

The Role of Grain Size in Unconventional Reservoirs

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ABSTRACT

Grain size affects fracture susceptibility, permeability, hydrocarbon saturation, and hydrocarbon recovery in clastic and carbonate sediments that are both water wet and overpressured. Grain size is critical to both natural and induced fracture susceptibility. Resistance to fracturing increases with decreasing grain size. Examples from the Williston Basin illustrate the effect of grain size on fracture stimulation. Grain size is also directly related to permeability. Permeability decreases by a factor of four as grain size decreases. Decreasing grain size limits hydrocarbon saturation. Smaller grain size typically has smaller pores and smaller pore throats that decrease the storage volume and migration of hydrocarbons into the sediment. Therefore, hydrocarbon recovery efficiency is also directly related to grain size. Decreasing grain size results in lower hydrocarbon recovery.