
BMO CAPITAL MARKETS

OIL & GAS

THE ALBERTA BAKKEN: A NEW, UNCONVENTIONAL TIGHT OIL RESOURCE PLAY OCTOBER 2010

Summary

- The Alberta Bakken is an example of an early entry Deep Basin, tight oil resource play.
- Crescent Point Energy, Murphy Oil and Bowood Energy have established a dominant land position in the thermally mature source rock fairway in southwestern Alberta.
- Rosetta Resources, Newfield Exploration and Anshultz Exploration are the dominant land holders on the Blackfoot Indian Reservation in Montana just south of the Alberta–Montana border.
- The Alberta Bakken type well with 2 horizontal legs, an EUR of 250 Mbbbl and three-month IP of 348 bbl/d (based on a vertical producer) has economics that are comparable to typical Bakken wells in Southeast Saskatchewan, North Dakota, or Montana.

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Table of Contents

Executive Summary	2
Introduction.....	5
Recent Drilling, Acquisition, Farm-in and Land Sale Activity	6
Geological Setting.....	10
Type Curve Development	16
Economic Parameters	18
Economic Summary.....	19
Summary and Conclusions	21

Executive Summary

The Alberta Bakken, composed of the Banff–Exshaw–Big Valley Formations (Figure 1), is an example of an early entry Deep Basin tight oil resource play. While the play is still speculative due to the low number of producing wells, DSTs, core or completion attempts, the play is considered geologically proven, with production and DST oil recoveries from the Big Valley (Three Forks equivalent), and DST recoveries from the Exshaw (Bakken equivalent). The main Alberta Bakken play fairway is coincident with the thermally mature Exshaw source rock fairway (Figure 2).

The advent of horizontal drilling and multi-stage completion technology now allows for the exploitation of Alberta Bakken unconventional tight oil reservoirs. Recognition of potential low resistivity, overpressured bypassed pay is critical in the identification of potential reservoir in a Deep Basin setting.

Significant activity is presently expanding the limits of the Alberta Bakken Play (Figure 2):

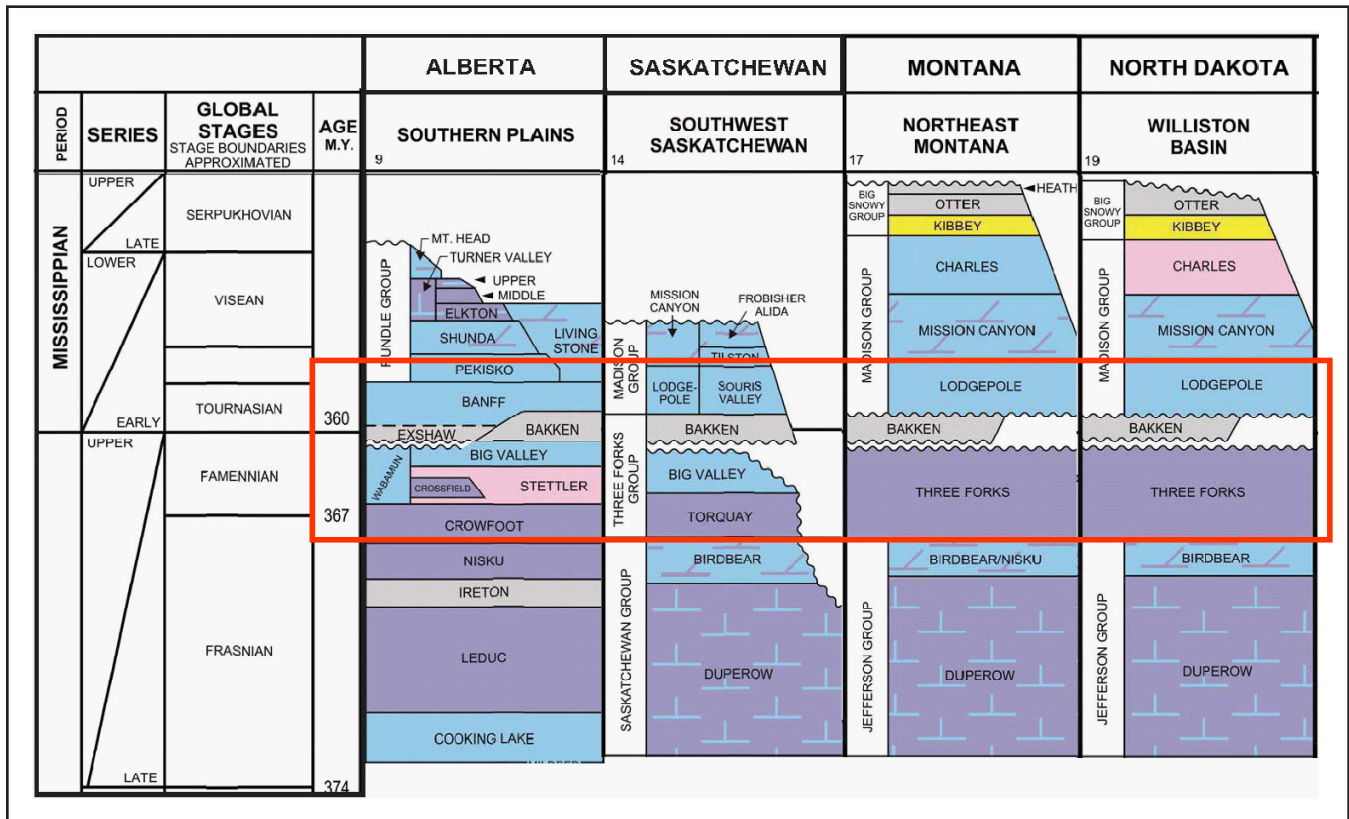
- Approximately 112,887 ha (~436 sections) have been purchased via crown land sale for the Alberta Bakken. The average price at crown land sales in 2010 was \$890/ha, with a maximum price escalating to \$4,668/ha. The total bonus for Alberta Bakken lands in 2010 was ~ \$100 million.
- In southwestern Alberta, Crescent Point Energy (through the acquisition of Darian Exploration for \$96 million) and Murphy Oil and Bowood Energy (through farm-ins on the Blood Indian Reserve) have established dominant land positions totalling ~1,862 sections in the thermally mature Exshaw source rock fairway.
- In Alberta, one horizontal well has been drilled and completed targeting the Alberta Bakken (drilled under broker: Antelope Land Services 14-7-1-21W4: TD – Wabamum; results confidential). A second horizontal well is presently drilling (Antelope Land Services 16-24-2-25W4, licensed to the Exshaw, spudded August 17, 2010), and a third horizontal well licensed by Antelope Land Services located at 3-8-1-18W4 has also been drilled and rig released on October 3, 2010, to the Exshaw. It is believed that Crescent Point Energy is the operator of these three wells.
- In the Montana portion of the play, Rosetta Resources and Newfield Exploration have farmed into 512,000 net acres (800 sections), and, along with Anshultz Exploration (undisclosed land), are the dominant land holders on the Blackfeet Indian Reservation.
- Rosetta, Newfield and Anshultz have drilled six vertical and one horizontal wells with nine wells licensed of an announced 18-well program in northwestern Montana. The horizontal well (Tribal Gunsight 31-16H) is speculated to have tested significant oil on completion, but, rates are unknown.

The Alberta Bakken type well is modeled after one vertical well. The vertical oil well at 10-30-8-23W4 has produced 243 Mbbbl from the Stettler formation, had a three-month IP of 297 bbl/d, and will have an EUR greater than 250 Mbbbl. The Alberta Bakken horizontal type well uses a three-month IP of 348 bbl/d with an EUR of 250 Mbbbl and has a decline similar to the type wells found in corporate presentations for the Bakken in North Dakota, Montana and Saskatchewan. Since our type well assumes two horizontal lateral legs are drilled, with a combined three-month IP of 348 bbl/d (174 bbl/d per leg) and an EUR of 250 Mbbbl (125 Mbbbl per leg), it is a conservative estimate considering that the vertical analogy will exceed 250 Mbbbl.

Also, since much of the Alberta Bakken is situated in a Deep Basin, overpressured setting with thick pay, it is reasonable to assume that it will have higher deliverability and reserves than the Southeast Saskatchewan Bakken. However, the Alberta basin will require much higher drilling and completion costs than Saskatchewan, so the total cost burden of \$4.5 million for the Alberta type well is significantly higher than for a Saskatchewan well.

