# The State of U.S. Tight Oil Activity During the Downturn

**OPEC/IEA/IEF Workshop**

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# About PetroNerds

PetroNerds, LLC is a Denver, CO based energy analytics and consulting firm with a focus on oil, gas, and biofuels.

We are committed to providing detailed, data-driven, and actionable insights into the activity of energy companies, markets, and policy developments. PetroNerds combines its experience, knowledge, analytical skills and access to proprietary data and tools to provide some of the most detailed and accessible upstream insights available.

Much more than high-level forecasts, 30,000 ft summaries, or macro-models.

PetroNerds seeks to work closely with its clients and provided personalized services. We tailor our projects to the exact requirements of our clients, large and small.

The founders of PetroNerds have nearly 15 years of experience in the oil and gas industry. They have led research contracts with US Department of Defense and US Department of Energy, presented at some of the world's foremost oil and gas venues and universities, published in publications such as *Oil & Gas Journal* and *World Oil*, and been quoted by the *Economist* and the *Financial Times.*

# Some of PetroNerds Services

- Upstream Oil and Gas Production Analysis and Asset Evaluations on a ***Wells-up Basis.***
- Midstream Markets and Crude Oil Transportation Market Guidance
- Downstream/Refining Economics and Policy, Biofuels/Ethanol Analysis and Advising
- Geopolitics and International Crude Markets.  Putting US production in context.
- Public policy and economic reports
- Equity Analysis, Project Economics, Due Diligence
- Custom Economic Models + Software

# Overview

- U.S shale market overview
- What is keeping production so robust?
- Play breakout
- Financial state of the shalers

# Summary

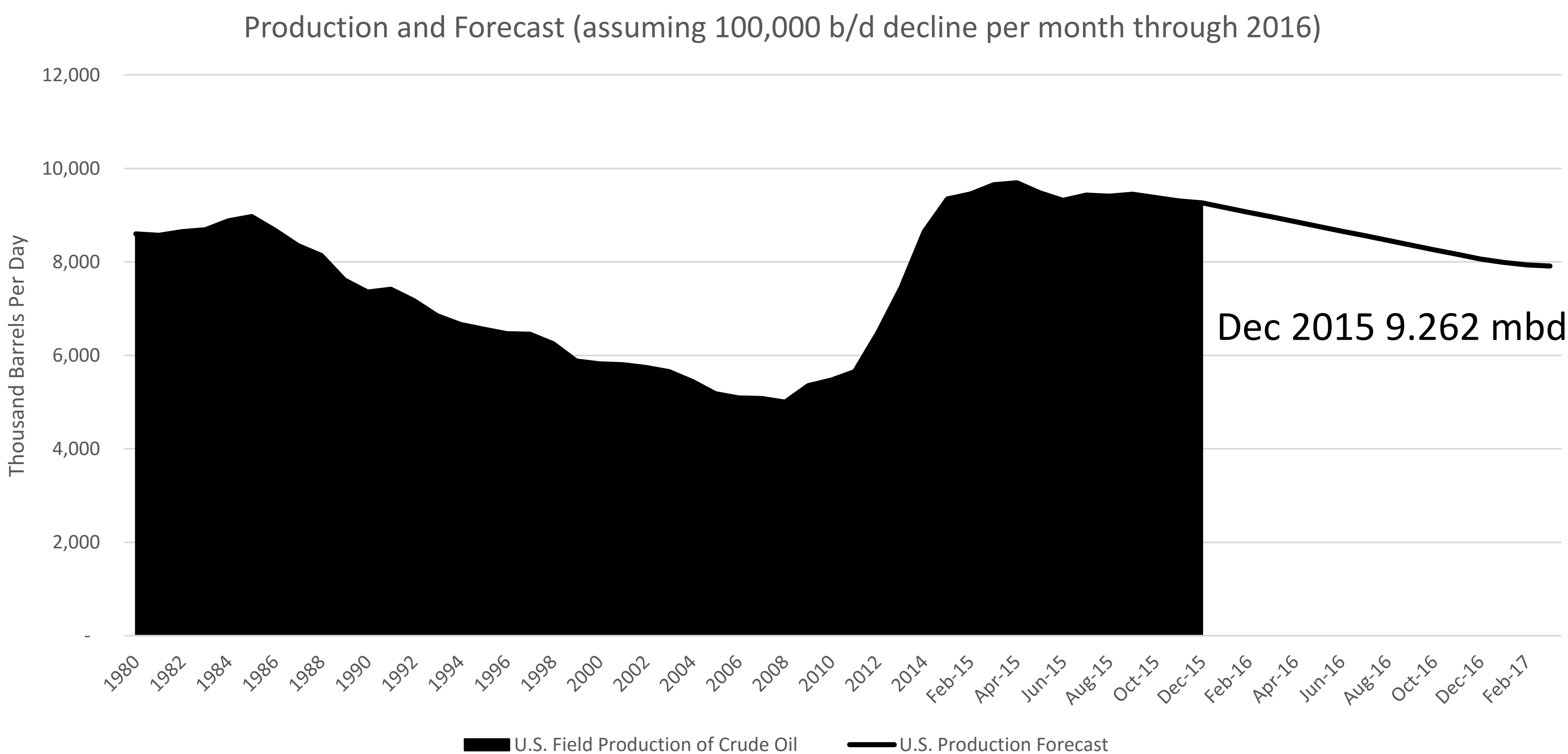
- Larger operators and lenders are in the same boat.  Both have an interest in maintaining the status quo (keeping credit lines open and avoiding default) to survive the downturn.

- Most bankruptcies thus far have affected only small producers…although that could change.

- The continued availability of credit is partially responsible for stronger than expected shale oil production volumes.

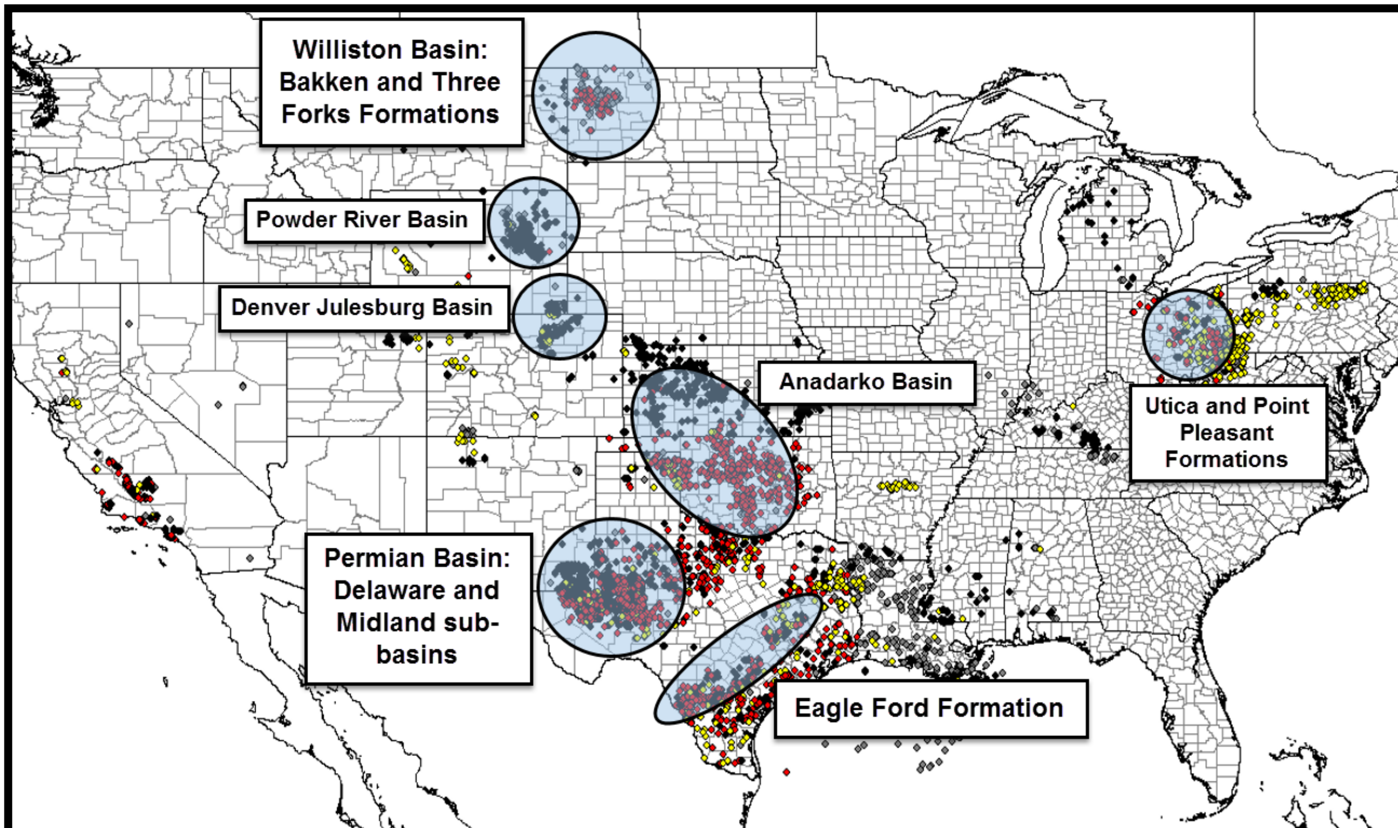
- Core oil plays doing far better than condensate and gas plays.

