BMO Capital Markets

A&D Drill Bits

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Montney Unconventional Shale Gas – Initial Deliverability and Liquid Content Have The Most Significant Impact On Rate of Return

Summary

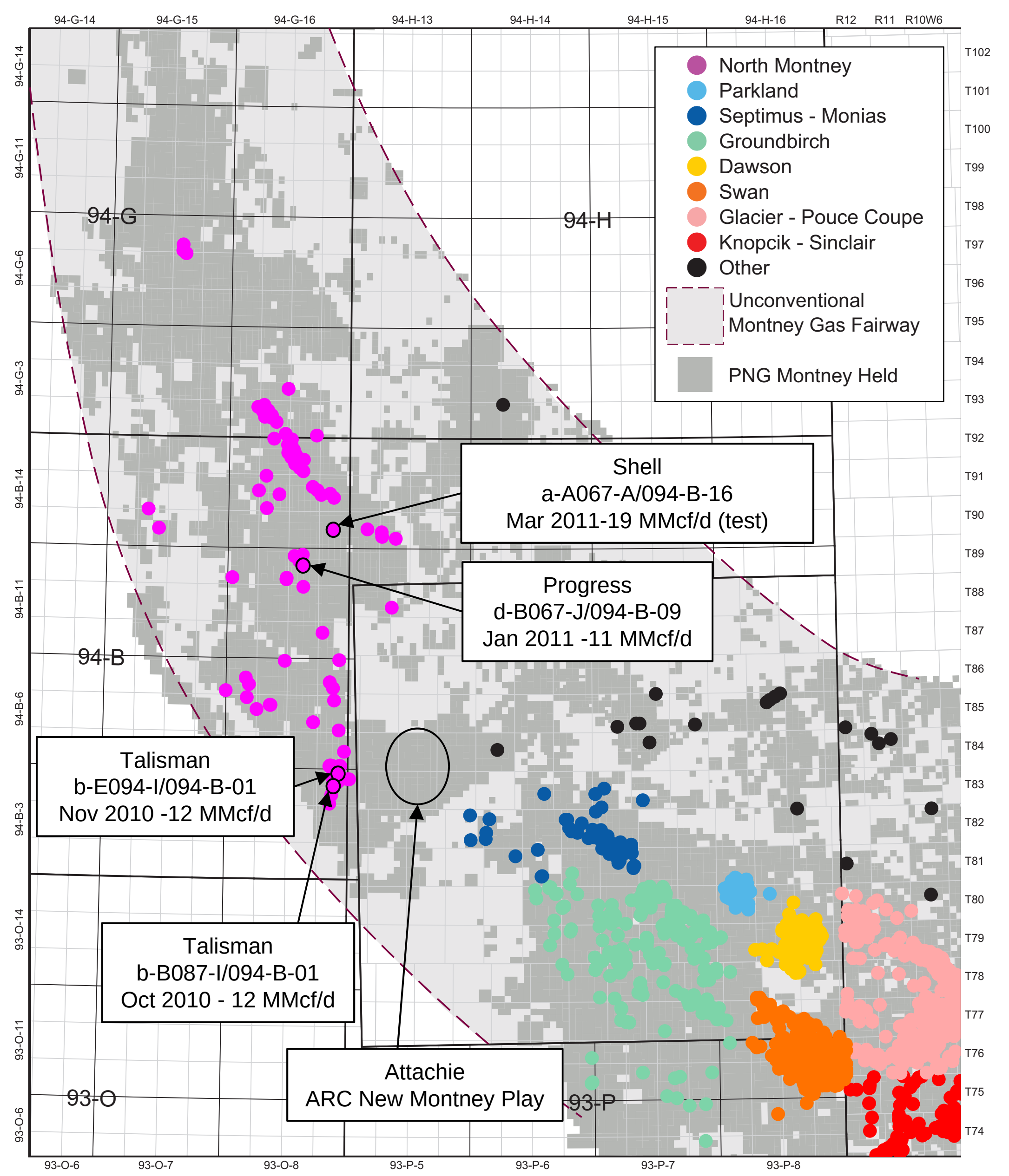
- Original horizontal development of Montney shale gas began in the Dawson field and from there quickly spread to the Swan area of British Columbia, with the first modern horizontal wells with multiple fracs drilled in 2005/2006
- Currently 1,100 wells (702 horizontal) produce a total of 1.7 Bcf/d from the Montney unconventional gas fairway
- Early development focused on the Upper Montney which was only a portion of the full interval (which is often more 300 m [~1,000 ft] thick and completely gas charged)
- Successful development has proven deliverability from the Upper, Middle and Lower Montney
- Continued exploration has pushed the play boundaries to the north and west – we focused on a fairway that is approximately 190 by 80 miles or more than 15,000 square miles
- Each area of development distinguishes itself with subtle changes in characteristics which impact initial deliverability, decline, liquid content and ultimately economics
- The least developed of all the areas is the North Montney where the best performing wells from the entire fairway have been drilled with test rates as high as 19 MMcf/d (Shell a-A67-A/94-B-16)
- Using $4.00 AECO flat pricing, and assuming constant DC&C costs of $6.5MM per well, we were able to establish a relative play ranking for each of the Montney shale gas areas. The rate of return for Montney shale gas averages 34% and is as high as 56% depending on the specific area
- In a pressured gas pricing environment, Montney shale gas continues to provide positive returns and the North Montney has the potential to provide even better economics due to increased deliverability and higher liquid content. In any of the areas reviewed the efficiencies of the individual operator can increase or decrease the overall ROR

