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Reservoir Heterogeneity in an Estuarine Incised Valley-Fill Reservoir, Sun Ranch Field, Wyoming: Abstract

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ABSTRACT

Incised valley-fill reservoirs containing sand derived primarily from the sea may contain significantly more barriers and baffles to flow than fluvially filled incised valleys. In choosing well locations, designing above ground handling capabilities and predicting economics of individual wells, it is important to recognize that the geometry, scale and type of barriers to flow are significantly different in these two types of valley fills. The tidal estuarine model developed primarily by Clifton for Pleistocene and modern estuarine deposits of Wilipah Bay, Washington, provides an excellent analog for deposits of Muddy (Cretaceous) sandstones at Sun Ranch field.

Individual tidal valley-fill deposits may have several relatively continuous horizontal shaley beds which form baffles or barriers to vertical flow. These thin horizontal shales represent flooding events of more than the usual daily tidal duration. The beds are: (1) dominantly clay and fine sand and silts; (2) have very low porosity and permeability; (3) prevent or deter vertical flow between reservoir compartments and act as baffles to flow; (4) are the focus of diagenetic clay formation; and (5) are easily recognizable in core but not on most logs. Tidal and tidally-reworked fluvial valley fills may have significantly lower porosity and permeability and smaller "port sizes" than most fluvial fills.

Detrital clay also occurs as drapes, clasts and "grains" within otherwise very sandy beds. Anomalously low log porosities may be calculated where clay occurs as clasts and clay drapes or ripples in otherwise high quality reservoir sandstones.

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1 Consulting Sedimentologist/Stratigrapher, Tulsa, OK