Unconventional Oil Plays
Opportunity vs Risk

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Sofitel London

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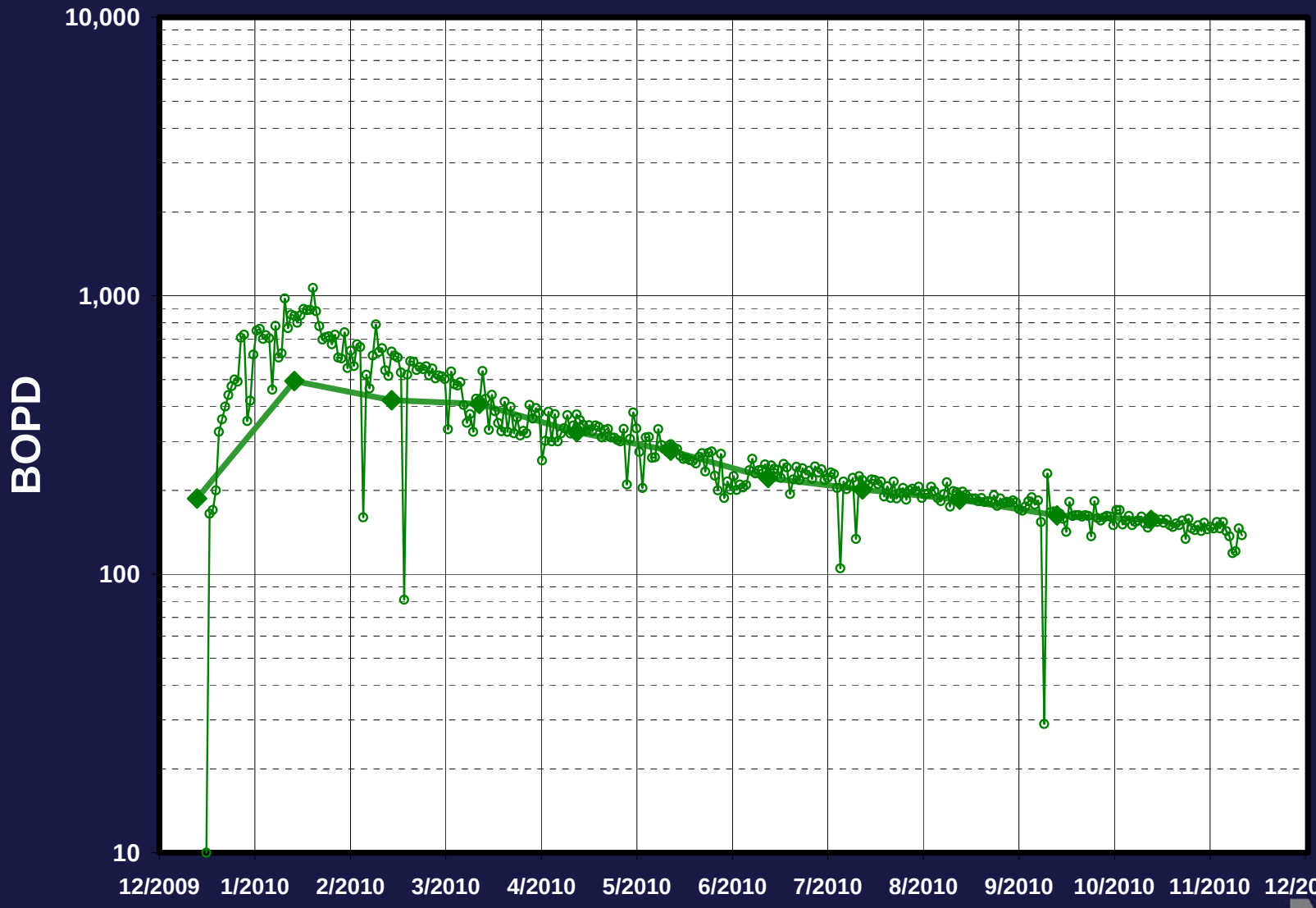
Netherland, Sewell & Associates, Inc.

1000 BOPD - What a great well!



If only it was always so easy . . .

Fundamental Goals of Reservoir Engineering

- How much oil and/or gas are wells going to make, and
- Can my Company make $ drilling wells?

Prices

OGIP

Costs

OOIP

Free Gas vs. Adsorbed Gas

Recovery per Incr. Lateral Foot

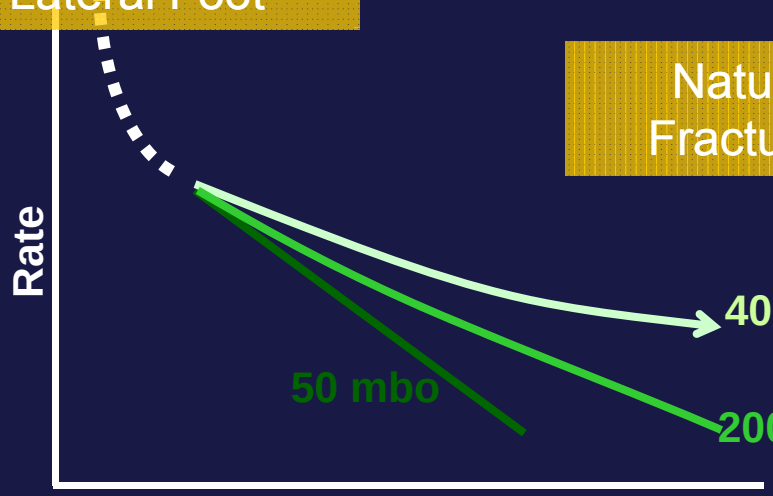
Vertical vs. Lateral

TOC

Natural Fractures

Hydraulic Fractures

Ro



Porosity

Permeability - Natural

Temperature

Permeability - Induced

Pressure

Fluid Analysis

Porosity vs. TOC

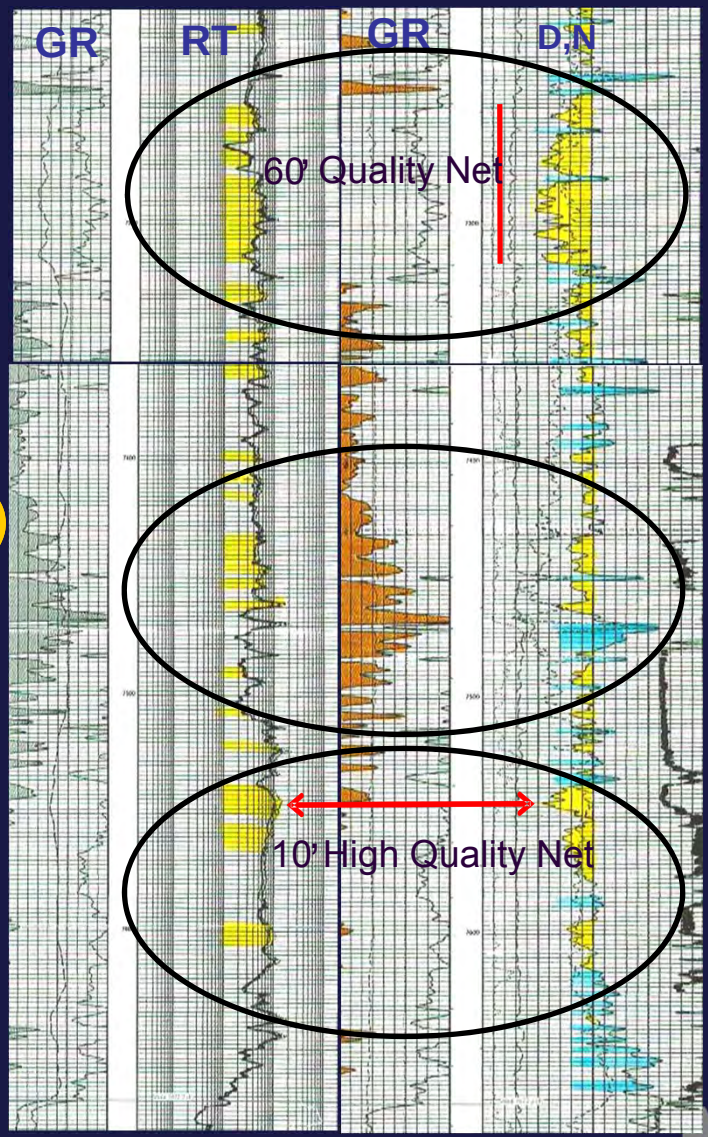
Recovery Factor

Well Spacing

General Principles

More is Better…

- Storage Capacity (In-Place)
- Flow Capacity (Permeability)
- Reservoir Energy (Rec. Factor)



Higher silt content (Rt and Rhob)

Higher organic content (GR)

Higher silt content (Rt and Rhob)

Hydrocarbon Profile

430' Gross

250' Net < 2.5 g/cc

OGIP
+/- 175 BCF/Sq Mi

Unconventional Oil

Description: Oil resources not economical to produce using conventional oil and gas recovery techniques

Sources:

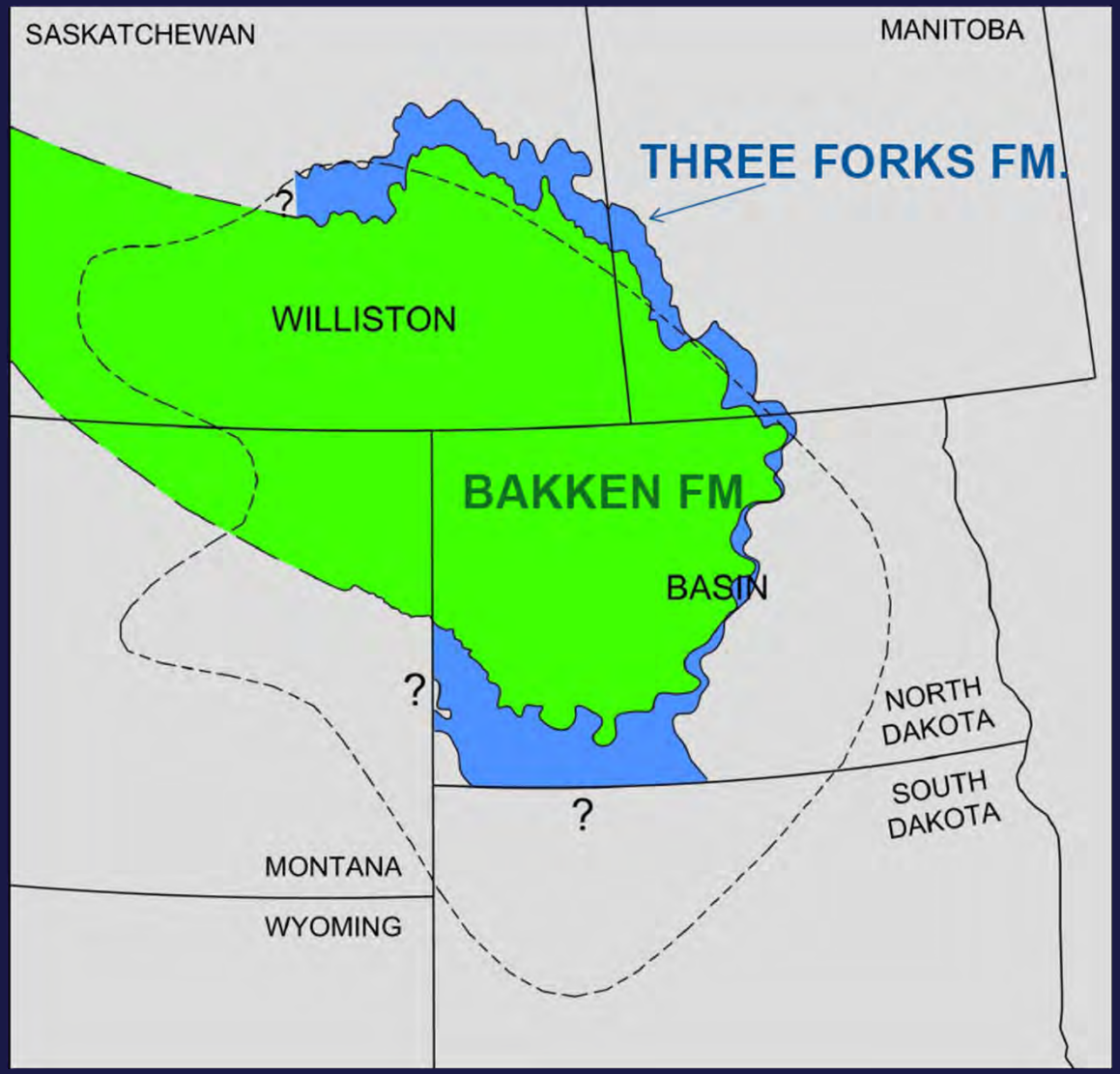
- Heavy Oil (<20° API)
- Tight Oil Reservoirs
  - Shales
  - Low permeability sandstones and carbonates
- Oil Shale (solid rock)
- Oil Sands