Wendy Smith Low, B.Sc.
Director
(403) 515-1528
wendy.smithlow@bmo.com

Joyce Kennedy, B.Sc.
Vice President
(403) 515-1576
joyce.kennedy@bmo.com

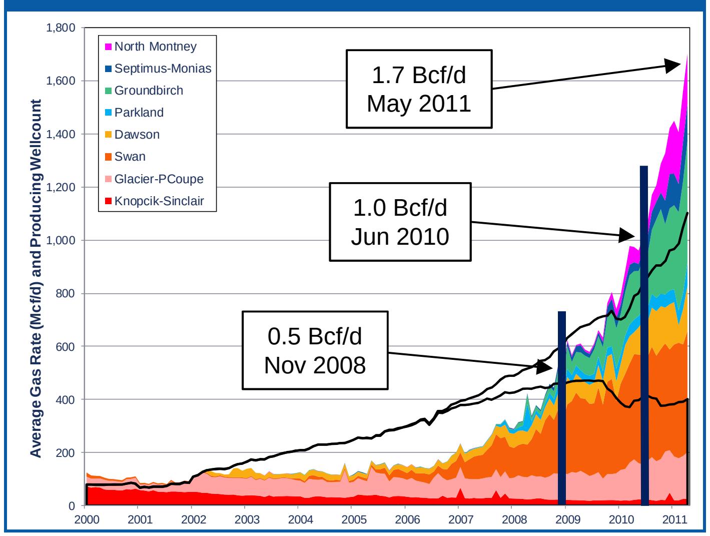
Ryan Twa, M.Eng, P.Eng
Vice President
(403) 515-1509
ryan.twa@bmo.com

