

## **Geomechanical Approach to Assess Risk in Drilling and Completion**

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### **ABSTRACT**

In times of oil price uncertainty, operators are even more hard-pressed to make demonstrably efficient capital investments. While a degree of uncertainty is accepted in the oil and gas industry, investors' willingness to take risks, understandably, is very low. Consequently, it is important to target the plays most likely to produce desirable outcomes. One example is old plays, where a reasonable knowledge exists regarding what has been left behind. These wells can be re-assessed for their potential to yield predictably good returns if new technologies are introduced. Prospect assessment usually starts by taking into account past experience, which may include legacy data from some other operator. Before drilling a new well or re-entering an old one, it is necessary to dedicate efforts to predicting current conditions. Besides depletion, fluid contacts migration, temperature changes, etc., newer drilling and completion technologies (extended-reach wells, multi-stage fracking, etc.) will be introduced to an environment modified by past activity, from what the recorded data may initially suggest. In-situ stresses can be different, and the formation, being drilled at an oblique angle to its strata, may be different also. We propose a methodology that uses existing experience as a starting point. From there follows an analysis in which technological knowledge and tools – most developed over the past 25 years – are used to generate a refined picture of the conditions to be met. We also create a list of risks involved, as well as strategies to avoid them or to mitigate their effects. We also use new data acquired during current operations is used to further refine the model, in real- or near-real time. The process not only works in drilling operations, but also in work-over, stimulation and other operations.