geoconvention
Calgary • Canada • May 13-17 2019

Come for a Scroll, Stay for the Bar – Interpretation and Development Strategy of a Large-Scale Point Bar at Imperial's Aspen Project, Alberta

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Summary

Imperial Oil has begun construction on the Aspen in-situ oil sands development project, with first oil expected in 2022. The prediction of reservoir connectivity and quality is fundamental to project decisions and is centered on geo-scientific principles. The success of the project relies, in part, on the integration of multiple data sets using a meaningful stratigraphic framework and associated environments of deposition. This talk focusses on this methodology and the implications for development.

At Aspen, high-resolution 3D seismic, well logs, core lithofacies, formation micro-image images and interpreted dipmeter logs have been used to develop a stratigraphic framework comprised of four informal members, SB-I through SB-IV. The SB-1 member is localized in Devonian lows, deposited in a bed-rock confined valley and is water wet. The SB-II and SB-III are the dominant reservoir intervals, and are interpreted to have been deposited as small (<15m) to large (>30m) scale point bars respectively. The SB-IV member is dominated by overbank and coastal plain deposits and is typically non-prospective.

Seismic time slices at Aspen clearly illustrate the character of the reservoir objective. The main geo-body at Aspen is a large-scale point bar with an area of roughly 40km^2. The point bar is composed of lateral accretion sets which stack into five amalgamated bars with a common accretion orientation, and are bound by abandoned channel deposits. The preservation of the single large-scale point bar allows prediction of reservoir and non-reservoir lithofacies to be made according to depositional point bar models.

Reservoir quality, lateral and vertical reservoir continuity were key considerations in the selection of the initial development area at Aspen. The initial pads will be placed near the apex of the large-scale bar complex, where well data confirm the presence of the highest quality resource. In this area, the relatively high continuity of the geo-body favors the likelihood of higher reservoir continuity. The thickness of the continuous reservoir is impacted by the vertical stacking of reservoir in the SB-II and SB-III units and is considered in the placement of the horizontal well pairs.

Full development in the Aspen area will be predicated upon this integrated methodology and will continue to guide project decisions as the project moves from the initial development area to areas of more challenged resource.