

The Graminia-Blueridge of Northeast Alberta: A New Devonian Subcrop Bitumen Play

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Summary

The Upper Devonian Blueridge and Graminia Formations contain a significant bitumen resource that has been the focus of recent drilling by Laricina Energy Ltd in the Germain area (T 84 R 22W4) of northeastern Alberta.

The Graminia and Blueridge Formations of the Winterburn Group are peritidal carbonates that are distinguished by the higher argillaceous content of the former. They have a complex diagenetic history which includes late Devonian to early Mississippian dolomitization and early Cretaceous(?) fresh water leaching. This was quickly followed by oil migration and subsequent biodegradation to bitumen. Oil was trapped along the up-dip erosional subcrop by overlying Cretaceous shales.

Calcite is more soluble than dolomite under surface conditions. Exposing dolomitic strata to fresh meteoric water will result in the preferential leaching of any residual calcite-rich material. Intra-particle porosity develops within carbonate grainstones due to preferential leaching of coarser grains over the finer matrix material. This is sometimes referred to as pinpoint vug porosity. The less soluble dolomite matrix formed a rigid framework preventing the wholesale dissolution of the carbonate bed.

Some beds develop high porosity and become conduits for the flow of large volumes of fresh water. Under these conditions, cavernous porosity was created. These caverns are up to at least one meter high and contain a variety of filling materials including angular dolomitic breccias, insoluble residue from carbonate dissolution and Cretaceous(?) mudstones.

Graminia and Blueridge reservoirs are typically greater than 20% porosity and commonly exceed 30%. Permeabilities typically are greater than 200 mD and sometimes range up to several darcies. Permeability is augmented by numerous sub-vertical fractures. The gross bitumen saturated interval is greater than 30m thick. Its oil saturation is greater than 80%, supporting the theory that the Graminia-Blueridge is an oil wet reservoir.

The stratified nature of the reservoir will create challenges in developing a bitumen extraction strategy as it may preclude the use of horizontal wells. Possible application of alternative thermal and solvent applications is being considered.

Cores from Laricina's recent drilling program will be used to show the nature of the Graminia-Blueridge reservoir development and bitumen resource. Core from at least one cave interval will be displayed.