# U.S. Production and Forecast



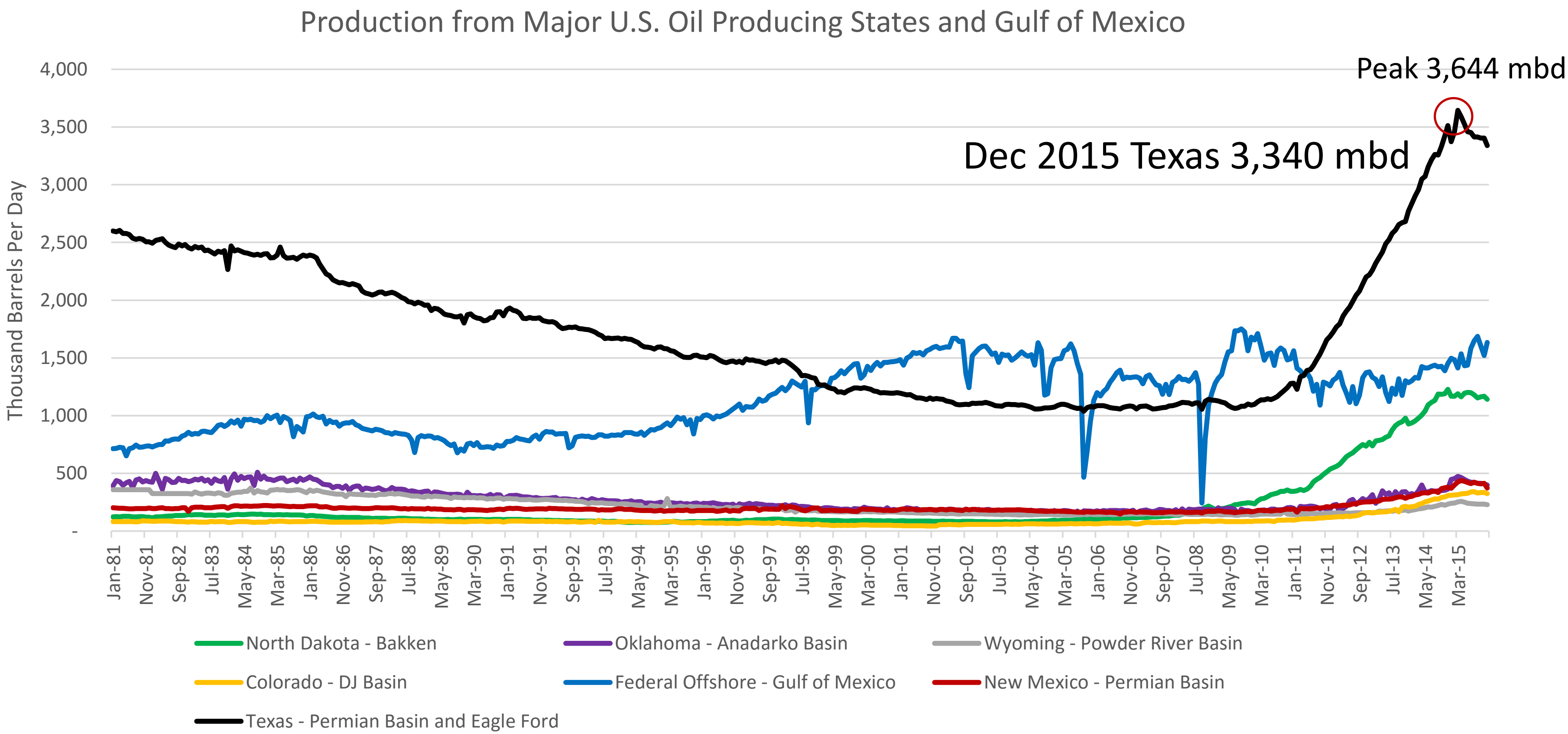

Source: EIA. PetroNerds forecast estimate

# Primary Shale and Tight Oil Plays



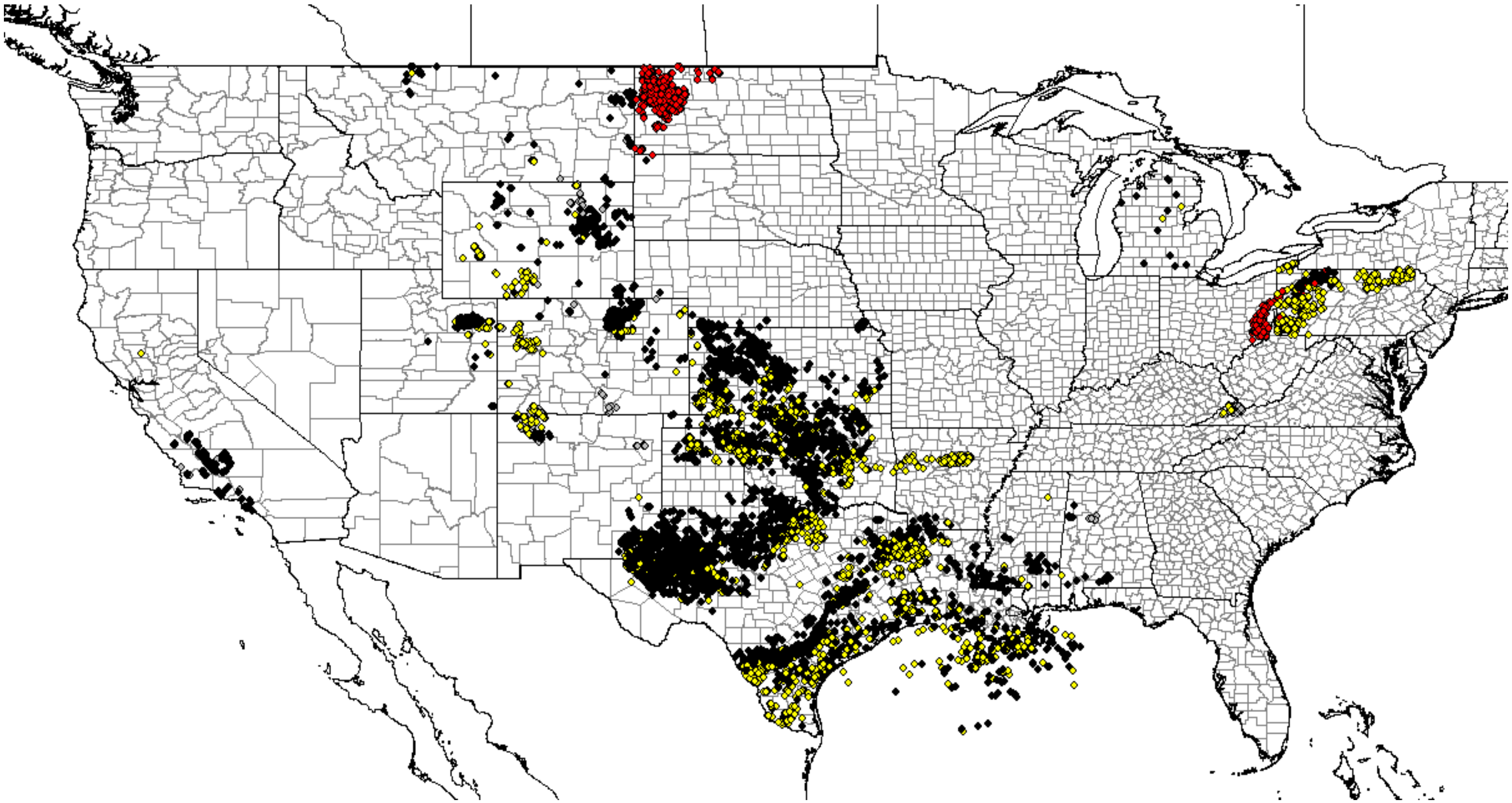

Source: DrillingInfo raw data

# U.S. Production by State




Source: EIA

# All new wells brought online in 2015

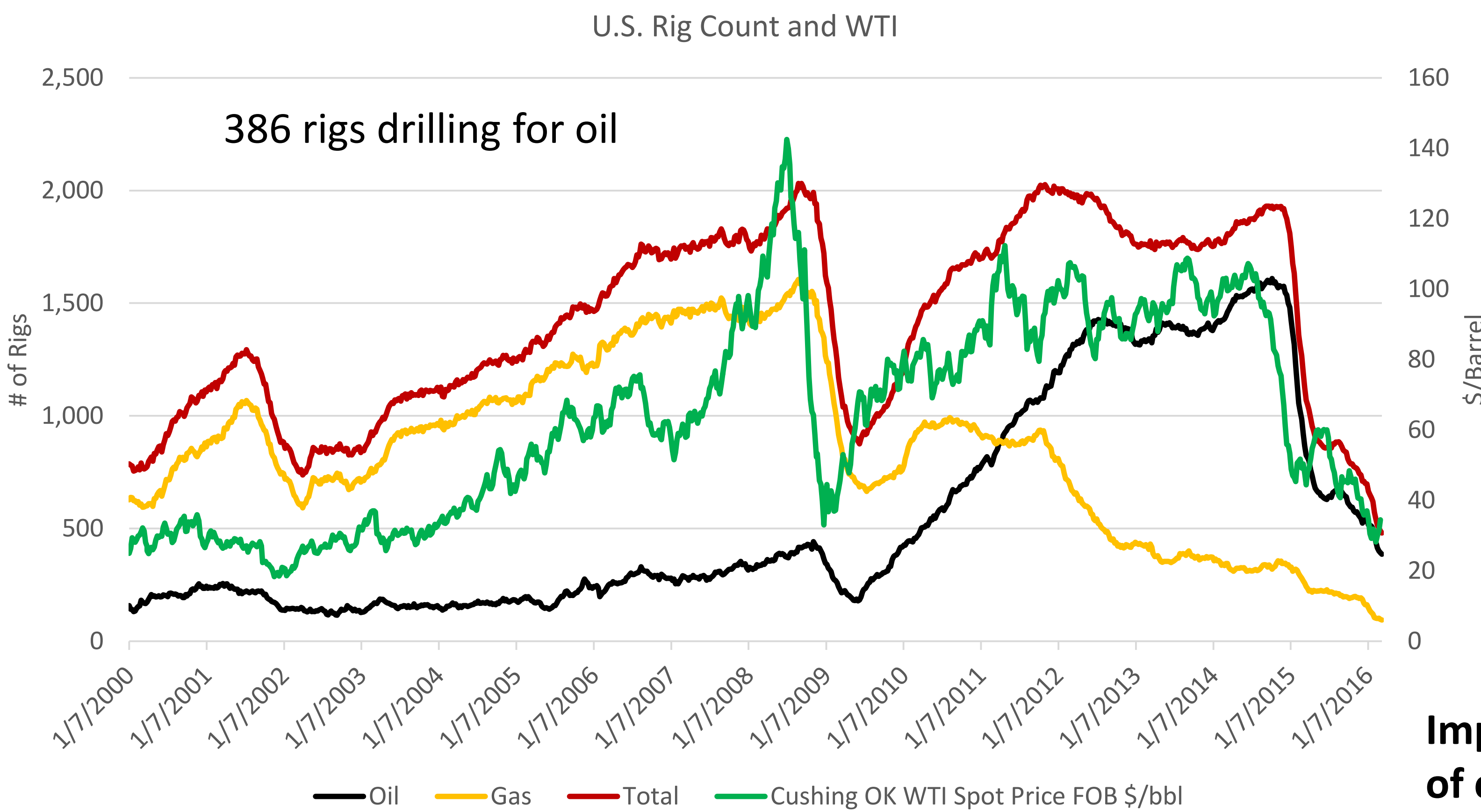


2015 - A very strong year for well additions

Source: DrillingInfo, March 10, 2016

![PetroNerds logo]

# Severe rig count decline continues despite modest price rebound




**Importance of contracts!**

Source: Baker Hughes, EIA

# Resilience and money - waiting on the sidelines

This is a new environment of easy money/zero percent interest rates and low oil prices (couple that with an infant unconventional industry)

It has allowed a lot of smaller independent oil companies to take on more debt and continue financing their operations despite a dramatic change in price – <u>but many smaller companies are now out of options.</u>

There is still a strong appetite for risk among investors and some lenders as they chase yields in a low rate environment.

However, 2016 activity levels and CAPEX are being dramatically reduced as companies enter their second year of low oil prices.

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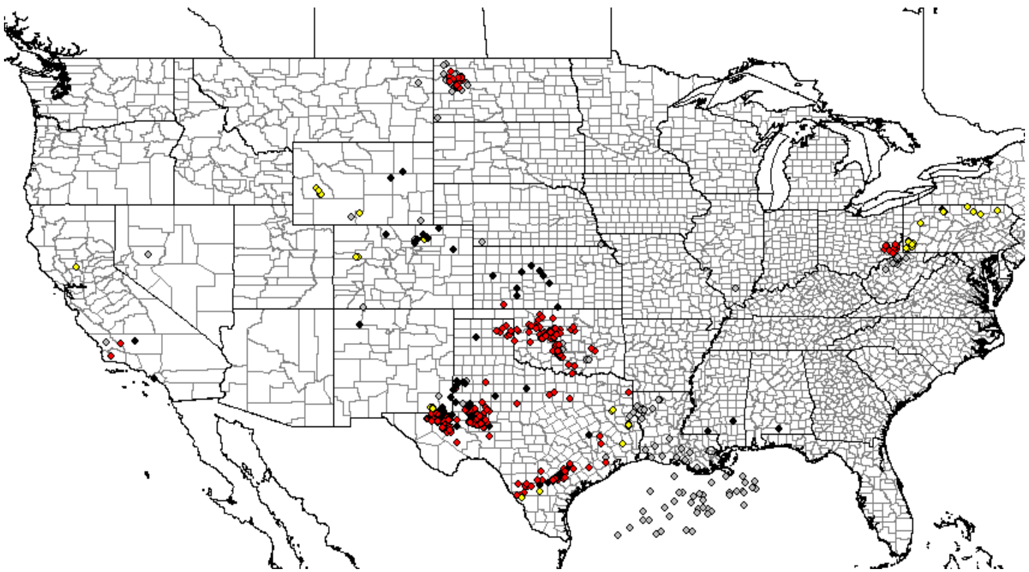
# Just over 500 rigs currently drilling in the U.S.



