THE OUTLIERS
FINDING TRIPLE DIGIT IRRS IN THE UNCONVENTIONAL MONTNEY FAIRWAY

BMO CAPITAL MARKETS OIL & GAS A&D ADVISORY

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Wendy Smith Low, B.Sc.,
Managing Director
+1-403-515-1528
wendy.smithlow@bmo.com

Joyce Kennedy, B.Sc., P.Geol.,
Director
+1-403-515-1576
joyce.kennedy@bmo.com

Steven Kehoe, M.E.Sc, P.Eng.,
Vice President
+1-403-515-3661
steve.kehoe@bmo.com

Kathleen Dixon, M.B.A., P.Geol.,
Vice President
+1-403-515-3670
kathleen.dixon@bmo.com

Scott Johnston, P.Eng.,
Associate
+1-403-515-1580
scotta.johnston@bmo.com

Michael Greene, M.Sc., Geo.I.T.,
Associate
+1-403-515-1582
michael.greene@bmo.com

Conor Ross, E.I.T.,
Analyst
+1-403-515-1554
conor.ross@bmo.com

BMO Capital Markets®
The Outliers

KEY POINTS

- The Montney is one of North America’s largest unconventional plays spanning an estimated 37,000 square km. This regional play has a number of variables that will determine well performance, from rock properties and depositional geology through to drilling and completion techniques.

- When variables align, Outliers are created where normal well economics are exceeded and exceptional rates of return are achieved.

- Key elements that define an Outlier are:
  - Reservoir quality - coarser, silica-rich and clay-poor siltstones that are brittle and conducive to fracturing.
  - Thickness of over 150 m - thicker net pay increases resource in place, improving economies of scale upon full build out.
  - Over-pressured - aids in the deliverability and capture.
  - Condensate rich - where the formation has been exposed to the right level of thermal maturity and produces significant amounts of C5+, hydrocarbon.

- Although there are many highly economic areas in the Montney where producers may only have one or two of these key elements, the focus of this Drill Bits is where multiple factors exist and where the well performance easily achieve triple digit rates of return.

Source: Modified after EIA (US Energy Information Administration)

Finding Triple Digit IRRS in the Unconventional Montney Fairway

OUTLIER CRITERIA

- Outlier >100% IRR
- Liquids (Thermal Maturity) Set in Stone
- Deliverability - IP (Depth, Pressure, Completion)
- Capital - $ (Depth, Pressure, Execution)
**KEY POINTS**

- The Montney varies from dolomized coquina and turbidite sands (conventional Plays) to the east, through to offshore organic shales and siltstones (unconventional) to the west as shown on the WCSB Atlas map.

- Core photos from each of the areas demonstrate the variability of the lithologies within the Montney stack. Key features of the Montney are its laminated nature, low permeability dolomitic siltstones and 2 - 4% TOC. Better reservoir is dependent on lower clay content regardless of where the reservoir is in the depositional cycle.

- More argillaceous basinal shale has higher TOC, but lower deliverability. Conversely, the distal shoreface siltstones have higher deliverability with lower TOC in place.
Depth Not Too Shallow, Not Too Deep, But Just Right...

- Depth to top Montney varies from 750 m at the subcrop edge to more than 4,000 m at the deformation front. Montney conventional oil and gas reservoirs are found at shallower depths where the Montney is normally pressured.

- The study area shown in purple, and the focus of this document, roughly outlines the Unconventional Montney Gas Fairway, which is much deeper than the conventional fairway and always over-pressured.

- Drilling costs are impacted by target depth; wells with total depths greater than 2,500 m typically require intermediate casing because they encounter high bottom-hole pressures and temperatures. This increases overall costs.

- Formation pressures generally increase with depth at a rate that follows the normal pressure gradient of 10 kPa/m (0.433 psi/ft). However, when conditions are encountered where the pressure increases at a rate greater than the normal gradient, the reservoir is considered to be “over-pressured”, positively impacting reservoir storage and deliverability. Some Montney operators report initial rates in excess of 20 MMcf/d.

- Burial depth and pressure influence thermal maturity. The three phase windows present in the unconventional fairway generally trend parallel to strike. Deep dry gas at the distal (west) edge of the fairway grades into over-pressured, liquids-rich gas which grades into the oil window.

- Operators target areas where high-pressured gas contains liquids with larger proportions of C₅+, and where sufficient energy in the reservoir from high-pressured gas will deliver the liquids efficiently.

