Reservoir Characterization and Variability of the Tight Oil Play of the Cardium Formation in East Pembina - Alberta

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This study presents the reservoir characterization of the offshore to transition offshore parasequence sets of the lower Cretaceous, Cardium Formation in East Pembina, Alberta. The purpose of this study is to investigate the reservoir characteristics and factors controlling oil production of the unconventional type low permeability offshore deposits of the Cardium. The Cardium Formation was deposited as eastward shingled parasequence sets in an overall coarsening upward profile. The low permeability Cardium reservoir consists of shaly sandstones, bioturbated silty sandstones, shale laminated sandstones and isolated sandstone beds. Bioturbation and its effects have played a significant role improving the overall reservoir quality within this low permeable reservoir. The lower sequences exhibit intensely bioturbated mud rich facies as opposed to the sand rich upper facies. This study seeks to examine and delineate the associated reservoir properties within Cardium sequences in East Pembina.

Detailed core observations and their relationship to open hole well-logs, thin section and SEM analysis coupled with CT scans were utilized to characterize the reservoir facies properties. Collectively the observed porosity and permeability relationships and pore size distribution within the various facies are linked directly to production values. The inter-well facies correlations of these offshore deposits reveal surprisingly high variability in facies architecture over relative short distances of 2-3 km's.

Total net sand density and volume furnished by the CT scans coupled with the petrophysical logs were used to resolve the total sand volume within the various facies. Reservoir characterization of the individual stacked facies sequences in the offshore deposits of the Cardium Formation helps establish a more thorough understanding of the total remaining reserves. As an operator, optimal placement of horizontal wells enhances the economics of this unconventional reservoir.