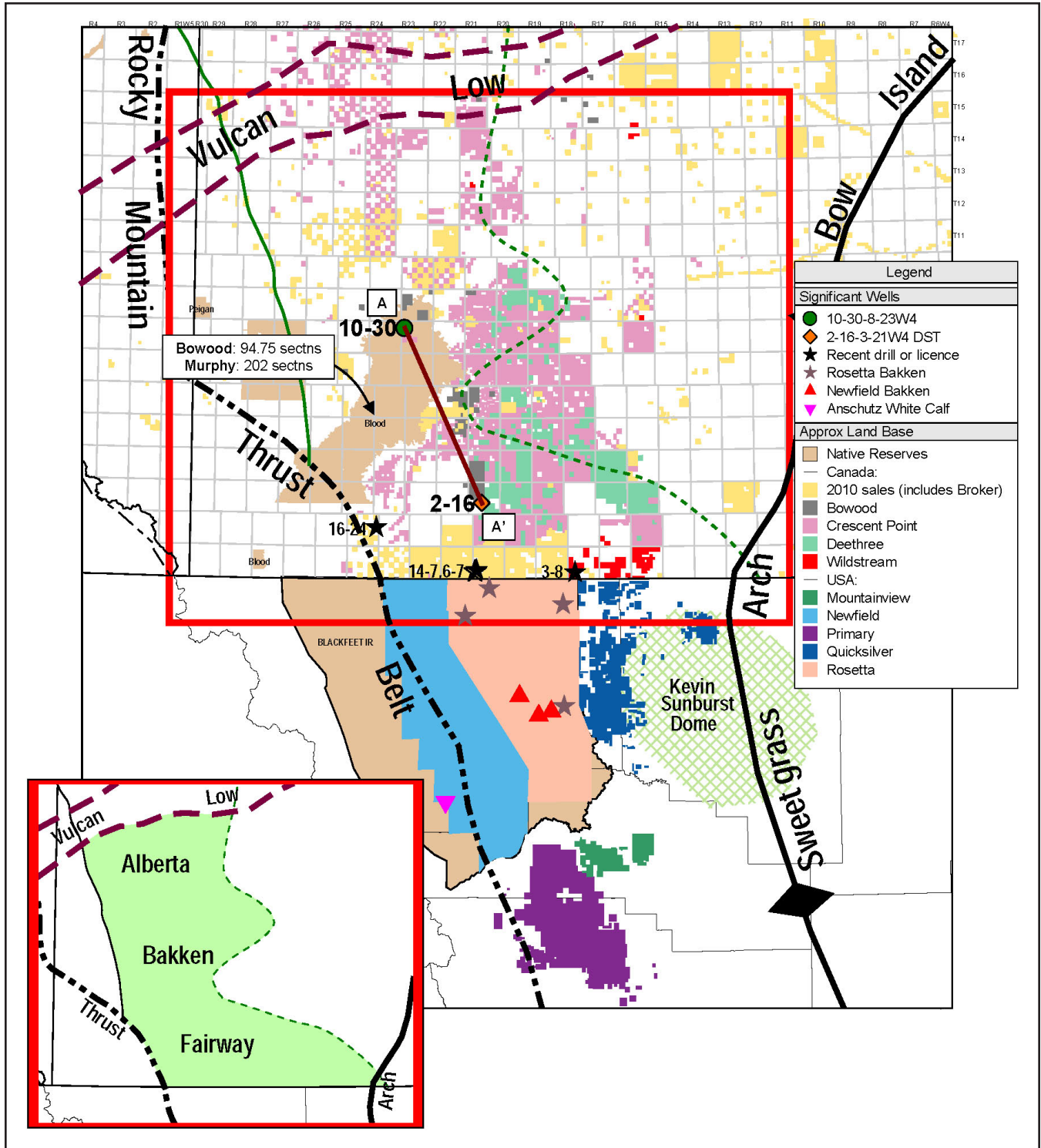
Bearing in mind that the Alberta type well has a conservative estimate for IP and EUR, as well as a high estimate for capital, it still generates economic results that are comparable to the other Bakken cases that were analyzed. A relatively minor improvement to deliverability or reserves, or a reduction in capital costs would significantly improve the economics.

Figure 1: Stratigraphic Chart Comparing the Bakken Petroleum System in Alberta With Saskatchewan, Montana and North Dakota (Williston Basin)



Source: Modified from Corelabs

Figure 2: Alberta Bakken Fairway Map (inset) highlighted in green and outlined in green lines on the main map. Recent land sale activity and resultant land base are highlighted. Exact locations of the farm-in lands on the Blood Indian Reserve by Bowood and Murphy Oil are not public at this time. Stars and triangles represent recent drilling or licensing activity. The circle represents the 10-30-8-23W4 well, having ~243,000 bbl of production from the Steller/Big Valley. The diamond is the location of 2-16-3-21W4, having a straddle Drill Stem Test of 298 bbl of clean oil over the Exshaw/Bakken middle member.



Source: BMO Capital Markets; Rocky Mountain Thrust Belt and Bow Island – Sweetgrass Arch – Geoedges; Vulcan Low – Zaitlin et al., 2002

Introduction

The Alberta Bakken Petroleum System, consisting of Devonian and Mississippian Big Valley–Exshaw–Banff formations (Figure 1), in northwestern Montana and southwestern Alberta is the latest play area being evaluated in the quest to capture early entry, contingent light oil resources. Other examples of light oil resource plays being targeted include the Nordegg, Lower Shaunavon, Viking and Cardium Formations (Figure 3), and the Bakken-Three Forks of the Williston Basin (Figure 4).

Figure 3: Analogue Parameters for Emerging Tight Oil Resource Plays

Analogue Tight Oil Plays					
		Nordegg	L. Shaunavon	Cardium	Viking
Area		Grand Prairie	Lietchville	Pembina	Doddsland
Depth	(m)	1160 - 2400	1350	1250 - 1400	670 - 730
Net Pay	(m)	21-27	4-8	6-14	3-8
Reservoir Porosity	(%)	5-18	15-18	6-16	21-24
Water Saturation	(fraction)	0.15-0.3	0.3-0.45	0.40	0.45
Permeability	(md)	0.1-10	0.1-0.9	0.5-10	1.0-150
API	(oil)	17- >25	22	36-41	32-38
Lithology		vf sandstone/ siltstone, shale, carbonate, coquina	microcrystalline limestone	vf sandstone, argillaceous	vf sandstone, argillaceous
Water Present		No Deep Basin	No Deep Basin	No Deep Basin	No

Source: AJM Nordegg Research Study for Anglo Canadian Oil Corp.

Figure 4: Analogue Parameters for Emerging Tight Oil Resource Plays (See Figure 12 for Locations)

Bakken/Three Forks Tight Oil Analogues							
Area		S. Alberta Bakken	S. Alberta Big Valley - Three Forks	Elm Coulee	Viewfield	Sinclair Bakken	Sinclair Three Forks
Depth	(m)	1525-2800	1525-2800	2500-3200	1550-1650	850	850
Net Pay	(m)	4.5-11	0-15	1.5-5	6-12	0.5-6	0.5-6
Reservoir Porosity	(%)	4-8	2-12	8-11	5-20	14.7	16.5
Water Saturation	(fraction)	ND	15	15-25	0.40-0.60	0.4	0.4
Permeability	(md)	ND	0.1-23	0.05-0.40	0.1-20	1.8	4.3
API	(oil)	36	32.5	38-42	42	40	40
Lithology		(fractured) silty dolostone	(fractured) dolostone and dolomitic packstones	fractured silty dolomite	dolomitic siltstone	dolomitic siltstone	dolostone and dolomitic packstones
Water Present		no Deep Basin	no Deep Basin	no	oil/water	oil/water	oil/water
		overpressured	overpressured	overpressured	normal to underpressured	normal to underpressured	normal to underpressured

Source: BMO Capital Markets; Sonnenberg and Pramudito, 2009; Prospect Saskatchewan, 2005; Davidson and Gomph, 2006

Horizontal drilling and multi-stage completion technology has recently been applied to allow for the exploitation of unconventional tight oil reservoirs. Variations in facies and reservoir parameters may also require further specialized technology (frac fluids, propanants, etc.) to unlock the resource. However, to identify prospective new tight oil plays developed within a deep basin setting, one needs to identify areas that exhibit:

- i) pervasive petroleum saturation;
- ii) abnormal pressure (high);
- iii) a lack of downdip water;
- iv) updip water saturation;
- v) low-permeability and low-matrix porosity reservoirs;
- vi) deliverability is enhanced by fracturing; and
- vii) plays that are self-sourcing within a mature source rock fairway.

The Alberta Bakken is considered a proven geological play with production from the Stettler/Three Forks and hydrocarbon recoveries from DSTs in the Bakken/Exshaw (see Figure 9). Evaluation of the available geological, production, drill stem test (DST) and core data appears to indicate that the Alberta Bakken is developed in a Deep Basin setting, as it is characterized by the seven key attributes listed above. However, the question remains: is the Alberta Bakken developing into the next significant unconventional tight oil play to be tested in the Western Canada Sedimentary Basin?

Recent large-scale land acquisition and drilling activity in the Alberta Bakken has focused on its Deep Basin tight oil potential (Figure 2). This activity initially occurred in northern Montana by Rosetta Resources, Newfield Exploration and Anshutz Exploration. No production results are publically available at this time and, as such, this play is at the speculative stage of development. However, the increasing level of farm-in, acquisition and drilling activity occurring on the Alberta side of the border (see Figure 2), in conjunction with some of the public corporate announcements focusing on the Alberta Bakken, indicates there is common consensus that the Alberta Bakken has the potential to be a successful Deep Basin unconventional tight oil resource play.

Recent Drilling, Acquisition, Farm-in and Land Sale Activity

In the Montana portion of the Alberta Bakken play, Rosetta Resources (~291,000 net acres or ~455 sections), Newfield Exploration (~221,000 net acres or 345 sections) and Anshultz Exploration (undisclosed land total) have farmed into lands, predominantly on the Blackfeet Indian Reservation. Rosetta Resources has drilled two vertical wells and one horizontal well, which have been announced to be targeting the Alberta Bakken to date (Figure 2). The horizontal well (Tribal Gunsight 31-16H) is speculated to have tested significant oil on completion, but rates are unknown. Rosetta has licensed two additional wells out of an announced 10-well 2010 program. Newfield Exploration has drilled three wells to date with no announcements of their results. Newfield did announce plans to drill

an additional eight wells in 2010, with seven locations licensed. Anshutz Exploration is testing the “Bakken-Three Forks” at the White Calf 1-4. Collectively, Rosetta, Newfield and Anshutz have drilled six vertical wells and one horizontal well, with an additional nine wells licensed of an announced program of 18 wells for 2010. A variety of other U.S.-based companies (e.g., Primary Petroleum, Quicksilver Resources, Provident Energy Associates) are also considering activity in the play.