Source: BMO Capital Markets, GeoSCOUT, geoEDGES, BC OGC
The map shows the Crown land position in the Montney, with the unconventional study area polygon and the Montney subcrop edge in the northeast.

Beginning in 2005/2006 horizontal drilling and multi-stage fracking reached a point where the pursuit of the unconventional portions of the Montney reservoir became economic.

As the economic and geographical boundaries of the reservoir were pushed back, the next several years saw a run on postings and land sales within the fairway, both in Alberta and British Columbia.

Operators also took advantage of their existing Montney positions, as these rights were held by the historical production from deeper zones.

There are additional regulations and processes in place in many of the First Nations areas of BC which impact land acquisition and oil/gas development. Two of these areas are shown on the map.

Two very large parcels (~30,000 acres) located just northwest of the Halfway River First Nations Area of Cultural Significance were auctioned in early November for a total bonus of $190MM. Both parcels were picked up by brokers.

Currently available data shows that any Montney Crown rights within the unconventional fairway are tightly held, making farm-in, joint venture or purchase from existing owners the only ways to acquire these rights.

Source: GeoSCOUT, BMO Capital Markets

*The Halfway River First Nations Oil and Gas Consultation Agreement. Retrieved from www.bcogc.ca/node/8241/download

Development of the “unconventional” Montney trend began in late 2006 and grew steadily as operators were chasing the high rates with relatively dry gas from this emerging play.

When the incredible areal extent and thickness of the Montney - 100 to 300 m on average - became apparent, the associated gas-in-place was enticing enough to drive the industry to reduce capital costs and strive to make the play economic.

While certain pockets of the Montney began to show very high liquid yields, the premium value given to natural gas condensates ($C_{n+}$) provided a new driver for development and high rates of return.

As the trend matures it will most certainly start to fill in the gaps as it provides decades of drilling for both dry gas and liquids–rich gas production.
Traditional North-East BC Montney ~40% IRR

**TYPE WELL FORECAST**

- The early days of the Montney - prior to 2011 - produced gas type curves that were high rates and EURs (relative to conventional gas plays) with very low NGL composition.

- While there was a range of values across the trend, a typical average type curve had an IP\textsubscript{30} of approximately 5.5 to 6.0 MMcf/d with an EUR of 5.5 to 6.0 Bcf.

- The type curve above has an IP\textsubscript{30} of 5.6 MMcf/d with an EUR of 5.6 Bcf and a liquids composition as follows: C3 = 12 bbl/MMcf, C4 = 7 bbl/MMcf, C5+ = 7 bbl/MMcf.

**ECONOMIC SUMMARY - TRADITIONAL NORTH-EAST BC MONTNEY**

<table>
<thead>
<tr>
<th>IP\textsubscript{30} (MMcf/d)</th>
<th>C5+ (bbl/MMcf)</th>
<th>EUR (Bcfe)</th>
<th>% Liquids (bbl/MMcf)</th>
<th>Capital ($MM)</th>
<th>Drill Credit ($MM)</th>
<th>BT-NPV@10 ($MM)</th>
<th>IRR (%)</th>
<th>PI@10% (x)</th>
<th>Payout (years)</th>
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</thead>
<tbody>
<tr>
<td>Traditional Montney (East)</td>
<td>5.6</td>
<td>7</td>
<td>5.8</td>
<td>6.5</td>
<td>1.0</td>
<td>4.5</td>
<td>38</td>
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<td>2.3</td>
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<tr>
<td>Traditional Montney (West)</td>
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<td>5.5</td>
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<td>0.9</td>
<td>2.0</td>
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</table>

**INPUT SENSITIVITY TO THE BASE VALUE IRR**

Since the northern Montney originally focused on British Columbia (BC), the economics were calculated assuming the BC royalty environment with sensitivities on the west vs. east drill credits ($2.2MM vs. $1.0MM respectively) shown below.

- The base type curve value assumes the east credit. Sensitivities to various input parameters are shown above with the capital being the most impactful. Decreasing the capital by 20% to $5.2MM increases the IRR from 38% to >60%.

- Conversely, varying the EUR +/- 20% has negligible impact on the value.

