Energy Development and Transmission Interim Committee

Justin J Kringstad
Geological Engineer
Director
North Dakota Pipeline Authority

August 14, 2019
Presentation Outline

• Economics
  • Current Activity and oil transportation dynamics
  • Understanding current and future oil production
    • Pricing update
    • Activity
    • Oil forecasts
  • North Dakota natural gas production
    • Flaring and gas capture
    • Natural gas liquids
Bakken & Three Forks Formations

Bakken Formation

Three Forks Formation
Bakken Drilling Economics

www.northdakotapielines.com
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Estimated Williston Basin Oil Transportation

May 2019

- Pipeline Export: 72%
- Refined: 6%
- Truck/Rail to Canada: 3%
- Estimated Rail: 19%

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Estimated Williston Basin Oil Transportation

- Estimated Rail
- Estimated Pipeline Export
- Refined
- Truck/Rail to Canada
- Brent - WTI Spread (EIA)
Estimated ND Rail Export Volumes

Barrels Per Day

May-13  Sep-13  Jan-14  May-14  Sep-14  Jan-15  May-15  Sep-15  Jan-16  May-16  Sep-16  Jan-17  May-17  Jan-18  May-18  Sep-18  Jan-19  May-19
Rail Destinations Market Share (April 2019)

Data for Rail Destination Market Share Provided by the US Energy Information Administration
Crude Oil Prices – August 13, 2019

Pricing Data: Bloomberg & CME (LLS-Argus)

Brent $60.07
WTI + $3.82

LLS (Argus)
WTI + $3.97

Cushing $56.25
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Statewide Oil Performance

~12% Improvement Over 2017
Top 20 IP Rates (Oil)
Top 20 Oil IP Rates & Associated Gas IP

<table>
<thead>
<tr>
<th>Completion Zone</th>
<th>Middle Bakken</th>
<th>TF B1</th>
<th>TF B2</th>
</tr>
</thead>
</table>

### DUNN
- IP Test - Oil - 24-Hr Rate (bbl)
- IP Test - Gas - 24-Hr Rate (MCF)

### MCKENZIE
- IP Test - Oil - 24-Hr Rate (bbl)
- IP Test - Gas - 24-Hr Rate (MCF)

### MOUNTRAIL
- IP Test - Oil - 24-Hr Rate (bbl)
- IP Test - Gas - 24-Hr Rate (MCF)

IP Test Dates: Jul 1, 18, Nov 1, 18, Mar 1, 19.
Top 20 IP Rates (Oil)

*Month “0” is a partial month with daily production calculated using “Days on production”. Months 1+ use calendar days to calculate daily rate.
Top 20 IP Rates (Oil)
Electrical Submersible Pump (ESP) Timeline
Impact of ESP on Production Profiles
Well: SIBYL USA 44-19TFH (Mountrail County)

*Month “0” is a partial month with daily production calculated using “Days on production”. Months 1+ use calendar days to calculate daily rate.
Impact of ESP on Production Profiles
Additional Examples

*Month “0” is a partial month with daily production calculated using “Days on production”. Months 1+ use calendar days to calculate daily rate.
High Initial Production (IP) Scenarios

"Typical" type curve used as a comparison example for how high IP wells may perform over time.

In this example, the entire production curve over time is uplifted relative to a "typical" well. Well economics and EUR are both improved.

In this example, only the early life of the well is higher relative to a "typical" well. Early well economics improve, but uncertainty exists if EUR will improve or suffer with the high IP rate.

In this example, the early life of the well is higher relative to a "typical" well. Early well economics improve along with an incremental EUR improvement.
Oil/Gas IP Bin Comparison

*Month “0” is a partial month with daily production calculated using “Days on production”. Months 1+ use calendar days to calculate daily rate.
Economic Incentive to Higher IP Rates
Example: Payout Period Using $7 million well cost

Oil 24-Hr IP Rate Group / Well Cost

<table>
<thead>
<tr>
<th>Rate Group</th>
<th>Payout (Months) @ $56 Wellhead Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>14</td>
</tr>
<tr>
<td>4000</td>
<td>12</td>
</tr>
<tr>
<td>6000</td>
<td>8</td>
</tr>
<tr>
<td>8000</td>
<td>6</td>
</tr>
</tbody>
</table>
Economic Incentive to Higher IP Rates
Example: Rate of Return Using $7 million well cost

<table>
<thead>
<tr>
<th>Oil 24-Hr IP Rate Group / Well Cost</th>
<th>After Tax - Rate of Return @ $56 Wellhead Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>72%</td>
</tr>
<tr>
<td>4000</td>
<td>93%</td>
</tr>
<tr>
<td>6000</td>
<td>166%</td>
</tr>
<tr>
<td>8000</td>
<td>318%</td>
</tr>
</tbody>
</table>
EIA Forecasted Oil Price – August 2019

- EIA Price Forecast
- Historical
North Dakota Oil Production Forecast – Aug. 2019
Assumes Current Technology – Enhanced Oil Recovery Not Included
Crude Oil Transmission and Refining
Williston Basin Oil Production & Export Capacity, BOPD

Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.

