

Petroleum Geology and the Implementation of a High-Pressure Gas Injection EOR: Alberta Bakken, Milk River Area Southern Alberta

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Abstract

With the progression of oil and gas into tighter, unconventional plays in the early 2000s, the success of the Williston Basin Bakken development spawned renewed interest in the potential for contemporaneous, analogous deposits in the Alberta Basin. As a result, Southern Alberta saw a rapid expansion in the exploration and resources put toward the evocatively named Alberta Bakken formation; theretofore unceremoniously grouped into the widely known Exshaw-Banff system. Results of this exploration were largely unfruitful and proved uneconomic, primarily as a result of poorer rock quality throughout the interval compared to its sister Basin. In December of 2010 however, Dee Three Exploration Ltd. (now Granite Oil Corp.) discovered what has developed into the only economic early Mississippian Alberta Bakken pool. Since discovery, the extent of the productive zone has been identified over a strike extending 60 km with a primary producing pool that has been estimated to contain in excess of 470 million barrels of original oil-in-place in the Ferguson strike area.

Upon initial oil production from this commercial find, details of undersaturated fluid properties, oil sourcing, reservoir variabilities and sediment deposition and their relationship to production have become extremely important contributing factors to the ongoing development of this unique oil resource. Rapid pressure depletion upon initial production and low GOR ratios sturdily pointed to an undersaturated reservoir fluid and the decision was made early in the producing life of this oil pool to commence a high-pressure gas injection EOR scheme. Further evaluations through complex production modelling and field observations are extremely encouraging; greatly increasing the ultimate recovery of the original oil-in-place. This early life oil play is constantly undergoing geological and production evaluation to understand the sandstone reservoir and the best matched engineering to achieve elevated and long term oil recovery rates with exceptional economics.

In this presentation, Granite will walk through the evolution of a large scale oil discovery, geologic understandings, the implemented high-pressure gas injection process and practice - concluding with a review of the economic benefits observed.

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