Montney Unconventional Shale Gas Development Fairway

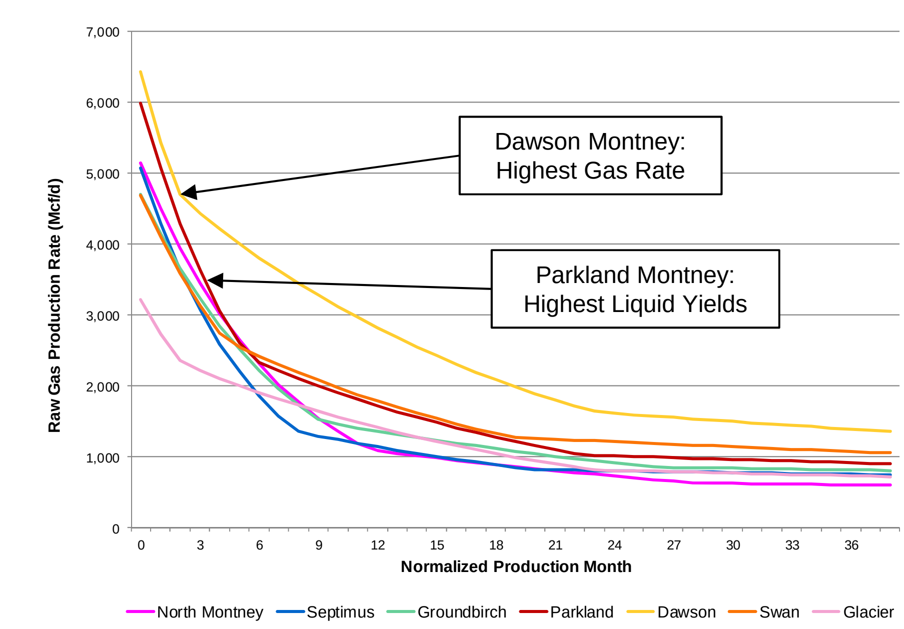


- The Montney trend is pushing north and west as new areas are being proven productive
- Much of the original Montney development occurred at Knopcik, Pouce Coupe, Dawson and Swan where the Montney was targeted as a conventional vertical play. Subsequently these areas have been further developed in the tighter facies with horizontal wells
- The realization that the resource is stored in the less permeable portion of the Montney was significant and led to the initial horizontal development of this reservoir
- Led by Encana and then Murphy, Swan was the first major unconventional development using horizontal wells. Production from the Swan area is currently 463 MMcf/d
- Subsequently significant development has occurred at Groundbirch, Septimus, Parkland, Glacier and now in the North Montney along with continued development at Dawson
- The North Montney area (including Town, Altares, Kobes, Farrell Creek, Cypress and Gundy) is the most recent development in the fairway. Here we see the highest deliverability of the entire trend as well as significant liquid content

Montney Production Growth



Average Type Well by Area



- As shown on the plot above, an averaged horizontal type well was created for each area. Liquid yields were estimated using publically available gas analysis and reported condensate production
- Economics were calculated using the type well, calculated liquid yields and estimated DC&E costs of $6.5MM (as DC&E costs are reduced by individual operators the rates of return will improve)
- On average, Montney shale gas is an economic play with a before-tax rate of return of 34% at $4.00 AECO
- Initial deliverability is key to optimizing overall rates of return. Parkland, Dawson and North Montney generate the best rates of return regardless of overall reserves capture
- Key in the development of Montney shale gas is maximizing initial deliverability. We would expect the rate of return for the North Montney to continue to increase given recently reported results
- The top six horizontal drillers are Encana, ARC, Shell, Murphy, Talisman and Progress. Both Talisman and Progress are dominant players in the North Montney

Average Montney Economics by Area

Area	Initial 30 Day Raw Gas Rate (MMcf/d)	Total Sales Gas (MMcf)	Total Sales Liquids (Mbbl)	Theoretical Liquid Yield (bbl / MMcf)	Economics (BTax) ROR (%)	Economics (BTax) NPV@10% ($M)	Economics (BTax) Payout (yrs)
Dawson	6.4	5,634	100	16	56%	$5,624	1.7
Parkland	6.0	4,403	250	48	53%	$5,914	1.8
North Montney	5.2	4,260	204	42	44%	$4,576	1.9
Septimus	5.1	5,077	217	39	29%	$3,916	3.3
Groundbirch	4.7	5,760	62	10	19%	$1,825	4.7
Glacier	3.2	3,617	102	26	18%	$1,424	4.5
Swan	4.7	4,200	61	12	17%	$1,277	4.5
Average	5.0	4,707	143	28	34%	$3,508	3.2