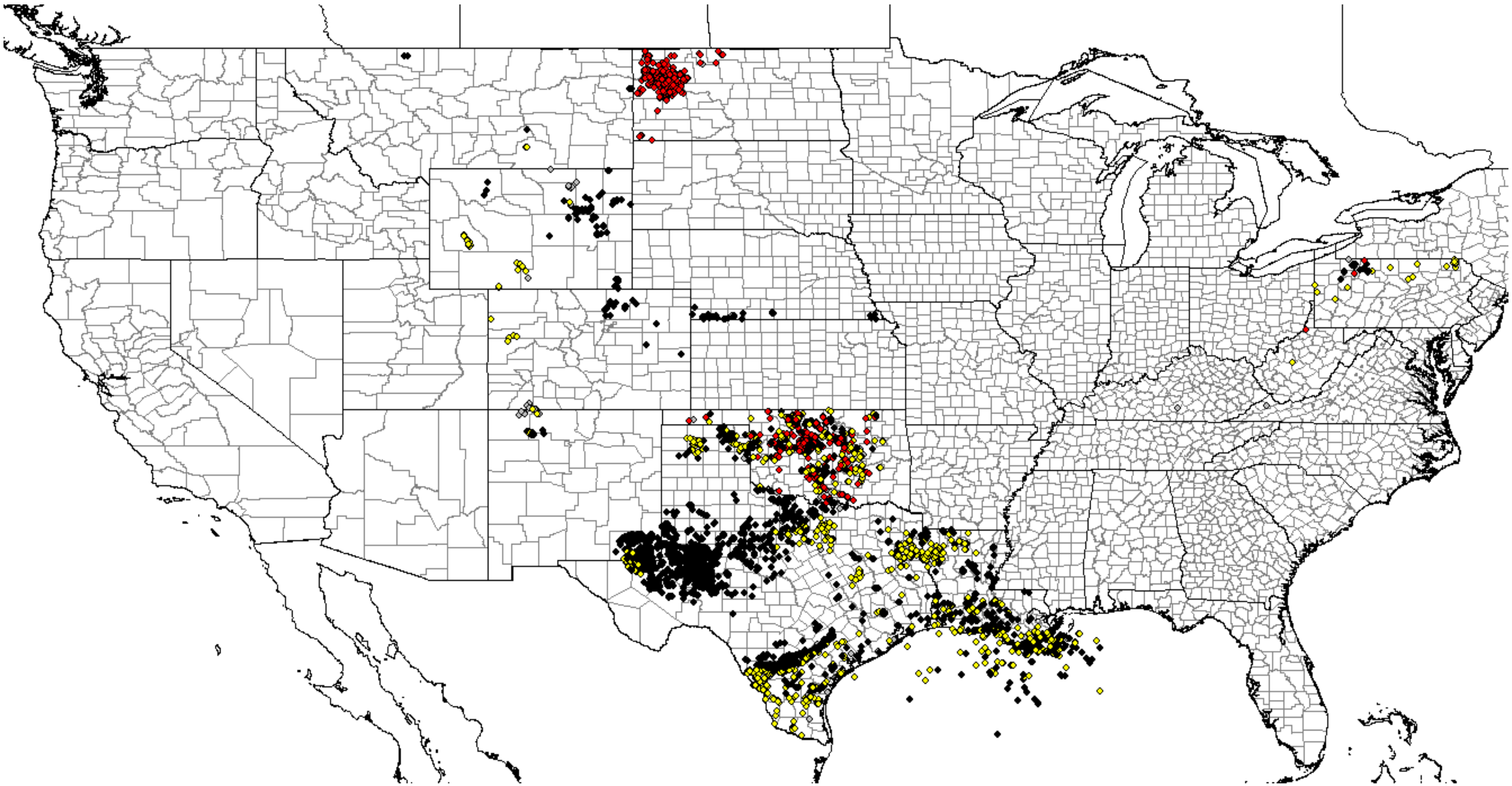
- 514 rigs currently drilling in the U.S.
- Only 40 dry gas rigs
- 341 horizontal
- 76 vertical rigs still drilling

| Operator | Permit Count |
|---|---|
| XTO ENERGY INC. | 18 |
| CONTINENTAL RESOURCES INC | 15 |
| PIONEER NATURAL RES. USA, INC. | 15 |
| EOG RESOURCES, INC. | 9 |
| ANTERO RESOURCES CORPORATION | 8 |
| ANADARKO E&P ONSHORE LLC | 7 |
| COG OPERATING LLC | 7 |
| MARATHON OIL EF LLC | 7 |
| APACHE CORPORATION | 6 |
| CHESAPEAKE OPERATING, L.L.C. | 6 |
| CIMAREX ENERGY CO. | 6 |

| Color | Product Type | Permit Count |
|---|---|---|
| Red | OG | 251 |
| Black | OIL | 84 |
| Gray | PMT DETAILS PENDING | 47 |
| Gray | (N/A) | 44 |
| Yellow | GAS | 40 |
| Gray | CONFIDENTIAL | 38 |
| Gray | INJ | 6 |
| Gray | DSP | 4 |

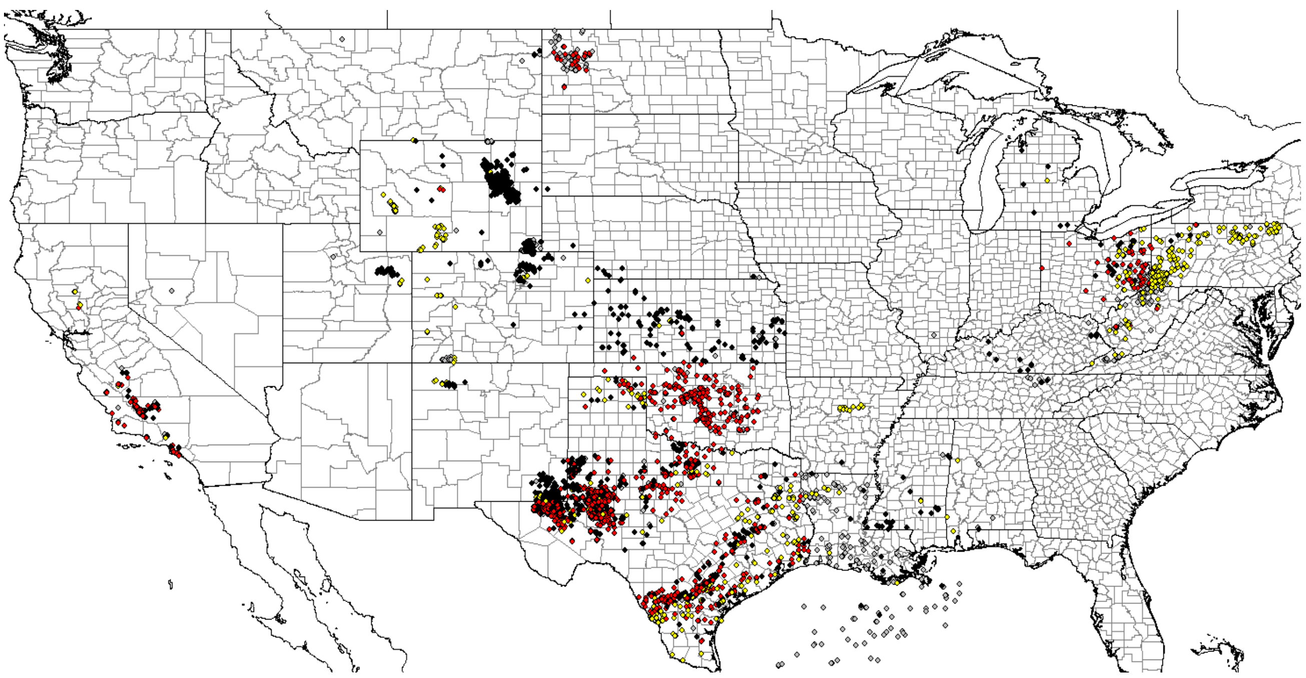
Source: DrillingInfo, March 12, 2016

# All wells completed since June 1, 2015



Source: DrillingInfo, March 12, 2016

# Reduction in filed permits



Source: DrillingInfo, permits filed in past 90 days, March 12, 2016

7,937 permits filed in past 90 days as of March 12, 2016 vs. 12,657 permits filed (past 90 days) March 11, 2015

Permitting is noticeably thinner in areas where assets are better delineated, developed, and held by production – Bakken and Eagle Ford

# Capital expenditure cuts severe for 2016

***American producers are expected to cut their budgets by 51% to $89.6 billion from 2014, a reduction that exceeds the worst years of the 1980s, according to Cowen & Co. - WSJ***

U.S. tight/unconventional oil production and technology grew on the back of small independent operators and a <u>nimble service sector.</u>

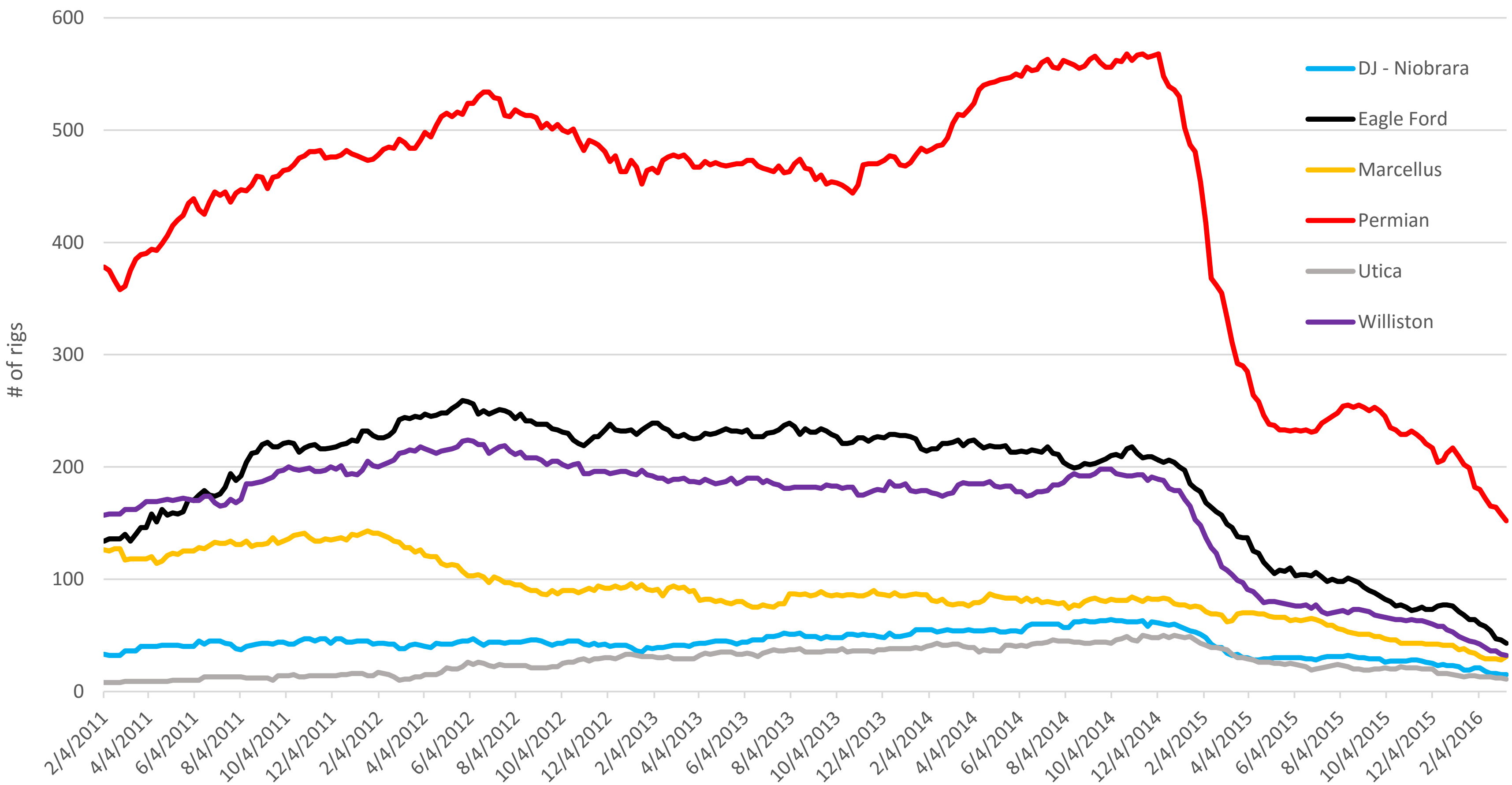
| Company | 2014 Capex (millions) | 2015 Capex (millions) | % Change | Company | 2014 Capex (millions) | 2015 Capex (millions) | % Change |
|---|---|---|---|---|---|---|---|
| Anadarko | $ 9,300.00 | $ 5,600.00 | -40% | Laredo Petroleum | $ 1,406.00 | $ 595.00 | -58% |
| Apache Corp | $ 9,500.00 | $ 3,750.00 | -61% | Laredo Energy | $1,000.00 | $595.00 | -41% |
| Bonanza Creek Energy | $ 667.00 | $ 420.00 | -37% | Linn Energy | $1,550.00 | $530.00 | -66% |
| BHP Billiton | $ 3,700.00 | $ 1,500.00 | -59% | Lonestar Resources | $140.00 | $76.00 | -46% |
| Breitburn Energy Partners | [illegible] | [illegible] | -47% | Magnum Hunter Resources | $400.00 | $100.00 | -75% |
| Cabot Oil and Gas | [illegible] | [illegible] | -44% | Marathon Oil | [illegible] | [illegible] | -49% |
| Carrizo | [illegible] | [illegible] | -42% | MarkWest Energy Partners | [illegible] | [illegible] | -23% |
| Chesapeake Energy | $ 6,700.00 | $ 3,750.00 | -44% | Matador Resources | $ 614.00 | $ 425.00 | -31% |
| Cimarex Energy | $ 2,200.00 | $ 1,300.00 | -41% | Murphy Oil | $3,430.00 | $2,300.00 | -33% |
| Comstock Resources | [illegible] | [illegible] | [illegible] | Newfield Exploration | $2,000.00 | $1,400.00 | -30% |
| Concho Resources | [illegible] | [illegible] | [illegible] | Nighthawk Energy | $22.40 | $25.00 | 12% |
| ConocoPhillips | $ 16,870.00 | $ 11,000.00 | -35% | Noble | $4,800.00 | $2,900.00 | -40% |
| CONSOL Energy | $ 1,000.00 | $ 800.00 | -20% | NRG Energy | $909.00 | $1,700.00 | 87% |
| Continental Resources | $ 5,200.00 | $ 2,550.00 | -51% | Oasis Petroleum | $1,425.00 | $670.00 | -53% |
| Denbury Resources Inc | $ 1,100.00 | $ 550.00 | -50% | Occidental Petroleum | $8,700.00 | $5,800.00 | -33% |
| Devon Energy | $ 5,300.00 | $ 4,000.00 | -25% | Parsley Energy | $ 491.00 | $ 350.00 | -29% |
| Diamondback Energy | $ 710.00 | $ 425.00 | -40% | PDC Energy | $650.00 | $535.00 | -18% |
| Emerald Oil Inc | [illegible] | [illegible] | [illegible] | Penn Virginia | $ 686.00 | $ 335.00 | -51% |
| Encana Energy | [illegible] | [illegible] | [illegible] | Pioneer Natural Resources | $ 3,630.00 | $ 2,200.00 | -39% |
| Energen Resources | $ 1,431.00 | $ 1,100.00 | -23% | PostRock Energy | $28.00 | $5.50 | -80% |
| Enerplus | $ 502.00 | $ 365.00 | -22% | QEP Resources | $ 2,726.00 | $ 950.00 | -65% |
| EOG Resources | [illegible] | [illegible] | [illegible] | Rosetta Resources | [illegible] | $750.00 | -38% |
| EP Energy | [illegible] | [illegible] | [illegible] | RSP Permian | [illegible] | $ 450.00 | -47% |
| EQT | $ 2,700.00 | $ 1,800.00 | -44% | Sanchez Energy | $870.00 | $575.00 | -34% |
| Exco Resources | $ 434.80 | $ 300.00 | -31% | SandRidge Energy | $1,600.00 | $700.00 | -56% |
| Exxon Mobil | $ 38,500.00 | $ 34,000.00 | -12% | SM Energy | $2,100.00 | $1,400.00 | -33% |
| Goodrich Petroleum | $ 375.00 | [illegible] | -73% | Southwestern Energy | [illegible] | $1,875.00 | -22% |
| Gulfport | $ 1,100.00 | $ 686.00 | -38% | Stone Energy | [illegible] | $450.00 | -49% |
| Halcon Resources | $ 1,100.00 | $ 400.00 | -64% | Swift Energy | $400.00 | $115.00 | -71% |
| Hess | [illegible] | [illegible] | [illegible] | Whiting Petroleum | [illegible] | [illegible] | -46% |
| Kinder Morgan | [illegible] | [illegible] | [illegible] | WPX Energy | [illegible] | [illegible] | -60% |

