

The Duvernay Formation (Devonian): An emerging shale liquids play in Alberta, Canada

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Introduction

The Duvernay Formation (Devonian - Frasnian) of Alberta, Canada is a Type II marine, proven source rock which has yielded much of the oil and gas to the adjacent classical Devonian, conventional fields in carbonate reefs and platform carbonates. These conventional fields were discovered starting in the late 1940's during Alberta's 'golden years' of Paleozoic exploration and production. Production in these conventional fields is in decline and exploration and development has now shifted to their source, the Duvernay shale.

Theory and/or Method

Based on a comprehensive database of over 300 wells, comprised of 14 cores, 8,800 km 2D seismic, 2,200 square km 3D seismic, it is 35 to 60 meters thick and the trend extends over 400 kms from northwest to southeast across Alberta. It is stratigraphically age equivalent to the Muskwa Formation of the Horn River dry shale gas play to the northwest in the neighboring province of British Columbia. The VRo% equivalent maturity is published and well documented; the liquids rich portions represent approximately 24,000 square kilometers (5.9 million acres) at drill depths of 2,800 to 3,600 meters (9,200 to 11,800 feet).

Based on petrophysics calibrated to core and cuttings samples, the Duvernay is characterized by porosity of 6.0 to 7.5 % with an average of 6.5%; permeability of 236 to 805 nD with an average of 394 nD; and TOC of 2.0 to 7.5 weight % with an average of 4.5%. Xray diffraction results from core and cuttings samples indicate it is likely very brittle with a low clay content average of 26%, with an average of 47% amorphous biogenic silica and 20% calcite and dolomite matrix.

The pressure gradient, based both on production tests, and inference from mud weight data, is 15.8 to 20.3 KPa/meter (0.7 to 0.9 psi/foot). This degree of overpressure is important for being sufficiently above the dew point/bubble point so as to limit condensate dropout in the wellbore during production.

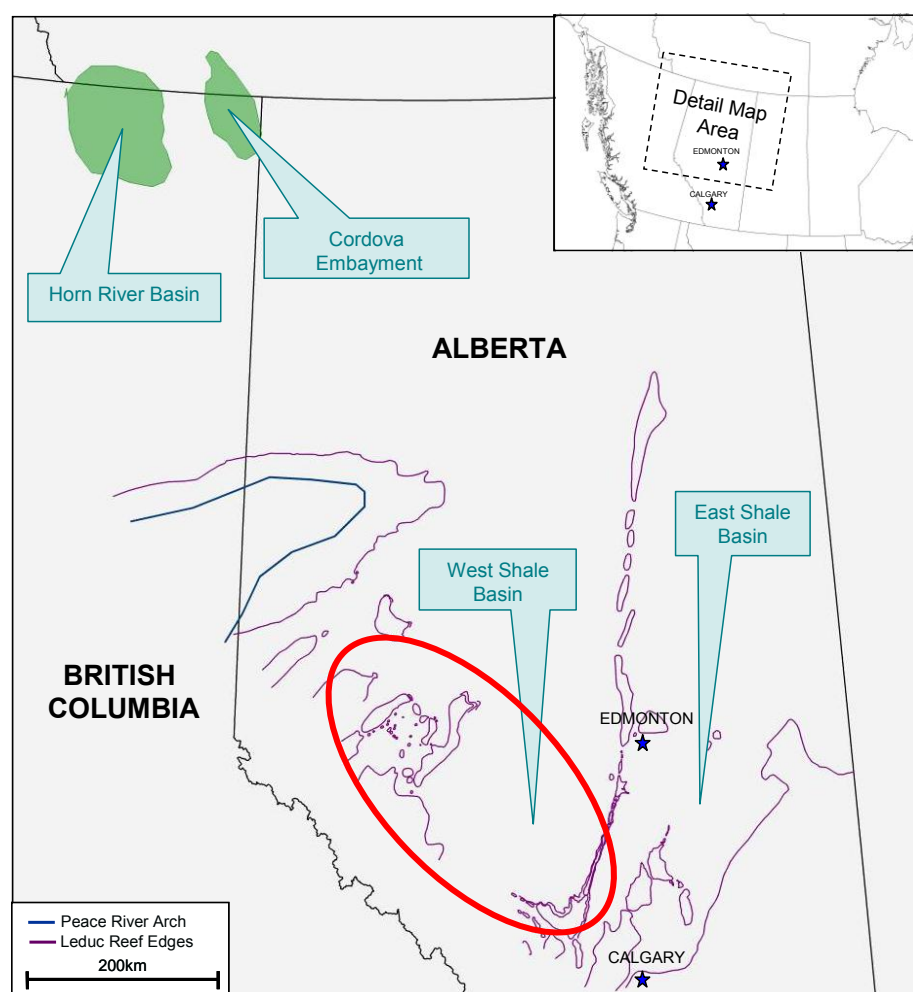


Figure 1: Area of unconventional Duvernay exploration and development highlighted in red.

Conclusions

Presently, this is an emerging shale liquids play in Canada. At this early stage there are only a few horizontal wells with frac stimulation and production tests; so far, results have been encouraging for Industry. Several large and small companies (e.g., Talisman, Shell, Chevron, ConocoPhillips, Encana, Trilogy, Celtic and Yoho) are in various stages of establishing the play and attempting to prove its commercial viability.

References

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