

A Multiple Model Technique for Evaluating the Potential Hydrocarbon Volumes and Risk of an Exploration Prospect

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Potential hydrocarbon volumes and geologic risk of an exploration prospect are usually assessed using a single geological model describing the likely structure, reservoir, seal and hydrocarbon charge. However a single model may not adequately capture the wide range of alternate models which could exist within the constraints of the available data. Although the probability of these other models occurring may be relatively small, their impact on the probabilistic distribution of potential hydrocarbon-in-place volumes may be significant.

To assess potential hydrocarbons volumes and geologic risk of a deep Paleozoic carbonate buildup, suites of conceptual reservoir and seal models were developed to adequately depict the spectrum of potential scenarios which could exist within the data constraints. The workflow consisted of 1) estimation of the probabilities for each reservoir and seal model, 2) calculation of volumes for each reservoir-seal combination, and 3) generation of a cumulative probability curve relating resource volumes to their probability of occurrence. Model probabilities were also used to calculate the appropriate geologic risks for reservoir and seal failure.

We found the multiple model technique to be very effective in capturing, evaluating and ranking a wide range of geologic concepts and divergent expert opinions. The technique has the additional advantage that the calculated risk incorporates most possible outcomes, not just the risk associated with a single geologic model. We believe the multiple model technique can be applied to other prospects which have a wide range of geologic outcomes for two or more key play elements.