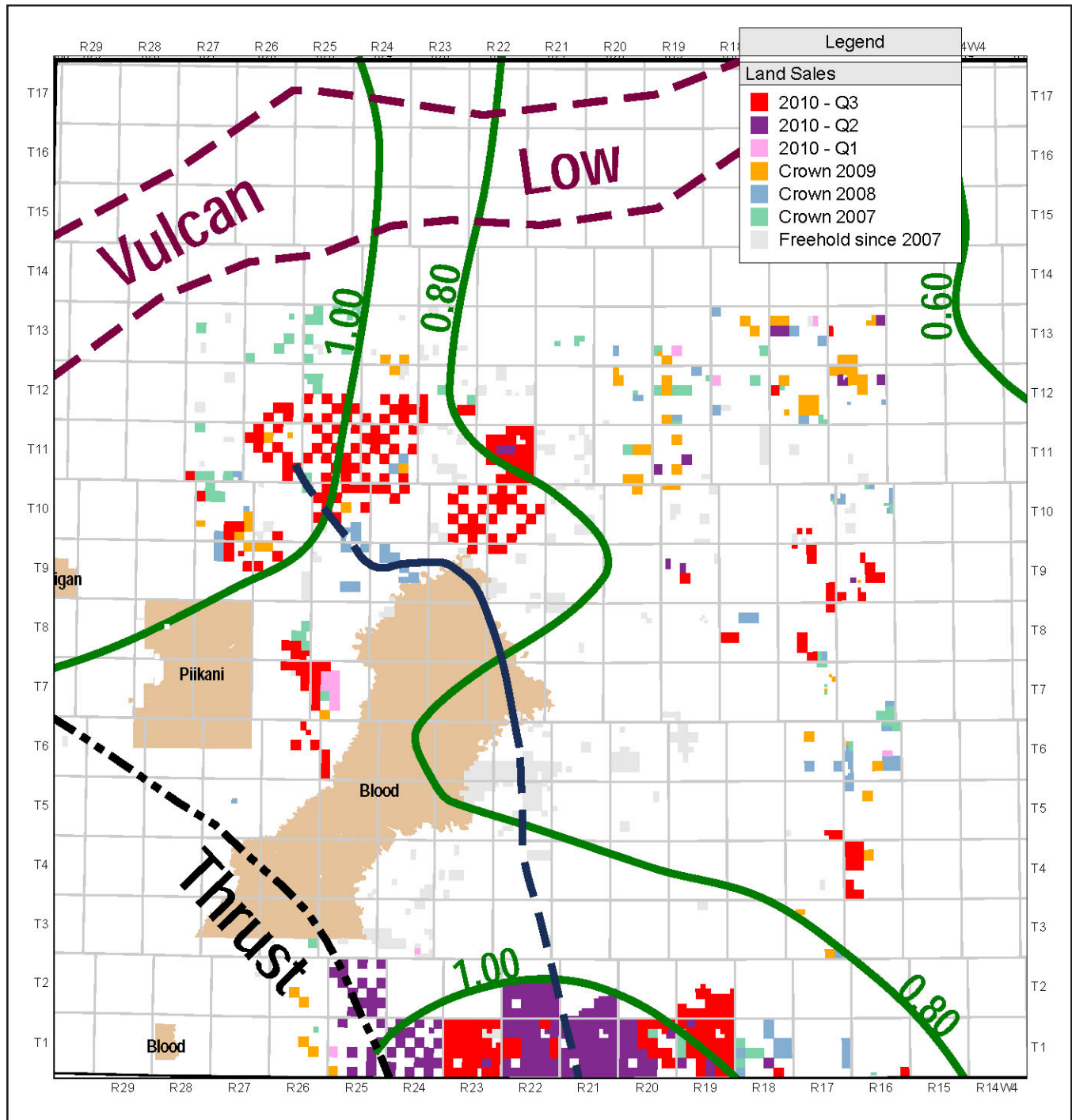
In southern Alberta, a series of land sales, acquisitions, farm-ins and drilling has occurred in the last 12 months, appearing to focus on the Southern Alberta Play (Figure 5). Specifically, three major farm-ins/acquisitions have occurred:

- Crescent Point, through the acquisition of a private company called Darian Exploration for ~\$96 million, has established a land position of ~1 million acres (1,565 sections) and an initial production base of 900 boe/d. In its press release it indicated that the lands are prospective for the Bakken/Three Forks. CPG has provided guidance increasing its 2010 capital budget to focus on the Alberta Bakken opportunity to drill ~19 (net) exploratory wells by the end of 2011.
- Murphy Oil, through a farm-in on the Blood Indian Reserve, has established a land position of 129,280 acres (202 sections), with a commitment of 16 wells and a bonus payment of \$36 million. The exact location of the lands on the reserve has not been released at this time.
- Bowood Energy has established, via farm-in on Blood Energy Reserve, a land position of 60,640 acres (95 sections) and commitment of eight wells for a bonus payment of \$14.1 million. The exact location of the lands on the reserve has not been released at this time.
- Additional companies with exposure to this play on the Alberta side include DeeThree Exploration and Wildstream Exploration. On the U.S. side, Mountainview, Primary and Quicksilver have all acquired significant land positions.

An analysis of land sale activity is presented in Figures 5 and 6. Since 2004, 195,682 ha (~756 sections) have been bought at Alberta crown land sales. Approximately 57%, or 112,887 ha (~436 sections), has been purchased for an average price of \$890/ha in 2010, with a maximum price of \$4,668/ha. The inset chart on Figure 5 displays land sale activity by quarter for 2010. The increases in total hectares sold (2,575–68,449 ha), average \$/ha (\$206–1,040) and maximum \$/ha (\$500–4,668) indicate increased competitiveness over the last three quarters. Between land sale activity, farm-in activity and corporate acquisition, the majority of prospective lands for the Alberta Bakken can be considered to have been captured. The October 13, 2010, land sale saw two parcels sell for \$3.5 million, or about \$1500/ha, eclipsing the average Q3 price of \$1,040/ha.

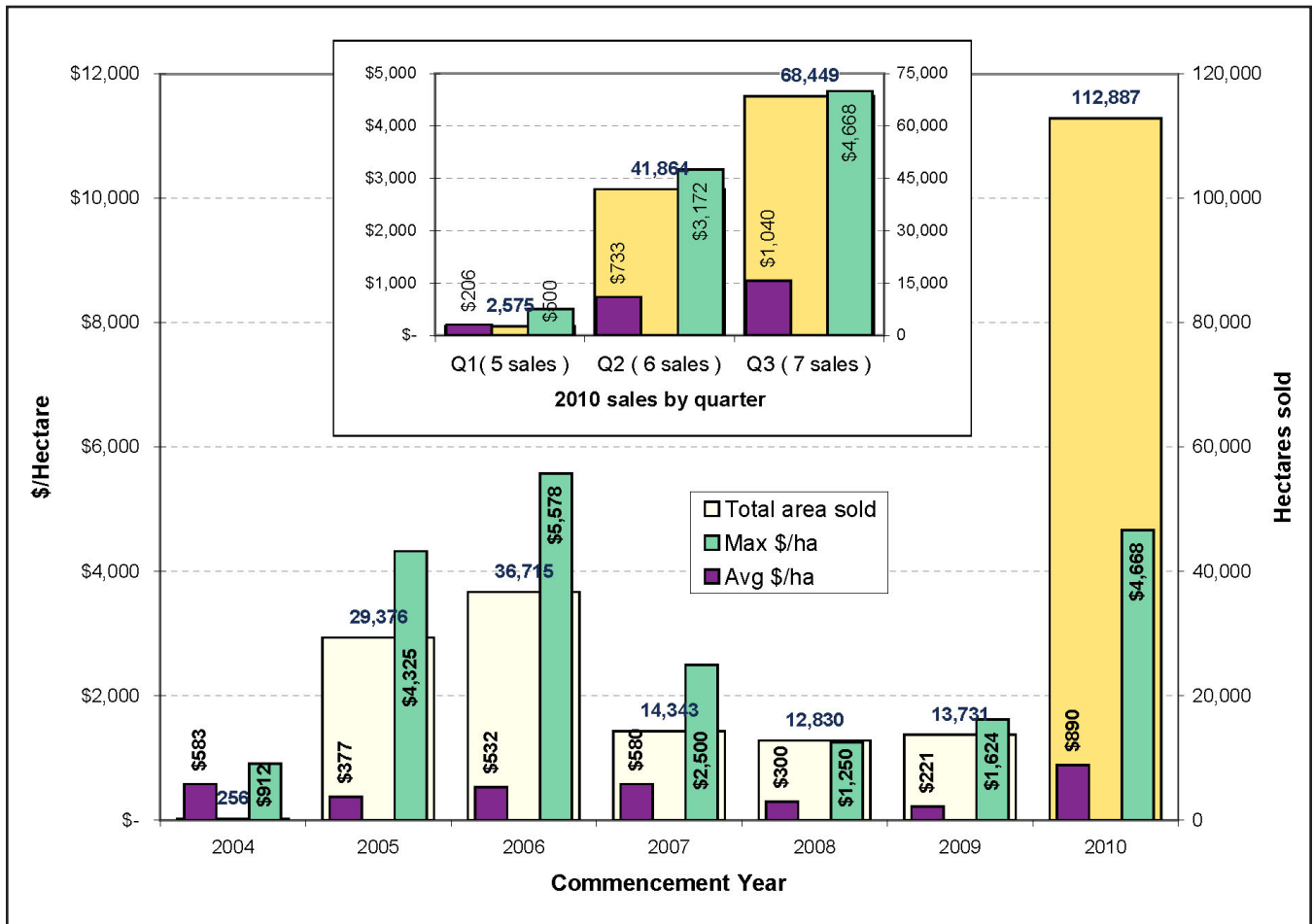
Antelope Land Services (believed to be Crescent Point Energy) has drilled and completed the horizontal 14-7-1-21W4 (TD-Wabamum; results confidential). A second horizontal at 16-24-2-25W4 well has also been licensed to the Exshaw, and was spudded August 17, 2010. A third well located at 3-8-1-18W4 has also been licensed to the Exshaw (Figure 2). If these wells are in fact Crescent Point wells, it confirms that it did purchase these lands at the sale.