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Natural Gas Update

Production
- Technology
- Markets

Gathering
- Capacity
- Connections

Processing
- Capacity
- Location

Transmission
- Dry Gas
- Natural Gas Liquids
Statewide Gas Performance

Average BKN/TF Well Performance Statewide

~12% Improvement Over 2017
Bakken and Three Forks Gas Performance

**IP Year**
- 2018
- 2017
- 2016
- 2015
- 2014
- 2013

**Average MCFD**

- **Dunn**
- **McKenzie**
- **Mountrail**
- **Williams**
Statewide Initial Gas Production Rate: 24hr
North Dakota Gas Production Forecast – Aug. 2019
Assumes Current Technology – Enhanced Oil Recovery Not Included

- ND Gas Case 1 - MMCFD
- ND Gas Case 2 - MMCFD

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Solving the Flaring Challenge

**Simple Terms**

**Blue** – Lack of pipelines

**Orange** – Challenges on existing infrastructure

**GREEN** – % of gas captured and sold

**Blue** – % flared from zero sales wells

**Orange** – % flared from wells with at least one mcf sold.

Statewide

- **81%** in **GREEN**
- **15%** in **Orange**
- **4%** in **Blue**

May 2019 Data – Non-Confidential Wells
Solving the Flaring Challenge

- New Wells Selling Gas
- New Producing Wells

Number of Wells Per Month

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Natural Gas Update

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Solving the Flaring Challenge
Assumes Current Technology – Enhanced Oil Recovery Not Included

Planned Plant Capacity
Existing Plant Capacity
NDPA Case 1 Forecast
NDPA Case 2 Forecast
Historical Sold, MMCFD
Historical Flared, MMCFD
Targets Case 1 (Sold)
Targets Case 1 (Flared)

MMCFD

Solving the Flaring Challenge

Assumes Current Technology – Enhanced Oil Recovery Not Included
Natural Gas Update

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Processing
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Major Gas Pipeline and Processing Infrastructure
Project Highlights

- 67 Miles - 20” Pipeline
- 20 Miles - 12” Pipeline
- $220+ Million
- At least 250,000 MCFD Capacity (expandable)
- Expandable to 375,000 MCFD
- End of 2021 Proposed Completion
- Residue Gas Service From North of Lake Sakakawea to Northern Border Pipeline in McKenzie County
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Northern Border Pipeline

- 42” Pipeline
- Carries Canadian (Port of Morgan) and Domestic Gas
- Receives Gas From ND Plants, WBI Transmission Interconnections, and WY Pipelines (Bison & Grasslands)
- Midcontinent Deliveries
Northern Border Pipeline

*Data Source: Northern Border IPS*
Northern Border Pipeline Market Share

- Canadian Market Share
- Williston Basin Market Share

NDPA Calculations Using Northern Border IPS
Conclusion: **IF** no other gas export options open and all other deliveries on other pipelines stay static, ND gas production could increase 0.83-1.13 BCFD (from May-19) before Northern Border is 100% Bakken production. **BTU management becomes increasingly important for Bakken residue gas.**
Conclusion: If no other gas export options open and all other deliveries on other pipelines stay static, ND gas production could increase 0.83-1.13 BCFD (from May-19) before Northern Border is 100% Bakken production. **BTU management becomes increasingly important for Bakken residue gas.**

- Gas Plants With C2+ Capture
  ~1,010+ BTU Residue Gas
- Gas Plants With C3+ Capture
  ~1,150+ BTU Residue Gas
Regional NGL Infrastructure
North Dakota Captured* NGL’s – Aug. 2019

*Non-flared NGL’s & Assumes 10 GPM

All Natural Gas Liquids

Ethane

Propane

Butane

Isobutane

Natural Gasoline

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NGL Pipeline Takeaway Options

- Northern Border (ND Prod.)
- Aux Sable Prairie Rose
- Alliance Tioga Lateral
- ONEOK Elk Creek
- Case 1: All Captured NGLs
- WBI Transmission
- ONEOK Bakken NGL
- Vantage
- Elk Creek Expansion (Proposed)
- Case 2: All Captured NGLs
ONEOK Elk Creek NGL Pipeline

Project Highlights

• 900 Miles - 20” Pipeline
• $1.4 Billion
• 240,000 BPD Capacity
• Expandable to 400,000 BPD
• End of 2019 Proposed Completion
• Y-Grade Transportation
Contact Information

Justin J. Kringstad, Director
North Dakota Pipeline Authority

600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Phone: (701)220-6227
Fax: (701)328-2820
E-mail: jjkringstad@ndpipelines.com

Websites:
www.pipeline.nd.gov
www.northdakotapipelines.com