High-Activity Unconventional Oil Plays

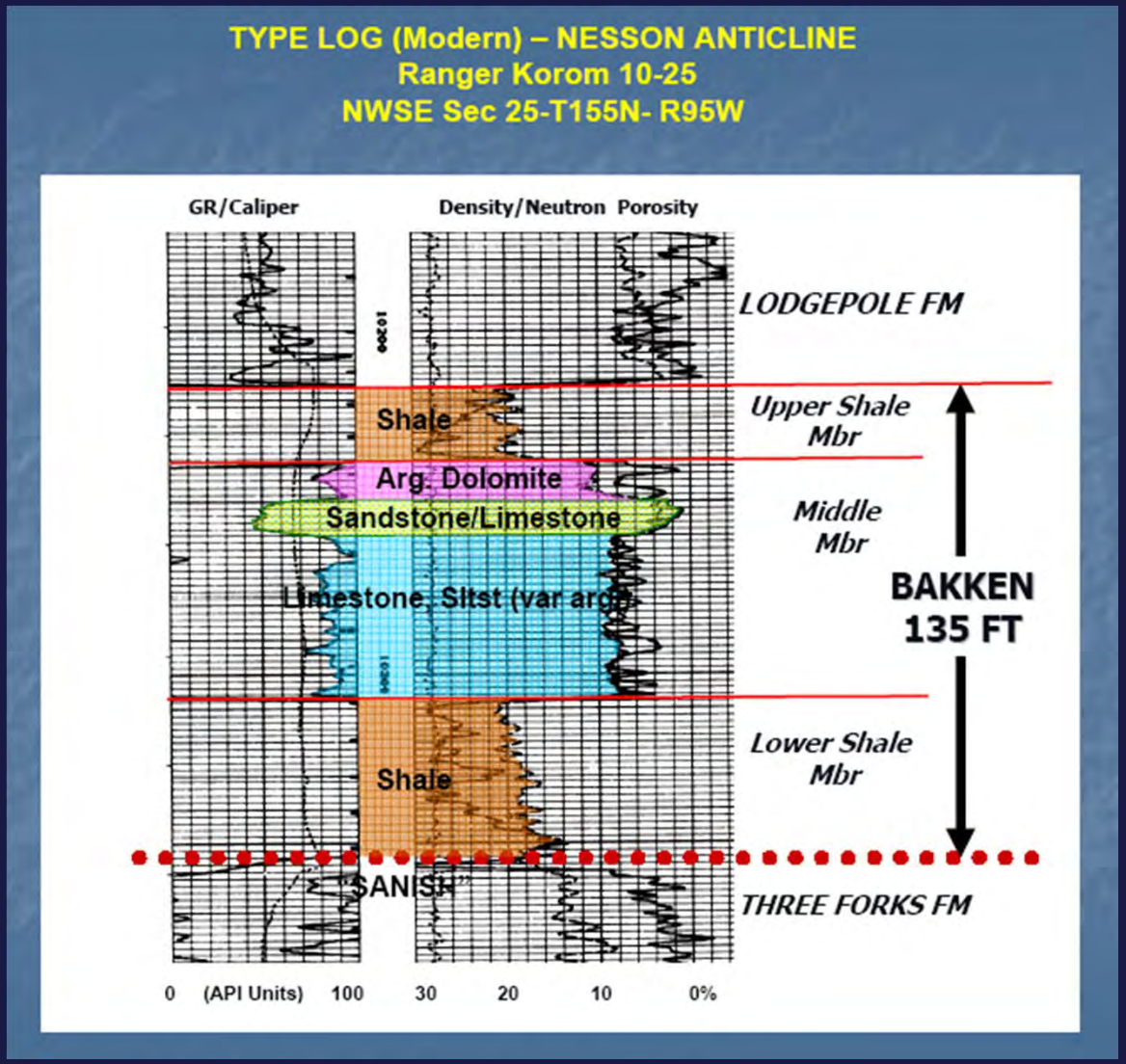
- Bakken/Three Forks Reservoirs
  - Williston Basin
  - Montana and North Dakota
- Niobrara Reservoir
  - Denver-Julesburg Basin, Powder River Basin, Laramie Basin, Others
  - Colorado and Wyoming
- Eagle Ford Reservoir
  - South Texas
- Mississippian Reservoir
  - Northern Oklahoma and Southern Kansas

Bakken Shale / Three Forks Reservoirs

Bakken/Three Forks – Areal Extent

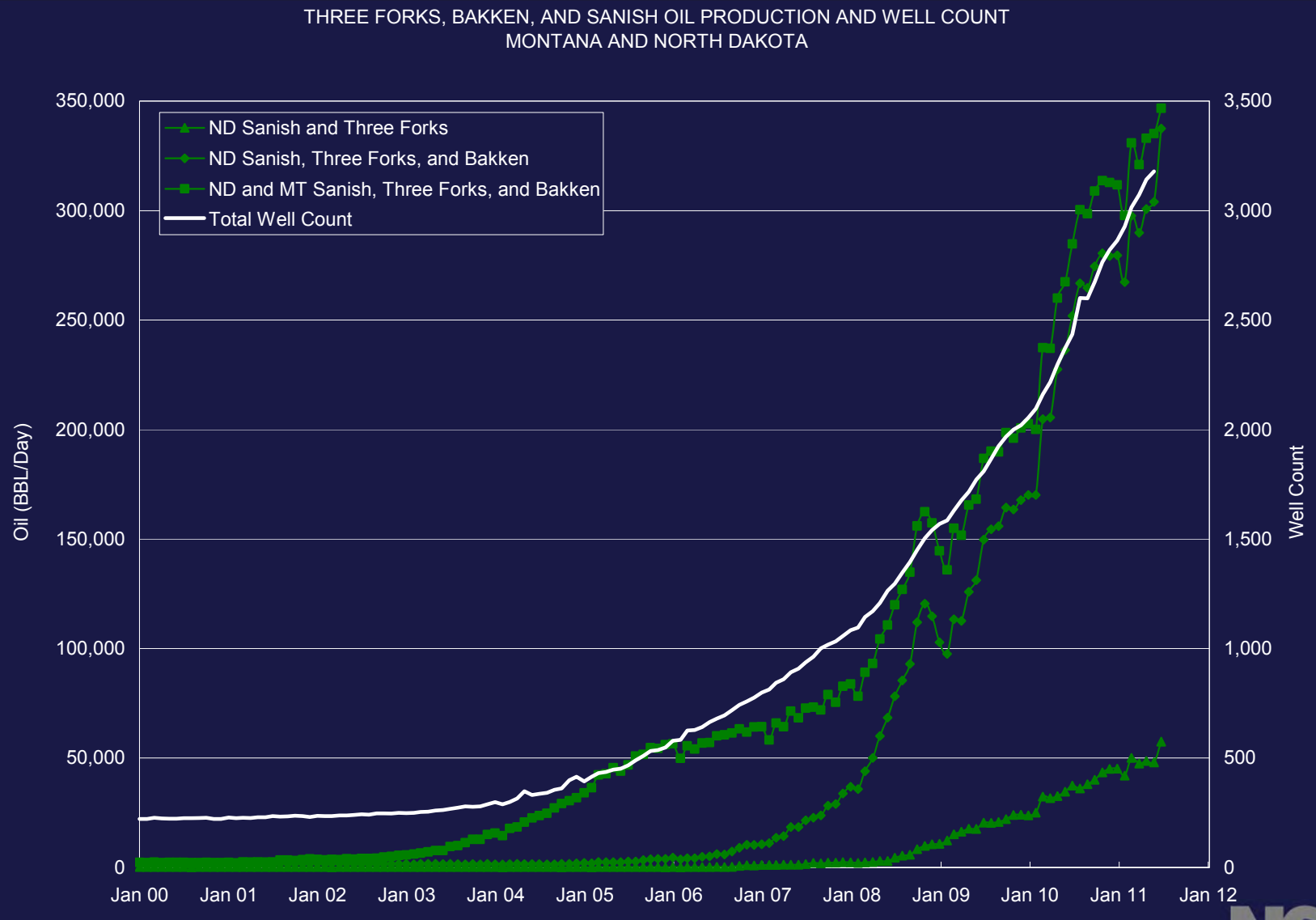


Bakken/Three Forks – Lithology



Source: "Elm Coulee" Oil Field Richland County, Montana Bakken Oil Well Frac Treatment

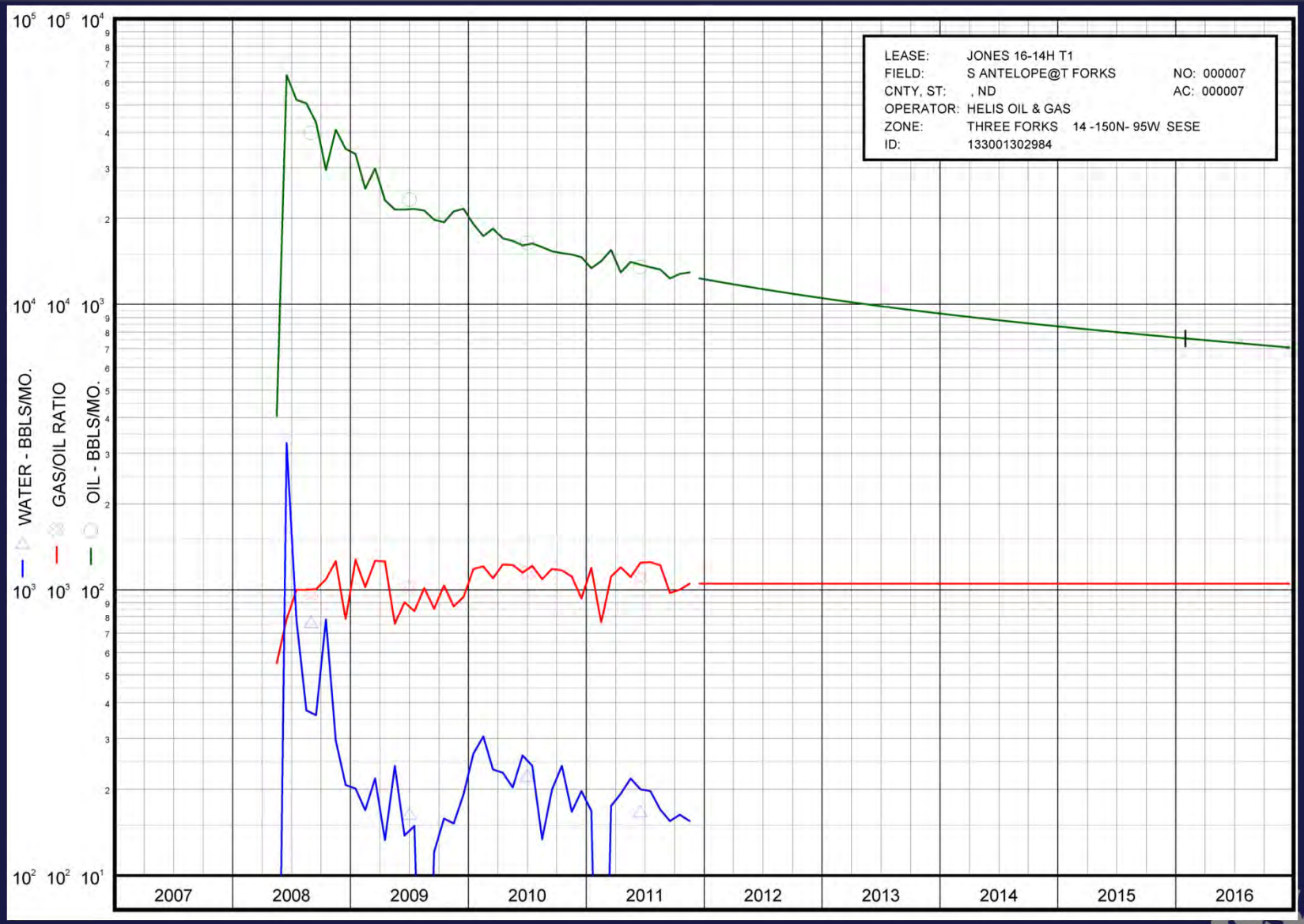
Bakken/Three Forks – Why the Excitement?