**Average Capex Cut: 39%**

**Fall 2015 U.S. CAPEX cuts averaged about 40%**

**2016 CAPEX cuts are ranging between 30 and 80% → reductions by as much as 126% from 2014 for some companies**

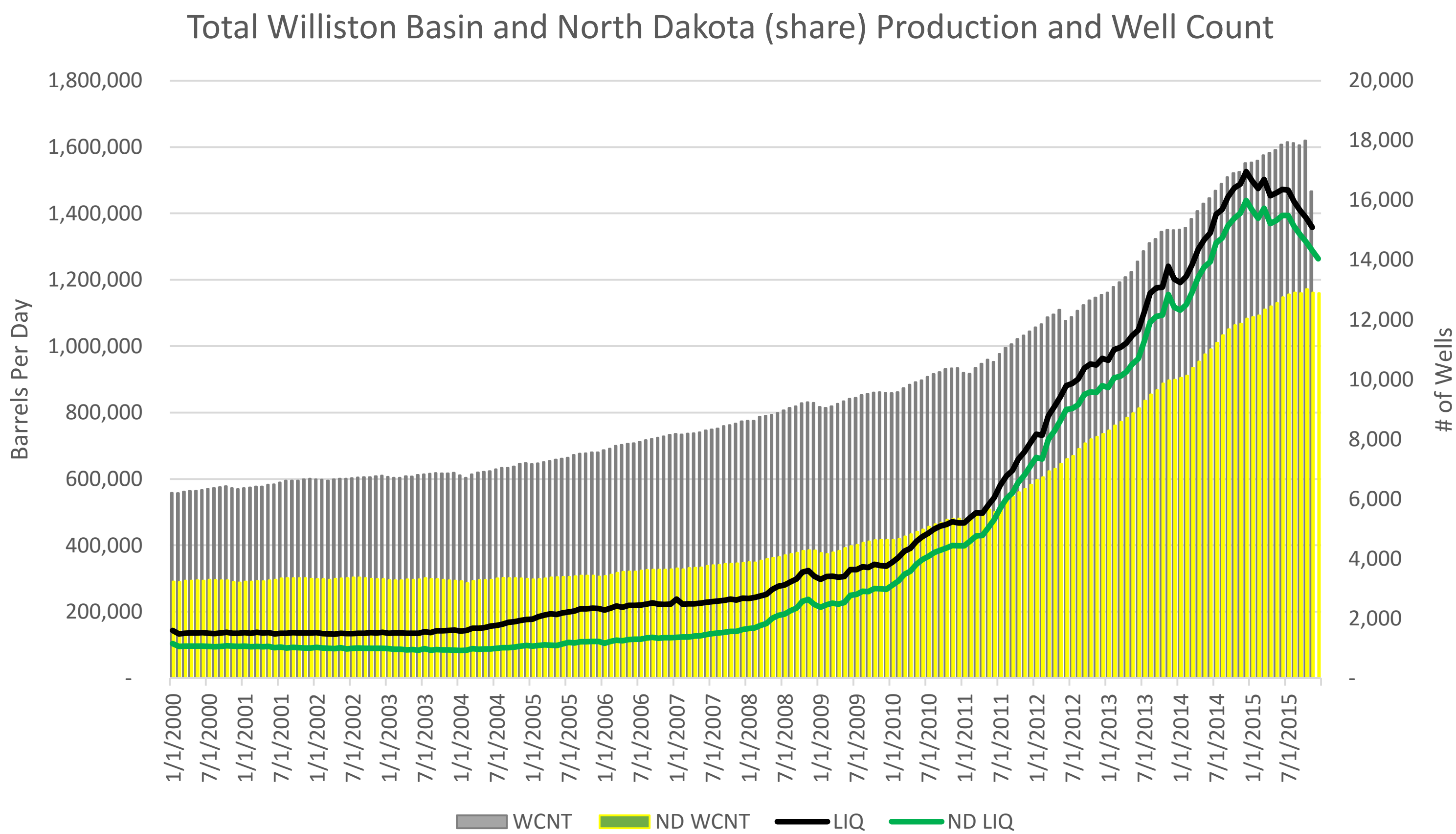
# The major shale oil plays continue to shed rigs




