DUG Bakken and Niobrara
North Dakota Pipeline Authority
Justin J. Kringstad
May 30, 2013 – Denver, CO
May 27, 2013 – 186 Drilling Rigs
ND Drilling Stats

- Spuds
- Drilling Rigs
- Spuds per Rig per Month

Graph showing trends from Jan-07 to Jan-13.
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Forecasted New Wells

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

[Bar chart showing miles of pipeline for YE 2009, YE 2010, and YE 2011.]

- 2,353 miles of new pipe in 2011
- Roughly Distance from Seattle to Washington DC
- 2012 Data Available Q3 2013
Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions
Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions
Forecasting Williston Basin Oil Production, BOPD

Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Forecasted Remaining Reserves (ND Only)

Assuming 11 Billion Barrels Recoverable

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

JJ Kringstad - North Dakota Pipeline Authority
North Dakota Type Curves*

**Typical Type Curve Based on the July 2012 BENTEK Natural Gas Study**
Crude Oil

Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions
North Dakota Crude Oil Pipelines

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

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

145,000 BOPD

210,000 BOPD

68,000 BOPD

160,000 BOPD
Oil Loading Rail Facilities
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  Sep-12  Dec-12  Mar-13
Estimated Williston Basin Oil Transportation

March 2013

- Pipeline Export: 20%
- Tesoro Refinery: 8%
- Truck to Canadian Pipelines: 1%
- Estimated Rail: 71%

JJ Kringstad - North Dakota Pipeline Authority
US Williston Basin Oil Transport*

- Rail
- Pipelines (US & CAN)
- Tesoro Refinery

*Some data based on estimates or assumptions
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.
OIL TRANSPORTATION TABLE

This is a table used by the Pipeline Authority to create the charts seen in the presentations. If anyone notices an error, please contact the Pipeline Authority to get the table updated.

Click on table to enlarge

[Image of 811 logo: Know what’s below. Call before you dig.]
Crude Oil Gathering
Challenges*

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

*Modified from Bridger and Belle Fourche Pipelines
ND Crude Oil Gathering

Red – Trucked
Blue – Pipeline

Sep 2012 Estimates – Some data incomplete or unavailable
ND Crude Oil Gathering

**Red** – Trucked
**Blue** – Pipeline

64% 36%

All ND Production

Sep 2012 Estimates – Some data incomplete or unavailable
Crude Oil

Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions (EPRINC & Others)
ND Oil Pricing: ND-WTI Differential

Source: EIA DATA
Hydrogen Sulfide
Natural Gas
Keys to Reducing Flaring

1. Economics Must Work
2. Understanding Production Potential
3. New Gas Gathering Pipelines
4. Enhancing Existing Gathering Pipelines
5. Adequate Gas Processing Capacity
6. Adequate Interstate Pipeline Capacity
7. Flaring Alternatives (Short & Long Term)
Rich Natural Gas

Raw Natural Gas (1500+ BTU) → Processing Plant

Consumer Quality Dry Natural Gas

- Methane ($3.49 MMBTU)
- Ethane 41.64%
- Propane 28.33%
- Butane 16.53%
- Natural Gasoline 13.51%

NGL’S (8-12 gpm)
- Y-Grade or Fractionated

*Using NGL breakdown from the July 2012 BENTEK Natural Gas Study*
North Dakota Type Curves*

*Typical Type Curve Based on the July 2012 BENTEK Natural Gas Study

JJ Kringstad - North Dakota Pipeline Authority
Gas – Oil Ratio (GOR) Increasing Over Time

Horizontal Well Completed in Target Reservoir

High Reservoir Pressure

Bubble Point Pressure

Low Reservoir Pressure
Gas – Oil Ratio (GOR) Increasing Over Time

Youngest - Original Reservoir Pressure

High Reservoir Pressure

Bubble Point Pressure

Low Reservoir Pressure

Oldest – Entire Reservoir Below Bubble Point

JJ Kringstad - North Dakota Pipeline Authority
Production curve for the Bakken and Three Forks, US Williston Basin.
Source: BENETEK Energy July 2012 Report
Only horizontal wells shown on map
1980’s-90’s Bakken Development

Bakken Horizontal
Well 1987

GOR
MCFPD
BOPD
WTR

Elm Coulee
2000

JJ Kringstad - North Dakota Pipeline Authority
Forecasting Williston Basin Gas Production

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

JJ Kringstad - North Dakota Pipeline Authority
Solving the Flaring Challenge

**Simple Terms**

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

**Statewide**

March 2013 Data – Non-Confidential Wells
Capturing the 17% Faster Well Connections

JJ Kringstad - North Dakota Pipeline Authority
ND Gas Gathering Statistics

- Wells With Gas Sales or Lease Use
- Wells Without Gas Sales
Older, lower pressure wells connected to plant

New, high pressure well causes older wells to flare

Capturing the 11% Additional Compression
Capturing the 11%
Looping Existing Pipelines
NGL buildup in gathering pipelines reduces area for gas to flow

More of an issue in winter months due to lower ground temperature causing more liquids to drop out
Natural Gas Processing & Transmission

5 New or Expanding Gas Plants 2013-2015
(See Website for Details)
ND Gas Plant Capacity

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

Million Cubic Feet Per Day

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JJ Kringstad - North Dakota Pipeline Authority
Natural Gas Study
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.
November 5, 2012 – EERC Associated Gas Use Study

December 18, 2012 – Natural Gas Flaring Alternatives (Company Presentations)

February 27, 2013 – EERC Use of Associated Gas to Power Drilling Rigs
Rich Natural Gas

Raw Natural Gas (1500+ BTU) → Processing Plant

- Consumer Quality Dry Natural Gas
- Methane ($3.49 MMBTU)
  - Ethane 41.64%
  - Propane 28.33%
  - Butane 16.53%
  - Natural Gasoline 13.51%

*NGL breakdown from the July 2012 BENTEK Natural Gas Study*
ND NGL Production, BPD
Assumptions

- No Flaring
- 8 Gal/MCF
- All liquids extracted
ND NGL Production & Pipelines

Vantage* (Ethane)
Tioga Lateral*
Aux Sable
Alliance (Dense Phase)

ONEOK (Y Grade)
New Frontier*

*Under Construction/Planned

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Produced Water Infrastructure

Red – Producer Owned SWD
Green – Independent SWD
Blue Circle – SWD Volume
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