Figure 5: Land Sale Map in the Alberta Bakken Core Area in Southwestern Alberta for 2010



Source: BMO Capital Markets; GeoScout

Figure 6: Land Sale Statistics for the Alberta Bakken for 2004–2010. Inset Map for 2010 by Quarter.

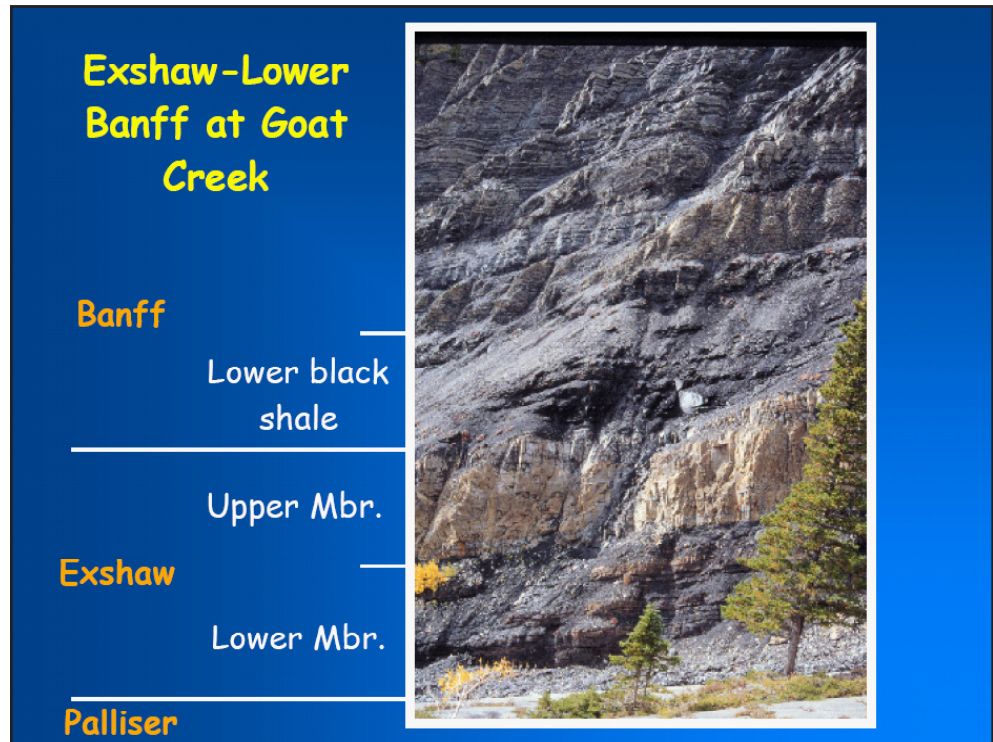


Source: BMO Capital Markets; GeoScout

Geological Setting

The Devonian-Mississippian Alberta Bakken System comprises a 0–50m thick mixed carbonate-clastic interval of the Banff-Exshaw-Big Valley/Stettler/Palliser Formations (Figures 1 and 7). The Alberta Bakken is approximately time equivalent to the Bakken Petroleum System (Lodgepole-Upper Bakken shale-Middle Bakken-Lower Bakken Shale-Sanish/Three Forks) of the Williston Basin.

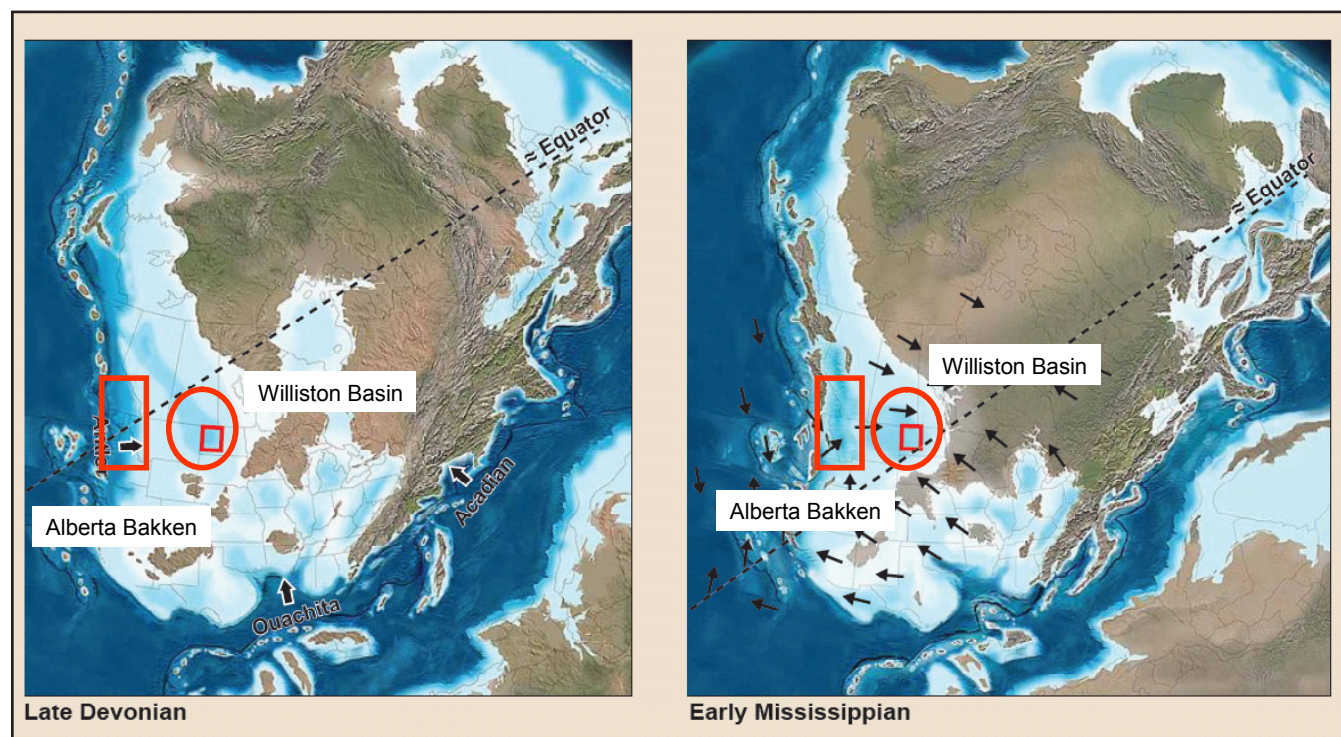
Figure 7: Photograph of the Alberta Bakken Stratigraphic Succession Between the Palliser Formation (Equivalent to the Big Valley, Stettler and/or Three Forks in the subsurface) and Banff Formations at Goat Creek, Alberta. Note “Sandwiching” of the Exshaw Between Two Organically Rich Source Rocks.



Source: Reidiger et al., 2004

Paleogeographic reconstructions of the Late Devonian and Early Mississippian are presented in Figure 8. Darker blues represent deeper waters; lighter blues represent shallower waters. In southeastern Alberta, the Alberta platform (light blue) passed westward into deeper waters of the Prophet Trough/Antler Foreland Basin; and eastward across the Alberta Platform into the deeper waters of the Williston Basin, formed as an intracratonic sag. Though approximately time equivalent, the Alberta Bakken and Williston Basin Bakken developed in two very different depositional settings: a semi-restricted intracratonic basin (Williston Basin) versus a westward-facing foreland trough (Alberta Bakken; Figure 8).

Figure 8: Paleogeographic Reconstructions for North America for the Late Devonian and Early Mississippian Highlighting the Position of the Williston Basin (red circle) and Antler Foreland Trough (red rectangle). Small Red Box Is Approximate Map Area Highlighted in Figure 12.



Source: <http://personal.umich.edu/~sperrin/geology/northamerica.pdf>

During Late Devonian time, the Southern Alberta Bakken is interpreted to have developed at or near the paleoequator (Figure 8). As shown in the paleogeographic reconstruction, there is no major source of detrital input; hence the Banff-Exshaw-Big Valley/Stettler Formations are dominated by carbonate deposition. However, the Williston Basin has major detrital input from the north and east, thereby resulting in Middle Bakken being dominated by dolomitic sandstones and siltstones in the north and east portions of the basin, and silty carbonate deposition in the southwest.

Figure 9 exhibits the main geological elements of southwestern Alberta and Northern Montana during Alberta Bakken time. The western boundary of the Alberta Bakken play is defined by the Rocky Mountain Thrust Belt. The Thrust Belt is divisible into an inner Foothills fairway characterized by large scale NW-SE trending anticlinal structures, and an outer or forefoothills fairway with smaller scale structures. Alberta Bakken reservoirs are influenced by structuring, enhancing inherent low permeability by naturally fracturing dolostones to silty dolostones.

The eastern boundary of the Alberta Bakken is defined by the Sweetgrass Arch/Bow Island Arch and Kevin Sunburst dome. The northern limit of the Alberta Bakken is defined by the Vulcan Aeromagnetic Low. The bolded subsea contours on the Mississippian Rundle Formation exhibit widely spaced contours to the east and more closely spaced contours to the west, indicating a hinge and change of slope aligned north-south through the study area.

Both the Exshaw and Bakken shales represent important petroleum source rocks in the Western Canadian Sedimentary Basin (Allan and Creaney, 1991). The total organic carbon content (TOC) for the Exshaw Shales ranges from 1% to 21 wt%, and hydrogen indices range from 100 mg to 1,100 mg HC/g TOC (Caplan and Bustin, 1996).

