

The Deep Basin Development Entity – Enhancing Exploitation of Alberta’s Deep Basin Tight Gas Resource

Brad J. Hayes
Petrel Robertson Consulting Ltd., Calgary, Alberta
bhayes@petrelrob.com

Introduction

A huge tight gas resource base exists within the Alberta Deep Basin, the development of which has been greatly aided by the creation of Development Entity #2 (also known as the Deep Basin Development Entity, or DBDE). The DBDE was designed in 2006 by a cooperative effort between the Alberta Energy Resources Conservation Board and industry partners, with geological support from Petrel Robertson Consulting Ltd. It was expanded in 2009, and now encompasses 464 townships in west-central Alberta (Fig. 1).

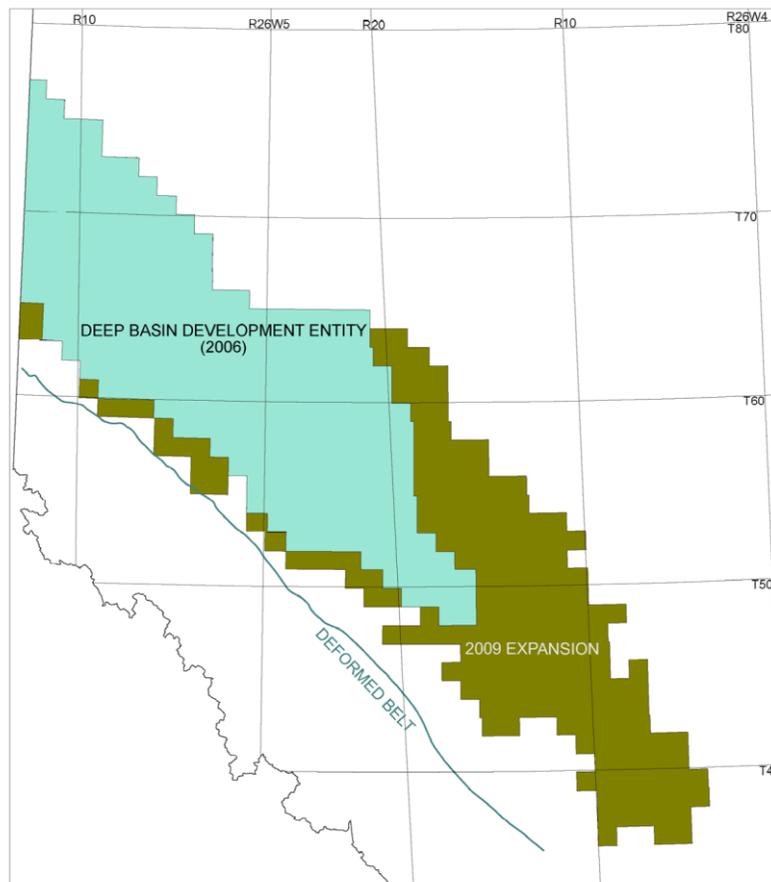


Figure 1. Outline of Deep Basin Development Entity created in 2006 (light green), and the expansion area, approved in 2009 (dark green).

Industry's need for the DBDE arose from technical advances in drilling and completions, which allow companies to drill and produce from numerous stacked tight gas reservoirs in a single wellbore (Fig. 2). Closely-spaced wells, each producing from up to 12 tight gas zones, can attain economic flow rates and reserves, particularly when drilled in large, multi-well projects. However, the regulatory environment for conventional gas wells, which lays out specific rules for well spacing and data collection from each wellbore, hinders efficient and economic implementation of such projects. Prior to the DBDE, companies had to make special applications for downspacing and commingling, and projects were considered on a case-by-case basis.