Source: Baker Hughes

# Production by Play: Bakken, Permian, and Eagle Ford

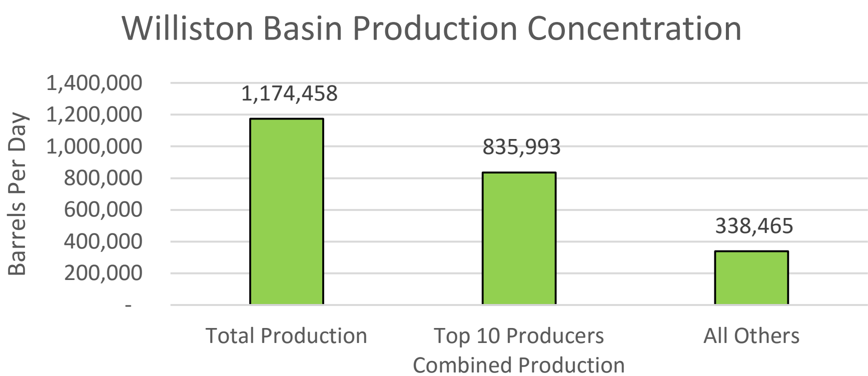
# Williston Basin Production

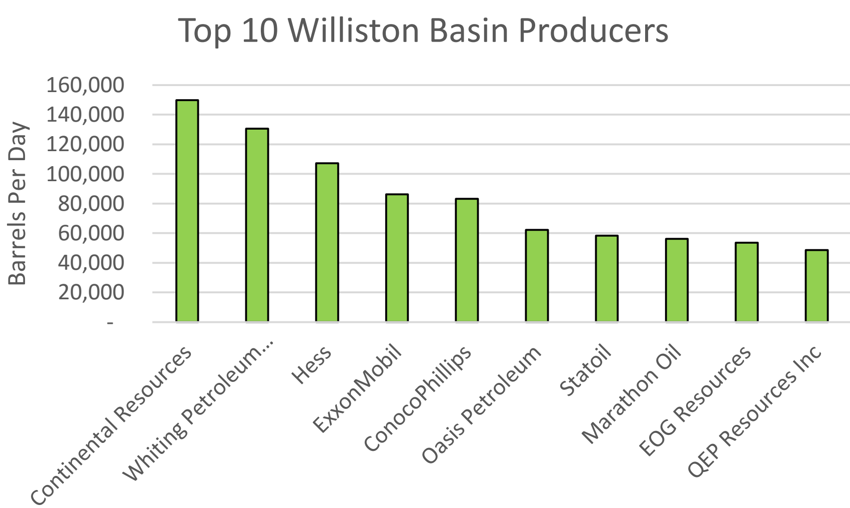



ND - 1.3 mbd

Source: Raw data from HPDI

# Bakken Production Concentration

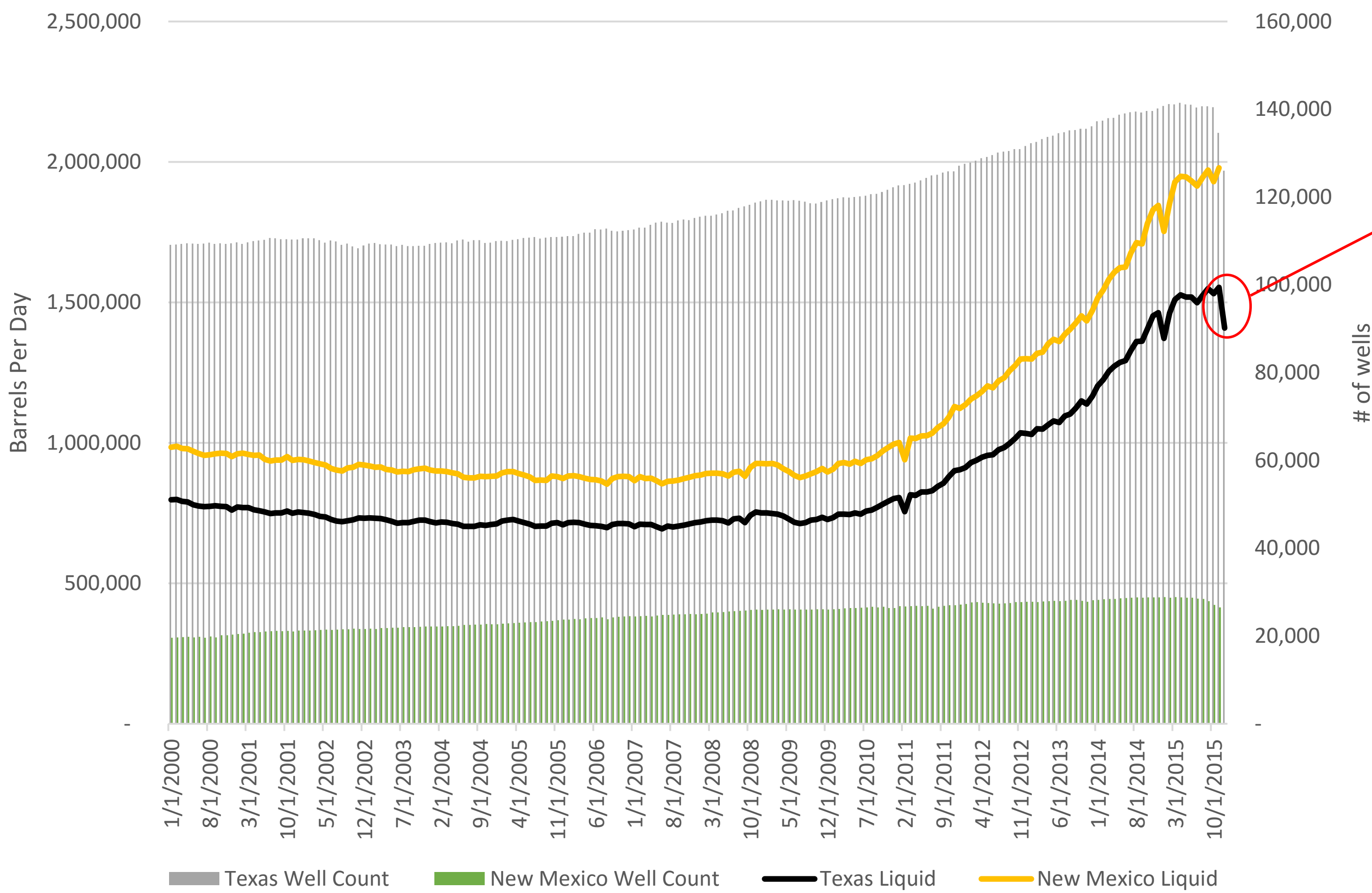



- High grading is taking place – running out of steam at $30 - $40 oil
- Only a handful of companies aggressively added wells the second half of 2015 – Hess (89), Exxon (85), ConocoPhillips (62)
- …EOG..? Only 13
- 2016 well additions dramatically cut by major operators

Source: PetroNerds, March 2016

# Permian Basin Production

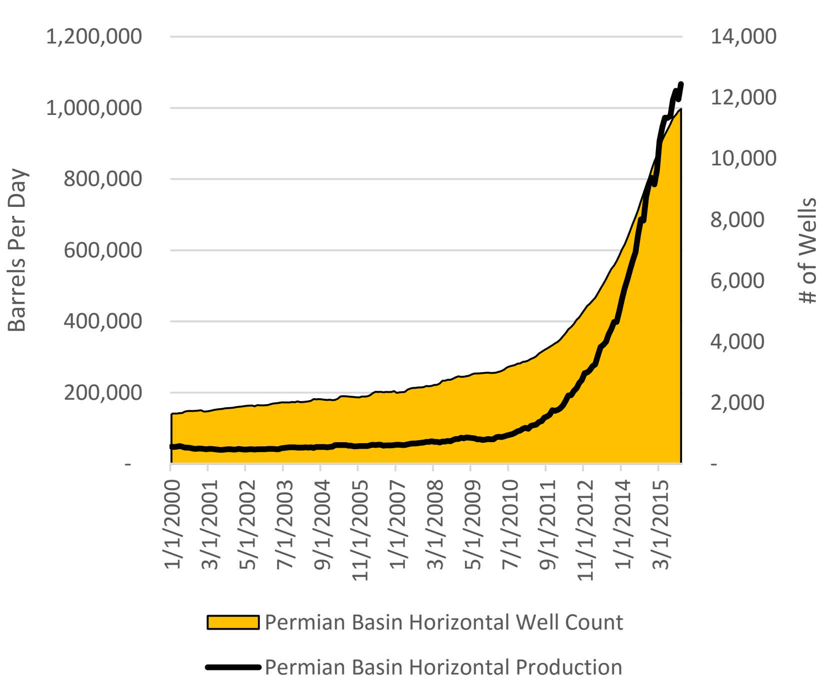


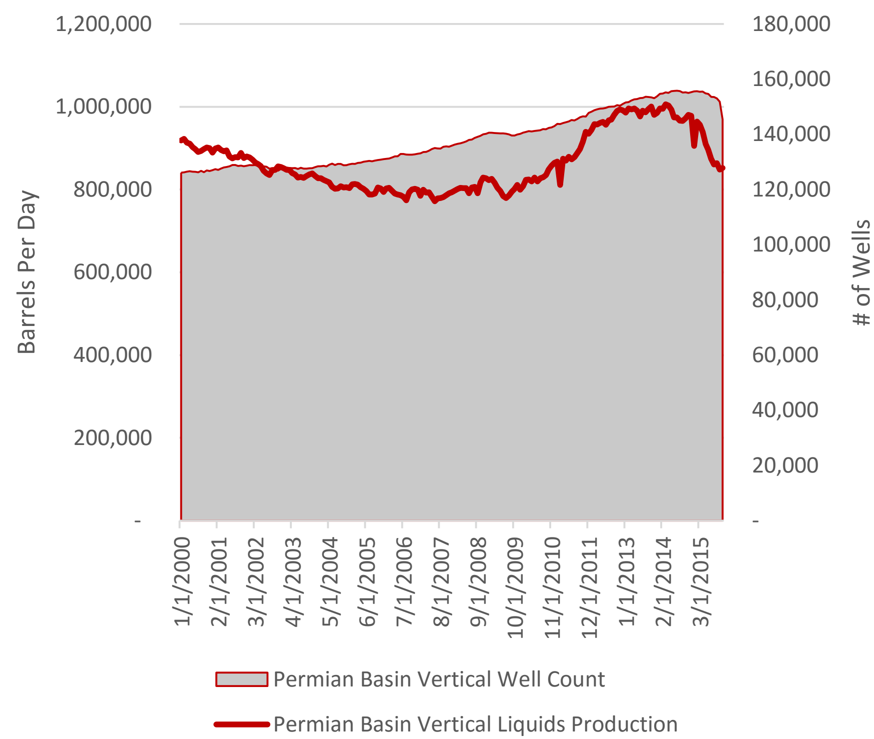

Usually revised upwards as additional data comes in

Output has stayed relatively flat at around 1.9 mbd (Texas + New Mexico Permian) for the past several months

Source: PetroNerds, Raw data DrillingInfo

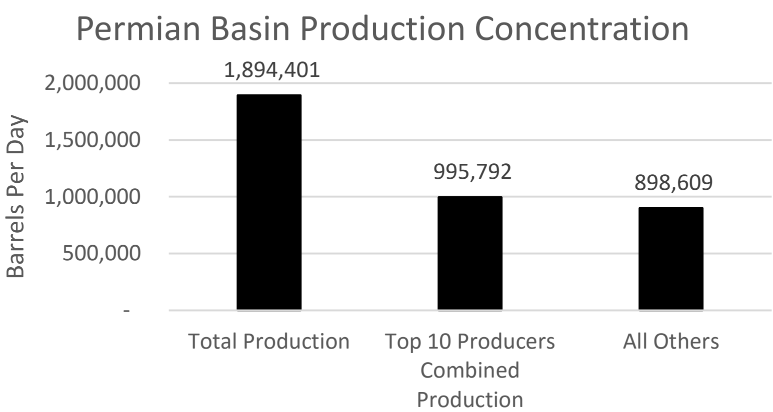
# Permian Basin Production by Drill Type

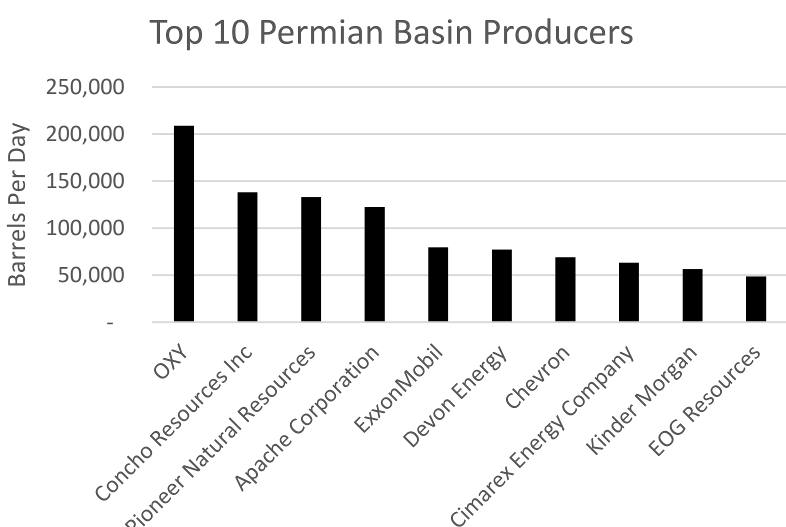



Source: PetroNerds, Raw data DrillingInfo

# Permian Basin Production Concentration



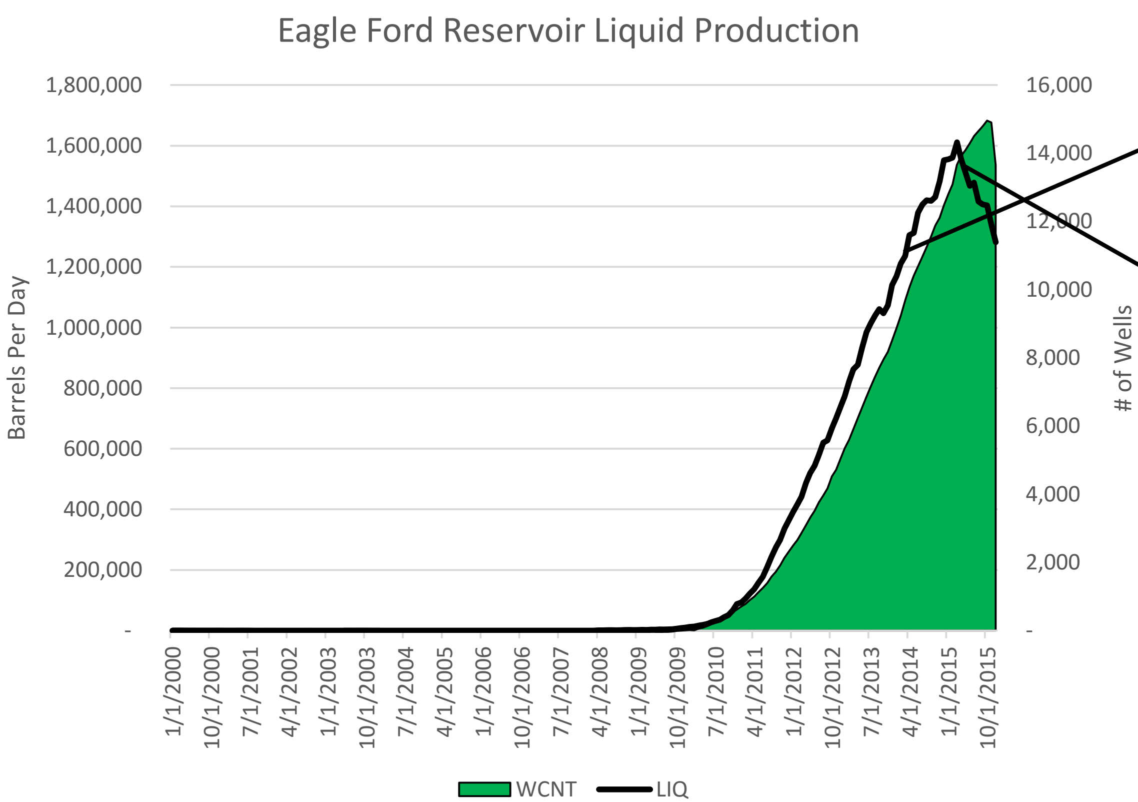




A fair number of vertical wells have brought online since June.