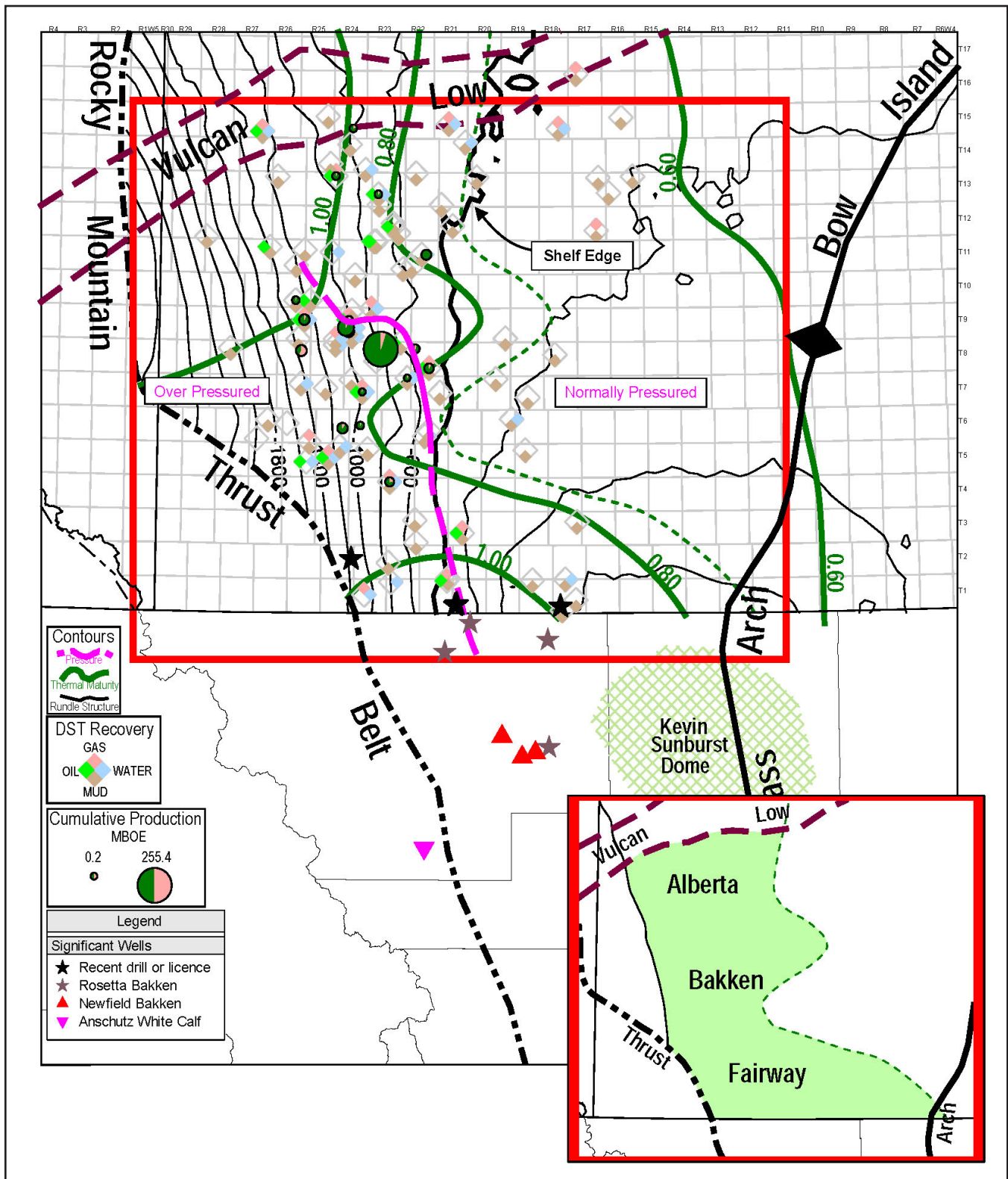
Within the Williston Basin, Middle Bakken reservoirs are sandwiched between two world-class shale source rocks (Upper and Lower Bakken Shales). It has also been recognized by various workers that the Bakken Petroleum system in the Williston Basin is divisible into:

- an overpressured (basin-centred oil) sub-system in Montana and North Dakota (e.g., Elm Coulee and Parshall areas);
- a normal to underpressured transitional (within mature source rocks) sub-system (e.g., northern Neeson Anticline area); and
- a sub-system characterized by the updip migration where oil over water is trapped by conventional structures and/or stratigraphic traps in southeastern Saskatchewan and southwestern Manitoba (e.g., Viewfield and Sinclair/Daly areas).

Figure 9 displays the contours of vitrinite reflectance (R_o) values as taken from GSC Report for the Alberta Bakken area. Oil generation from most organically rich shale units is considered to commence at $R_o \sim 0.65$, with peak oil generation occurring at $R_o \sim 1.00$ and the end of oil generation occurring when $R_o > \sim 1.3$ (Waples, 1980). As is shown in Figure 9, R_o values associated with the Alberta Bakken range from ~ 0.6 in the east to > 1.00 toward the west and south. This indicates that the Alberta Bakken Petroleum system is an active hydrocarbon system, having the conditions of TOC and maturity to locally generate oil. Important points in support of this observation of a locally sourcing area of maturity are:

1. a review of DST recoveries from the Banff–Stettler interval on Figure 9 indicates that all live oil or gas recoveries occur at or west of the $R_o = 0.80$ line;
2. a review of production from the Banff–Stettler interval on Figure 9 indicates that no proven production occurs east of the $R_o = 0.80$ line;
3. the Antelope Land Services horizontal wells at 14-7-1-21W4, 16-24-2-25W4 and 3-8-1-18W4 are all located in the $R_o = 1.00$ or greater area along the Alberta-Montana border; and
4. the Rosetta Resources, Newfield Exploration and Anshutz Exploration wells are all located in the $R_o = 1.00$ or greater area in Montana.

Figure 9: Alberta Bakken Geology Map in Relation to Production and DST Recoveries. Highlighted Are Source Rock Maturity, Mississippian (Rundle) Subsea Structure (with dark line representing shelf break), Recent Drilling and Well Licenses and Main Structural Elements. Pressure Line is From Canadian Discovery.



Source: BMO Capital Markets; Geoedges; Zaitlin et al., 2002; Geological Survey of Canada Report 4341; Various corporate presentations, GeoScout

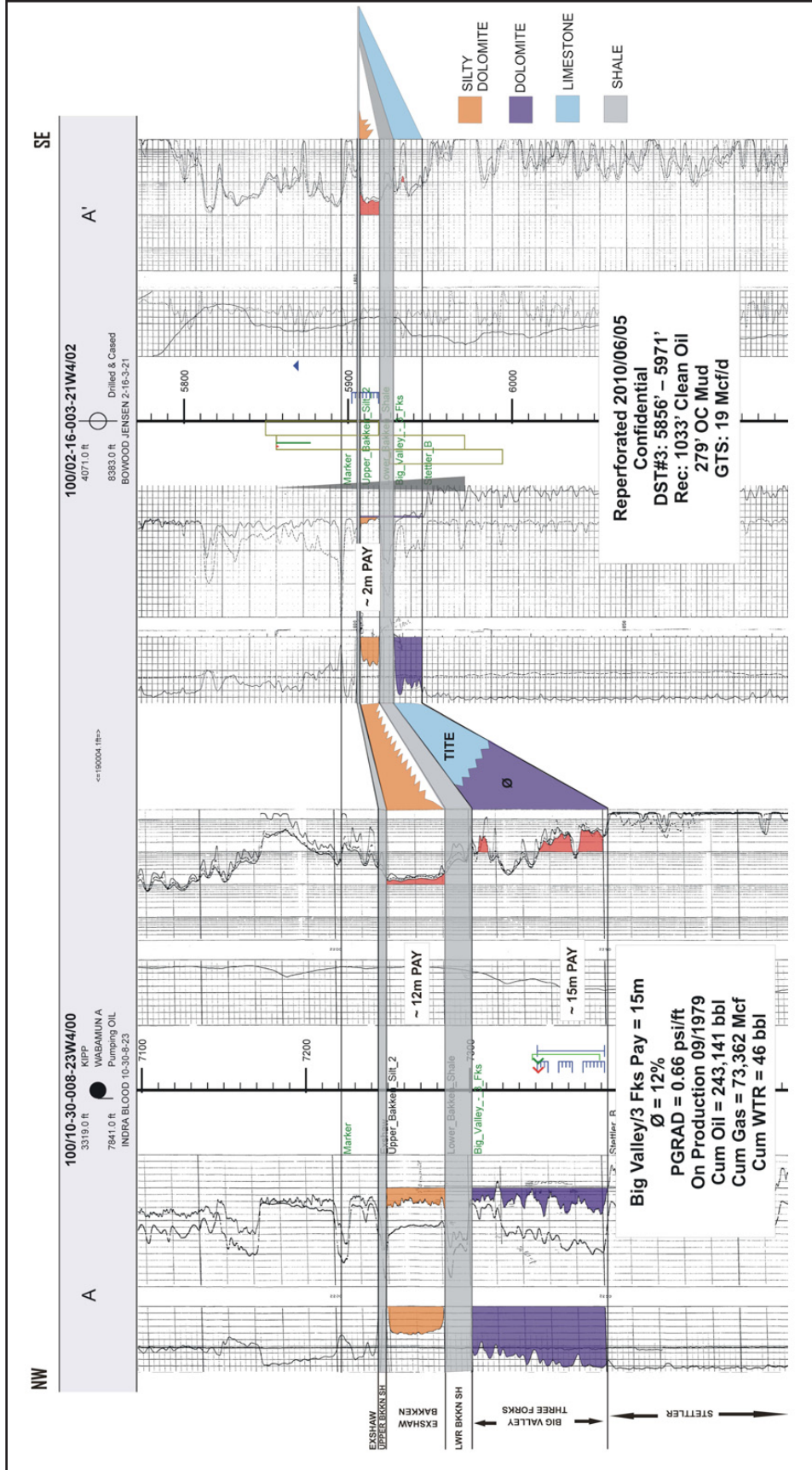
The regional paleogeographic setting indicated that the Alberta Bakken in southeastern Alberta passed westward into deeper waters of the Prophet Trough/Antler Foreland Basin, i.e., the Alberta Bakken thickens to the west. A two-well cross-section (Figure 10) from 10-30-8-23W4 to 2-16-3-21W4 shows the thinning of the Stettler/Big Valley-Upper Bakken succession eastward onto the Platform. The 10-30 well displays a full Alberta Bakken succession. The silty dolostone of the Big Valley has approximately 15m of pay at 12% average porosity, and has produced ~ 243 Mbbl of oil with no water. The 10-30 well has a pressure gradient calculated at PGrad = 0.65, or approximately 50% overpressure. Using a dolomite baseline of 0% and interpreting the Middle Bakken/Exshaw as a silty dolostone, it is possible to calculate 12m of potential pay with an $R_t \sim 15$ (total pay of 27m).

