

# **Core Display of Fluvial-Estuarine Deposits of the Athabasca Oil Sands used in Ray-Traced Seismic Models, Steepbank River and Clarke Creek Areas, NE Alberta**

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Stratigraphic sections of outcrops were measured and three structural-stratigraphic cross-sections constructed in the Steepbank River area, north of Fort McMurray, near the Suncor Steepbank Mine. At least four channel complexes were identified in these outcrops based on stratal bounding surfaces, arrangement of exposed lithofacies, and packages of consistent paleoflow patterns. The lower part of each channel complex consists of medium to large-scale trough cross-bedded sandstone. This is overlain by sandy or muddy estuarine point bar deposits, comprised of inclined heterolithic stratification, which downlap onto the lower sandy channel deposits. Abandonment fill mudstones cap complete channel and point bar successions; whereas, in stacked successions the mudstones are lacking, and channel and point bar complexes cut into one another, preserving incomplete successions, and exhibiting more common sand-on-sand contacts.

Nearby subsurface wells in the Steepbank River area contain cored and logged intervals that show similar (and in the case of a close well, the same) lithofacies as the outcrop sections. For outcrop – subsurface correlations, artificial sonic logs were constructed for the outcrop sections using sonic curves representative of similar facies in nearby wells, adjusting the sonic curves to reflect the real differences in thickness of the different lithofacies and mud content observed in outcrop. The three cross sections were used to construct seismic models for the area using ray-tracing techniques (Langenberg et al., 2002).

The near-surface deposits of the Steepbank River area are similar in scale and geometry to the subsurface deposits of the Clarke Creek area, located about 20 km southeast of the Steepbank River outcrops. The Clarke Creek channel and point bar complexes are very well imaged on high-resolution 2D seismic lines, and our seismic modeling indicates that such high-resolution seismic data are necessary to image the estuarine channel and point bar complexes within the McMurray Formation. The results of this study show that seismic models for the Steepbank River area are appropriate models for the four, high quality, industry

acquired seismic lines from the Clarke Creek ExxonMobil lease area (Langenberg et al., 2003). Application of such outcrop-subsurface correlation in other areas will help the interpretation of seismic data obtained from other areas within the Athabasca oil sands deposit.

**References**

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