Source: Geoscout Data

Pricing: $4/GJ AECO, $70/bbl Edm Flat

Top 20 Montney Operators by Current Rate

Operator	Well Counts: Wells Producing	Well Counts: Drilled not producing	Well Counts: Licenced not drilled	Well Counts: HZ Wells	Well Counts: Total Wells	Combined Totals: May Gas Rate (Mcf/d)	Combined Totals: CTD Gas (MMcf)
EnCana Corp	376	48	167	429	591	448,018	454,459
Murphy Oil Comp Ltd	115	41	67	211	223	248,742	74,610
ARC Rsrcs Ltd	100	36	39	139	175	245,240	100,689
Shell Cda Lmtd	121	50	57	201	228	219,496	80,288
Cdn Nat Rsrcs Lmtd	101	22	15	51	138	97,395	189,683
Talisman Enrg Inc	33	41	83	155	157	83,947	24,221
Tourmaline Oil Corp	19	3	8	31	30	55,590	4,696
Birchcliff Enrg Ltd	42	7	4	36	53	52,548	23,792
Crew Enrg Inc	21	11	22	54	54	33,129	13,229
Advantage O&G Ltd	23	5	3	30	31	28,897	10,926
Huron Enrg Corp	14	1	11	26	26	22,859	13,638
Progress Enrg Ltd	40	11	39	69	90	20,550	18,280
Painted Pony Petrl Ltd	8	2	8	15	18	19,983	2,315
Pengrowth Corp	11	1	9	21	21	18,644	2,546
Suncor Enrg Inc	43	0	0	2	43	14,384	92,551
Canbriam Enrg Inc	5	6	6	17	17	12,359	2,110
Devon Cda Corp	9	3	1	5	13	7,287	7,025
Taqa North Ltd	16	0	2	4	18	6,538	21,956
Penn West Petrl Ltd	6	0	0	3	6	6,410	5,556
Insignia Enrg Ltd	5	0	0	2	5	3,987	3,239
Others	52	35	23	47	110	22,190	45,301

Source: GeoSCOUT

Conclusions

- The Montney has expanded from a localized conventional vertical target to a world-class unconventional gas resource producing over 1.7 Bcf/d
- The Montney shale gas Fairway is expanding north and west with significant growth in the recently developed North Montney area. Currently, the best Montney producers are North Montney drills with initial deliverability of 11-19 MMcf/d
- Overall rate of return for each of the plays is directly tied to the initial deliverability but can be improved with increased NGL content and the efficiency of individual operators. Although our work shows RORs of 17-56% for the study areas the actual ROR of individual operators may be well in excess of this. True RORs reported by individual operators can be more than 100% at current pricing and conversely lower for higher cost operators
- The robust economics of the North Montney combined with the unique geographical positioning for access into the proposed LNG terminals sets North Montney shale gas apart from most other shale gas plays in North America

What To Watch For

- Consolidation of the smaller players such as Huron, Painted Pony, Canbriam and UGR
- Continued interest in Joint Ventures to accelerate development to meet the demands of West Coast LNG Facilities
- ARC's development at Attachie and in particular the initial deliverability and NGL content
- Continued refinements in horizontal well drilling and completion technology to increase deliverability

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BMO Capital Markets

Ian van Staalduinen, B.A.Sc., P.Eng.
Managing Director
(403) 515-1526
ian.van@bmo.com

Engineering

Wendy Smith Low, B.Sc.
Director
(403) 515-1528
wendy.smithlow@bmo.com

Ryan Twa, M.Eng., P.Eng.
Vice President
(403) 515-1509
ryan.twa@bmo.com

Steve Kehoe, M.E.Sc., P.Eng.
Associate
(403) 515-3661
steve.kehoe@bmo.com

Geology

Joyce Kennedy, B.Sc.
Vice President
(403) 515-1576
joyce.kennedy@bmo.com

Kathleen Dixon, B.Sc., M.B.A., P.Geol.
Associate
(403) 515-3670
kathleen.dixon@bmo.com

Commercial

Mandy Edwards, B.A.
Coordinator
(403) 515-1581
mandy.edwards@bmo.com

Jennifer McQueen, B.F.A.
Desktop Specialist
(403) 515-1578
jennifer.mcqueen@bmo.com

Lesley Steinhauer, B.Sc.
Associate
(403) 515-3669
lesley.steinhauer@bmo.com

Gemma Hobb
Senior Admin. Assistant
(403) 515-3666
gemma.hobb@bmo.com