Source: GeoSCOUT, BMO Capital Markets

* Flat pricing with $C4/GJ (AECO) and $US90/bbl (WTI). Assuming the BC East Sweet Drill Credit.
Where’s the Money? Start by Following the Liquids

- The Outlier Liquids Fairway map shows the liquids production in barrels per million (bbl/MMcf) along the Montney unconventional gas trend.

- By analyzing publically available gas analyses, (for gas wells only) for any zone within the Montney (upper, middle, lower), a liquid fairway trend was developed over the unconventional portion of the reservoir. Where gas analysis data was not available, production data was used.

- The data was then filtered to the maximum C5+ liquids values produced across the unconventional gas fairway. The analysis presented here focuses strictly on unconventional Montney gas, so that only areas west of the normal pressure gradient line are included*. Gas analyses from Montney oil producers were excluded.

- Once mapped the Outliers begin to appear where C5+ content is greater than 40 bbl/MMcf. Kakwa, certainly, has the highest liquids production with some wells exceeding 300 bbl/MMcf.

- In search of the Outliers, type curves for each area were built with corresponding liquids yields, costs, and royalty credits to determine economic values. Any area with an IRR greater than 100% would be considered exceptional and thus an Outlier.

- This process identified three distinct areas that will be discussed in more detail:
  1) Outlier >100 IRR
  2) Emerging areas
  3) Sub 100% IRR areas but with exceptional liquid content

* The Montney at Pouce Coupe and Knopck behaves primarily as a conventional reservoir and has been excluded from the analysis. These two areas are greyed out on the map.

Note: Liquid Yields used in the type curve economics were assumed to be flat over the life of the curve. Rather than model a declining yield curve, C5+ values are estimated at approximately 60% of the values shown on the Outlier Liquids Fairway map.
A generic type curve was built using all Montney gas wells in Alberta within the unconventional fairway.

This type curve was meant to represent an “average” Alberta Montney well and distinguish it from average British Columbia Montney wells so that economics could be compared in a fulsome manner (i.e. taking into account royalty incentive differences).

BMO understands that it is difficult to draw one type curve through all of the Alberta Montney plays as they are not all created equally, but for the purposes of the comparative exercise the economics derived were more than sufficient as they match the individual area type wells that will be shown later in the document.

The IRR matrix (above) illustrates how internal rate of return (IRR) changes with the three most important inputs to the economic model:

- **IP**
- **Capital**
- **C₅+ Yield**

In order to achieve an Outlier with an IRR of greater than 100% (on half-cycle economics) the matrix shows that a minimum IP (deliverability) is always needed regardless of the C₅+ yield.

This shapes the discussion around how to find the Outliers when looking at a play with the magnitude and complexity of the Montney.
### Average Type Well British Columbia

No Surprise - IRRS are Dictated by Rate and C\textsubscript{5+} Content

#### TYPE CURVE GENERATION - BRITISH COLUMBIA

- Following a similar methodology a type curve for the British Columbia unconventional Montney was generated to represent an average well from the fairway
- In British Columbia there are two different sets of royalty incentives depending on which side of the drill credit boundary a company’s lands fall on (west vs. east)
- There also seemed to be a distinctive change in depth when looking at west vs. east which was taken into account when creating the economic matrices (west being deeper and more expensive)
- Being west of the drilling credit boundary gives a more favorable incentive which drives a better economic result
- Like Alberta, a minimum IP is needed regardless of the C\textsubscript{5+} yield to achieve an economic Outlier

#### IRR MATRIX - EAST OF BRITISH COLUMBIA DRILL CREDIT BOUNDARY

Notes: 2,500 m TVD and 4,100 m MD, Flat C$4/GJ AECO and US$90/bbl WTI, C\textsubscript{3} 7 bbl/MMcf and C\textsubscript{4} 6 bbl/MMcf

#### IRR MATRIX - WEST OF BRITISH COLUMBIA DRILL CREDIT BOUNDARY

Notes: 2,000 m TVD and 3,600 m MD, Flat C$4/GJ AECO and US$90/bbl WTI, C\textsubscript{3} 7 bbl/MMcf and C\textsubscript{4} 6 bbl/MMcf

Company IRR values are taken from recent corporate presentations and are for illustrative purposes only. They are not calculated using the same price deck and are not necessarily the same type curves

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Source: GeoSCOUT, Corporate Presentations
The Outliers Kakwa/Karr - C_5^+ >200 bbl/MMcf with Excellent Deliverability

