

West Siberia Reservoirs with Unexplored Potential: Lower Cretaceous Turbidites, Debrites and Intrusions

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Sandstone debrites and intrusions within clastic sequences have long been known and documented in both outcrops and subsurface (core/log/seismic) data. However, until recently in West Siberia basin their importance to hydrocarbon production was not considered to be high. This situation is now changing fast as several oil accumulations has been discovered in 2000-2002. Some producing Lower Cretaceous complex reservoirs show evidence of having undergone mass flowing and intrusion into the underlying Black Shales of the Bazenov Formation (Jurassic). Case studies of turbidite and related debrites sediments from Kalchinskoe, Zimnee, Tor - Eganskoe and Vyemskoe oil fields are presented to illustrate specific features which vary from centimeters (core-scale) to hundreds of meters (seismic-scale).

There are four types of processes associated with mass-flow: erosion, partial re-deposition, compression and lateral intrusion. The intrusion of clastic mass produced a stratigraphic anomaly where younger Neocomian (K1) sediments are overlaid with older (J3) rocks. Several factors are required to be present for such specific geologic event: fast accumulation or large sandy volumes within the mud-dominated prograding system; local structure (uplift); and presence of consolidated, organic rich shales at the basin floor. Studies performed on rock material indicate admixture of lithologies and partial oil-wetting in sandstone reservoirs. Features recognized in cores include: over-folds, scars, balls, "bull-eye" and "flame" structures, and "injection breccias".

Sandstones subjected to mass-movement have various inclusions that affect their logging properties. Intrusions and debris-flow lead to complex geometries that are distinctly different from those described by classical models of turbidite systems. Individual bodies are disconnected and require application of directional drilling and LWD for completion and optimal production. They present a separate exploration target with "exotic" reservoirs and can play a significant role in mature provenances of West Siberia Basin.
