

Reservoir Characterization Studies of Cut Bank Field, Montana

By

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Opportunities for oil reserves growth occur in depleting reservoirs because of heterogeneities that prevent mobile hydrocarbons from migrating to well bores. This research focuses on reservoir characterization of the Cut Bank stripper well field in Montana. The main producing zone is the Lower Cretaceous Cut Bank Sandstone, which is inferred to be deposits of as a braided-to-meandering fluvial system. The oil occurs in stratigraphic traps in channel-fill sands of highly variable thickness. The key challenge study is to predict the spatial distribution of petrophysical properties between well bores. Past studies have been limited by the one dimensionality of well-log dataset. Therefore, I will integrate the well log data with 3-D seismic and production data to identify the reservoir heterogeneities responsible for intra-reservoir entrapment and the presence of the bypassed oil in the field.

I will use seismic-guided log-property mapping techniques to model the heterogeneous distribution of porosity. Also, I will integrate geologic and engineering data to identify heterogeneities. This approach involves several specific steps, including (1) determination of sandstone reservoir architecture, (2) investigation of the trends in reservoir fluid flow, and (3) integration of fluid flow-trends with reservoir architecture. To accomplish these steps, I will (1) prepare a map suite (gross sandstone maps, log facies maps, percent sandstone maps, porosity maps, etc.) that establishes a reliable, high-resolution, internal reservoir stratigraphy, (2) study diagenetic modifications of the Cut Bank Sandstone, and (3) identify reservoir architecture and fluid-flow trends.