- Development in Kakwa started in 2011 with Paramount and is focused primarily on the Upper and Middle Montney. Seven Generations began operations shortly after and is now the largest producer after identifying an area with extremely high liquids-yields and IPs - free condensate values have been reported as >200 bbl/MMcf and test rates >15 MMcf/d. Other operators include XTO, and Kicking Horse Energy*

- The Montney is relatively deep in this area with a TVD for most wells of approximately 3,000 m. This leads to one of the primary characteristics of an Outlier, that is, an over-pressured pressure gradient of greater than 0.5 psi/ft (11.3 Kpa/m)

- As the depth of the Montney goes beyond approximately 3,500 m, the liquids content is reduced to minimal amounts. At Kakwa, there is a region between ~3,000 m and 3,500 m where substantial liquids are found in the gas phase and the over-pressure provides the energy to give the required deliverability

*Kicking Horse Energy was announced on October 21, 2014 as the merger of Contact Exploration and Donncreek Energy
The shape of the type curve was determined from the wells highlighted on the map on the previous page. The production profiles for these wells have been normalized to their peak rates and plotted as shown top left. The average, peak IP$_{30}$ for each of the wells (sorted by operator) is shown lower left. The overall average value and IP$_{30}$ for the type curve is 5.4 MMcf/d.

The capital costs for the areas are largely dependent on the depth of the formation. Since the Montney at Kakwa is greater than 3,000 m, the capital costs are relatively high. Based on public disclosure from area operators, the capital costs used in this model were a total of $10.0MM (DCET).

Free condensate and C$_{5+}$ liquids recovery are modeled as one “C$_{5+}$” yield value. Many wells have reported in excess of 200 bbl/MMcf of condensate after several months of production. Paramount uses 180 bbl/MMcf and Seven Generations uses 75 - 86 bbl/MMcf. Our model assumes a flat condensate yield of 150 bbl/MMcf plus an additional 27 bbl/MMcf of C$_3$ and C$_4$.

Note: Peak IP$_{30}$ rates represent historical data from the early phase of development.
The Outliers  
**Elmworth/Wapiti - C₅⁺ >75 bbl/MMcf with Excellent Deliverability**

**ELMWORTH/WAPITI**

- Montney development began at the southern end of the Elmworth-Wapiti block in 2006 with increased activity added by Sinopec and Nuvista in 2012. This is a significant growth area for Nuvista while Sinopec, Encana, and Paramount are also active. Chinook and Birchcliff also have a position here but are not actively developing yet. Shell has two wells on the eastern edge of the liquids-rich window, but they are not actively drilling this area.

- The Montney here is over-pressured with the majority of the liquids-rich region between 10 kPa/m and 11.3 kPa/m (0.433 and 0.5 psi/ft) while the depth ranges from 2,300 m to 2,800 m. This results in liquids data points that show produced condensate yields of nearly 200 bbl/MMcf but the general trend is for C₅⁺ yields of less than 100 bbl/MMcf.

**LOCATOR MAP**

**AREA PRODUCTION BY OPERATOR**

Source: GeoEDGES, GeoSCOUT, BMO Capital Markets
**TYPE WELL FORECAST**

- **IP** sub 30: 5.8 MMcf/d
- **C5+ Yield**: 75 bbl/MMcf

**BT-NPV@10%**
- $21.1MM
- IRR 224%
- Payout 0.7 yrs
- Drill Credit $2.6MM

*Normalised on Peak IP 30

Source: GeoSCOUT, BMO Capital Markets

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**INPUT SENSITIVITY TO THE BASE VALUE IRR**

- **Base Value**: $21.1MM, IRR > 224%
- **Capital**: $9.0MM
- **Condensate Price**: $76.97/bbl
- **Condensate Yield**: 90 bbl/MMcf
- **Gas Price**: $3.21/Mcf
- **30 Day IP**: 6.4 MMcf/d

- **Source**: BMO Capital Markets
  - *Flat pricing with $C4/GJ (AECO) and $US90/bbl (WTI)

- There is a large dataset of producing wells in this area with a wide range of rates. With the exception of the two Shell wells with IP 30s below 1 MMcf/d, the remainder of the wells show relatively high rates. The resulting type curve is shown (top left) overlaid on the existing producers.

- Capital costs were assumed to be slightly less than those at Kakwa and were set at $9.0MM. Looking at the tornado plot (above right) it is clear that the Elmworth type curve is most sensitive to capital costs - a reduction of 20% to $7.2MM will increase the IRR to 400%.