Continued activity a result of multiple factors – drilling to hold acreage, certain companies well hedged, booking reserves, locked into rig contracts, etc.

Source: PetroNerds, March 2016

# Eagle Ford Production



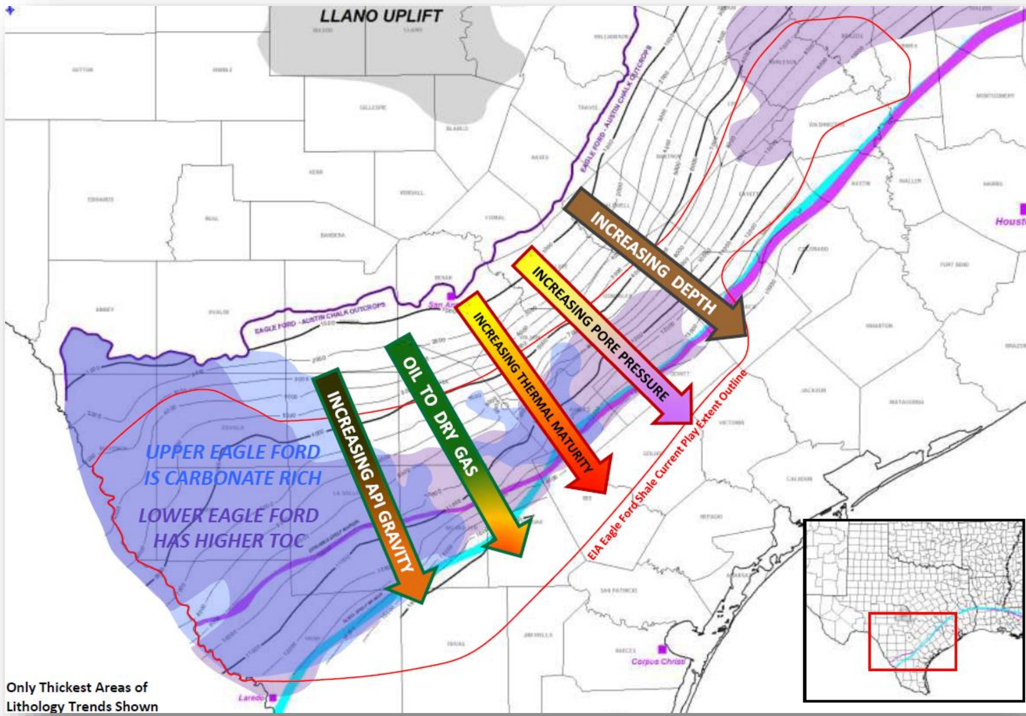

Roughly 40% of this liquid production is condensate

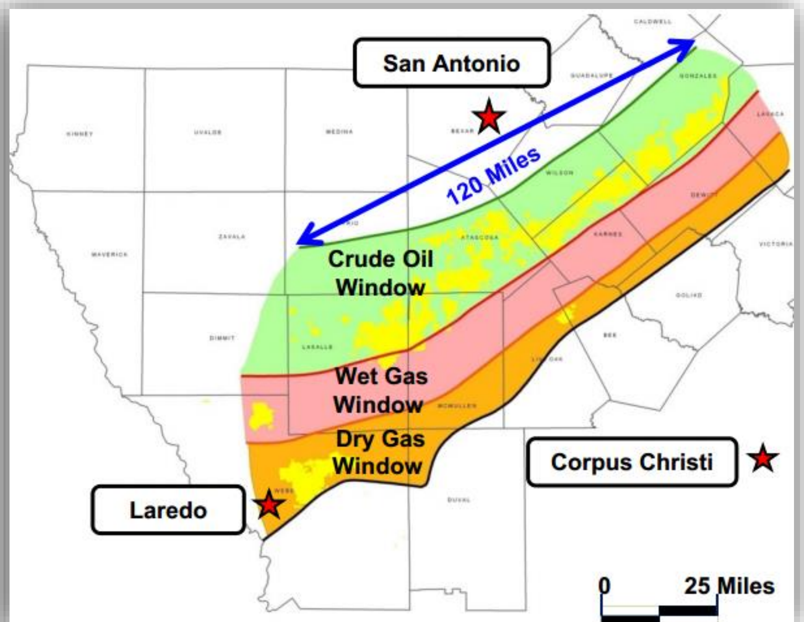
Current Eagle Ford production is about 1.3 mbd, roughly 300,000 b/d off its high of 1.6 mbd in March 2015.

The large drop in Eagle Ford production is most likely concentrated in the condensate window. This drop is also the main driver in the drop in Texas oil production.

Source: PetroNerds, raw data DrillingInfo

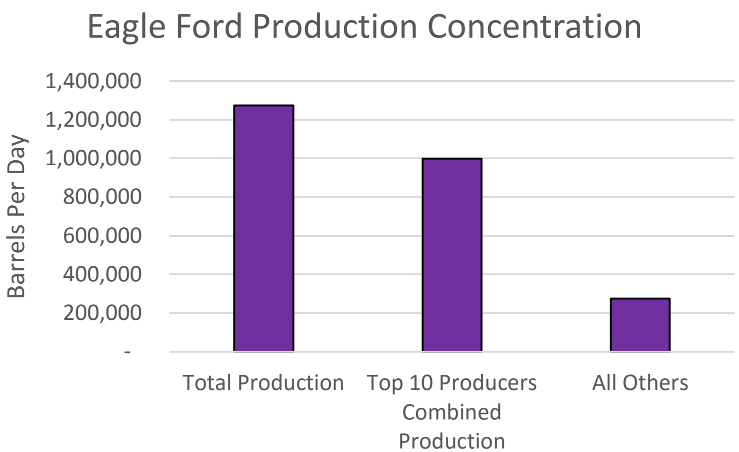
# Geology of Eagle Ford → Varying crude grades

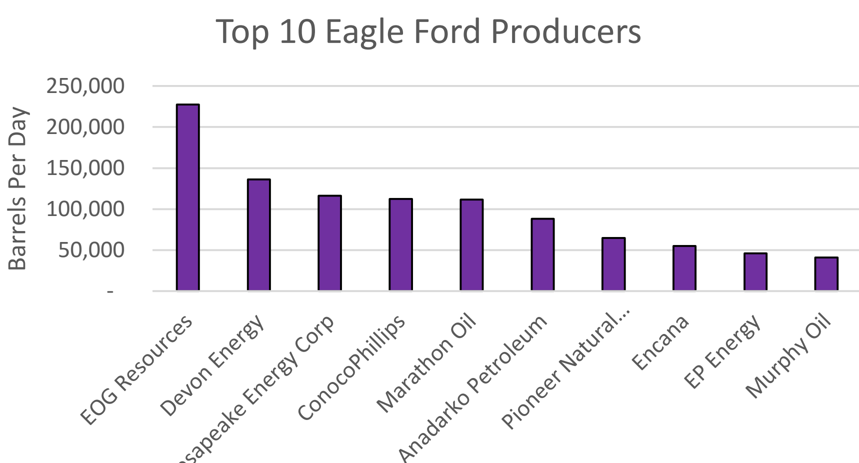



Source: Momentum Oil and Gas LLC, DUG Eagle Ford Conference Presentation Oct 2011; EOG Investor Presentation Feb 2014;

# Eagle Ford Production Concentration



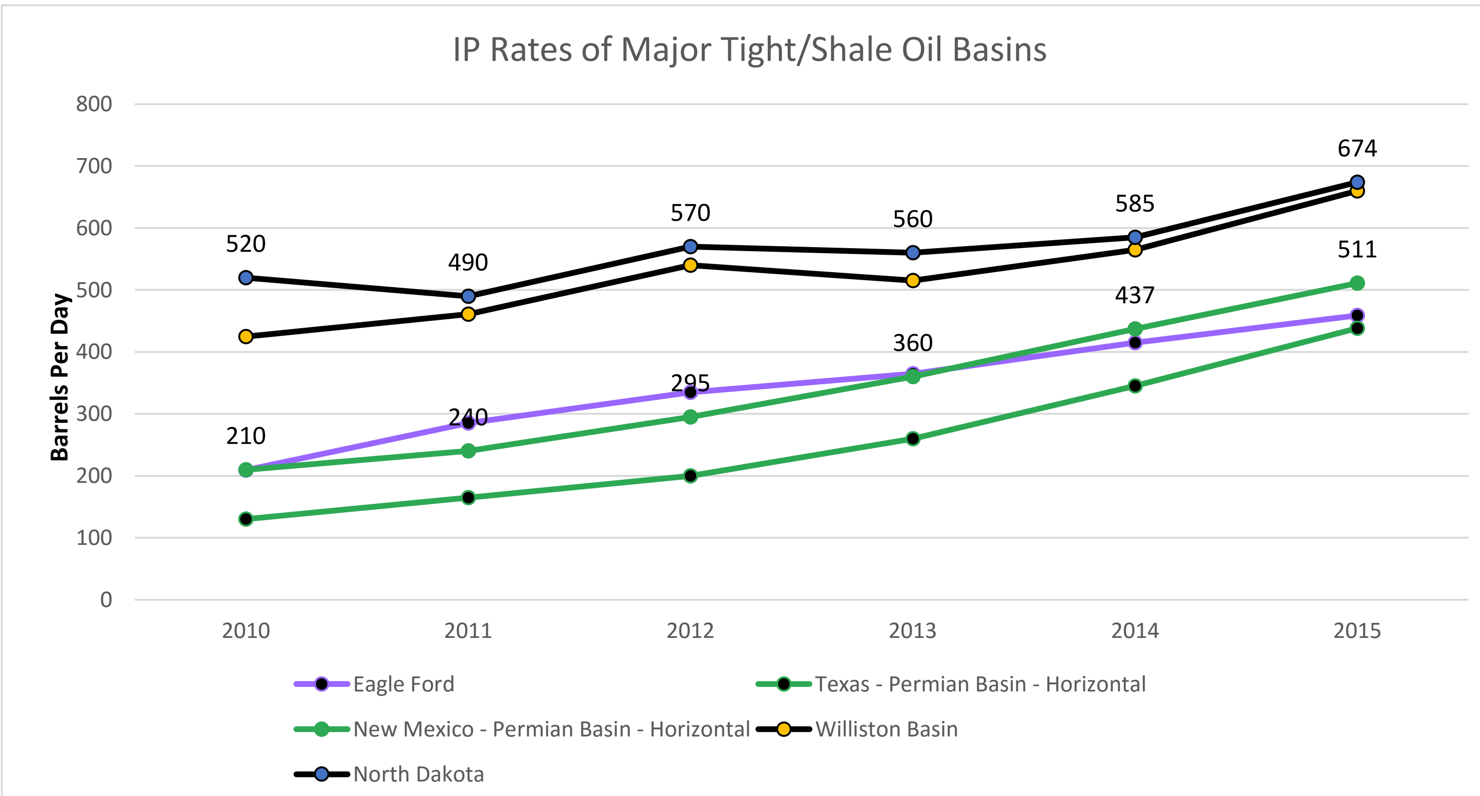

Production has dropped by nearly 300,000 b/d from March 2015.

