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The Clearwater Formation at Marten Hills: A case study

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Summary

The Lower Cretaceous Clearwater Formation occurs throughout much of central and northern Alberta and generally consists of deeper marine silts and shales. It immediately overlies highly productive Wabiskaw/Bluesky sandstones, also of the Mannville Group, but due to being primarily distal deposits Clearwater parasequences are largely overlooked in the Western Canada Sedimentary Basin when prospecting for oil. However, careful mapping and the application of modern multi-lateral horizontal drilling techniques are rapidly turning this repeatedly by-passed zone into a prominent oil resource play.

Introduction

Within the Clearwater Formation oil accumulations with commercial potential occur along a broad fairway stretching from township 62-16W4 in the south-east to 77-7W5 in the northwest, and possibly beyond in each direction. But when it comes to extracting commercial value the devil is in the details, which are the primary focus of this presentation as they pertain to the Marten Hills area centered at township 75-25W4. In this region a thick Clearwater sand deposit is predominantly oil charged and has sufficient permeability to flow medium gravity oil into un-stimulated horizontal well-bores. High feldspar and kaolinite compositions within this deposit cause a 'dirty' and 'damp' looking log response which likely lead to misjudgment of the zone when previously penetrated in numerous wells. Lower Cretaceous oil pools in this region are also mostly known for production of viscous oil from very clean and permeable sandstones. However, studying Clearwater cores and oil analyses led to a promising story for the Marten Hills area: 5-25 m net pay, 20% to 30% effective porosity, 50% oil saturation, 5 to 500 milli-darcy permeability, and <300 cp. oil viscosity. Low rate productivity was previously established in several wells, but in order to commercialize the deposit operators are now drilling multi-lateral horizontal wells that allow for enormous open-hole contact with the reservoir.

