Prospecting for Viking Oil Resources: Verendrye to Forgan Trend

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Summary

The Viking reservoir in SW Saskatchewan is one of the most cost effective and active light oil plays in the Western Canadian Sedimentary Basin. Horizontal drilling and multi-stage hydraulic fracture stimulation techniques have revitalized this widespread low permeability sandstone reservoir which was first discovered and developed over a half century ago.

The Viking sands were deposited as sanding up cycles separated by marine mudstones in the Western Interior seaway in Upper Albian time. The tops of cycles are interpreted as erosional surfaces. The Viking reservoir consists of discrete fine grained sands and occasionally granular to pebbly conglomerates, interbedded fine grained sands and shales, and bioturbated sands and shales (White and Velesco, 1970; Pozzobon and Walker 1990). The depositional environment is proposed to be a combination of offshore bars, lowstand shoreface and foreslope sands, deltaic sediments, and submarine flows (Mathison 2013; Michaud 2015).

The early development of the pools with vertical wells focused upon the more continuous sand layers and the conglomeratic bodies. Current horizontal drilling technology can also recover hydrocarbons from the thin interbedded and bioturbated facies as well as the unswept portions of the better quality sands.

This paper is an overview of the reservoir trend in the area of the Verendrye, Plato, Totnes, Elrose and Forgan pools. The work is the result of a summer student project and was done using readily available well log, drill stem test, and production data with a small amount of core review. It was an effort to gain an understanding of reservoir distribution, hydrocarbon charge, and the location of remaining economically recoverable reserves.

The challenge with this project was working with log suites which cannot be expected to accurately represent the thin bedded and shaly nature of the reservoir. A combination of petrophysical cutoffs integrated with DST and production data was used to overcome this challenge and identify the best areas of the stacked reservoir intervals. An effort was made to subdivide the Viking sands but without detailed core study this stratigraphic subdivision was of limited reliability. Instead the stacked sum of reservoir properties of interest were used to identify prospective fairways for additional exploration and development.

The most important observations were that it appears that oil is trapped in local structural lows and in the lower quality reservoir sands while gas is trapped on structural highs in the better quality sands which match observations of others (Kohlruss 2015). Some of the results of recent horizontal drilling would suggest that situations occur where the higher quality sands are gas prone while the adjacent interbedded
sands and shales surrounding them are oil bearing. Wells drilled in this intermixed resource play and conventional reservoir zone perform like oil wells despite having a free gas component (often depleted from earlier production).

Acknowledgements

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References


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