Bakken/Three Forks – Fluid Properties

Oil Density =	42 API (Sweet)
Oil Viscosity =	0.3 CP at Reservoir Conditions
Initial Solution GOR =	500 to 800 SCF/BBL
Solution GOR at 3 Years =	800 to 1,100SCF/BBL
Solution Gas Heating Value =	1,500 BTU/SCF

Bakken/Three Forks Example Well



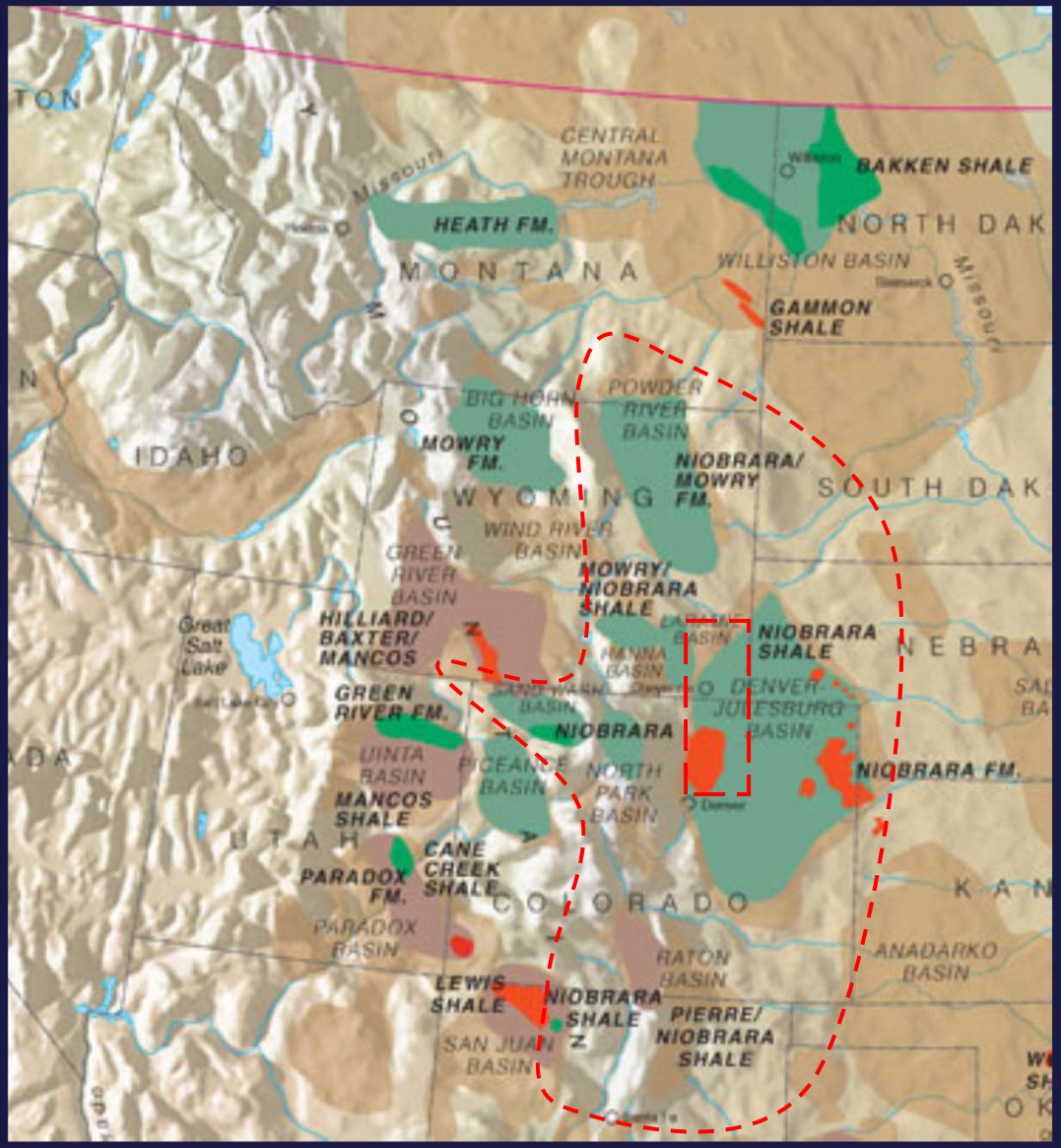
Bakken Development Issues

- Pipeline Capacity
- Gas Processing Capacity
- Infrastructure Capacity
- Workforce
- Optimal Well Spacing

Niobrara Shale

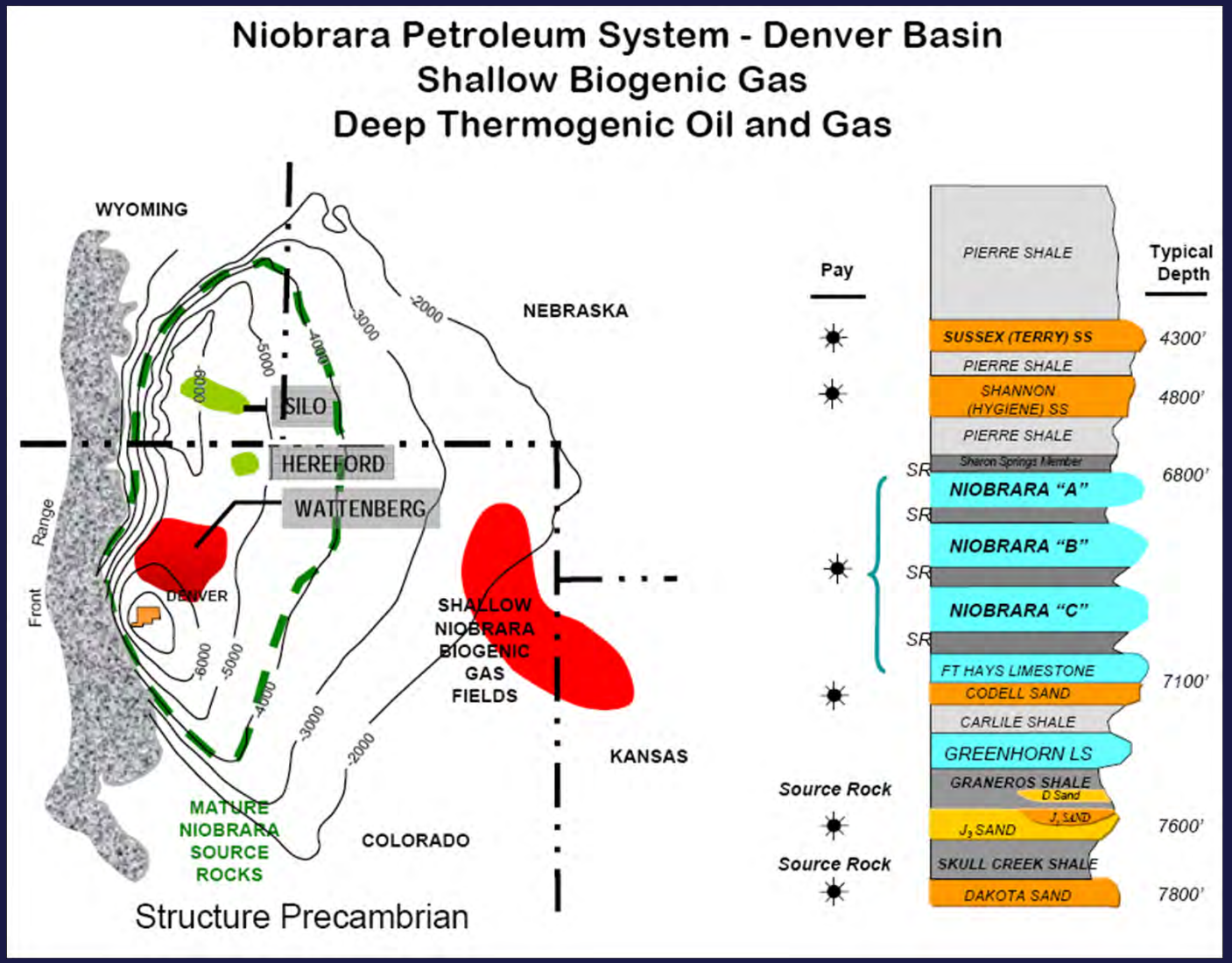
Niobrara Producing Basins

- Powder River Basin
- DJ Basin
- Laramie Basin
- Hanna Basin
- Sand Wash Basin
- Piceance Basin
- North Park Basin
- San Juan Basin
- Raton Basin