- By comparison, increasing the condensate yield by 20% to 90 bbl/MMcf will only increase the IRR to approximately 300%.

- The assumed C5+ yield for this area is flat at 75 bbl/MMcf.

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**PEAK IP 30 FROM TYPE WELL FORECAST**

- **POU Type Curve IP** is 5.8 MMcf/d with 180 bbl/MMcf condensate

- **Source**: GeoSCOUT, BMO Capital Markets
  - **Note**: Peak IP 30 rates represent historical data from the early phase of development
**The Outliers  Septimus - 100 bbl/MMcf**

- Septimus is an established area with CNRL and Crew having active programs. It is over-pressured and entirely west of the 11.3 kPa/m (0.5 psi/ft) gradient, but is relatively shallow (1,900 - 2,200 m TVD).
- The current focus of activity (southwest area of the map above) has C₅⁺ liquids yields from 10 - 40 bbl/MMcf, however, as the play continues to evolve northeast, there appears to be a much bigger prize with C₅⁺ yields greater than 100 bbl/MMcf.
- CNRL discusses sales capacity for Septimus of 97 bbl/MMcf of liquids sales capacity - which presumably assumes a shallow-cut recovery with C₃⁺ through a refrigeration plant. This implies that the C₅⁺ component will be approximately 40 - 50% of this, or 40 - 50 bbl/MMcf.
- As of August 2014, the well highlighted on the map (09-020-082-19W6) shows a cumulative condensate yield of 134 bbl/MMcf after more than three years of production. The initial condensate yield was greater than 200 bbl/MMcf.

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**LOCATOR MAP**
- Normal Pressure Gradient 10.0 kPa/m (0.43 psi/ft)
- Septimus
- BC Drill Credit Line

**AREA PRODUCTION BY OPERATOR**
- PDGHR (MMcf/d)
- Well Count
- Source: GeoSCOUT, BMO Capital Markets, BC OGC

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**SEPTIMUS**
- Wells Used to Generate Type Curve
- Montney Wells with Production
- Montney Wells
- Press. Gradient 11.3 kPa/m (0.5 psi/ft)
- 09-20-082-19W6/03
- C₅⁺ Yield 134 bbl/MMcf

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**PDGHR (MMcf/d)**
- Cdn Nat Rsrcs Ltd
- Crew Enrg Inc
- Well Count

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**Source:** GeoEDGES, GeoSCOUT, BMO Capital Markets
Septimus  IRR >444%

TYPE WELL FORECAST

IP_30 3.9 MMcf/d
C_5+ Yield 100 bbl/MMcf

BT-NPV@10% $18.1MM IRR 444% Payout 0.5 yrs Drill Credit $0.8MM

* Normalised on Peak IP_30

Source: GeoSCOUT, BMO Capital Markets

INPUT SENSITIVITY TO THE BASE VALUE IRR

The current development area at Septimus would most likely have a C_5+ yield of approximately 40 bbl/MMcf. With nearby production suggesting yield significantly higher, the economics for this area were calculated using a C_5+ value of 100 bbl/MMcf.

With depths less than 2,200 m, capital costs here are relatively low at less than $5MM. With an IP_30 conservatively set at 3.9 MMcf/d, the value of this type curve is $18.1MM with an IRR of 444%.

Even if the C_5+ yield is set at 40 bbl/MMcf, the type curve would still be considered to have Outlier economics with an IRR >130%.

The tornado plot above shows all of the sensitivities to “max out” at 500%. This is due to the limitations of Value Navigator not calculating IRR values above 500%. The ranking of the impact of variables is still valid, and shows that the type curve is most sensitive to capital costs. Even with a 20% increase in capital, the type curve is still highly economic with an IRR of nearly 275%.

Source: BMO Capital Markets

*Flat pricing with $C4/GJ (AECO) and $US90/bbl (WTI)

PEAK IP_30 FROM TYPE WELL FORECAST

Source: GeoSCOUT, BMO Capital Markets

Note: Peak IP_30 rates represent historical data from the early phase of development
The Outliers

Altares - C₅⁺ 42 bbl/MMcfd

- Altares is a primary focus for Canbriam and there is also activity from CNRL, Progress and Suncor in the immediate area.

- The Halfway River First Nations Area of Cultural Significance is located immediately northeast of Canbriam’s land position which explains the lack of well control.