The wells display a significant thinning of the Stettler to Upper Bakken Shale succession. The Big Valley is interpreted as a tight limestone and forms an updip facies trap for the Big Valley. The Middle Bakken/Exshaw displays approximately 2m of >6% pay, and from a straddle DST recovered ~300 ft of live oil with an $R_t \sim 35$. The low R_t values may be indicative of low resistivity pay due to the mineralogical (pyrite, dolomite, phosphate, etc.). Bowood went back in June 5, 2010 to recomplete this zone and results are confidential at this time. Canadian Discovery has completed a hydrodynamic study of the Alberta Bakken which shows a potential change from normal pressure in 2-16 well to overpressure in 10-30 well (purple line on Figure 9).

Summarizing the observations presented above, the Alberta Bakken appears to be characterized by:

- pervasive hydrocarbon saturation (staining, DST and production);
- is abnormal overpressured (Canadian Discovery, 10-30 well);
- no apparent down-dip water (DST and production);
- apparent up-dip water (DST and production);
- low-permeability and low-matrix porosity reservoirs (logs, core and cuttings);
- local fracture, which may enhance deliverability; and
- a self-sourcing hydrocarbon system with mature source rocks and TOCs.

Figure 10: Two-well cross section in the Alberta Bakken highlighting the rapid thinning of the Three Forks-Exshaw across the shelf break (see Figure 2 for location of cross-section; Figure 9 for position of shelf break). Note proven production in the Big Valley - Three Forks in 10-30 well and low resistivity pay in the Bakken/Exshaw in 2-16 well confirmed by DST oil recovery.

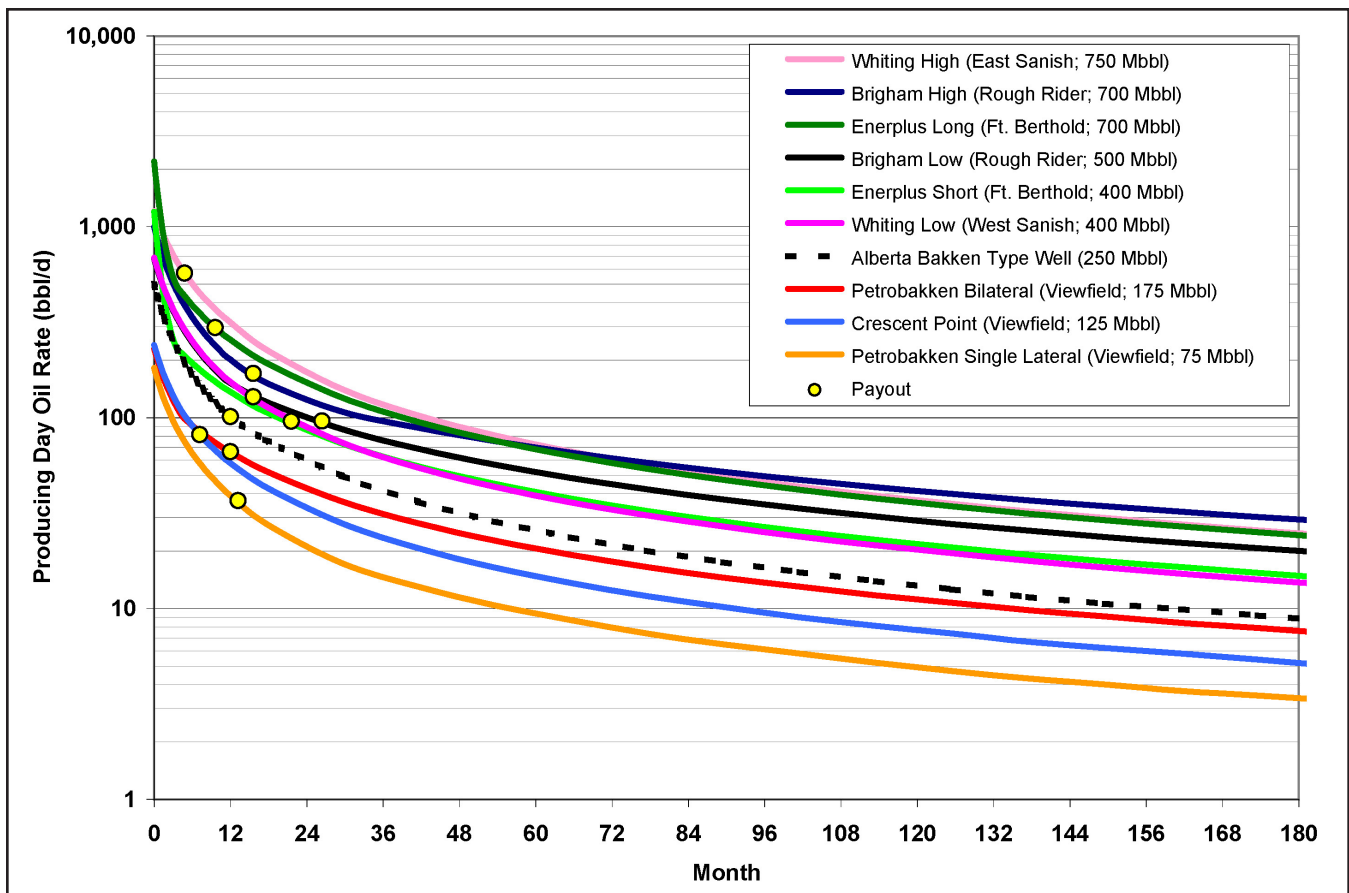


Source: BMO Capital Markets; GeoScout

Type Curve Development

Each of the type curves (Figure 11) was selected from the respective company corporate presentations. They were recreated using their initial rates, production curve shapes and EURs, and then entered into Value Navigator so that economic variables could be modified to determine sensitivities. Where possible, for each regional area and company that was analyzed, the type curves were presented with a range, so that each company (with the exception of Crescent Point) has two curves representing high and low expectations. The locations of the type curves from the Williston basin are shown in Figure 12.

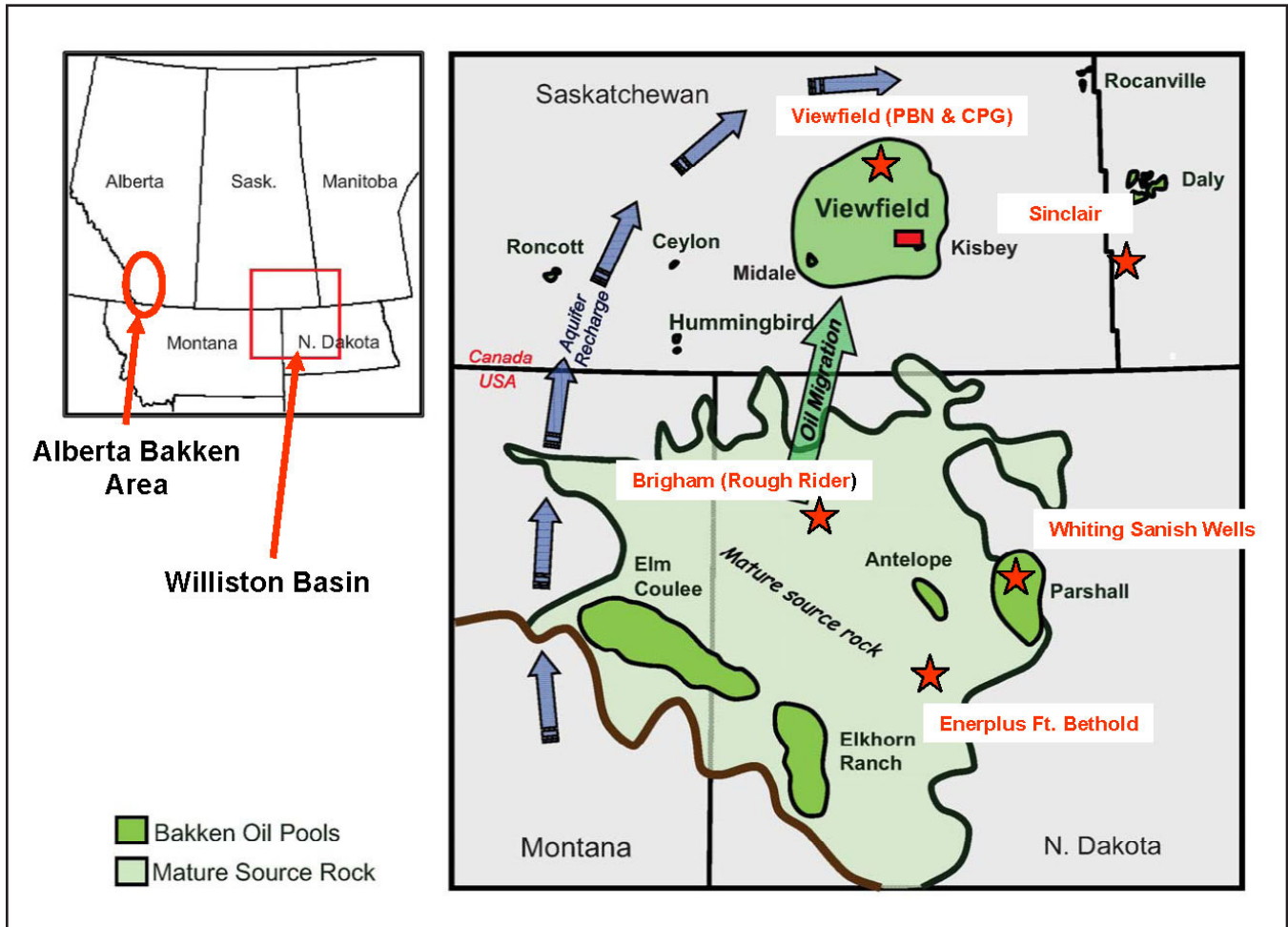
Figure 11: Bakken Type Curves From the Respective Corporate Presentations, as well as BMO's Estimated Type Curve for Southern Alberta Bakken. Also Shown Are the Associated Times to Payout.