Source: Hart Energy

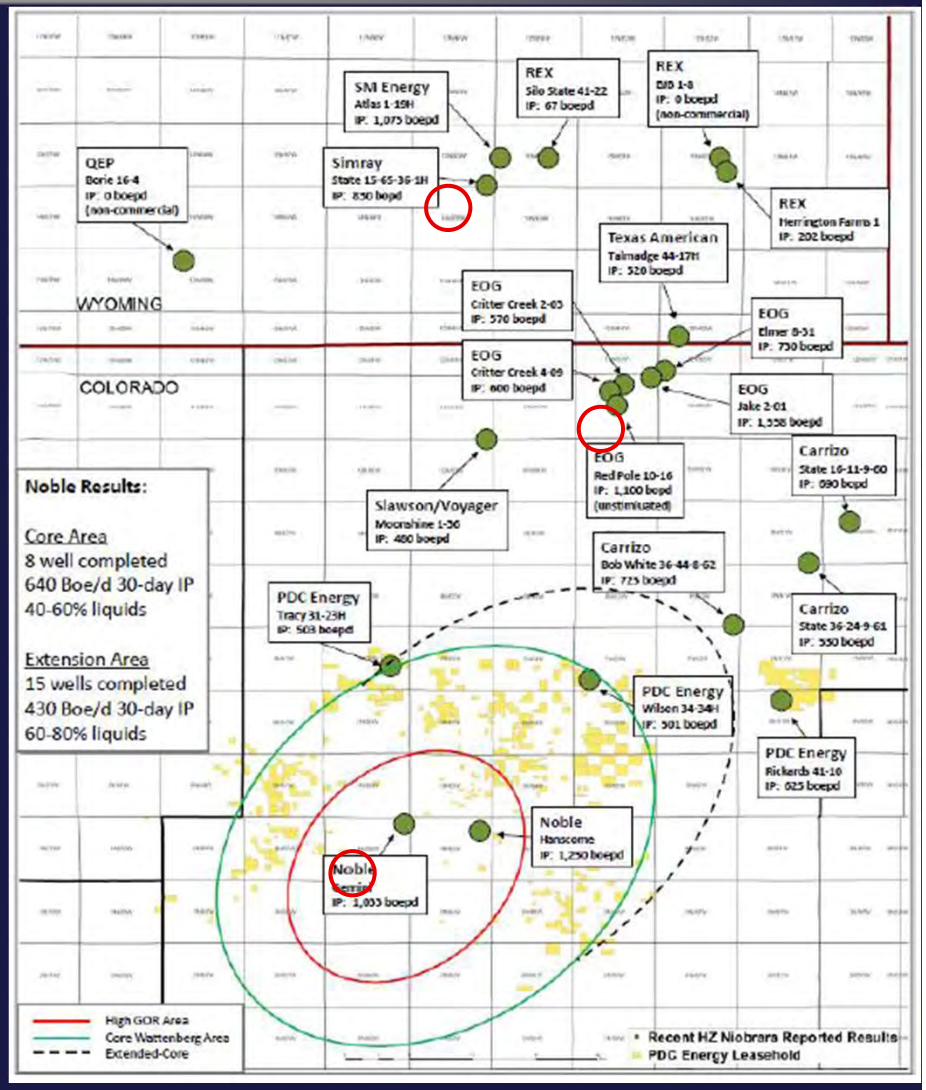
Denver-Julesburg Basin Niobrara



Source: Adapted from Sonneburg, 2010

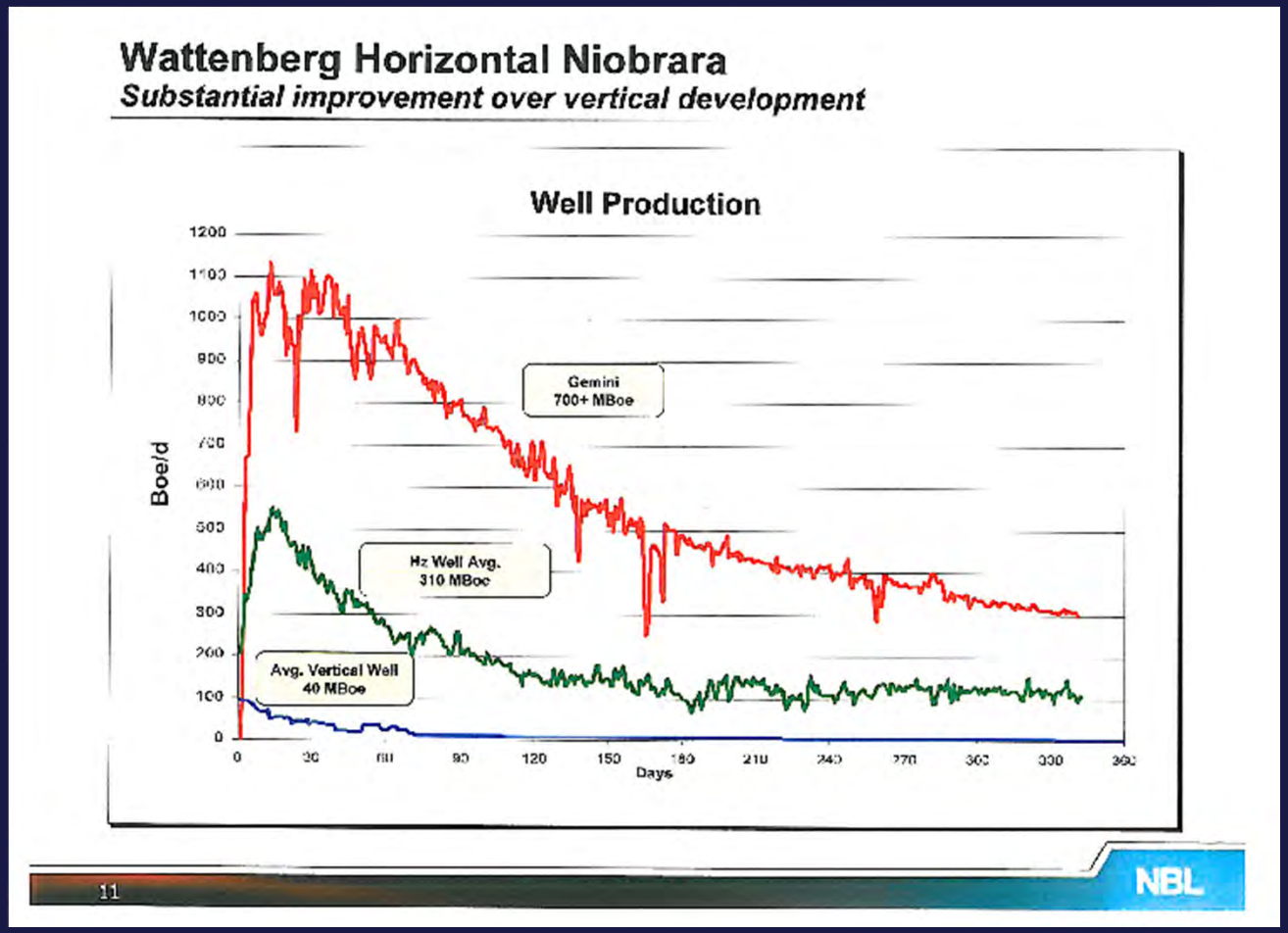
Wells That Sparked the Niobrara Horizontal Drilling Play

- EOG Resources: #2-01H Jake, Weld Co.
  - 3Q 2009; Max rate to sales 1,558 BOPD
  - 3,800-ft lateral, TMD 11,838 ft.
  - Made 50,000 BBLS in 1st 90 days on line
- Noble Energy: #1-99H Gemini K, Weld Co.
  - Made 60,000 BOE in 1st 60 days on line
- SM Energy: #1-H Atlas, Laramie Co., WY
  - Produced 1,700 BOPD 1st week on line



Source: PDC Energy – Hart Energy DUO Conference, May 2011

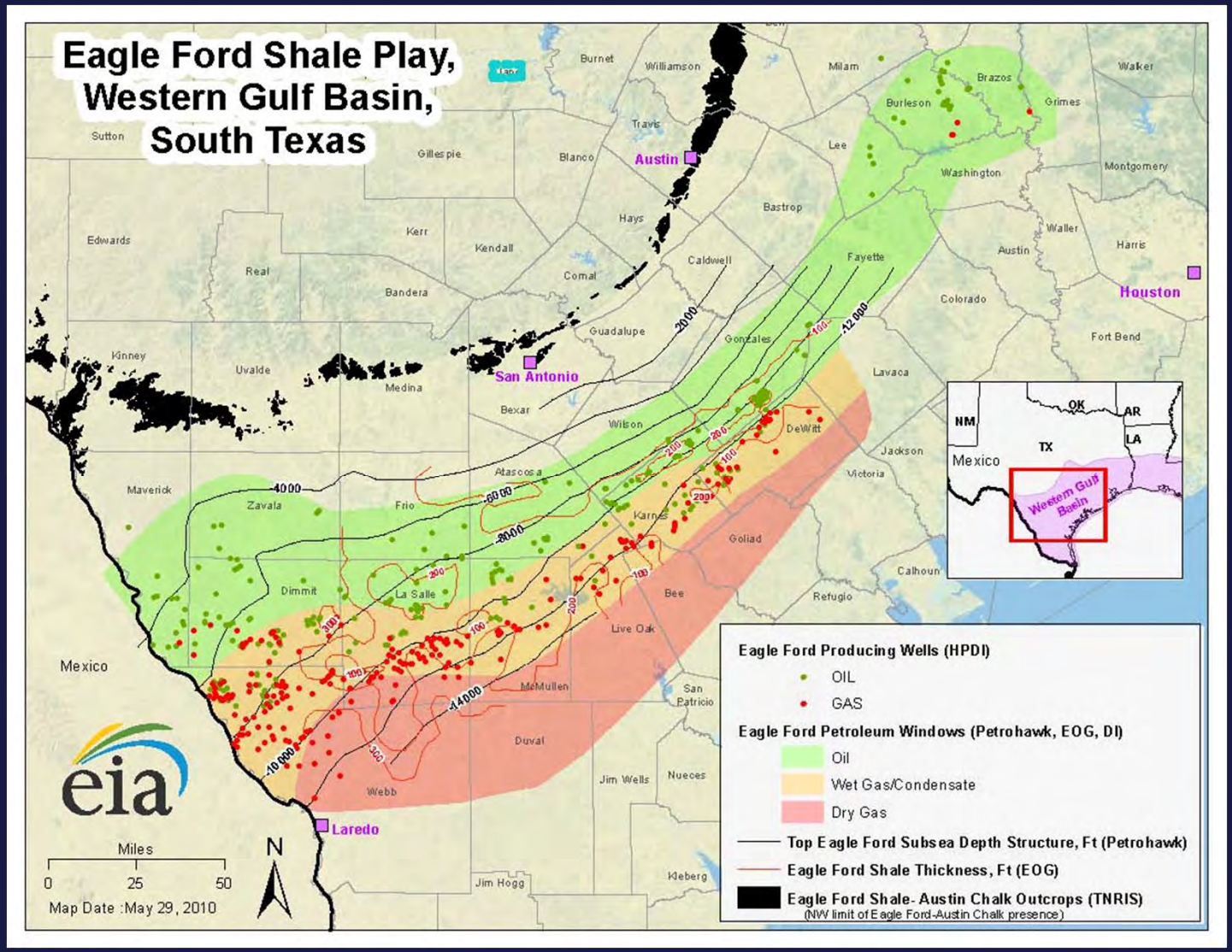
Horizontal vs. Vertical Performance



Source: Adapted from Noble Energy, Inc.

