Bakken Three-Mile Lateral Design and Execution

February 26, 2020

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Agenda

► WPX Overview
► Three-Mile Design Considerations
► Execution
► Q&A
WPX Asset Overview

**Delaware Basin**
- ~185,000 Net Acres

**Williston Basin**
- ~85,000 Net Acres
Why 3-Mile Laterals

- Surface location mitigation
  - Leases underneath lake
  - Terrain limitations
  - Lease line wells

Lease Line Well

Two Well Pad under Lake Sakakawea
## 3-Mile Design Considerations

### 3 Mile WBD

<table>
<thead>
<tr>
<th>Casing Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Size</td>
</tr>
<tr>
<td>Surface</td>
</tr>
<tr>
<td>Intermediate</td>
</tr>
<tr>
<td>Production</td>
</tr>
</tbody>
</table>

### Design Considerations

- **Well plan**
  - T&D
  - Wellbore profile
  - Buckling

- **Fluid design**
  - Lube/Hole Cleaning
  - Hydraulics
  - ECD's throughout the lateral

- **BHA Design**
  - 1.25* Bend selection in tangent
  - Stabilization
  - Reamers
  - DP Selection

- **Liner Design**
  - Shoe track
  - Liner Hanger

- **Rig Specifications**
  - Pump liners
  - Rack back capacity

- **Batch Drill vs Whole Drill**
Modeled torque shows 26,000 ft-lbs at TD
- .15 - .3 OH-FF modeled
- Real-time showed ~.21

Modeled torque used to understand rotation of liner to bottom (if needed)
Design Considerations – Buckling

- 4 ½” Drillpipe improves:
  - Helical/Sinusoidal Buckling
  - Rotating on Bottom Weight
  - Slide Drilling Weight
  - Torque Capacity
Design Considerations – Drillpipe Selection

### 4” 14 PPF XT39

<table>
<thead>
<tr>
<th>Pipe Body:</th>
<th>Nominal 100% RBW</th>
<th>95% RBW</th>
<th>Ultra Class 90% RBW</th>
<th>Premium 80% RBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD (in)</td>
<td>4.000</td>
<td>3.957</td>
<td>3.934</td>
<td>3.868</td>
</tr>
<tr>
<td>Wall Thickness (in)</td>
<td>0.330</td>
<td>0.314</td>
<td>0.297</td>
<td>0.264</td>
</tr>
<tr>
<td>Tensile Strength (lbs)</td>
<td>513,645</td>
<td>485,769</td>
<td>459,124</td>
<td>403,526</td>
</tr>
<tr>
<td>Torsional Strength (ft-lbs)</td>
<td>41,918</td>
<td>39,586</td>
<td>37,281</td>
<td>32,752</td>
</tr>
<tr>
<td>Burst Capacity (psi)</td>
<td>19,491</td>
<td>21,161</td>
<td>20,048</td>
<td>17,820</td>
</tr>
<tr>
<td>Collapse Capacity (psi)</td>
<td>20,141</td>
<td>18,604</td>
<td>17,042</td>
<td>13,836</td>
</tr>
</tbody>
</table>

Notes: Body properties are calculated based on uniform OD and wall thickness. Burst capacity for Nominal (100% RBW) based on 87.5% RBW per API.

#### Connection: XT39

- TJ OD (in): 4.875
- TJ ID (in): 2.688
- MYS (ksi): 120

Maximum MUT (ft-lbs): **21,200**

Tension at Shoulder Separation @ Max MUT (lbs): Tensile Limited

Tension at Connection Yield @ Max MUT (lbs): 553,300

Minimum MUT (ft-lbs): **17,700**

Tension at Shoulder Separation @ Min MUT (lbs): 647,200

Tension at Connection Yield @ Min MUT (lbs): 662,200

MUT values are based on a friction factor of 1.15. A copper-based thread compound with a friction factor of 1.15 must be used to achieve the MUT values for this connection.

### 4 ½” 16.6 PPF DELTA 425

<table>
<thead>
<tr>
<th>Pipe Body:</th>
<th>Nominal 100% RBW</th>
<th>95% RBW</th>
<th>Ultra Class 90% RBW</th>
<th>Premium 80% RBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD (in)</td>
<td>4.500</td>
<td>4.466</td>
<td>4.433</td>
<td>4.395</td>
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<tr>
<td>Wall Thickness (in)</td>
<td>0.337</td>
<td>0.320</td>
<td>0.303</td>
<td>0.276</td>
</tr>
<tr>
<td>Nominal ID (in)</td>
<td>3.826</td>
<td>3.826</td>
<td>3.826</td>
<td>3.826</td>
</tr>
<tr>
<td>Tensile Strength (lbs)</td>
<td>595,004</td>
<td>592,966</td>
<td>531,168</td>
<td>468,296</td>
</tr>
<tr>
<td>Torsional Strength (ft-lbs)</td>
<td>55,453</td>
<td>52,405</td>
<td>49,589</td>
<td>43,450</td>
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<tr>
<td>Burst Capacity (psi)</td>
<td>17,693</td>
<td>19,209</td>
<td>18,198</td>
<td>16,175</td>
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<tr>
<td>Collapse Capacity (psi)</td>
<td>16,773</td>
<td>15,354</td>
<td>13,513</td>
<td>10,964</td>
</tr>
</tbody>
</table>

Notes: Body properties are calculated based on uniform OD and wall thickness. Burst capacity for Nominal (100% RBW) based on 87.5% RBW per API.

#### Connection: Delta 425

- TJ OD (in): 5.375
- TJ ID (in): 3.000
- MYS (ksi): 130

Maximum MUT (ft-lbs): **35,000**

Tension at Shoulder Separation @ Max MUT (lbs): Tensile Limited

Tension at Connection Yield @ Max MUT (lbs): 482,858

Minimum MUT (ft-lbs): **34,800**

Tension at Shoulder Separation @ Min MUT (lbs): Tensile Limited

Tension at Connection Yield @ Min MUT (lbs): 482,858

Tool Joint Torsional Strength (ft-lbs): 49,748

Tool Joint Tensile Strength (lbs): 786,353

XT39 is a trademark of NOV Grant Prideco.

Note: MUT values are based on a friction factor of 1.0. There is no published pressure rating for this connection.

Delta 425 is a trademark of NOV Grant Prideco.
Execution

- Days from Spud:
  - 2015-16: 26.8
  - 2019: 19.94

- Modeling is a necessity
- 100% success on liner runs

- 4 ½” Drillpipe
  - Less buckling
  - Higher torque capacity
  - Better hole cleaning (AV’s)
  - More available WOB

- 100% conventional assemblies

- 2020:
  - 9 wells in the schedule
  - Currently batch setting on a 5 well pad

- Future Opportunities:
  - BHA design evolution
    - Eccentric reamers
    - Drillpipe configuration
  - Permian applications?
Questions?