The top 10 Eagle Ford producers contribute the bulk of Eagle Ford liquids production and many of these operators have <u>concentrated assets in the volatile oil and condensate windows.</u>

Source: PetroNerds, March 2016

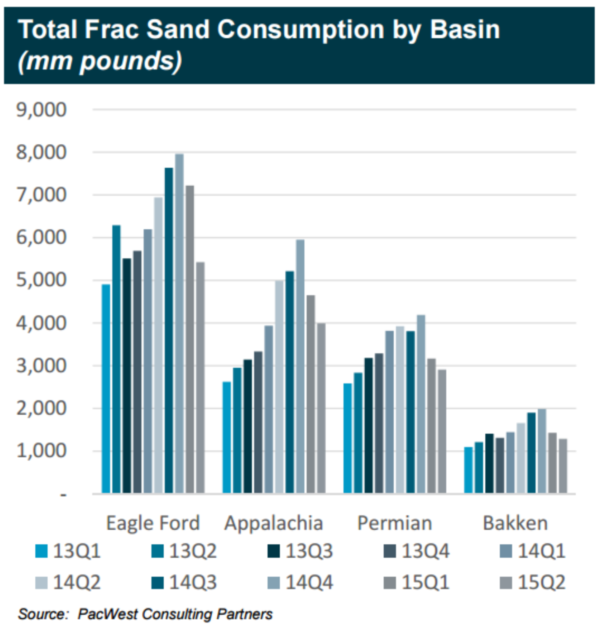
# Initial Production Rates

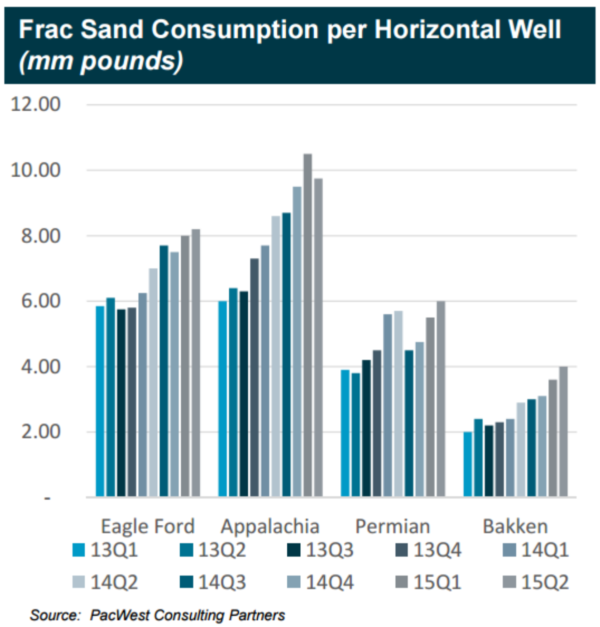
Initial production rates have risen significantly in 2015 – nearly 100 b/d in Williston and Permian




Source: DrillingInfo raw data, PetroNerds, figure as of March 12, 2016 IP

# Frac sand usage



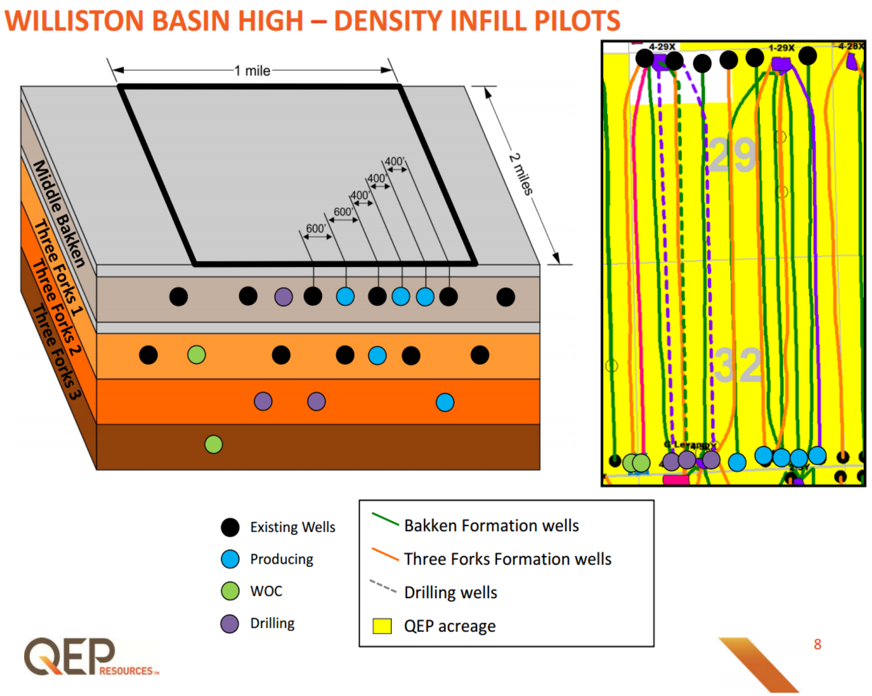




*…during the fourth quarter we completed wells with average frac sand volumes of 6.7 million pounds versus 5.2 million pounds in the third quarter. The fourth quarter wells achieved 30-day average rates 22% better than the third quarter.*

Whiting Petroleum, Q4 2015 conference call, Seeking Alpha March 2016

Source: Emerge Energy Services, January 2016 Investor Presentation

# Significant high grading has taken place




"High" Everything….

"…Intensity Completions"

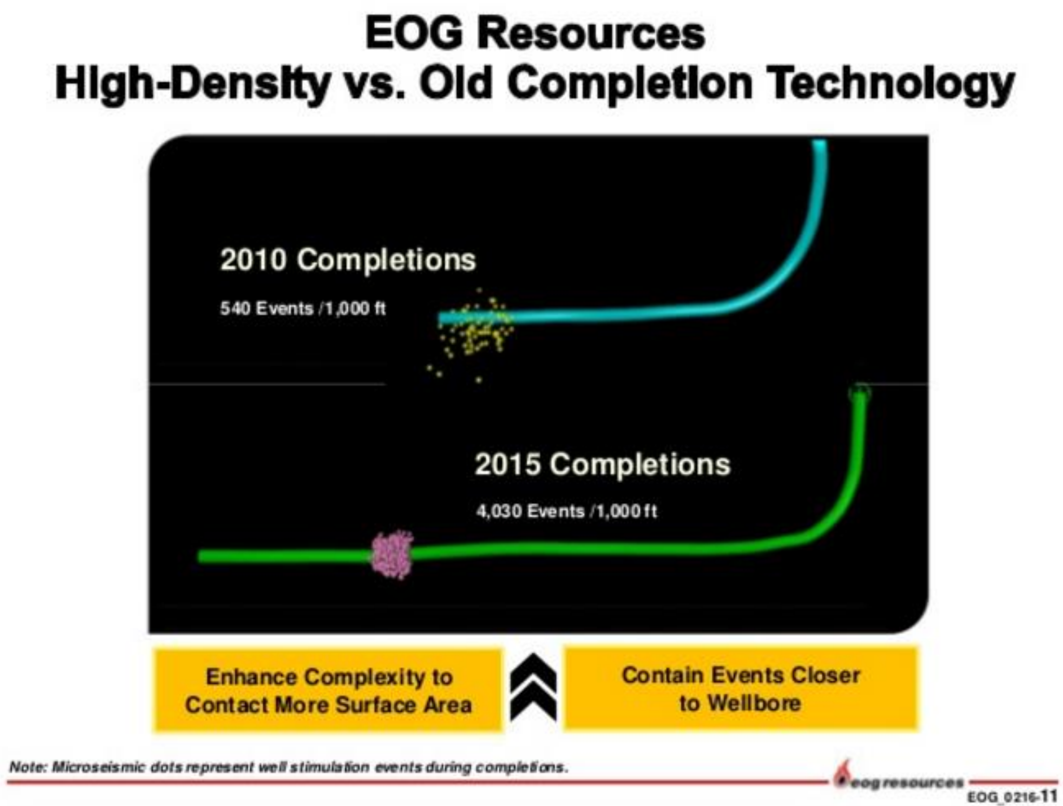
"…Grading"

"…Intensity Infill Drilling"

"Enhanced Completions"

Source: QEP Resources, 2$^{nd}$ Quarter 2015 Earnings Call presentation

# EOG completion example

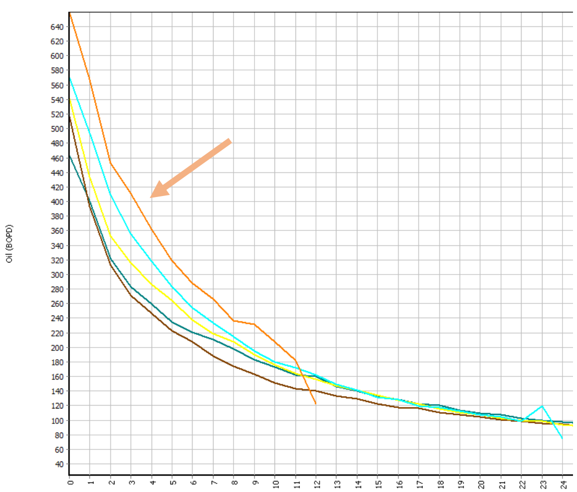



Source: 4th Quarter 2015 presentation (Feb 2016)

# 2015 decline curves have outperformed

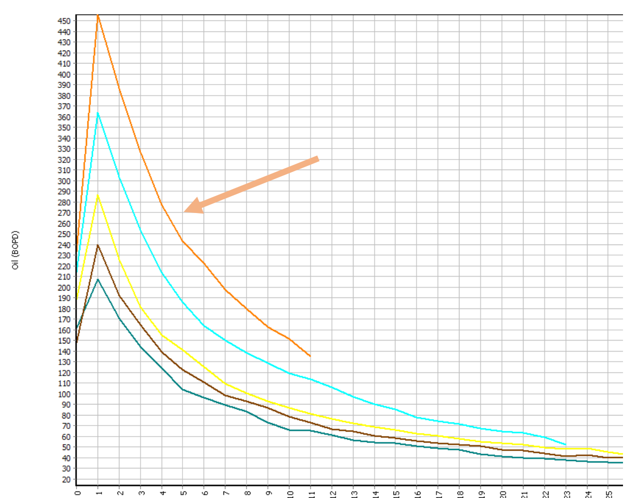
Williston Basin

650



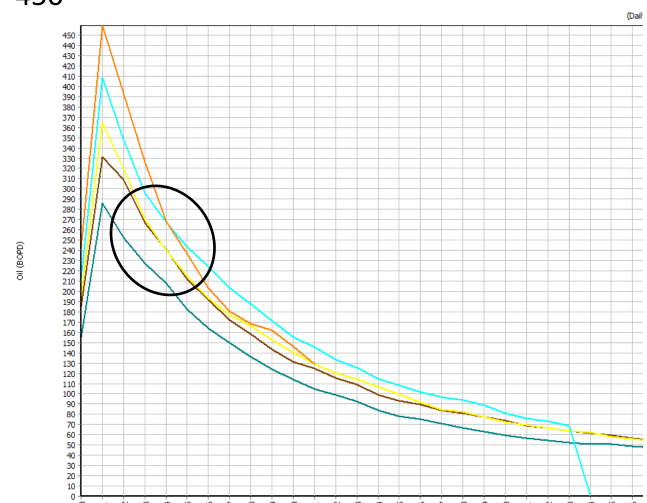

Permian Basin - Horizontal

450




Eagle Ford

450

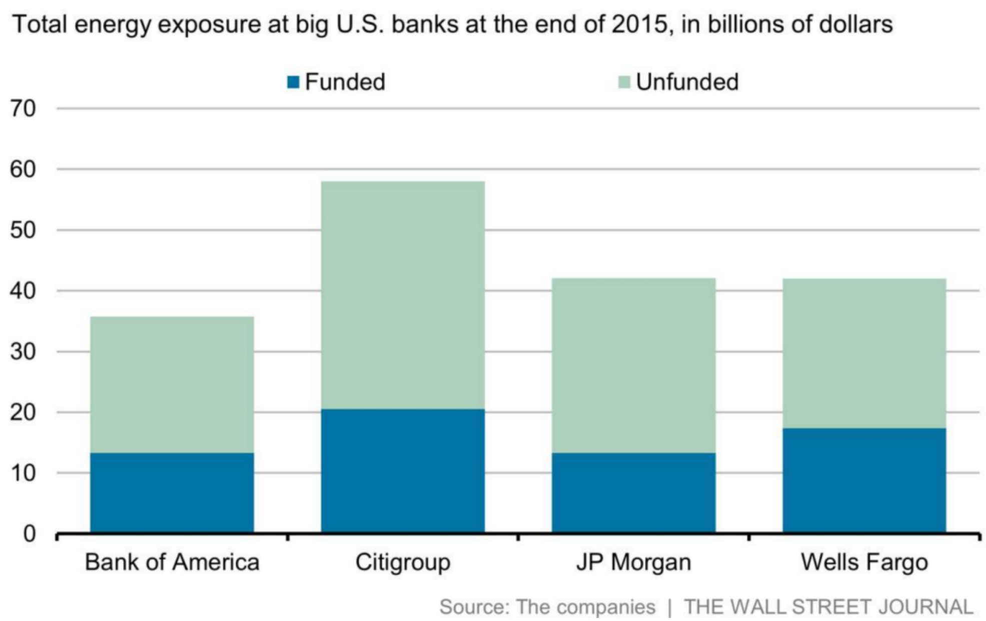



Source: DrillingInfo raw data, PetroNerds, figure as of March 12, 2016

# Financial state of the shalers – bankruptcies and borrowing

# Bank exposure to energy loans

As oil prices continue their volatile moves in 2016 and low prices reach into their second year, banks are beginning to shed more light on their exposure to the energy sector, non-performing loans, and unfunded loans - committed but untapped credit to oil companies.