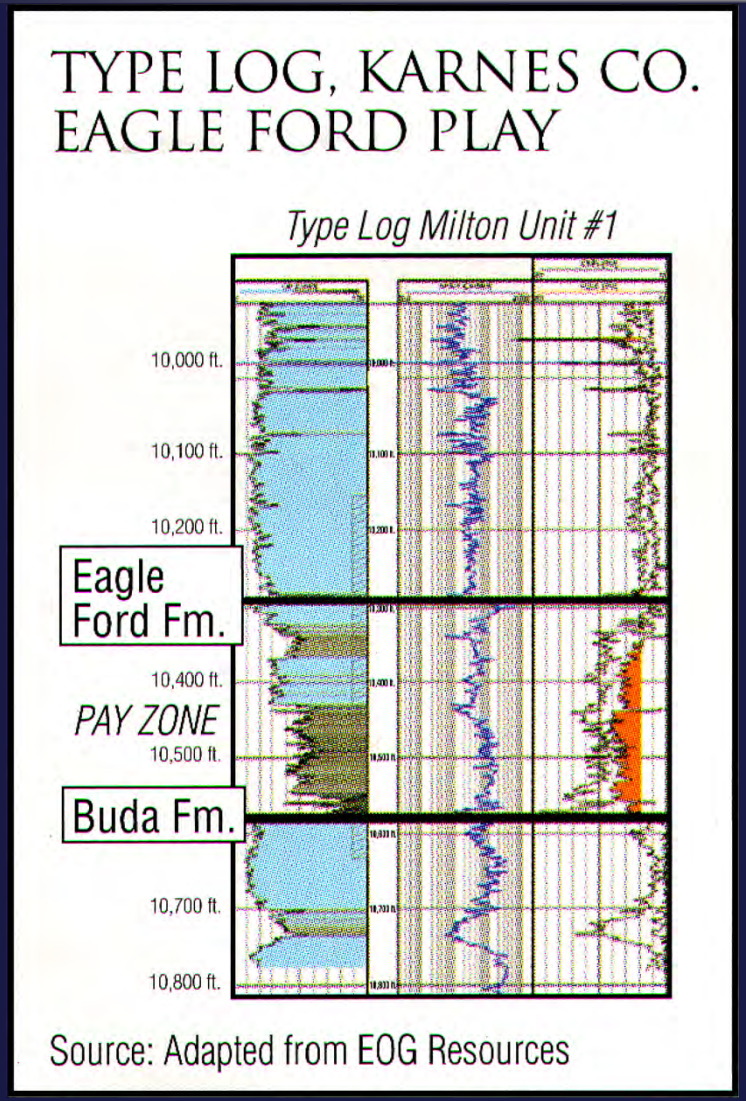
Eagle Ford Shale

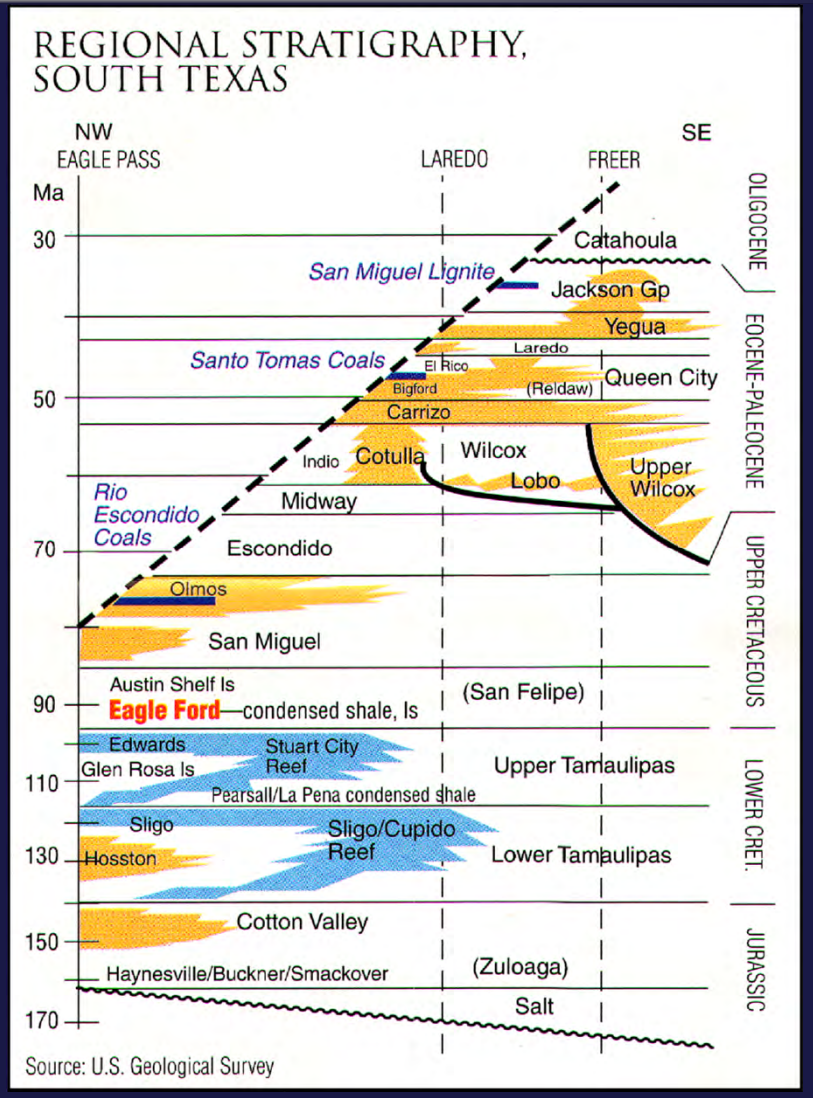
Eagle Ford Shale Play



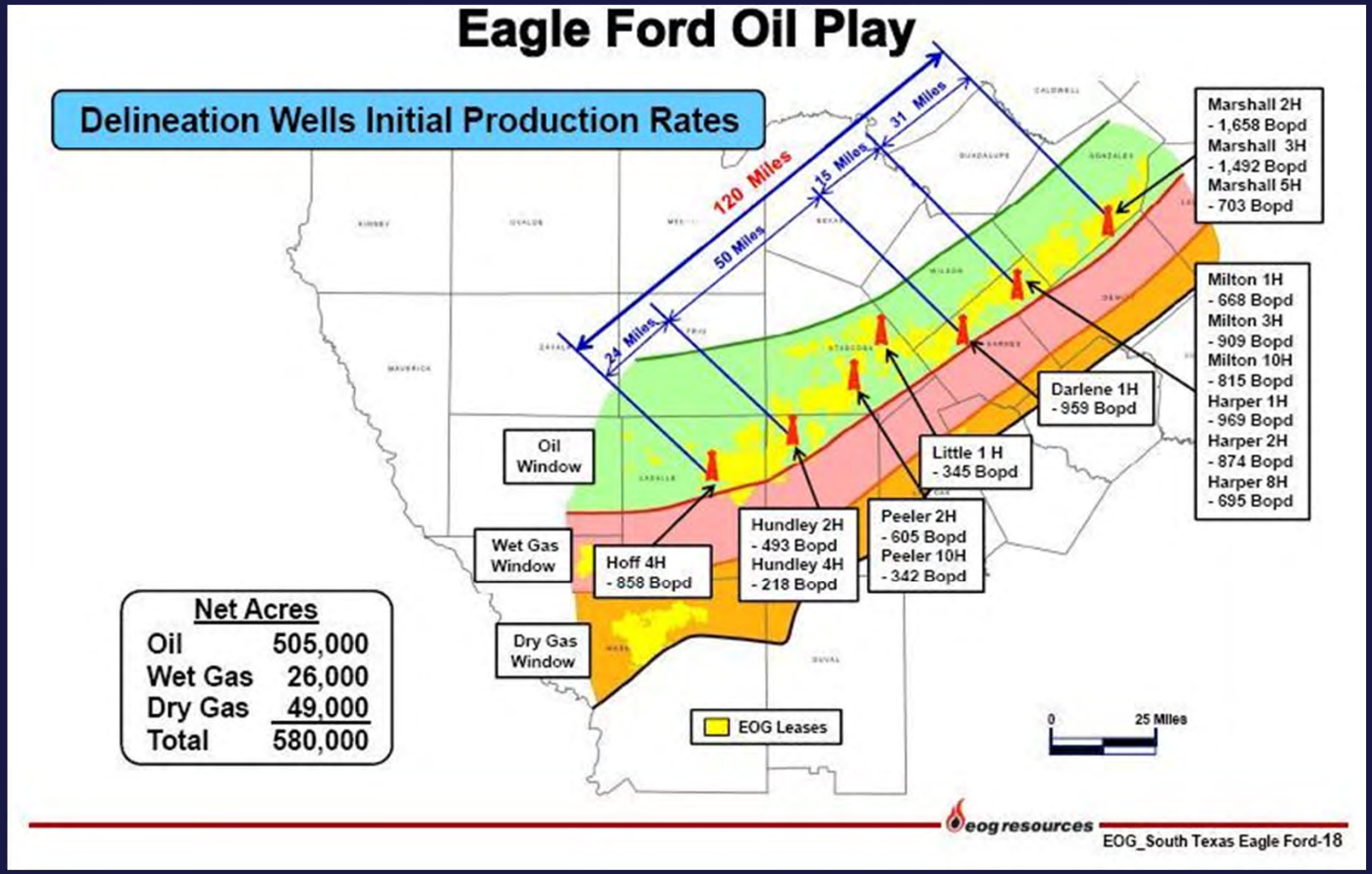
Source: http://www.eia.gov/oil_gas/rpd/shaleusa9.pdf

