OIL AND GAS UPDATE

Government Finance Committee

Bismarck, ND
August 2, 2017
Oil and Gas Update

- Bakken Development
- Bakken Performance
- Bakken Takeaways

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Welcome to the North Dakota Industrial Commission, Department of Health and Gas Division, home page.

Please check out the new Information Center and Policy Center.

Proposed Rule Changes and Adoption of New Rules

Rule Changes Full Notice

General Guidelines for Temporary Abandonment of Wells

Bakken and Three Forks Information!

Available on the ND Petroleum Council web site are the Surface Owner Information Center, the Royalty Owners Information Center, and the Drilling Activity Report.

The Oil and Gas Division regulates the drilling and production of oil and gas in North Dakota. Our mission is to encourage and promote the development, production, and utilization of oil and gas in the state in such a manner as will prevent waste, maximize economic recovery, and fully protect the correlative rights of all owners to the end that the landowners, the royalty owners, the producers, and the general public realize the greatest possible good from these vital natural resources.
Oil and Gas Update

• Bakken Development
  – Uniform Spacing—orderly development
  – Energy Corridors

• Bakken Performance
  – Oil Production
  – Well Count
  – Gas-Oil Ratio
  – Gas Capture
  – Water-Oil Ratio
  – Stimulations

• Pipelines

• Bakken Takeaways
Contained Spills / Berm Effectiveness

More spills will be contained onsite due to Oil and Gas Division rule changes effective April 1, 2016 requiring perimeter berms on high volume production sites.

Root Causes Excluded:
- blow out
- treater upset
- fire
- stuffing box leak
- vessel leak
- wind blown leaks

<table>
<thead>
<tr>
<th>Year</th>
<th>Spill Contained on Location</th>
<th>Total Spills Contained With Berm Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>2014</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>2015</td>
<td>80%</td>
<td>90%</td>
</tr>
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<td>2016</td>
<td>80%</td>
<td>90%</td>
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</tbody>
</table>
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- **Bakken Performance**
  - Oil Production
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Current drilling activity is focused in Mountrail, Dunn, McKenzie, and Williams Counties.
Well density is the big question.

Source: Continental Resources

Bakken Fm
Three Forks Fm
Well density is the big question.

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North Dakota Idle and Non-Completed Wells

- IDLE WELLS
- NC WELLS
- OIL PRICE
Wells

13,876 active
2,057 conventional
11,819 Bakken/Three Forks

1,772 inactive
+$40 for 90 days
830 waiting on completion
+$50 for 90 days
1,919 permitted
+$60 for 90 days
NYMEX 2024+

13,141 increased density approved 6/27/17
31,538 total

55,000-65,000 estimated final

9,782 reclaimed and bond released
1,017 reclamation in progress
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EERC—Phase I Study

- HB 1358—Effective April 20, 2015
- Recommendations to NDIC
- December 1, 2015—EERC report published
- NDIC promulgated rules—effective January 1, 2017
EERC—Phase II Study

- HB 1358—Effective April 20, 2015
- Pipeline Leak Detection
- Field Evaluation of Liquid Gathering Pipelines
- December 30, 2016—EERC report published
EERC—Phase III Study

- HB 1347—Effective July 1, 2017
- Leak detection and monitoring technology analysis
- Risk assessment of new + existing pipeline systems
- September 30, 2018—EERC report due
Western North Dakota Gathering Pipelines

Estimate 12,700 miles pre August 2011
+ 4,900 miles August 2011-December 2013
+ 2,650 miles per year 2014-mid 2017
= 26,875 miles thru mid 2017
= 36,000 miles projected to 2020

14,000+ miles within OGD database
Bakken/Three Forks EOR Potential

• Pilot projects
  – CO$_2$ injection
  – water injection
  – projects small-scale and usually inconclusive
  – ethane injection encouraging in lab
  – further testing must be conducted

• > 300 billion barrels OOIP
  – every 1% of EOR = 3 billion barrels

(note: cum oil prod from 1951-2016 = 3.8 bil bo)
Bakken Takeaways

- Multi-well pads allow batch drilling
- Rig efficiency = more wells / rig
- SI + NC wells = near term prod increase
- GOR increasing = more gas issues
- Stimulation improvements = higher EUR
- WOR increase = disposal + pipeline needs
- Bakken EOR Potential