Source: WSJ, Why Big U.S. Banks Can Ride Out the Oil Bust By AARON BACK
March 2, 2016 12:20 p.m. ET

# Bankruptcies 2015-2016

- 51 North American upstream oil and gas companies have filed for bankruptcy from the beginning of 2015 through March 1, 2016. (Haynes and Boone)

- These 51 companies held a combined $17.4 billion in outstanding debt.
  - Secured: $9.4 billion
  - Unsecured: $8 billion

- For context, EOG Resources Inc. holds $6.7 billion in long-term debt, as of December 31, 2015.

# Production of 8 Largest Bankrupt Debtholders

- The following table shows US oil and gas production figures for the 8 companies who have filed for bankruptcy since January 1, 2015 with more than $500 million in outstanding debt.

| Company | Production (b/d) | Gas Production (mcf/d) | Total Debt (Secured + Unsecured), $billions | Producing Region |
|---|---|---|---|---|
| **Quicksilver Resources** | 600 | 250,000 | 2.1 | Mostly gas in Barnett and upper Michigan, but some oil in Montana, Colorado, and Wyoming |
| **Samson Resources** | 15,000 | 225,000 | 4.3 | Anadarko Basin (largely gas), Wyoming gas and some oil, Bakken, California, NM Permian, other states |
| **Sabine Oil & Gas** | 10,000 | 300,000 | 2.9 | Eagle Ford, Cotton Valley Sand |
| **Milagro** | <1000 | 1,000-3,000 at peak | 1.1 | Eagle Ford, East Texas, and Gulf Coast, primarily gas |
| **Swift Energy** | 8,000 | 220,000 | 1.2 | Mostly Eagle Ford, some Anadarko and Marcellus/Utica |
| **Energy and Exploration Partners** | 2,000-4,000 | 5,000-14,000 | 1.2 | Texas, Eagle Ford mostly |
| **Magnum Hunter Resources Corp.** | 2,200 | 50,000 | 1.1 | Mostly gas wells, but some oil (around 929 total) in Kentucky and West Virginia |
| **New Gulf Resources** | 2,000-3,000 | 8,000 | 0.6 | East Texas, gas focused |
| **Total** | **~40,000** | **~1,100,000** | **$14.5 billion** | |

Source: PetroNerds, DrillingInfo Data

## Debt Highly Concentrated in 8 Companies (and in Texas Producers)

- Note that the 8 companies listed on the previous slide had a combined $14.5 billion of outstanding debt at the time of their bankruptcies.
- This represents 83% of the aggregate outstanding debt held by the 51 companies that have declared bankruptcy since the start of 2015.
- The vast majority of these and the smaller bankruptcies occurred in producers with a gas focus and/or Texas producers operating in the condensate-rich Eagle Ford and gassy East Texas.
- These struggles help to explain why Eagle Ford production has declined more than any other major tight oil play (and vice versa).
- Many of these companies were struggling at $80 oil, much less $40 and $30

# Other Notable Financial Struggles

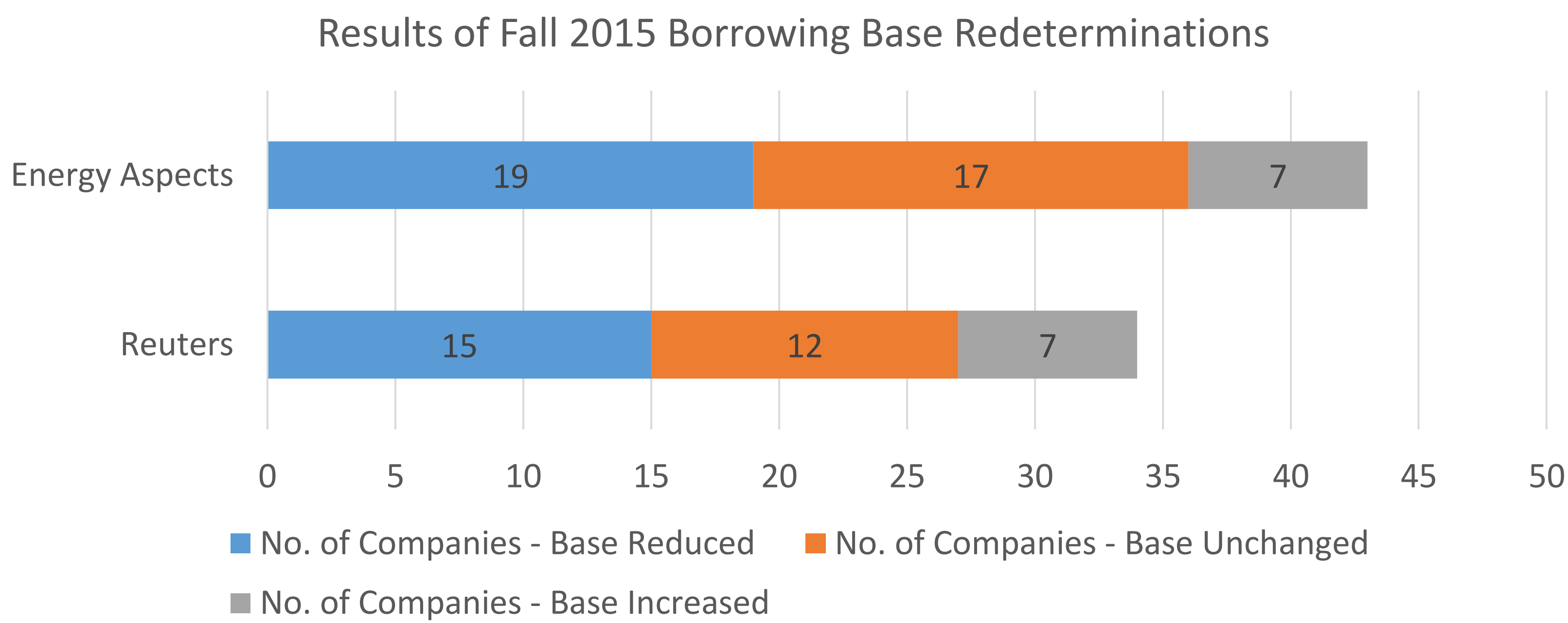
- These companies are, in terms of production volumes, far larger than the 8 largest bankruptcies (defined by debt) of the past 15 months.

| Company | Production (b/d) | Gas Production (mcf/d) | | |
|---|---|---|---|---|
| **Linn Energy** | 50,000 | 725,000 | Bankruptcy is rumored to be imminent. | Anadarko Basin, Heavily weighted with vertical wells across the country, some Permian wells but all vertical |
| **Chesapeake** | 160,000 | 5,300,000 | Has had to publicly disavow bankruptcy rumors | Anadarko and Appalachian Basins, some Eagle Ford and some Wyoming – significant gas and condensate production |
| **Paragon Offshore Plc** | | | Filed for bankruptcy | |
| **Penn Virginia Corp.** | 20,000 | 40,000 | Delisted from NYSE | Mainly Oklahoma, Kentucky, some West Virginia |
| **Total** | **230,000** | **6,065,000** | | |

Source: PetroNerds, DrillingInfo Data

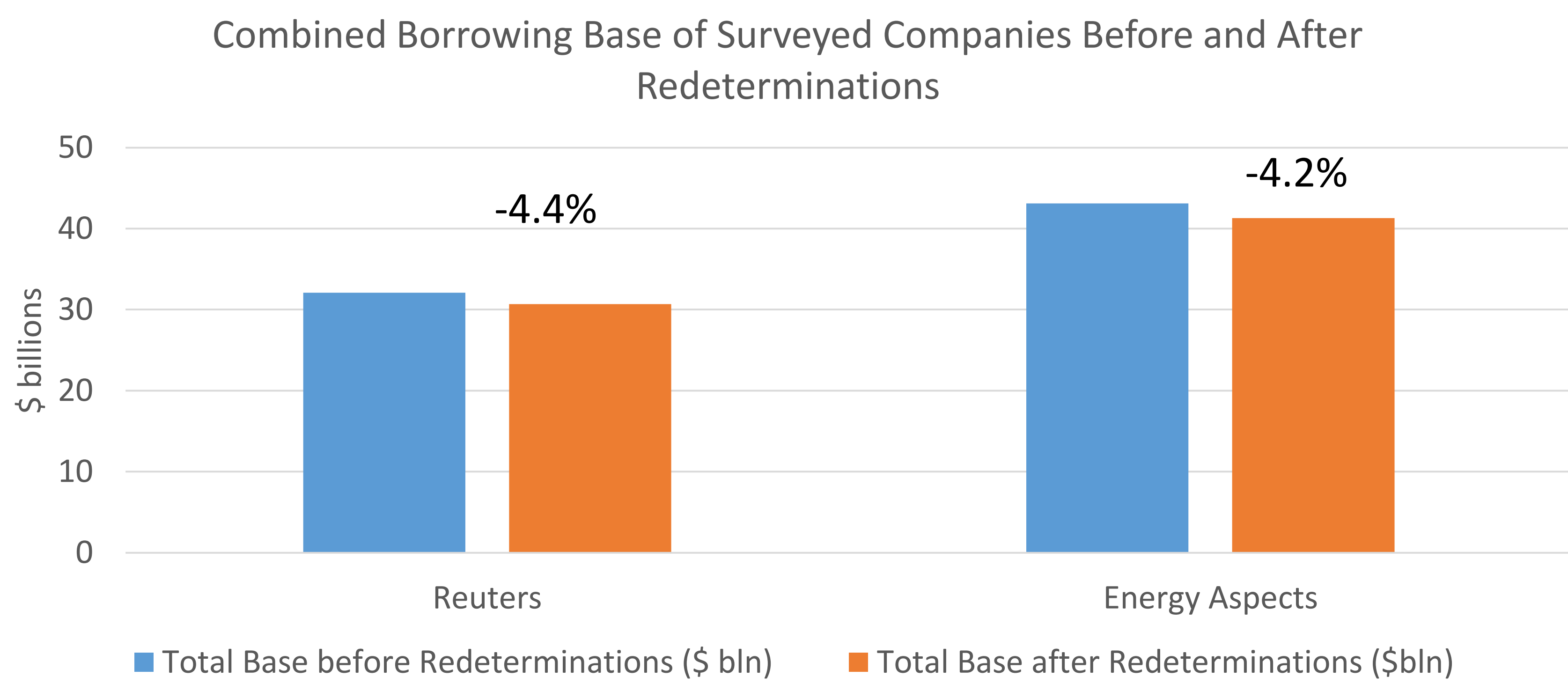
# Fall 2015 Borrowing Base Redeterminations

- Several of the companies surveyed by Energy Aspects and Reuters had their borrowing bases reduced in the past fall's round of redeterminations.



# But Aggregate Reductions Small

- But the combined borrowing base reductions of surveyed companies was quite small.



# Why such small reductions?

- Varying risk appetite across lenders
- Pulling the plug on credit could trigger bankruptcies. In effect, by keeping credit lines open, lenders are hoping that their debtors will survive the downturn.
- Risk tolerance depends on whether or not debt is secured, actual value of collateral, a lender's ability to absorb large write-downs, and a plethora of other factors.