

Chasing a Giant – Assessing and Developing the Bakken Resource Play in the Williston Basin, North Dakota

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Critical aspects for the development of the Bakken have been assessed including drilling operations, reservoir quality and distribution, well performance, production operations, and fracture stimulation. Of these, reservoir quality and fracture stimulation are the key drivers to the success of the play.

The Bakken Formation (Upper Devonian) of the Williston Basin, North Dakota, consists of the Upper and Lower Bakken Shales and the Middle Bakken Member. The shales were deposited in anoxic conditions following large-scale transgressive events. They range from 20 to 40 feet in thickness, contain up to 30% TOC, and are mature to sub-mature source rocks. Resource estimates of 200 to 500 BB bbls OOIP are believed to have been generated and largely remain in situ.

The Middle Bakken Member is a mélange of lithologies including siltstones, very fine-grained sandstones, dolomites, and oolitic limestones. The section typically exhibits 6-10% porosity and ultra-low permeabilities of <.01 md. Horizontal drilling has targeted the Middle Bakken Anomaly which is a sub-facies of the Middle Bakken. It ranges from 6 to 15 feet in thickness when present and is characterized by a “cleaner” gamma-ray signature and an increase in sand content. Lower porosity, however, is commonly observed in the Middle Bakken Anomaly and has been confirmed with core data. It was deposited in a tidally influenced near-shore environment and contains channelized as well as bar morphologies. The current data set of 7 cores also suggests that large-scale tectonic or conduit-style fractures are not present and diagenetic effects are responsible for the ultra-low permeabilities observed.

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