Stratigraphy



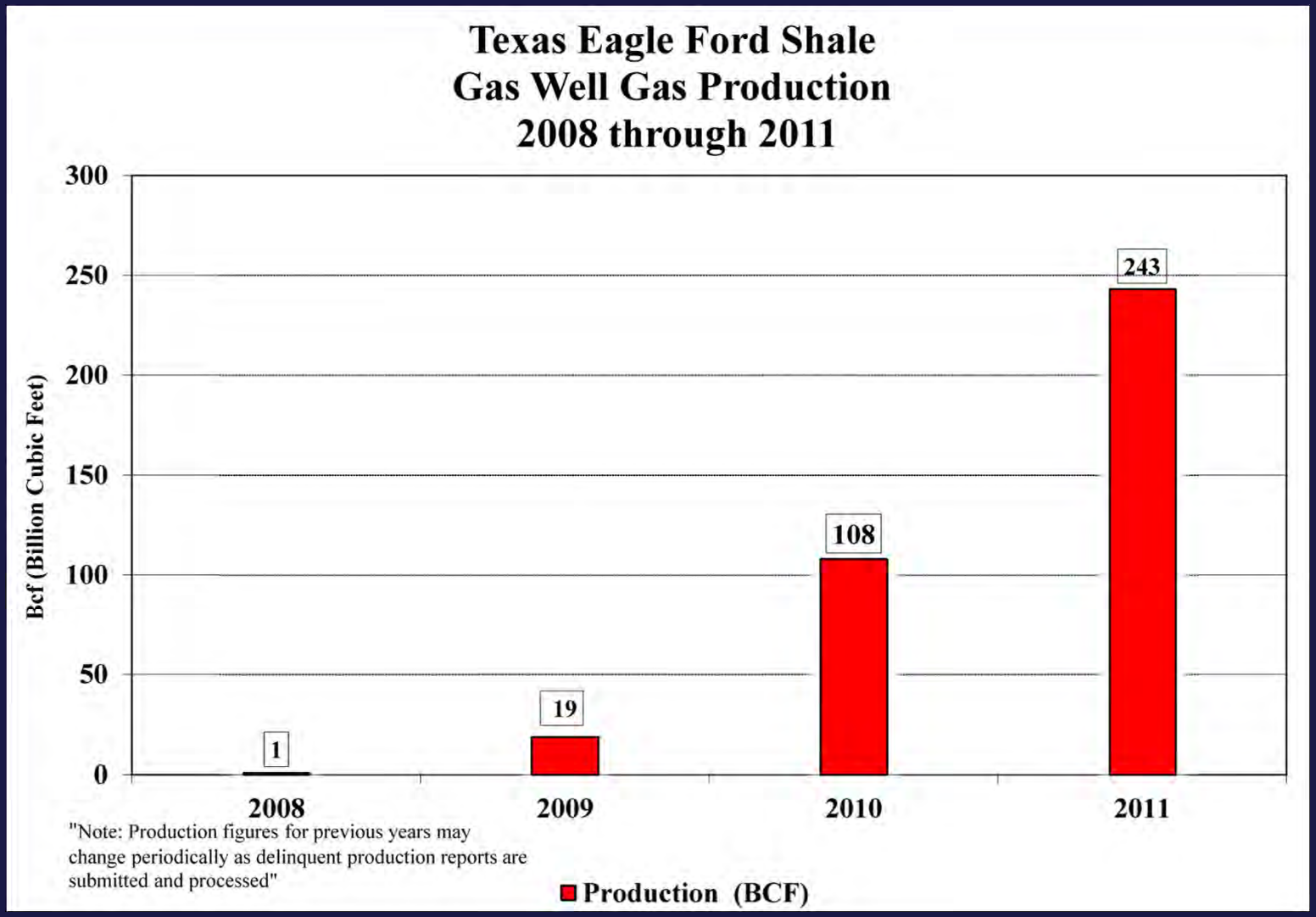


EOG Eagle Ford Wells



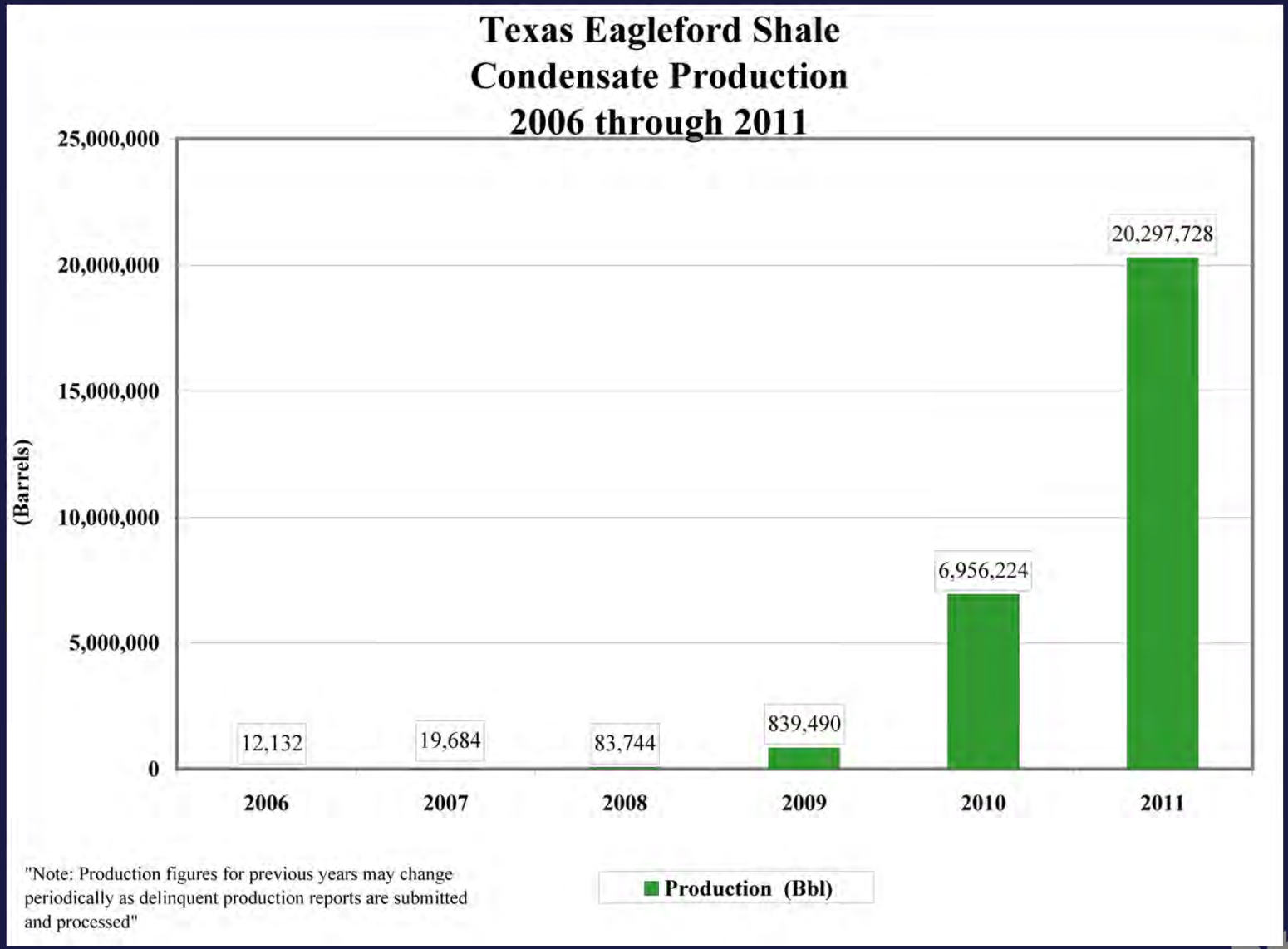
Source: EOG Resources, Inc.

Eagle Ford Production History



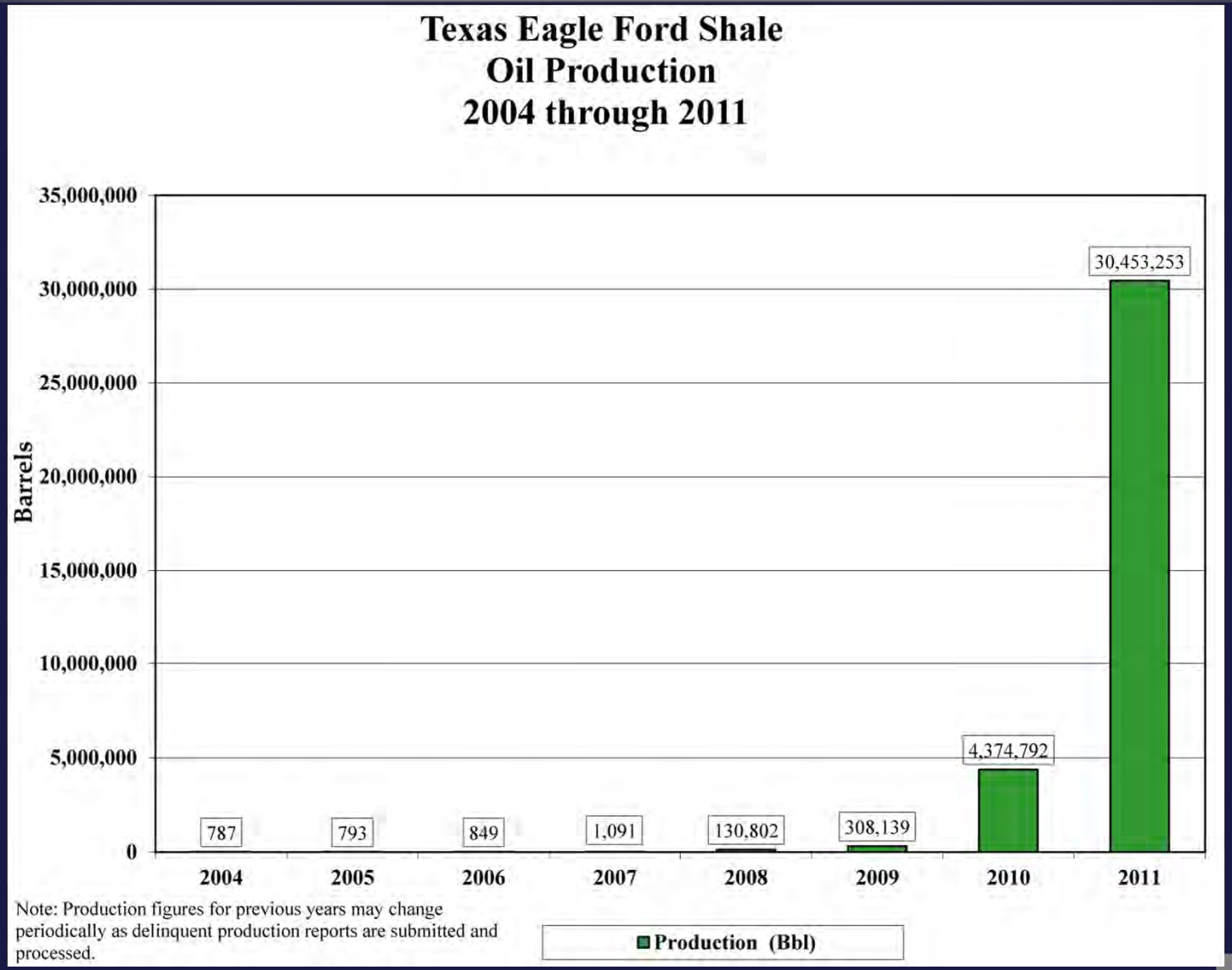
Source: http://www.rrc.state.tx.us/eagleford/index.php

Eagle Ford Production History



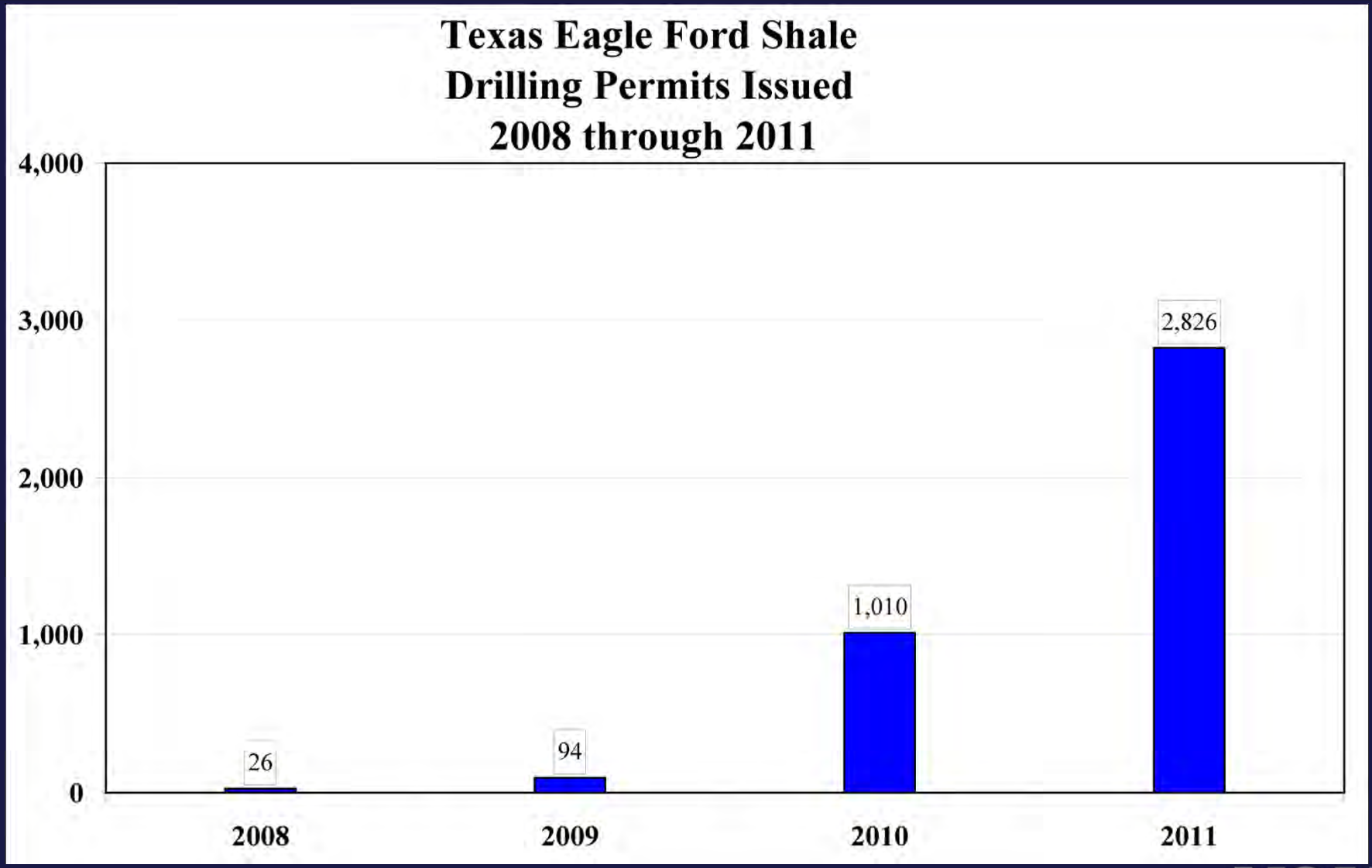
Source: http://www.rrc.state.tx.us/eagleford/index.php

