Please view replay video on the Pipeline Authority website for full commentary of the following slides

Slides Revised: January 1, 2015
Objective
Define where the Bakken/Three Forks system is economic in a lower oil price environment.

Method
Analyze past well performance across the region and estimate well economics for various production levels.

Disclaimer
The goal of this work is not to imply individual company actions or intentions. All view expressed are strictly that of Justin J. Kringstad.

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Key Economic Assumptions

- $7-$9 Million Well Costs
- $45/BBL Wellhead Pricing
- 1/6 Royalty
- Zero Flaring
- Minimum 20% IRR to drill (calculated after production taxes and royalties)
- No Tax Incentives Included
- Production rate is 30-day average
- All Bakken/Three Forks wells drilled in 2008+
Peak Month Minimum 300 BOPD

Peak Month Well Production, BOPD

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>Peak Month BOPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 MM</td>
<td>300</td>
</tr>
<tr>
<td>8 MM</td>
<td></td>
</tr>
<tr>
<td>9 MM</td>
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</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

$0  $20  $40  $60  $80  $100  $120

Peak Month BOPD / Well Cost

$45 Wellhead
Peak Month Minimum 400 BOPD

Peak Month Well Production, BOPD

Well Cost

400

7 MM
8 MM
9 MM

$0 $10 $20 $30 $40 $50 $60 $70 $80 $90

Breakeven Wellhead Price (AT IRR of 20%)

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Peak Month Minimum 500 BOPD

2,812 Wells

Peak Month BOPD / Well Cost

500

Well Cost

$5 $10 $15 $20 $25 $30 $35 $40 $45 $50 $55 $60 $65 $70 $75 $80

Breakeven Wellhead Price (AT IRR of 20%)
Peak Month Minimum 600 BOPD

Peak Month Well Production, BOPD

Well Cost

- 7 MM
- 8 MM
- 9 MM

Breakeven Wellhead Price (AT IRR of 20%)

$0 $5 $10 $15 $20 $25 $30 $35 $40 $45 $50 $55 $60 $65

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JJ Kringstad - North Dakota Pipeline Authority
Peak Month Minimum 700 BOPD

Peak Month BOPD / Well Cost

- 700 BOPD

Well Cost
- 7 MM
- 8 MM
- 9 MM

Breakeven Wellhead Price (AT IRR of 20%)

$0 $5 $10 $15 $20 $25 $30 $35 $40 $45 $50 $55 $60

$45 Wellhead
Peak Month Minimum 800 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>$45 Wellhead</th>
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<tbody>
<tr>
<td>7 MM</td>
<td>24%</td>
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<tr>
<td>8 MM</td>
<td>22%</td>
</tr>
<tr>
<td>9 MM</td>
<td>20%</td>
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</table>

Peak Month Well Production, BOPD

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Peak Month Minimum
900 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

Breakeven Wellhead Price (AT IRR of 20%)

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Peak Month Minimum 1,000 BOPD

Peak Month BOPD / Well Cost

$45 Wellhead

After Tax IRR

7 MM
8 MM
9 MM

Peak Month Well Production, BOPD

Well Cost

7 MM
8 MM
9 MM

Breakeven Wellhead Price (AT IRR of 20%)
Peak Month Minimum 1,200 BOPD

Peak Month Well Production, BOPD

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<th>BOPD</th>
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<tr>
<td>7 MM</td>
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<td>8 MM</td>
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<td>9 MM</td>
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</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

$45 Wellhead

After Tax IRR

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Peak Month: 100-300 BOPD*

*Low production wells also occur in areas deemed “Core” or “Hot Spot”.

Risk is still present in most areas.

Mapped wells drilled 2012-2014
Summary of $45 Wellhead Oil
Breakeven Summary

Peak Month Well Production, BOPD / Well Cost

Breakeven Wellhead Price (AT IRR of 20%)
Options for drilling outside 800 BOPD footprint:

1) Prove location is viable in low price environment (lower costs, improved IP, etc.)

2) Move rig to better geology (inside or outside of basin)

3) Release rig
800 BOPD Well Example

- $8 MM Well
- $45/bbl oil and $6/mcf gas
- AT IRR = 15%
- AT NPV (10) = $0.93 MM
- Simple Payback = 4.0 Years
Additional Considerations

• Can well costs come down further?
• Individual company budgets, cash flows, hedges, obligations, and management strategies
• Competition from other plays
• Completion technology continues to improve
  – Higher volumes of proppant and water
  – Higher density drilling success
Arguments

• Well economic assumptions too optimistic or conservative
  – Jump to lower or higher well performance footprints

• Some rigs are not drilling Bakken/Three Forks wells
  – No economics were run on wells in other formations
Next Steps

• Use the findings to refine crude oil and natural gas forecasts for the region
• Continue to monitor pricing, production, and technology to further enhance our understanding of well economics in North Dakota