

AADE -Houston Fluids Management Group

“Squeezing More From Completions”

Ross Rucker - Petroleum Engineering Specialist, Aramco

17 November, 2016





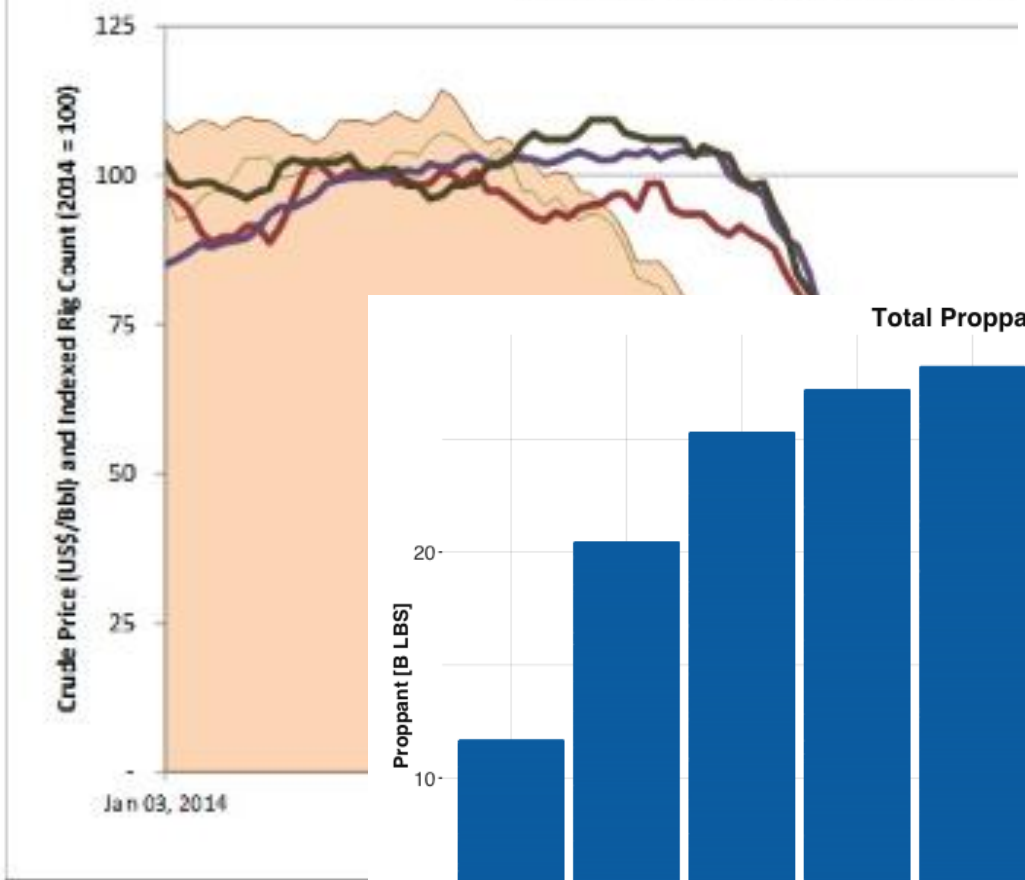
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