SAGD Pad Performance in a Point Bar Deposit with a Thick Sandy Base

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Abstract

The Lower Cretaceous McMurray Formation in Alberta comprises one of the largest bitumen accumulations in the world. The Middle McMurray Formation is a heterogeneous unit, which contains several sedimentological elements such as point bar deposits, which in turn consist of inclined heterolithic strata (IHS) of sandwiched sand-shale/siltstone sequences and abandoned mud channels. Because of the presence of the shale/siltstone interbeds, the reservoir commonly presents lateral and vertical lithological heterogeneity. Point bar deposits are the target for many SAGD operations in the McMurray Formation, which given that its dominant drive mechanism is gravity-drainage, suffers in performance from extensive vertical barriers. Here, we have constructed an ultra-defined point bar reservoir model consisting of ~96 million cells conditioned to geological (fluid compositional, logs, core, and seismic) data from an oil sands formation. As part of a continuing study on the performance of SAGD in point bar systems, we have evaluated the impact of the pad performance in a typical clean sand Athabasca reservoir (20 m thick) with an overlying highly heterogeneous point bar deposit (30 m thick). Many SAGD operations are being planned for point bar depositional environments thus an understanding of SAGD performance within these deposits is essential for optimal well pair planning. Also, given the structure of heterogeneity within the point bar system, optimizing the operating strategy to maximize process performance is important. The results clearly demonstrate that the performance of a 9 well pair pad depends on the orientation of the pad within the system. Depending on the orientation and well pair placement within the point bar, IHS shale/siltstone baffles can harm the performance of the recovery process.