

GEOSCIENCE NOTES

DEPOSITIONAL ENVIRONMENTS OF CRETACEOUS RESERVOIR SANDSTONES IN ROCKY MOUNTAIN AND GULF COAST AREAS

by

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ABSTRACT

Cretaceous sandstones which form stratigraphic traps in the Rocky Mountain and Gulf Coast areas represent a wide range of depositional environments. The environments are differentiated by means of textural change, bedding sequence, and morphology of the reservoir bodies. Generally, fluvial sandstones are characterized by decrease upward in grain size and scale of bedding, whereas littoral sandstones increase upward in grain size.

Two distinct fluvial types are recognized primarily on morphology, meander belt and braided belt sandstones. Lower Cretaceous Fall River (Dakota) reservoirs in the Powder River Basin, Wyoming, are point-bar sandstones which were deposited in meandering streams. Porous sandstone occurs in arcuate ridge-and-swale patterns, and the traps are formed by narrow, shale-filled channels which represent abandoned meander loops. The geometry of the reservoir bodies is identical to meander deposits of large modern streams in meander length, radius of curvature, and channel width.

Upper Cretaceous Tuscaloosa reservoirs at Mallalieu field, Mississippi, are both point-bar and channel-fill sandstones. The channel sandstones were deposited in narrow, sinuous bands which have a braided pattern that is quite distinct from underlying meander belt deposits. The upward change from meandering to braiding probably was caused by increase in slope toward the Gulf Coast Basin.

Lower Cretaceous Muddy Sandstone at Bell Creek Field, Montana, is a barrier island deposit. The sandstone is characterized by high quartz content, upward increase in grain size, and distinct subfacies which are recognized by sedimentary structures and include, in ascending order, lower shoreface, middle shoreface, beach-upper shoreface, and eolian sandstones. This sequence is identical to the modern deposits of Galveston Island. The Bell Creek trap is formed by an up-dip lagoonal facies which is dominated by "washover" sandstones and inter-laminated and burrowed siltstone and shale. Muddy Sandstone at other Powder River Basin fields represent a variety of fluvial and deltaic deposits.

In exploration, the identification of environment on the basis of lithology and bedding can be an aid to predicting geometry of the reservoir sandstone.