Natural Gas Study
North Dakota Type Curves*

*Based on the July 2012 BENTEK Natural Gas Study
Gas – Oil Ratio (GOR) Increasing Over Time

Horizontal Well Completed in Target Reservoir
Gas – Oil Ratio (GOR) Increasing Over Time

Youngest - Original Reservoir Pressure

Oldest – Entire Reservoir Below Bubble Point

High Reservoir Pressure

Low Reservoir Pressure

Bubble Point Pressure
Production curve for the Bakken and Three Forks, US Williston Basin.
Source: BENTEK Energy July 2012 Report
Only horizontal wells shown on map
1980’s-90’s Bakken Development
September 2012 Forecast Assumptions

Drilling Rigs

- North Dakota - 1
- North Dakota - 2
- Montana

September 2012 Forecast Assumptions

Completed Wells

- North Dakota - 1
- North Dakota - 2
- Montana - 1
North Dakota Crude Oil

Barrels Per Day

Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Challenges*
1) Moving oil out of the Williston Basin
2) Moving oil within the Williston Basin

*Modified from Bridger and Belle Fourche Pipelines
Williston Basin Oil Transportation

July 2009
- 73% Pipeline Export
- 8% Tesoro Refinery
- 18% Truck to Canadian Pipelines
- 1% Estimated Rail

July 2010
- 74% Pipeline Export
- 6% Tesoro Refinery
- 6% Truck to Canadian Pipelines
- 14% Estimated Rail

July 2011
- 67% Pipeline Export
- 17% Tesoro Refinery
- 4% Truck to Canadian Pipelines
- 12% Estimated Rail

July 2012
- 43% Pipeline Export
- 8% Tesoro Refinery
- 2% Truck to Canadian Pipelines
- 47% Estimated Rail
Estimated ND Rail Export Volumes

Barrels Per Day

Jun-08  Sep-08  Dec-08  Mar-09  Jun-09  Sep-09  Dec-09  Mar-10  Jun-10  Sep-10  Dec-10  Mar-11  Jun-11  Sep-11  Dec-11  Mar-12  Jun-12
BNSF Crude Rail Locations

★ Existing
1) Dore – Musket - Unit
2) Trenton – Savage – Manifest/Unit
3) Williston – Red River Supply - Manifest
4) Tioga – Hess - Unit
5) Manitou – Plains - Unit
6) Ross – Bakken Transload - Manifest
7) Stanley – EOG - Unit
8) Minot – ND Port Services- Manifest
9) Zap/Republic – Basin Transload - Unit
10) Eland – BOE - Unit
11) Dickinson – Centennial - Manifest
12) Gascoyne – Enserco – Manifest/Unit
13) Epping – Rangeland – Unit
14) Berthold – Enbridge – Unit (Full Serv Q1/13)

★ Planned
1) Fryburg – Great Northern - Unit
CP Crude Rail Locations

Existing
1) Stampede – US Development
2) Donnybrook - Centennial
3) New Town – Dakota Plains
4) Van Hook– US Development
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Challenges*

1) Moving oil out of the Williston Basin
2) Moving oil within the Williston Basin

*Modified from Bridger and Belle Fourche Pipelines
Crude Oil Gathering
North Dakota Crude Gathering

- Truck: 74%
- Pipeline: 26%

February 2012 Data
North Dakota Crude Gathering

- Williams
- Mountrail
- McKenzie
- Dunn

Grey = Truck
Color = Pipe
North Dakota Crude Gathering

Pie Charts
Truck = Red
Pipeline = Blue

- Williams: 95% (5% truck, 95% pipeline)
- Mountrail: 55% (45% truck, 55% pipeline)
- McKenzie: 89% (11% truck, 89% pipeline)
- Dunn: 78% (22% truck, 78% pipeline)
Pipeline Challenges Outside ND
Pipeline Challenges Outside ND
Source: Jodi Quinnell, BENTEK Energy - Sept 12, 2012 “Crude Awakening”
Strengthening Landowner Relations
Natural Gas
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
ND Gas Facility/System Intake
ND Gas Facility/System Intake

Five New/Expanded Plants in Next 12-24 months

ONEOK Stateline I & II
ONEOK Garden Creek II
Hess Tioga
Plains Ross
ND Gas Plant Capacity

- Natural Gas Production
  (*Forecasted Case 1)
- Processing Plant Capacity

Million Cubic Feet Per Day

2006  2008  2010  2011  2012*  2013*  2014*
May 2012 Gas Plant Volumes

![Graph showing gas plant volumes in May 2012. The x-axis represents different gas plants, and the y-axis represents MCFD (Thousand Cubic Feet per Day). The bars indicate the intake and nameplate capacity for each plant.](image-url)
First Time Gas Sales Per Month
ND Gas Gathering Statistics

- Wells With Gas Sales or Lease Use
- Wells Without Gas Sales
North Dakota NGL Potential

Assumptions
• No Flaring
• 8 Gal/MCF
• All liquids extracted
Case 1: ND NGL Potential*

*Using NGL breakdown from the July 2012 BENTEK Natural Gas Study
May 2012 Bakken/TF NGL’s

Assumptions

- May Bakken Gas 579,000 MCFD
- 8 Gal/MCF
- \((8/42)*579,000 = 110,286\) BPD

*This is an illustration only and should not be considered official industry data*
Moving Future NGL Volumes

**Transportation Options**

- Trucking Regionally
- Rail Transportation
- Vantage Pipeline (Ethane)
- ONEOK Bakken Pipeline (Y-Grade)
- Alliance Pipeline (Rich Gas)
- New Pipeline Infrastructure??

![Graph showing barrels per day for different cases of NGLs.](image-url)
Natural Gas Study

Transmission Future
Open Capacity Leaving N. Dakota Is Tight

- Northern Border and Alliance Serve As the Primary Routes to Transport Gas From the Region.
- Each Have Limited Open Mainline Capacity to Carry Additional Williston Supply.
NORTH DAKOTA GOVERNOR’S
PIPELINE SUMMIT
Bismarck, ND – June 14, 2012

Full 2.5 Hours Replay: http://www.governor.nd.gov/node/1459
Contact Information

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.ndpipelines.wordpress.com