity model of the field. The probability of each fault block being connected to another was analysed for connected volumes (clusters) and traversed using a percolation code (floating Bagatelle). The results of this work are in the process of being validated using detailed geochemical finger printing.