Source: BMO Capital Markets and various corporate presentations

The type curve for the Southern Alberta Bakken was built using the general shape of these curves, i.e., a sharp decline in the first year followed by shallow, harmonic decline. Since the Southern Alberta Bakken is deeper and overpressured, it is expected to provide better deliverability than the Williston Basin in Viewfield Saskatchewan. For this reason, the initial rate is assumed to be higher than the Viewfield wells, but lower than the North Dakota wells. In addition, the one analogy well that is available in Southern Alberta (10-30-8-23W4) shows an initial rate of 337 bbl/d and an EUR from decline analysis that is greater than 250 Mbbbl (all from a vertical wellbore). All of the relevant parameters used in the type curve development for each case are shown in Figure 13.

Figure 12: Relative Location of Type Wells in the Williston Basin Shown in Figure 11



Source: BMO Capital Markets; Map from Tristar 2009 Corporate Presentation

Figure 13: Summary of Type Curve Parameters and Economic Results for Each Case

	Crescent Point	Petrobakken		Enerplus		Brigham		Whiting		Alberta Bakken		
	Viewfield	Viewfield Single	Viewfield Bilateral	Fort Berthold Short	Fort Berthold Long	West of Neeson Anticline Low	West of Neeson Anticline High	Parshall	Parshall	Hz Oil	Hz Oil w/ DRC	Freehold Royalty
Instantaneous IP (bbl/d)	240	182	230	1200	2200	680	1000	690	1208	500	500	500
3-Month IP (bbl/d)	174	130	165	509	1014	489	695	497	916	348	348	348
EUR (Mbbbl)	125	75	175	400	700	500	700	400	750	250	250	250
RLI* (years)	1.4	1.1	2.1	0.9	0.9	2.0	1.9	1.6	1.7	1.4	1.4	1.4
TVD (m)	1,700	1,700	1,700	3,353	3,353	3,200	3,200	3,048	3,048	2,150	2,150	2,150
Horizontal Leg (m)	1,400	1,400	2,800	1,311	2,743	2,800	2,800	2,800	2,800	1,500	1,500	1,500
# frac intervals	8-16	15	30	12	24	20-38	20-38	22-30	22-30	16	16	16
Well Cost (\$MM)	1.7	1.8	2.4	6.0	8.0	7.5	7.5	5.5	5.5	4.5	4.5	4.5
Operating Costs (\$/bbl)	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Drill Credit / Royalty Incentive (\$MM)	101 Mstb	101 Mstb	101 Mstb	na	na	na	na	na	na	100 Mboe	100 Mboe+	na
1st-Year Royalty Rate (%)	2.4%	2.4%	2.4%	16.6%	16.6%	16.6%	16.6%	16.6%	16.6%	5.0%	2.6%	16.2%
Before Tax NPV @10% (\$MM)	3.9	1.9	4.3	4.9	11.9	5.4	9.9	5.9	16.2	4.5	4.6	4.5
Before Tax IRR (%)	337.2%	97.3%	124.0%	52.7%	158.4%	40.9%	87.5%	85.0%	>500%	99.4%	108.8%	75.9%
Profit Investment Ratio (Capex/BT-NPV10)	2.3	1.1	1.8	0.8	1.5	0.7	1.3	1.1	3.0	1.0	1.0	1.0
Payout Time (years)	0.6	1.1	1.0	1.8	0.8	2.2	1.3	1.3	0.4	1.0	0.9	1.4
Realised Break-Even Price (\$/bbl)	\$28.94	\$41.67	\$32.64	\$46.80	\$36.93	\$51.27	\$40.62	\$44.56	\$27.73	\$42.10	\$41.25	\$42.20

* The reserve life index (RLI) was calculated using the instantaneous IP rate, i.e., EUR/Inst. IP/365 = RLI (years).

Source: BMO Capital Markets and various corporate presentations

Economic Parameters

Well costs were taken from corporate presentations and are assumed to include drilling, casing and completion costs only. Operating costs for the Canadian companies were approximately \$8.00/bbl, but the American companies did not disclose their specific operating costs for these plays. To simplify the analysis and ensure equal comparison between type wells, it was assumed that operating costs for each case was \$8.00/bbl.

The wells for Crescent Point, Enerplus, Brigham and Whiting are all assumed to have one horizontal leg. To generate their high and low cases, Enerplus, Brigham and Whiting vary in the lengths of their horizontal legs, whereas the two cases for Petrobakken's Viewfield wells vary, with the low case as one lateral leg and the high case as two lateral legs. The costs associated with each of these cases are listed in Figure 13. The Alberta Bakken case is assumed to have two 1,500m horizontal legs (one targeting the Bakken/Exshaw and one targeting the Stettler) with total drilling costs of \$2.5 million and completion costs of \$2.0 million. Analogy wells in all of the areas show GORs (gas-oil ratios) that are approximately 700 scf/bbl. This value was used for each type well and economic case.

For the cases in North Dakota (Enerplus, Brigham and Whiting), the royalty rate is assumed to be 16.6%, with no drilling or royalty incentive programs. The cases in Viewfield (Crescent Point and Petrobakken) are assumed to qualify for the Saskatchewan "Horizontal Deep Oil Well" Royalty incentive, whereby the owner pays a maximum rate of 2.5% on the first 16,000m³ (or 100 Mstb).

In Alberta, the type well can occur on either crown or freehold land. In the case of crown land, the well is assumed to qualify for the Horizontal Oil Drilling Credit. Since the measured depth of the well will be 5.150m (2.150m TVD + 2 * 1.500m), the credit is a maximum rate of 5% on the first 100 Mboe or 48 months of production (whichever comes first). For wells drilled on crown land before April 1, 2011, the Alberta government also has the Drilling Royalty Credit that can run concurrently with the Horizontal Oil Drilling Credit. This case was also evaluated on the Alberta type well.

It is also likely that the Alberta type well could be drilled on freehold land. In this case it is assumed that the freehold royalty rate is 10%. The Alberta government also collects a Freehold Mineral Tax on top of the freehold royalty that decreases each year from an initial rate of 6.2%. It was assumed that the lessee pays all of the mineral tax. There are no royalty incentives or drilling credits available on freehold lands.

Economic Summary

All of the cases were run on the BMO Research Price Deck as of September 2, 2010 (Figure 13). The type curves shown in Figure 11 show the time to payout for each case. All of the cases in North Dakota (Whiting, Enerplus and Brigham) have payout times that vary from 0.4 years to 2.2 years. The cases in Viewfield, Saskatchewan (Crescent Point and Petrobakken) vary from 0.6 years to 1.1 years. As expected, when the initial rates are high payout occurs quickly.

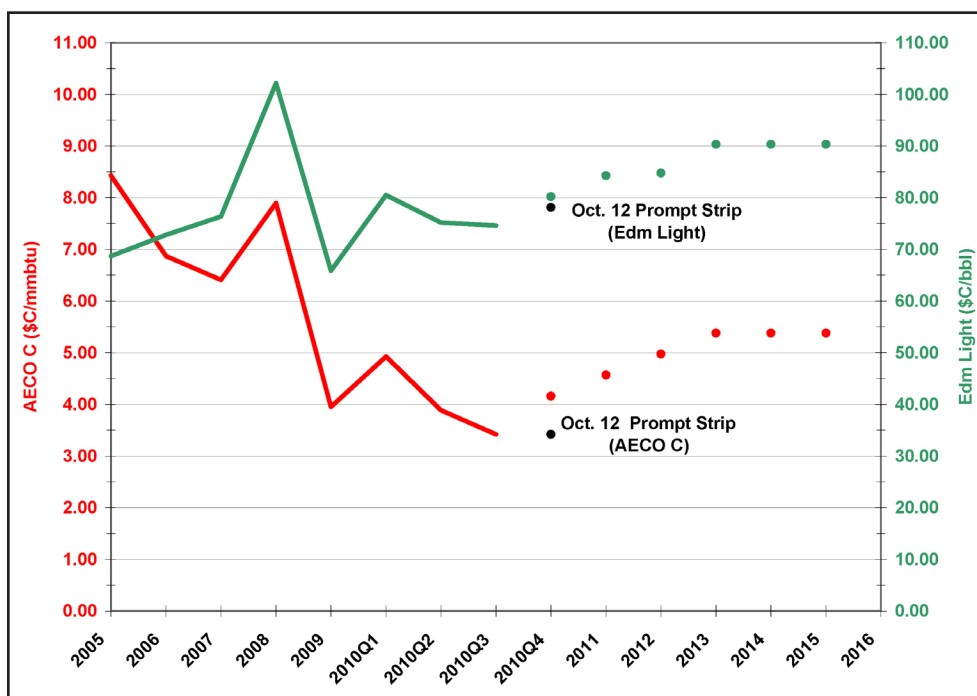
All of the resulting economic parameters are shown in Figure 13. Figure 15 shows the Before Tax Net present Value at a 10% discount rate (NPV) and Figure 16 shows the Internal Rate of Return (IRR) for each case. It is clear that the Alberta Bakken cases show NPV and IRR values that are comparable to the Saskatchewan Viewfield Bakken wells.