- With approximately 42 bbl/MMcfd of C₅⁺, the liquids-yield at Altares are relatively low when compared to the other Outliers, but the type curve still generates excellent economics.

- The pressure gradient is well west of the normal pressure gradient and the Montney TVD is approximately 2,500 m.

Source: GeoSCOUT, BMO Capital Markets
**TYPE WELL FORECAST**

![Graph showing type well forecast](image)

**IP_{30}**
- 5.4 MMcf/d

**C_{5+} Yield**
- 42 bbl/MMcf

**BT-NPV@10%**
- $13.6MM

**IRR**
- 98%

**Payout**
- 1.1 yrs

**Drill Credit**
- $2.6MM

*Normalised on Peak IP_{30}*

Source: GeoSCOUT, BMO Capital Markets

**INPUT SENSITIVITY TO THE BASE VALUE IRR**

![Graph showing input sensitivity to the base value IRR](image)

- Capital costs for the Altares type curve have been taken from area operators. In comparison to other areas with similar, relatively shallow Montney, the costs here are high at $10MM

- The wells in this area are shown with the type curve (above left) and have good deliverability. The type curve has an IP_{30} of 5.0 MMcf/d with a C_{5+} yield of 42 bbl/MMcf

- This generates a BT-NPV@10% of $13.6MM with an IRR of 98% (which is close enough to our 100% Outlier criteria)

- As shown in the tornado plot above, capital costs are the most impactful input variable on the value. By reducing the capital by 20% to $8MM, the type curve IRR increases to >160%

*Flat pricing with $C4/GJ (AECO) and $US90/bbl (WTI)*

Source: BMO Capital Markets

**PEAK IP_{30} FROM TYPE WELL FORECAST**

![Graph showing peak IP_{30} from type well forecast](image)

- *Avg. Peak IP_{30} (MMcf/d)*
  - CNRL: 4.3
  - Canbriam: 5.2
  - Suncor: 5.6
  - Progress: 7.0

*Canbriam Type Curves are choked at 5 MMcf/d*

Source: GeoSCOUT, BMO Capital Markets

Note: Peak IP_{30} rates represent historical data from the early phase of development
There are three primary input variables that must be optimized to define whether an area can generate the economic returns to be considered an Outlier in the unconventional Montney fairway:

1) High C₅₊ content
2) Good deliverability
3) Efficient capital costs

When these converge to produce IRRs of 100% or more, then the area can be considered an Outlier.

The four areas that we have identified as Outliers are listed below in descending order (by IRR). It is apparent that trying to determine minimum criteria for each of the three variables is not possible - rather it is the optimal convergence that produces an Outlier.

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**ECONOMIC SUMMARY - OUTLIER TYPE CURVES**

<table>
<thead>
<tr>
<th>IP₃₀</th>
<th>C₅₊</th>
<th>EUR</th>
<th>% Liquids</th>
<th>Capital</th>
<th>Drill Credit</th>
<th>BT-NPV@10</th>
<th>IRR</th>
<th>PI@10%</th>
<th>Payout</th>
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<tbody>
<tr>
<td>MMcf/d</td>
<td>bbl/MMcf</td>
<td>Bcfe</td>
<td>(%)</td>
<td>($MM)</td>
<td>($MM)</td>
<td>($MM)</td>
<td>(%)</td>
<td>(x)</td>
<td>(years)</td>
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<td>Septimus</td>
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<td>7.1</td>
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</table>

*Source: GeoSCOUT, BMO Capital Markets, Corporate Presentations

*Flat pricing with C$4/GJ (AECO) and US$90/bbl (WTI)*
Emerging Areas  
Sunrise and Attachie

**TYPE WELL FORECAST**

![Graph showing PDGR (MMcf/d) vs Month for Sunrise and Attachie](source: GeoSCOUT, BMO Capital Markets)

- Two areas have materialized as "emerging" areas - meaning that there is evidence to suggest that they may become Outliers in the future, but do not currently have enough public data or activity to conclusively say one way or the other.

- The Sunrise/Tower area has significant activity with Encana, Tourmaline, and ARC mostly targeting the Upper Montney with C$_5^+$ liquids-yield of approximately 10 bbl/MMcf.