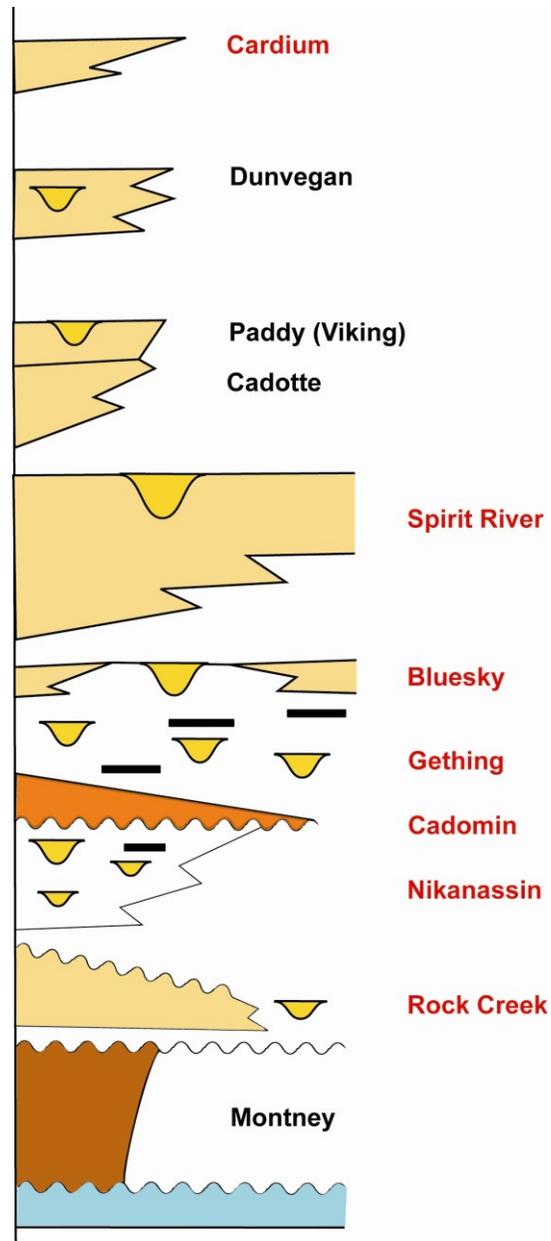


Figure 2. Deep Basin stratigraphic column. Reservoirs mapped in support of DBDE delineation are highlighted in red.

Creating the DBDE

The ERCB introduced the Development Entity concept in 2006, defining it as “an entity consisting of multiple formations in a specific area described in an order of the ERCB, from which gas may be produced without segregation in the wellbore subject to certain criteria”. Development Entity #1 addresses production from shallow coal seams and related strata in the south-central Alberta Plains, while Development Entity #2 was designed to facilitate gas production from tight sands of the Deep Basin.

In order for the Board to alter the regulatory regime to accommodate more efficient and economic drilling and production, assurance was needed that tight Deep Basin reservoirs could be accessed throughout the DE area, and that revised regulations would maximize gas resource recovery. Industry partners commissioned Petrel Robertson Consulting Ltd. to undertake systematic mapping of the major Deep Basin reservoir targets, and to calculate gas-in-place resources for each.

Deep Basin boundaries were mapped for seven major reservoir intervals between the Nikanassin and the Cardium (Fig. 2). Reservoir parameters (pay thickness, average porosity, gas saturation, temperature, pressure, and Z factor) were determined from wells and pool data, posted to maps, contoured, gridded, and combined to calculate distribution and gross volumes of gas in place. Final boundaries of the DBDE were determined through combining the various maps, ensuring that sufficient gas resource existed across the tight gas reservoir section to justify development through systematic commingling projects.

Based upon this project and additional industry input, the Board created the DBDE. Downspacing and systematic commingling within wellbores is allowed without special application. Operators can complete all prospective zones, without having to run specified pressure and flow tests across each reservoir. Costs are thus greatly reduced, and tight gas reservoirs that would have been uneconomic to complete under the old regulatory regime are now routinely completed, and their gas resource produced.

In 2009, the DBDE was expanded to its current configuration by a joint CAPP / ERCB committee, building upon knowledge gained in implementation of the original DBDE. Specific questions regarding Deep Basin boundaries, reservoir fluids (particularly sour gas and oil), and reservoir mapping were addressed to support application of DBDE efficiencies over a much larger area.

Conclusion

Today, the Deep Basin is a favored drilling province. Production volumes are increasing, and costs per completion are falling. The Deep Basin Development Entity underpins an economic success story, and is the product of technological advances, sound geological work, and a flexible regulatory regime.

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