A similar trend can be seen when reviewing the Breakeven Supply Cost (BESC) in Figure 17, with each of the Alberta Bakken cases comparing favourably to the Petrobakken, single leg or Saskatchewan Viewfield Bakken wells. However, the Petrobakken bilateral well and the Crescent Point Bakken Viewfield wells do outperform the Alberta Bakken wells on a BESC basis.

Considering that the deliverability, reserves and capital costs for the Alberta type well are all conservative, these results suggest that relatively minor improvements to the type well input parameters will significantly improve the economics.

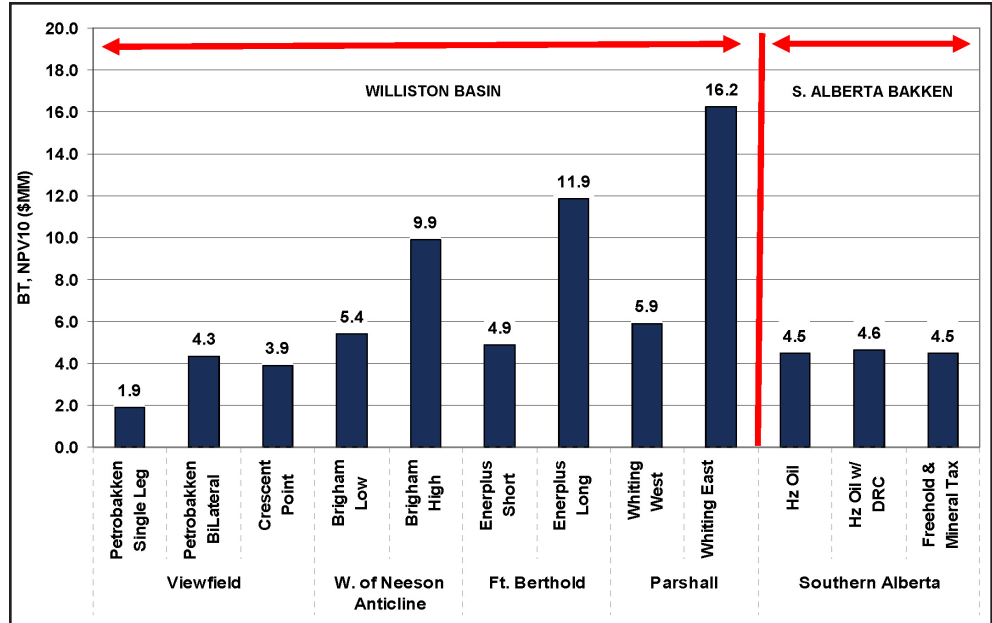
Ultimately, when comparing the Alberta Bakken type well to the Saskatchewan Bakken type wells, the Alberta Bakken—due to the overall thickness of the reservoir, and the overpressured, Deep Basin setting—has the potential for a highly economic well.

Figure 14: Price deck Utilized in the Economic Analysis



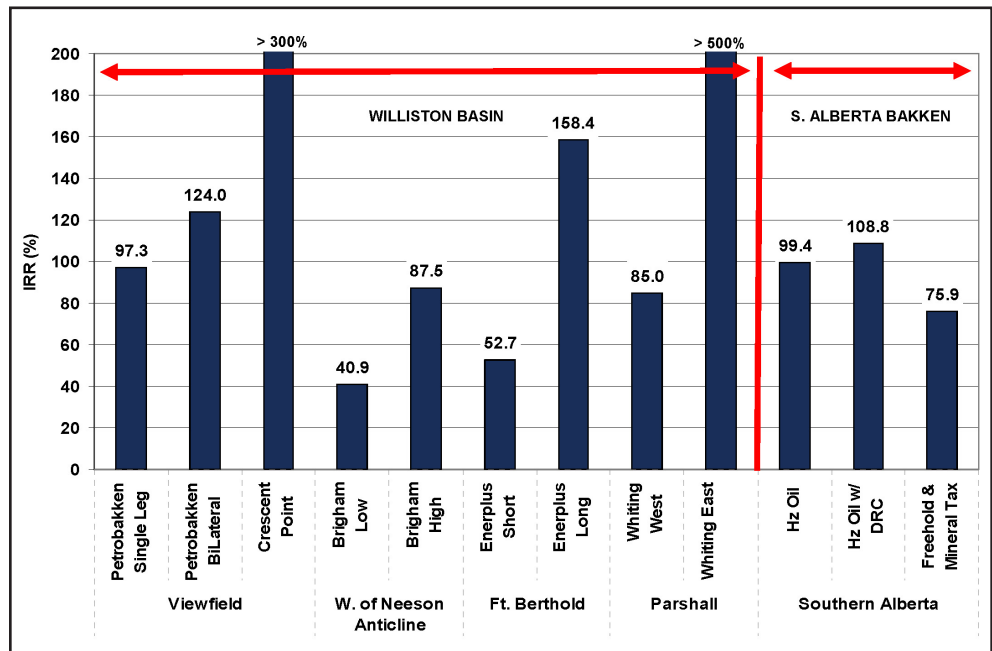
Source: BMO Capital Markets

Figure 15: Before Tax Net Present Value @ 10% Discount Rate for Each Case



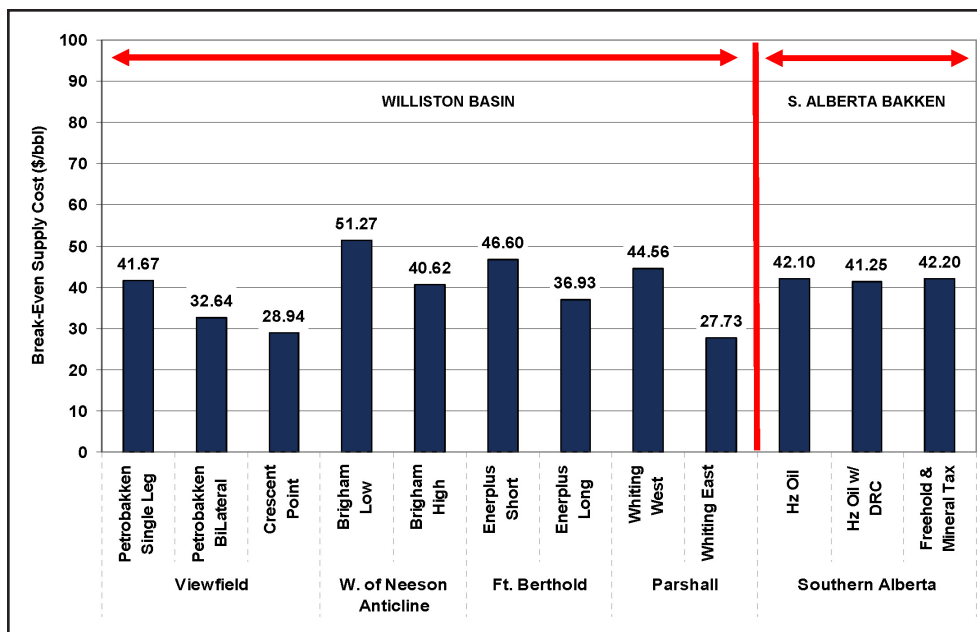
Source: BMO Capital Markets

Figure 16: Internal Rate of Return for Each Case



Source: BMO Capital Markets

Figure 17: Breakeven Supply Cost for Each Case



Source: BMO Capital Markets

Summary and Conclusions

The Alberta Bakken is an example of an early-entry Deep Basin tight oil resource play. The main Alberta Bakken play fairway is coincident with the thermally mature Exshaw source rock fairway. Though approximately time equivalent, the Alberta Bakken and Williston Basin Bakken developed in two very different depositional settings: a semi-restricted intracratonic basin (Williston Basin) versus a westward-facing foreland trough (Alberta Bakken).

Significant activity is presently testing the Alberta Bakken Play, with approximately 112,887 ha (~436 sections) purchased via crown land sale with a maximum price escalating to \$4,668/ha in the most recent land sale, for a total bonus ~\$100 million. In Alberta, Crescent Point Energy, through the acquisition of Darian Exploration, and Murphy Oil/Bowood Energy, through farm-ins on the Blood Indian Reserve, have established a dominant land position of ~1,862 sections in the thermally mature Exshaw source rock fairway.

In Alberta, we believe that three horizontal wells have been drilled/licensed by Crescent Point Energy in the play. In Montana, Rosetta Resources and Newfield Exploration are the dominant land holders on the Blackfeet Indian Reservation. For the Alberta Bakken, we estimate an EUR/well of 250Mbbbl and three-month average IP of 348 bbl/d. This yields a Before Tax Net Present Value @ 10% of ~\$4.5 million for a Horizontal Oil Case, an Internal Rate of Return (IRR) of 75.9–108.8% and a Breakeven Supply Cost (BESC) of \$41.25–42.20/bbl. While these economics are not quite as robust as the parameters in the Saskatchewan Williston Basin Bakken, they do compare favourably. Since the Alberta Bakken type well parameters are fairly conservative, there is potential for the Southern Alberta Bakken to have improved economics with only slight improvements to the type well.

While the play is still emerging, the Alberta Bakken appears to be developing into a potential new unconventional tight oil resource play.

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