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GEOMECHANICAL CONSIDERATIONS REGARDING EOR EFFICIENCY AND CO2 SEQUESTRATION

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An accurate geomechanical assessment of the subsurface is vitally important when designing, executing and monitoring Enhanced Oil Recovery and CO_2 Sequestration Operations. Detailed knowledge of the earth's current stresses and pressures active in the reservoir (and overburden) provides valuable information for understanding how the reservoir (and overburden) will respond to injecting gases or fluids into reservoir rocks.

The stresses operating in the area play an important role in inducing, preventing and controlling hydraulic fracturing (depending on the application). Controlling and containing hydraulic fractures is important for ensuring that the injected gases or fluids are contained within the reservoir during EOR operations. However, in some highly faulted environments, hydraulic fractures have been known to reactivate natural fractures or a faults which has resulted in fluids migrating away from the intended reservoir and minimizing production efficiencies. A case study will be presented in which primary production-induced stress changes were not considered when designing and executing EOR operations which significantly reduced the production performance.

Efficient CO_2 capture and containment will likely produce for our global societies important environmental dividends. Geologic concerns include the selection of a suitable reservoir, the preservation of an impermeable top seal and prevention of fault and/or natural fracture reactivation that could breach the CO_2 reservoir and cause unplanned leakage. Using a well-constrained geomechanical model it is possible to design a CO_2 sequestration program that maximizes the long-term containment of CO_2. Presented is a systematic workflow for analyzing in situ data to constrain the geomechanical model and use it to optimize CO_2 containment in the context of cap rock integrity, fault leakage integrity and natural fracture stability.

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