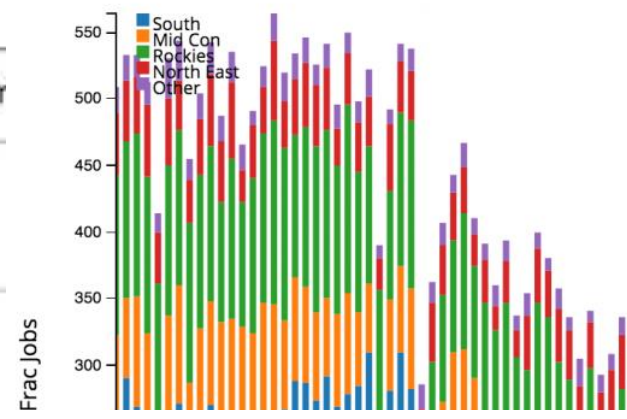
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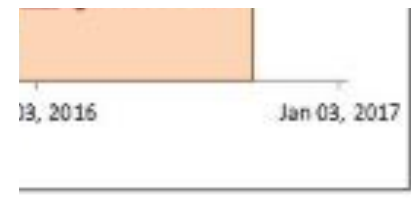
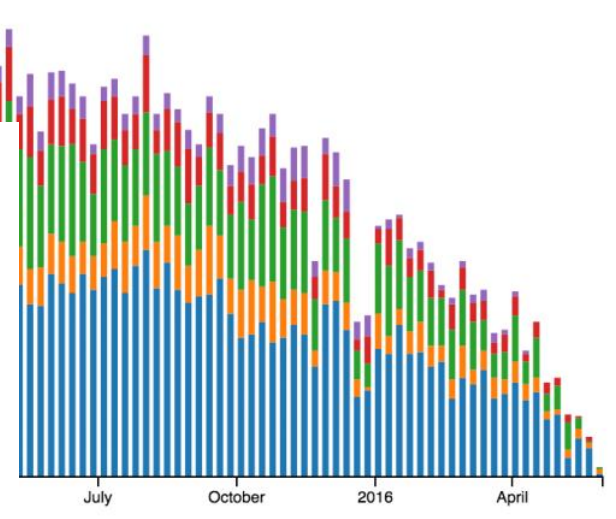
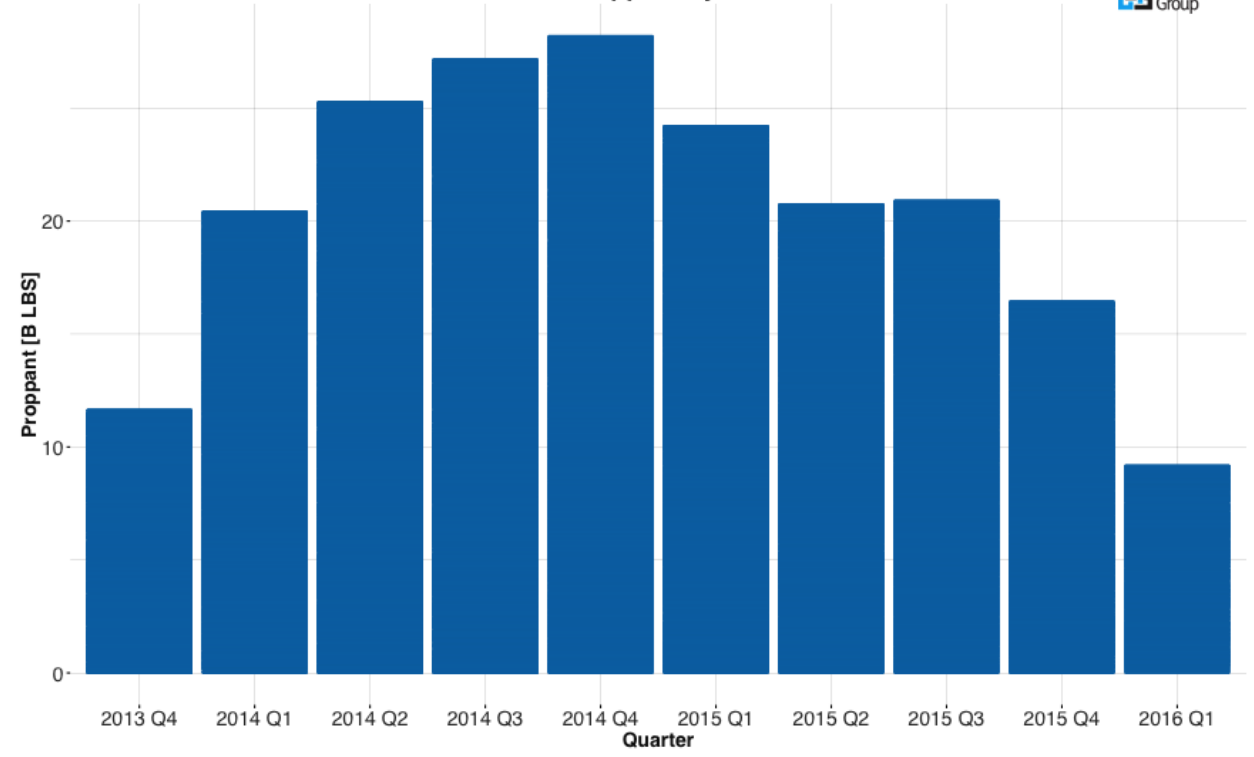
2014-2016 Current Brent and In



