Touching-Vug Pore System, Lake Medina Road Cut, Medina County, Texas

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ABSTRACT

Carbonate pore space has been grouped into matrix and touching-vug pores in order to facilitate merging petrophysical properties and geologic descriptions. Reasonable approaches to merging matrix petrophysics with geology have been developed, but understanding flow in touching vugs and its relationship to geology remains elusive. The road cut through Cretaceous strata near Lake Medina, Medina County, Texas, provides an opportunity to examine the touching-vug problem. The road cut contains a small cave, mostly filled with sediment, numerous fractures and small faults, and vugs of various types and sizes. The cave is associated with a fault with 3 ft (1 m) of offset. Solution-enlarged fractures and bedding-plane dissolution are found associated with the cave. The outcrop contains dolomite and anhydrite that have been calcitized and anhydrite nodules that have been dissolved to form small vugs.

Of primary interest is the dissolution of fractures to form large vugs that are not associated with the cave. These large vugs are located in the beds that have the highest matrix permeability on the outcrop. The permeable beds are described as grain-dominated packstones, whereas other beds are low-permeability, mud-dominated fabrics. Flow modeling by other workers demonstrated that the highest flow rate of groundwater is along the fault and the second highest flow rate is along fractures that intersect the permeable beds. This observation suggests that the distribution of large vugs in a touching-vug pore system is controlled in part by the intersection of permeable fractures and the high-permeability beds. Adding a matrix permeability model to a fracture model may improve predicting the distribution of vuggy pore space in a touching-vug reservoir.

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