Depositional and Diagenetic Controls on Reservoir Canada Development, Big Valley Formation ("Alberta Bakken"), Tight Oil Play, Southern Alberta

Jacqueline Colborne[1], R.Marc Bustin[1], Gerry Reinson[2], and Nathan Bruder[3]

[1]*The University of British Columbia, Vancouver, British Columbia, Canada*
[2]*Reinson Consultants Ltd., Calgary, Alberta, Canada*
[3]*Murphy Oil Company Ltd., Calgary, Alberta, Canada*

Abstract

The Upper Devonian (late Famennian) Big Valley Formation has been presented as a potential unconventional light oil play in southern Alberta. This occurred as the result of several investment houses applying the informal term “Alberta Bakken” to the Bakken age equivalent Exshaw Shale (Zaitlin et al. 2011; Bryden, 2011). The use of the “Alberta Bakken” term suggests prolific production of liquid hydrocarbons from an unconventional reservoir analogous to the Bakken Shale of the Williston Basin. However, production is interpreted to be mainly from the underlying Big Valley Formation. The Big Valley Formation is considered in part equivalent to the prolific oil producing interval in the Three Forks Formation of the Williston Basin (Figure 1).

The study area is from Township 4 to Township 11, Range 22 to Range 26 west of the fourth meridian inclusive in southern Alberta (Figure 2). Data for this study is based on 21 cores and 84 geophysical logs that penetrate through the Big Valley Formation. Cores along with wireline data logs are used to constrain depositional and stratigraphic trends of the Big Valley Formation within the study area.

Published literature on regional stratigraphy and nomenclature of the Upper Devonian Wabamun Group in and proximal to the study area is inconsistent, particularly with respect to the Big Valley and Stettler formations. Present nomenclature places depositionally related Big Valley units within the Stettler Formation. A proposed revision of the stratigraphy is presented in this paper as a necessary step in determining the origin and aerial distribution of potential reservoir zones (Figure 3).