ARMA Distinguished Lecture - Mike Mullen,

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Fracability Index – More Than Just Calculating Rock Properties

Wednesday 9th October - MARQUEZ HALL MZ 204 - 12:00 pm, Lunch will be provided

The geometry and complexity of hydraulic fracture stimulation treatments is largely controlled by the heterogeneous and anisotropic nature of rocks. Conventional practice in designing fracture stimulation treatments revolve around the parameters that can be changed and considers the rock being stimulated as homogenous and isotropic. Engineers can influence the frac geometry to some degree by changing the pumping rate, fluid viscosity and proppant loading. If the goal of a frac job is to get the fluid and proppant below the ground, most any formation can be frac'd. The degree to which a reservoir will generate complex fracture networks, break into fresh rock or create a simple bi-wing fracture can be influenced by the stimulation treatment job design. The creation of a complex fracture network is a function of the stimulation fluid rheology, rock properties and presence and orientation of preexisting planes of weakness acting in the stress state of the reservoir.

The index of brittleness or fracability is a term frequently used to describe formations that are likely to create complex fracture networks when fracture stimulated. In a broader view, fracability is much more than just calculating mechanical rock properties. A new definition of fracability, the Complex Fracability Index (CFI), proposed here integrates the sedimentary fabric, stratigraphic properties, mineral distribution and the presence and orientation of preexisting planes of weakness operating in the present day stress state into a single metric. This approach establishes a means to qualitatively or quantitatively determine the degree to which the rock will have the ability to create a complex fracture network or just a simple planer hydraulic fracture using the mechanical rock properties and the dip and orientation of the preexisting planes of weakness in the rock in the modern day stress state. The CFI methodology is not limited to shale reservoirs. Examples from the Barnett Shale and the tight sand in the Piceance Basin will be discussed.