**ECONOMIC SUMMARY - EMERGING AREA**

<table>
<thead>
<tr>
<th></th>
<th>IP$_{30}$</th>
<th>C$_5^+$</th>
<th>EUR</th>
<th>% Liquids</th>
<th>Capital</th>
<th>Drill Credit</th>
<th>BT-NPV@10</th>
<th>IRR (%)</th>
<th>PI@10% (%)</th>
<th>Payout (years)</th>
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</thead>
<tbody>
<tr>
<td>Sunrise</td>
<td>5.9 (MMcf/d)</td>
<td>8 (bbl/MMcf)</td>
<td>5.0 (Bcfe)</td>
<td>14 (%)</td>
<td>5.9 ($MM)</td>
<td>0.9 ($MM)</td>
<td>5.4 ($MM)</td>
<td>67 (%)</td>
<td>0.9 (x)</td>
<td>1.4 (years)</td>
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<td>Attachie</td>
<td>1.0 (MMcf/d)</td>
<td>100 (bbl/MMcf)</td>
<td>1.4 (Bcfe)</td>
<td>46 (%)</td>
<td>5.9 ($MM)</td>
<td>0.9 ($MM)</td>
<td>(0.4) ($MM)</td>
<td>8 (%)</td>
<td>(0.1) (x)</td>
<td>7.7 (years)</td>
</tr>
</tbody>
</table>

*Source: GeoSCOUT, BMO Capital Markets, Corporate Presentations*  
**Flat pricing with C$4/GJ (AECO) and US$90/bbl (WTI)**

---

- However, there are Lower Montney wells with less than one month of production with C$_5^+$ yields of approximately 100 bbl/MMcf. If a yield of 40 bbl/MMcf is used, then the IRR will increase from 67% to 200%.

- Conversely, at Attachie, there are two ARC horizontal wells with yields >100 bbl/MMcf, but their initial rates (IP$_{30}$) are low at approximately 1 MMcf/d. If the rates can be increased above 2 MMcf/d then the IRR here will also be increased to 200%. Crew has a land position at Altares and has a flow test from 04-20-084-24W6 with a final rate of 10 MMcf/d and 34 bbl/MMcf of condensate.
Sub 100% IRR Areas  Jedney, Nig, Blueberry/Inga

ECONOMIC SUMMARY - SUB 100% AREAS

<table>
<thead>
<tr>
<th></th>
<th>IP\textsubscript{30}</th>
<th>C\textsubscript{5+}</th>
<th>EUR</th>
<th>% Liquids</th>
<th>Capital</th>
<th>Drill Credit</th>
<th>BT-NPV@10</th>
<th>IRR</th>
<th>PI@10%</th>
<th>Payout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jedney</td>
<td>3.8 15</td>
<td>2.4 23</td>
<td>5.0</td>
<td>0.8</td>
<td>1.5</td>
<td>29</td>
<td>0.3</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nig</td>
<td>4.1 25</td>
<td>4.1 27</td>
<td>5.0</td>
<td>0.8</td>
<td>5.7</td>
<td>88</td>
<td>1.1</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blueberry/Inga</td>
<td>3.0 50</td>
<td>3.6 35</td>
<td>5.0</td>
<td>2.2</td>
<td>6.9</td>
<td>91</td>
<td>1.4</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Both areas are on the east side of the drill credit line. The incentive line has moved east before to increase the royalty credits, and if it were to move again to include Jedney and Nig in the "west" then these areas would generate IRRs approaching or greater than 100% (89% and 110% respectively)

- Blueberry/Inga has a wide variability in both IP\textsubscript{30} rates and C\textsubscript{5+} liquid-yields. There are several data points with yields of 75 to >200 bbl/MMcf. If sustained deliverability can be demonstrated with yields close to 100 bbl/MMcf, then this will be an Outlier

- Operators in these areas include Artek, Black Swan, Bonavista, Carmel Bay, CNRL, ConocoPhillips, Painted Pony, Paramount, Progress, Shell, Storm and UGR

* Flat pricing with C\$4/GJ (AECO) and US\$90/bbl (WTI)
Transformational Impact of Unconventional, Pure Play Liquids
Footprints don’t need to be Large to be a Game Changer

Source: BMO Capital Markets

Case Studies

DEVON-GEOSOUTHERN: ACQUIRED EAGLE FORD ASSETS

- Nov. 20, 2013: Devon Energy Corporation (“Devon”) has agreed to acquire Eagle Ford Shale assets from GeoSouthern Energy Corporation (“GeoSouthern”) for a total consideration of $6.0B