Eagle Ford Production History



Source: http://www.rrc.state.tx.us/eagleford/index.php

Drilling Activity

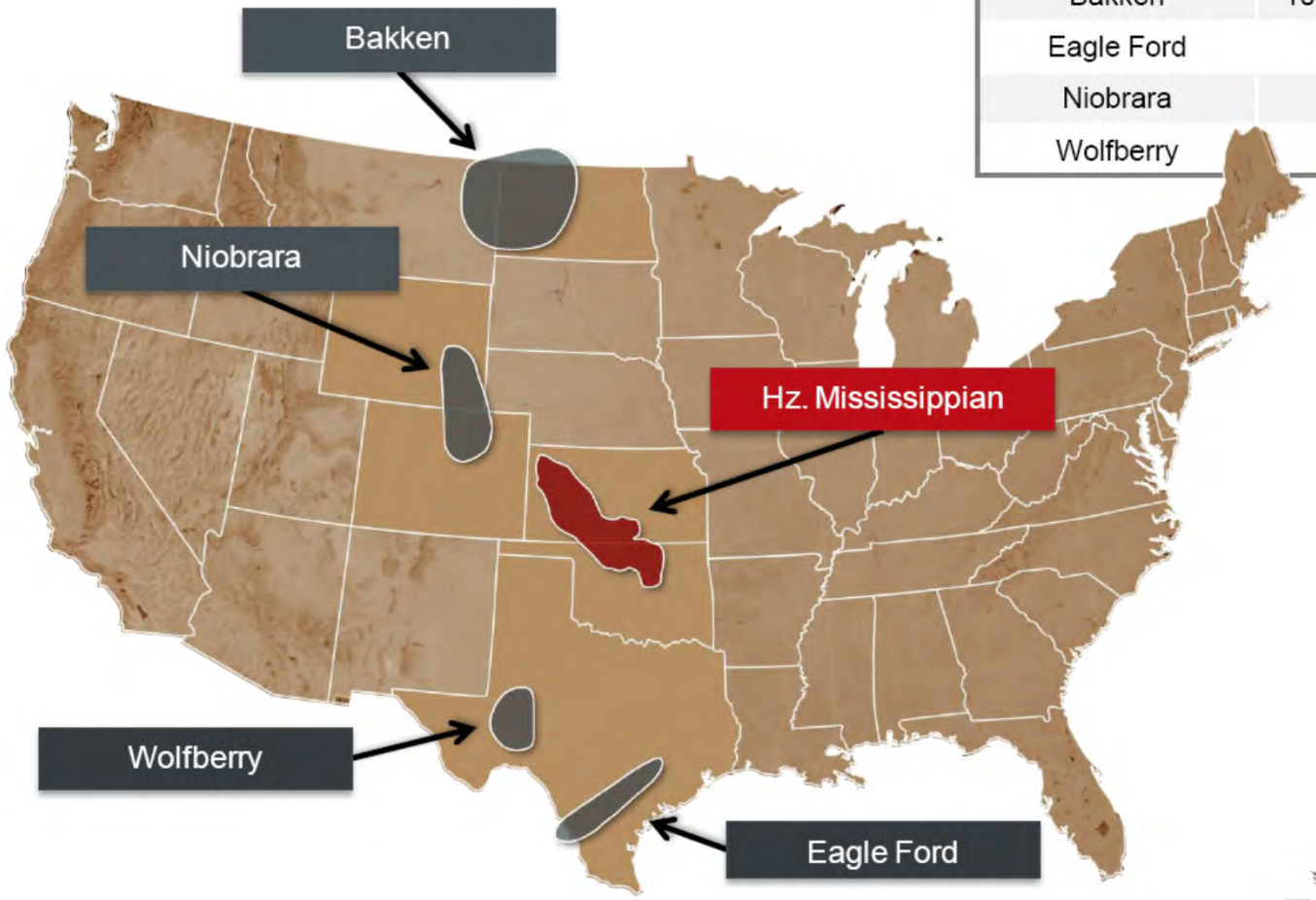


Source: http://www.rrc.state.tx.us/eagleford/index.php

Mississippian Lime Reservoir

Unconventional Opportunities

Oil Resource Play	Size
Mississippian	17 MM acres
Bakken	10-15 MM acres
Eagle Ford	6 MM acres
Niobrara	5 MM acres
Wolfberry	4 MM acres



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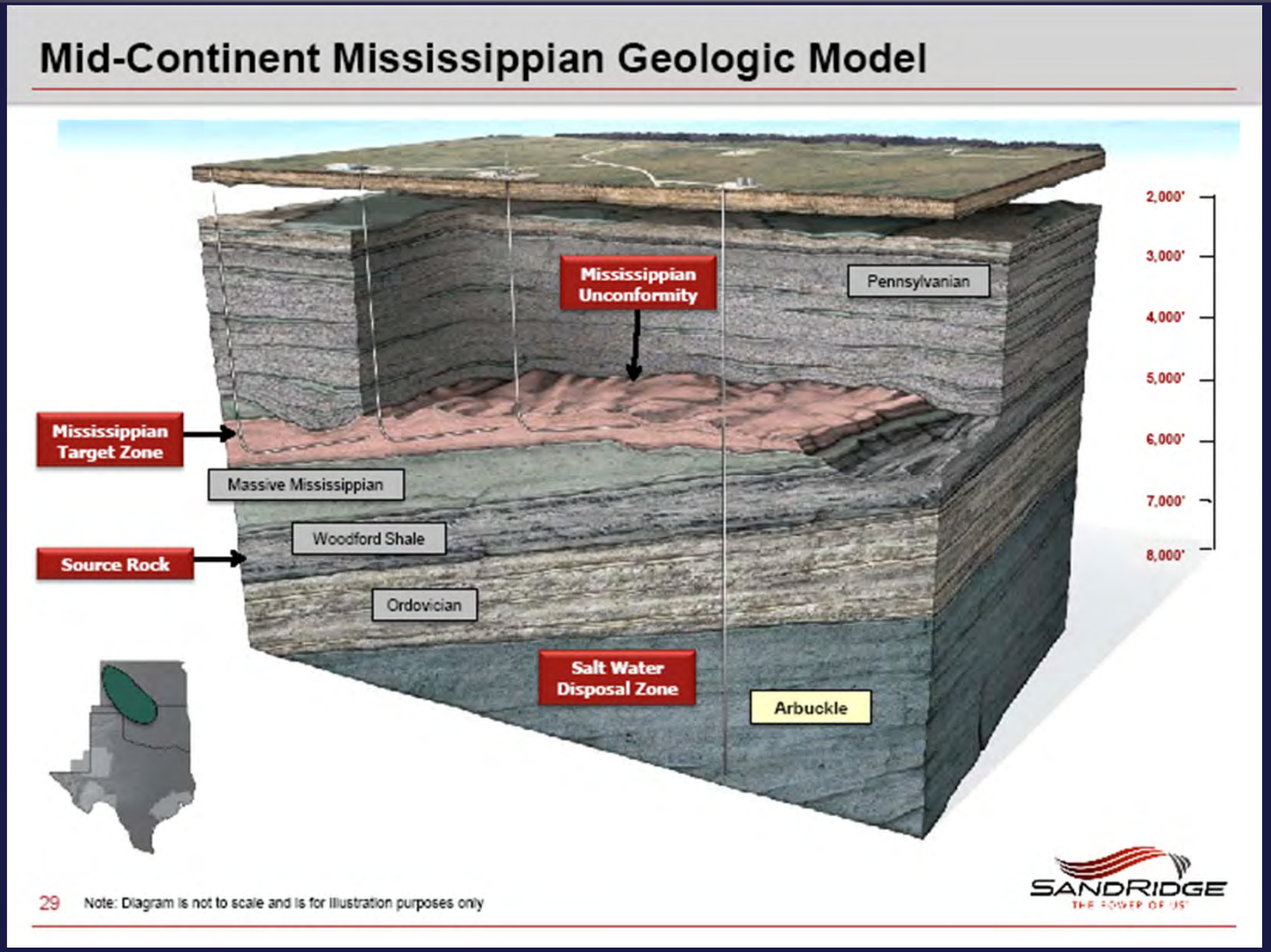
SANDRIDGE
THE POWER OF US

