

A Micrite Mystery in the Wildriver Sub-Basin

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Summary

A Devonian Leduc limestone micrite in the Wildriver Sub-Basin has exceeded expectations by producing 11.5 BCF from low permeability, 0.5 to 1.5 mD rock. The 15 - 19 - 56 - 23 W5 well, drilled in 1990, was almost abandoned after the initial routine core and log assessment indicated that porosity and permeability were too low for commercial production.

The 15 - 19 well targeted a seismically identified buildup. A total of 43.5m of core was cut in the middle of the Leduc zone. Upon reaching total depth, a full array of logs was run, including both the induction and laterolog resistivity logs. Visual examination of the generally dark coloured core led examiners to deem it "tight". Fortunately, subsequent SEM and capillary pressure work revealed many favourable rock qualities not seen with the human eye or using conventional 20X microscopes. An intricate network of micrite sized pores and pore throats displayed amazing connectivity at the minute grain sizes of ~5 microns. This secondary rock work completely overturned the initial assessment that the zone was too tight to produce at economic rates. The zone was perforated and the initial rates were > 8 MMcf / D. Fifteen years later, it continues to produce at ~ 800 mcf/d.

This paper examines how a 5 micron sized limestone reservoir was capable of such amazing rates. The micrite mystery is addressed both geologically and petrophysically. Guidelines are presented such that operators will recognize the productive potential of these low permeability carbonates. Finally, the enormous influence of overpressure (> 12,000 psi) on the rates will be discussed as it is the combination of *in situ* permeability and reservoir pressure that makes this micritic reservoir so productive.