House Energy and Natural Resources Committee

Justin J Kringstad
Geological Engineer
Director
North Dakota Pipeline Authority
### US Williston Basin Oil Production, BOPD

<table>
<thead>
<tr>
<th>MONTH</th>
<th>ND</th>
<th>Eastern MT*</th>
<th>SD</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>January</td>
<td>1,177,679</td>
<td>50,110</td>
<td>3,555</td>
<td>1,231,343</td>
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<tr>
<td>February</td>
<td>1,175,307</td>
<td>50,861</td>
<td>3,628</td>
<td>1,229,795</td>
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<td>March</td>
<td>1,162,354</td>
<td>49,837</td>
<td>3,502</td>
<td>1,215,693</td>
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<td>April</td>
<td>1,227,238</td>
<td>52,426</td>
<td>3,515</td>
<td>1,283,179</td>
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<td>May</td>
<td>1,248,202</td>
<td>53,717</td>
<td>3,471</td>
<td>1,305,390</td>
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<tr>
<td>June</td>
<td>1,227,436</td>
<td>53,987</td>
<td>3,443</td>
<td>1,284,866</td>
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<tr>
<td>July</td>
<td>1,269,297</td>
<td>53,194</td>
<td>3,377</td>
<td>1,325,868</td>
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<tr>
<td>August</td>
<td>1,292,533</td>
<td>55,599</td>
<td>3,471</td>
<td>1,351,603</td>
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<td>September</td>
<td>1,359,282</td>
<td>54,516</td>
<td>3,475</td>
<td>1,417,273</td>
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<td>October</td>
<td>1,391,877</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
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</table>
Estimated Williston Basin Oil Transportation

[Graph showing estimated market share and Brent-WTI spread over time]

- Estimated Rail
- Estimated Pipeline Export
- Refined
- Truck/Rail to Canada
- Brent - WTI Spread (EIA)
Estimated ND Rail Export Volumes
Rail Destinations Market Share (Oct 2018)

Destination Market Share
- Canada
- PADD I (East Coast)
- PADD II (Midwest)
- PADD III (Gulf Coast)
- PADD IV (Rockies)
- PADD V (West Coast)

Data for Rail Destination Market Share Provided by the US Energy Information Administration
Crude Oil Prices – January 9, 2019

Pricing Data: Bloomberg & CME (LLS-Argus)

Brent $59.99
WTI + $8.93

Houston WTI
WTI + $5.28

Cushing
$51.06
Midwest (PADD 2) Refinery Crude Oil Consumption

EIA Data
North Dakota Oil Pricing

Graph showing various oil pricing metrics over time, including:
- ND Wellhead Discount to WTI
- WCS-WTI Differential
- Midwest (PADD 2) Refinery Utilization %
- Brent-WTI Spread
- Williston Basin Oil Production, BOPD
- Excess Pipeline/Refinery Capacity (Does Not Include Rail)

Data spans from 2009 to 2019, with notable events such as DAPL in 2017.
Bakken Drilling Economics

www.northdakotapielines.com
Bakken Breakeven Price Range (20% IRR)

Bakken Breakeven Prices
$6 - $8 Million
Completed Wells Cost
- $58-$73
- $49-$61
- $43-$52
- $39-$48
- $36-$43
- $34-$40
- $32-$38
- $28-$33
- $26-$30

Background Map: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

JJ Kringstad - North Dakota Pipeline Authority
<table>
<thead>
<tr>
<th>30-Day Initial Production (BOPD)</th>
<th>Remaining Wells Low Case Cumulative</th>
<th>Remaining Wells High Case Cumulative</th>
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<tbody>
<tr>
<td>100+</td>
<td>37,077</td>
<td>106,455</td>
</tr>
<tr>
<td>200+</td>
<td>34,440</td>
<td>98,266</td>
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<tr>
<td>300+</td>
<td>29,822</td>
<td>85,136</td>
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<tr>
<td>400+</td>
<td>25,621</td>
<td>73,245</td>
</tr>
<tr>
<td>500+</td>
<td>21,410</td>
<td>61,572</td>
</tr>
<tr>
<td>600+</td>
<td>18,291</td>
<td>52,969</td>
</tr>
<tr>
<td>700+</td>
<td>14,877</td>
<td>43,968</td>
</tr>
<tr>
<td>800+</td>
<td>12,015</td>
<td>36,100</td>
</tr>
<tr>
<td>900+</td>
<td>9,690</td>
<td>29,522</td>
</tr>
<tr>
<td>1000+</td>
<td>7,776</td>
<td>23,721</td>
</tr>
<tr>
<td>1250+</td>
<td>4,311</td>
<td>13,608</td>
</tr>
<tr>
<td>1500+</td>
<td>2,292</td>
<td>7,178</td>
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</tbody>
</table>
Years Remaining* / Minimum Wellhead Oil Price

*Assumes 1,200 Completions Per Year and $7MM Well Costs (20% After Tax IRR)
Statewide Oil Performance

~13% Improvement Over 2017
North Dakota Oil Production Forecast

Assumes Current Technology – Enhanced Oil Recovery Not Included
North Dakota Oil Production Forecast
Assumes Current Technology – Enhanced Oil Recovery Not Included
Williston Basin Oil Production & Export Capacity, BOPD
Assumes Current Technology – Enhanced Oil Recovery Not Included

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

Assumes Current Technology – Enhanced Oil Recovery Not Included
NDPA North Dakota Production Forecast Summary

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

Statewide

- **GREEN** – % of gas captured and sold
- **Blue** – % flared from zero sales wells
- **Orange** – % flared from wells with at least one mcf sold.

**Simple Terms**

- **Blue** – Lack of pipelines
- **Orange** – Challenges on existing infrastructure

Oct. 2018 Data – Non-Confidential Wells
Bakken and Three Forks Gas Performance

Dunn

McKenzie

Mountrail

Williams

Avg. MCFD

2017
2016
2015
2014
2013

Production Month

5 10 15 20

5 10 15 20

5 10 15 20

5 10 15 20

Production Month

5 10 15 20

5 10 15 20

5 10 15 20
Solving the Flaring Challenge

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

Assumes Current Technology – Enhanced Oil Recovery Not Included

[Graph showing flaring and capacity data]

- 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)
Major Gas Pipeline and Processing Infrastructure

Upcoming or Recent Plant Expansion

- Yes
- No
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**

*Data Source: Northern Border IPS*
Simplified Example NB Calculations

Conclusion: **IF** no other gas export options open and all other deliveries on other pipelines stay static, ND gas production could increase 1.11-1.41 BCFD (from Oct-18) before Northern Border is 100% Bakken production. **BTU management becomes increasingly important for Bakken residue gas.**
North Dakota Captured* NGL’s

*Non-flared NGL’s & Assumes 10 GPM
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
North Dakota Pipeline Construction

- New Miles
- Year End Miles

<table>
<thead>
<tr>
<th>Year</th>
<th>New Miles of Pipe</th>
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<tbody>
<tr>
<td>2008</td>
<td>673</td>
</tr>
<tr>
<td>2009</td>
<td>1,355</td>
</tr>
<tr>
<td>2010</td>
<td>1,010</td>
</tr>
<tr>
<td>2011</td>
<td>2,353</td>
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<tr>
<td>2012</td>
<td>3,184</td>
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<td>2013</td>
<td>2,828</td>
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<td>2014</td>
<td>2,179</td>
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<td>2015</td>
<td>2,178</td>
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<tr>
<td>2016</td>
<td>914</td>
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<tr>
<td>2017</td>
<td>996</td>
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</table>

Sources: NDIC & PHMSA
Contact Information

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