Source: SandRidge Investor Presentation February 2012

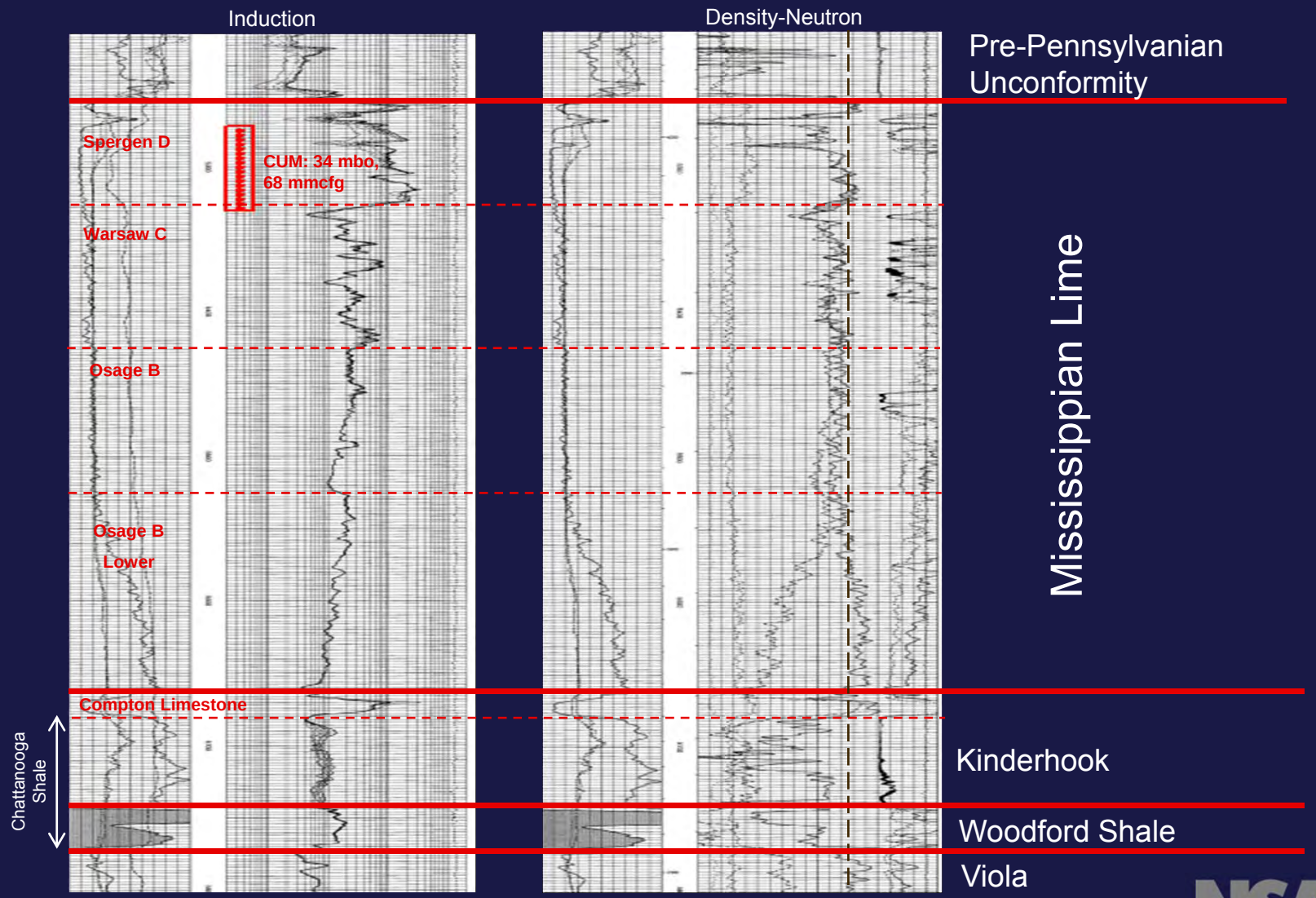
Geologic Model



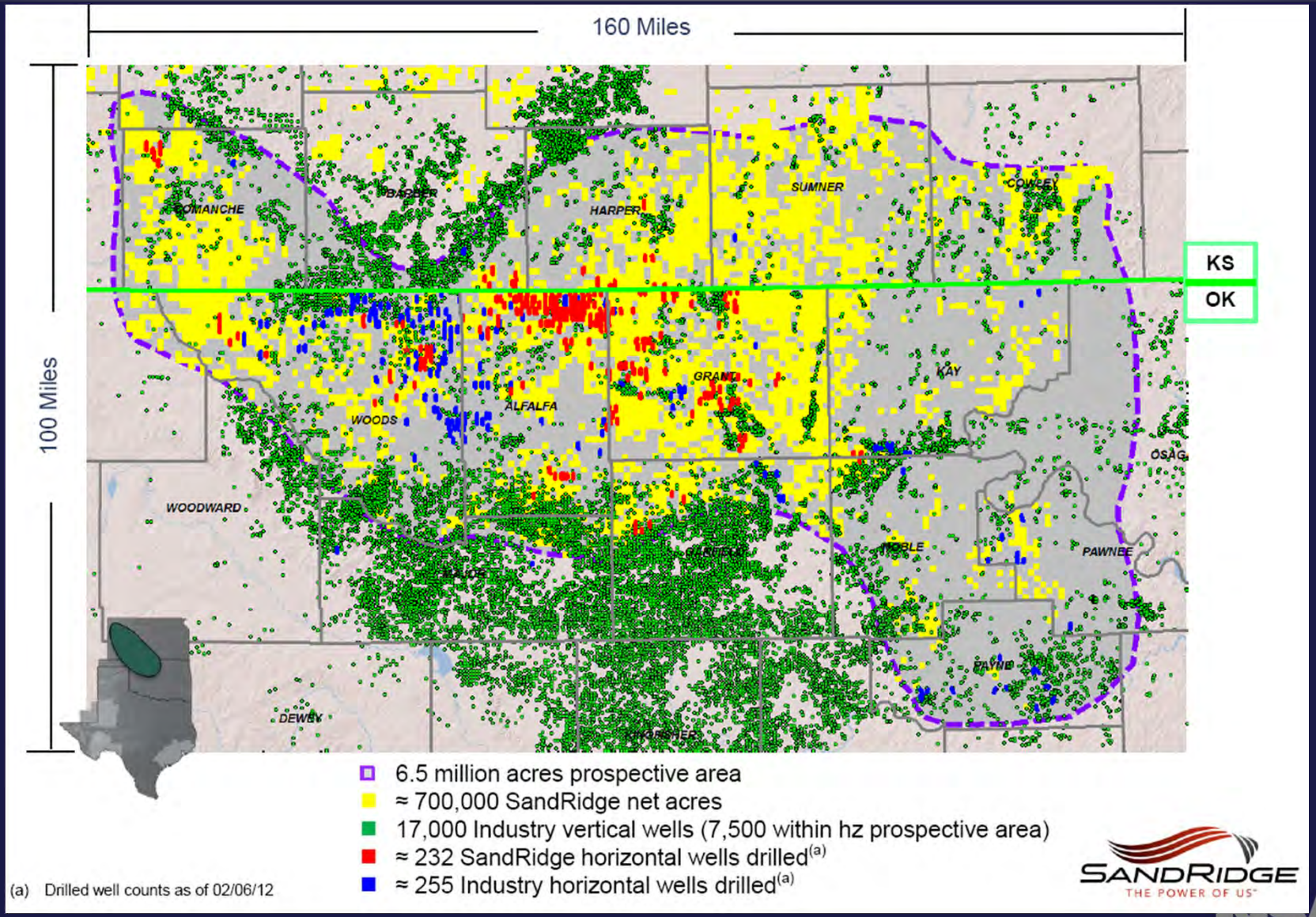
Source: SandRidge Investor Presentation February 2012

Mississippian Vertical Type Log – Woods County, OK

Sandridge W E 1-31, Township 28 N, Range 13 W, Section 31

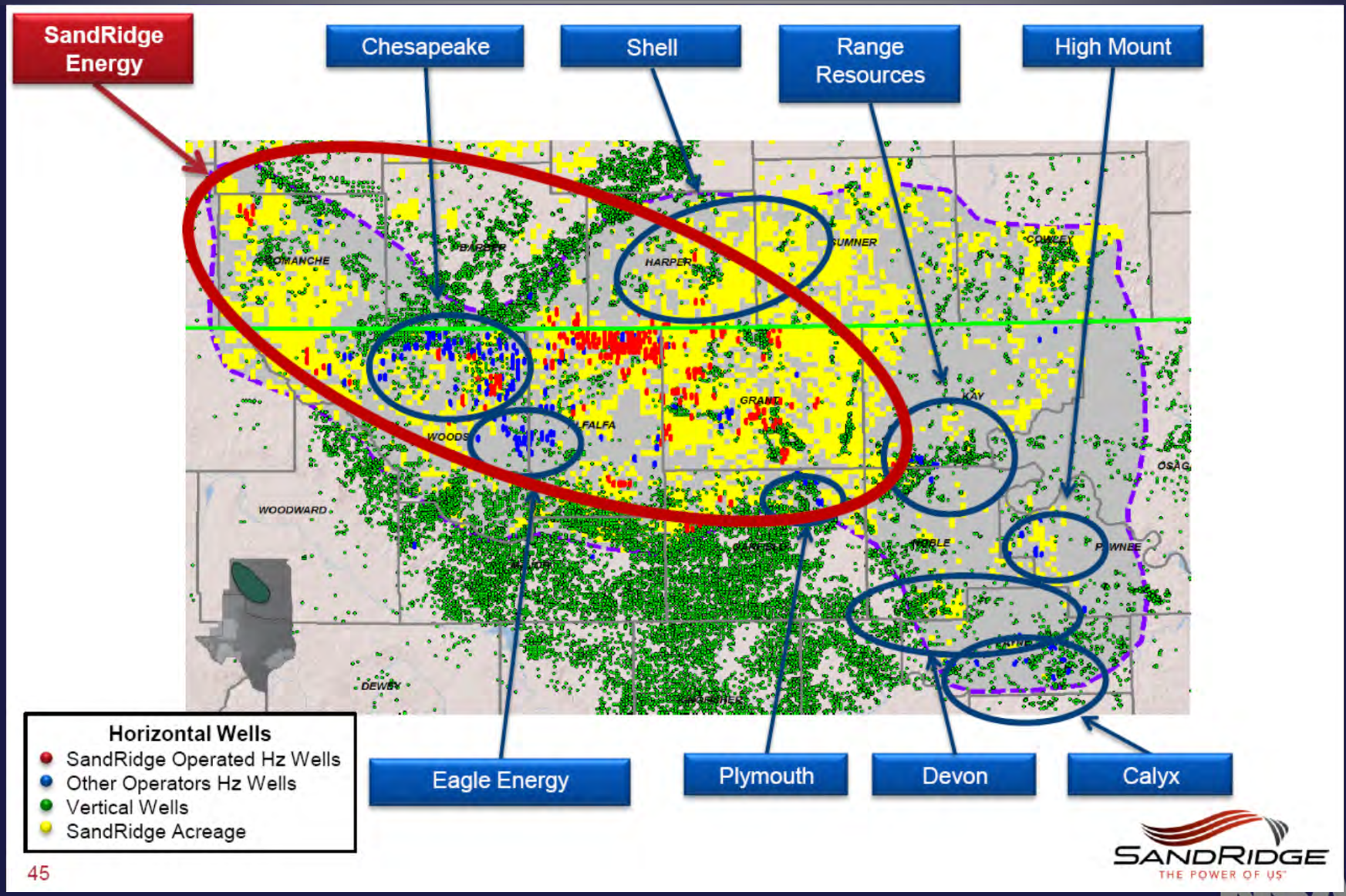


SandRidge 2011 Play Definition



Source: SandRidge Investor Presentation February 2012

Industry Mississippian Horizontal Drilling Activity

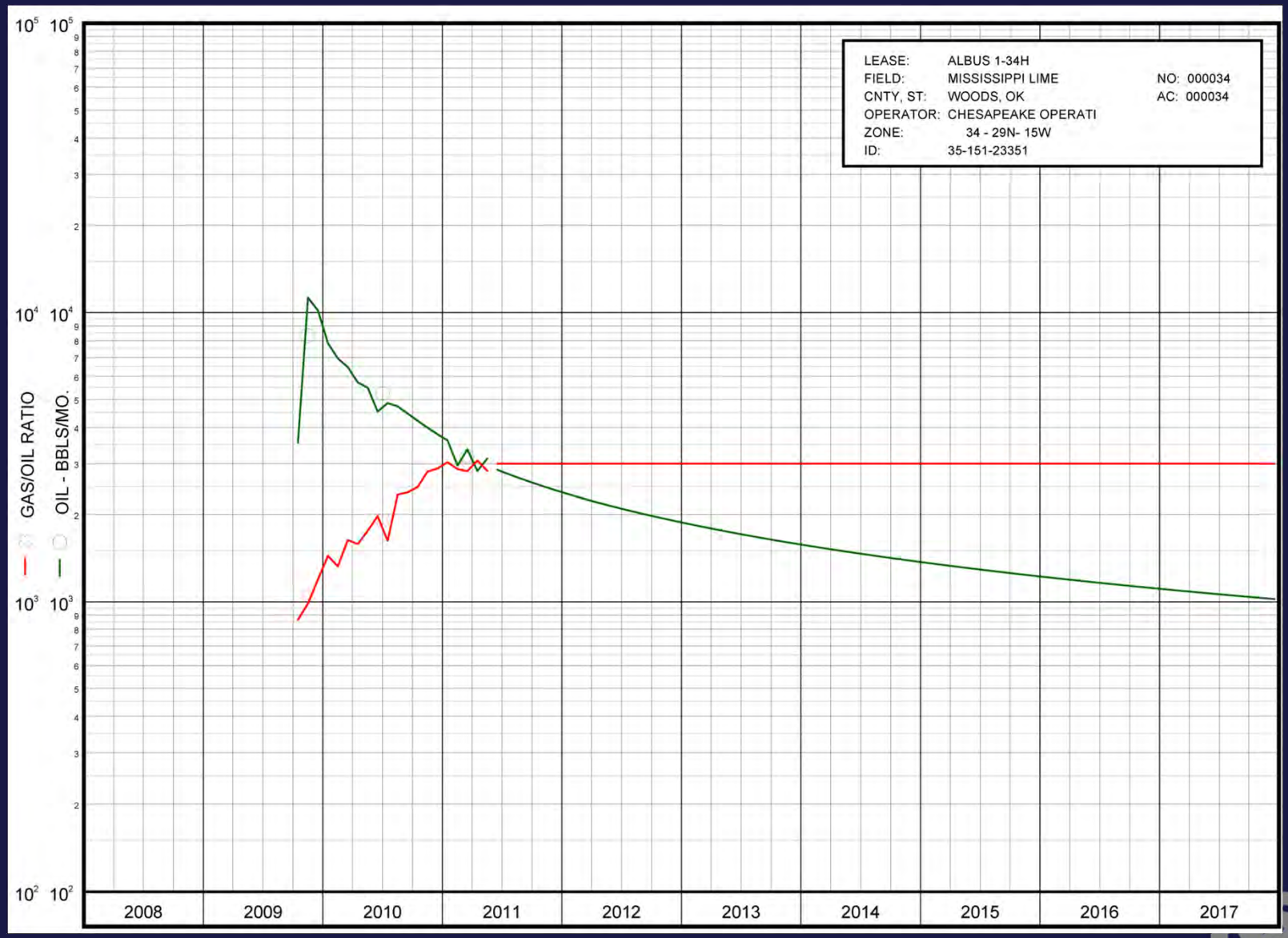


Source: SandRidge Investor Presentation February 2012

Mississippian Production Characteristics

- Complex fluid distribution
  - Inter-bedded oil, gas, and water
- Complex drive mechanism
  - High water-cuts and GORs for the life of the wells
- Horizontal to vertical EUR ratios are not applicable
  - Vertical wells generally develop local conventional structures in the chat
  - Horizontal well generally develop the large-scale matrix
- Results are very statistical in nature

Mississippian Example Well



Shale Plays
Evaluation Considerations

- Shale plays may require considerable initial capital expenditures to allow commercial access and determine economic feasibility.

- Geoscience costs tend to be very large early in shale plays:
  - Seismic in areas without recent petroleum exploration activity
  - Coring and laboratory analysis

- Learning curve – earliest wells in new play may deliver poor results as drilling and completion technology is perfected.

- General shale play economics improve over time due to:
  - More effective drilling and completion techniques
  - Better understanding of reservoir and identification of "sweet spots"

- Long-term investment
  - Shale plays have very large in-place volumes and very large drilling location inventories that may take decades to realize.

Unconventional Oil Reservoirs

Keys to Success:

- Large Volumes of Oil-in-Place
- Successful Production Technology Development
- Stable, High Oil Prices

Issues:

- Midstream Capacity
  - Pipelines
  - Gas Processing
  - Water Disposal
- Service Capacity
  - Materials
  - Workforce
  - Support Systems
- Optimal Well Density
- Optimal Completion and Drilling Plans


NSAI