- Net production of 53 Mboe/d (76% Liquids, 24% Gas)
- 400 MMboe of risked resource (~1,200 locations)
- 82,000 net acres (50% WI, 38% NRI)

  Production Value = $113,208/boe/d
  Resource Value = $15/boe
  Acreage Value = $73,171/acre

ENCANA-ATHLON: ACQUIRED PERMIAN ASSETS

- Sept. 29, 2014: Encana Corporation (“Encana”) and Athlon Energy (“Athlon”) entered into an agreement for Encana to acquire all of the issued and outstanding shares of Athlon for a total transaction value of $7.1B

- Net production of 53 Mboe/d (80% Liquids, 20% Gas)
- 400 MMboe of 3P Reserves (~1,200 locations)
- 82,000 net acres (50% WI, 38% NRI)

  Production Value = $236,667/boe/d
  Resource Value = $15/boe
  Acreage Value = $50,714/acre
What to Watch for

OUTLIER AREAS

- Kakwa and Elmworth: both areas are well delineated by Seven Generations, Paramount, NuVista and others with proven excellent deliverability and liquids. Look for increased capital efficiency with decreasing capital costs as pad drilling is implemented. Also look for results from the Lower Montney as most current development has been in the Upper and Middle intervals.

- Septimus: The high liquids-yield region is largely undeveloped and mostly held by Crew. Look for drilling to expand into this area east of the current development by Crew and CNRL.

- Altares: This is a primary focus area for Canbriam, so look for their land position to be further exploited with room for improved capital efficiencies.

EMERGING AREAS

- Sunrise: The Lower Montney appears to have significant liquids content but has not yet been exploited. The area is controlled mostly by ARC and Encana so look for future development of the liquids-rich Lower Montney as well as continued development of the Upper and Middle Montney.

- Attachie: There are two wells with significant liquids production but there are no other Montney wells within 15 km of them. If the initial rates can be increased to be above 2 MMcf/d then the IRR will approach 100%.

SUB 100% IRR AREAS

- Jedney and Nig are well delineated with high liquids content. If the BC Drill Credit Incentive line can be moved east to include these areas, then their IRRs will approach 100%. This will be further increased if the liquids content can be shown to improve even marginally above the current average of approximately 25 bbl/MMcf.

- Blueberry and Inga have some significant liquids production with yields up to 200 bbl/MMcf. Initial rates in the area have a very wide range but the type curve was determined to have an IP$_{30}$ of 3.0 MMcf/d and a C$_{5+}$ yield of 50 bbl/MMcf. If this type curve can be sustained and even marginally improved, then this area will become an Outlier.

Source: GeoEDGES, GeoSCOUT, BMO Capital Markets, BC OGC
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BMO CAPITAL MARKETS OIL & GAS A&D ADVISORY

Ian van Staalduien, P.Eng.,
Managing Director
Head A&D Advisory Canada
+1-403-515-1526
ian.van@bmo.com

Wendy Smith Low, B.Sc.,
Managing Director
+1-403-515-1528
wendy.smithlow@bmo.com

Engineering

Steven Kehoe, M.E.Sc, P.Eng.,
Vice President
+1-403-515-3661
steve.kehoe@bmo.com

Scott Johnston, P.Eng.,
Associate
+1-403-515-1580
scotta.johnston@bmo.com

Conor Ross, E.I.T.,
Analyst
+1-403-515-1554
conor.ross@bmo.com

Geology

Joyce Kennedy, B.Sc., P.Geol.,
Director
+1-403-515-1576
joyce.kennedy@bmo.com

Kathleen Dixon, M.B.A., P.Geol.,
Vice President
+1-403-515-3670
kathleen.dixon@bmo.com

Michael Greene, M.Sc., Geo.I.T.,
Associate
+1-403-515-1582
michael.greene@bmo.com

Commercial

Cliff Johnson,
Vice President
+1-403-515.3674
cliff.johnson@bmo.com

Mandy Edwards, B.A.,
Coordinator
+1-403-515-1581
mandy.edwards@bmo.com

Jennifer Martens, B.F.A.,
Desktop Specialist
+1-403-515-1578
jennifer.martens@bmo.com

Kristy Kivia, B.A.,
Senior Admin. Assistant
+1-403-515-3666
kristy.kivia@bmo.com