

Athabasca Oil Sands Deposit in the Fort McMurray Area, Alberta (Canada): Recognizing Geological Complexity and Reservoir Rock Heterogeneity

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Abstract

The Lower Cretaceous Athabasca Oil Sands deposit in the Fort McMurray area in NE Alberta is the largest oil sands deposit in the world. Ninety percent of the reserves are buried too deeply for surface mining and require in-situ recovery. In order to achieve the optimum economic benefit from recovery operations (i.e. SAGD) there is a need to develop the best available reservoir trends. Large amount of leases have been acquired through regionally applied, often relatively crude screening techniques. Numerous SAGD projects require evaluations of the reservoir trends and how it fit into larger regional context. Therefore, detailed geological modeling of the original depositional facies and sequence stratigraphic framework appears essential to develop this vast resource.

Athabasca deposit perhaps never been buried to significant depths, hence, diagenesis is minimal and played an insignificant role in reservoir development. Thus, the reservoir quality is mainly controlled by the primary depositional systems of the host sediments. Accurate delineation of the extent, quality, and reservoir characteristics require investigations of the complex reservoir architecture with closely spaced drill holes (core and stratigraphic data) to optimize bitumen recovery from both surface mining and in-situ projects. In that context, ongoing studies focus on play assessments using sequence stratigraphic model. Recognizing the enormous significance of estuarine system prove very critical. In addition, this would help to achieve a predictive model of fluid flow paths to identify communication between wells in an otherwise complex geology where extreme facies change over short distances result in horizontal discontinuity of the reservoirs.