Frac Crews by Week



Total Proppant by Quarter



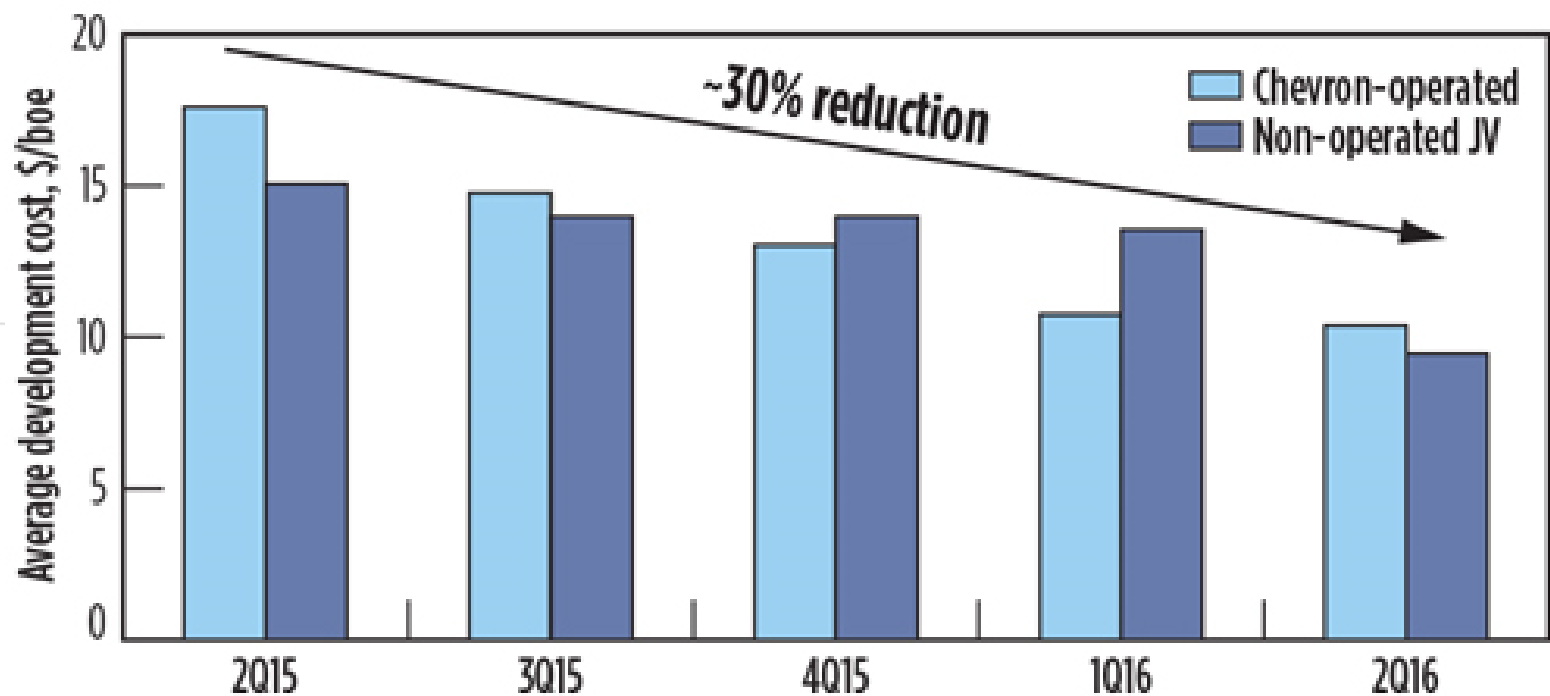
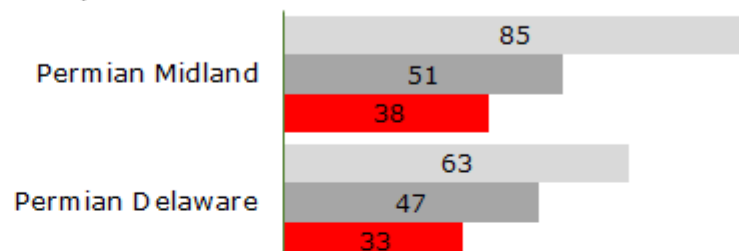
Wellhead Breakeven Prices by Spud Year

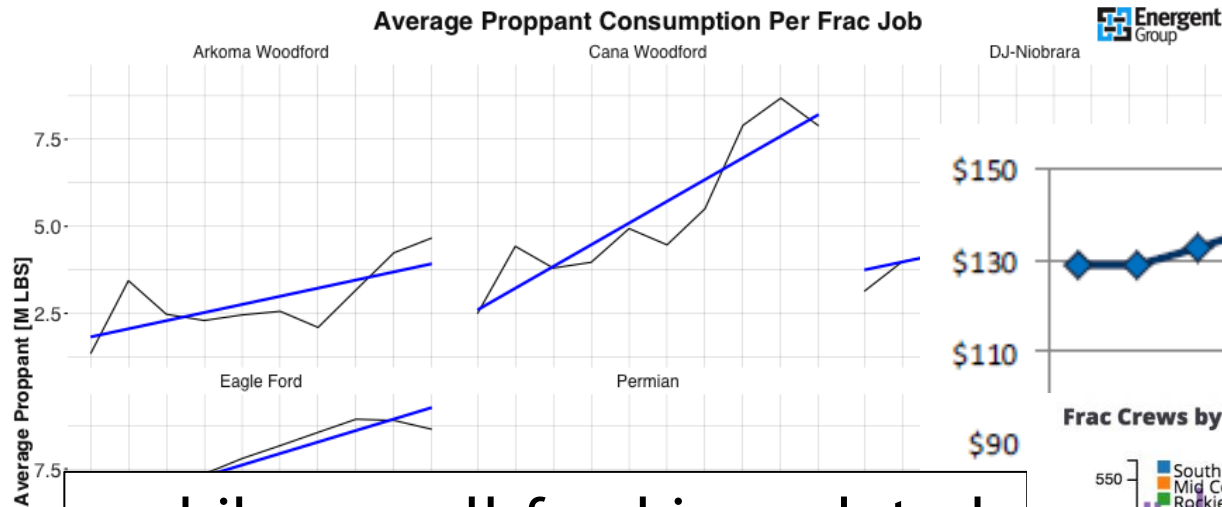
USD/Boe



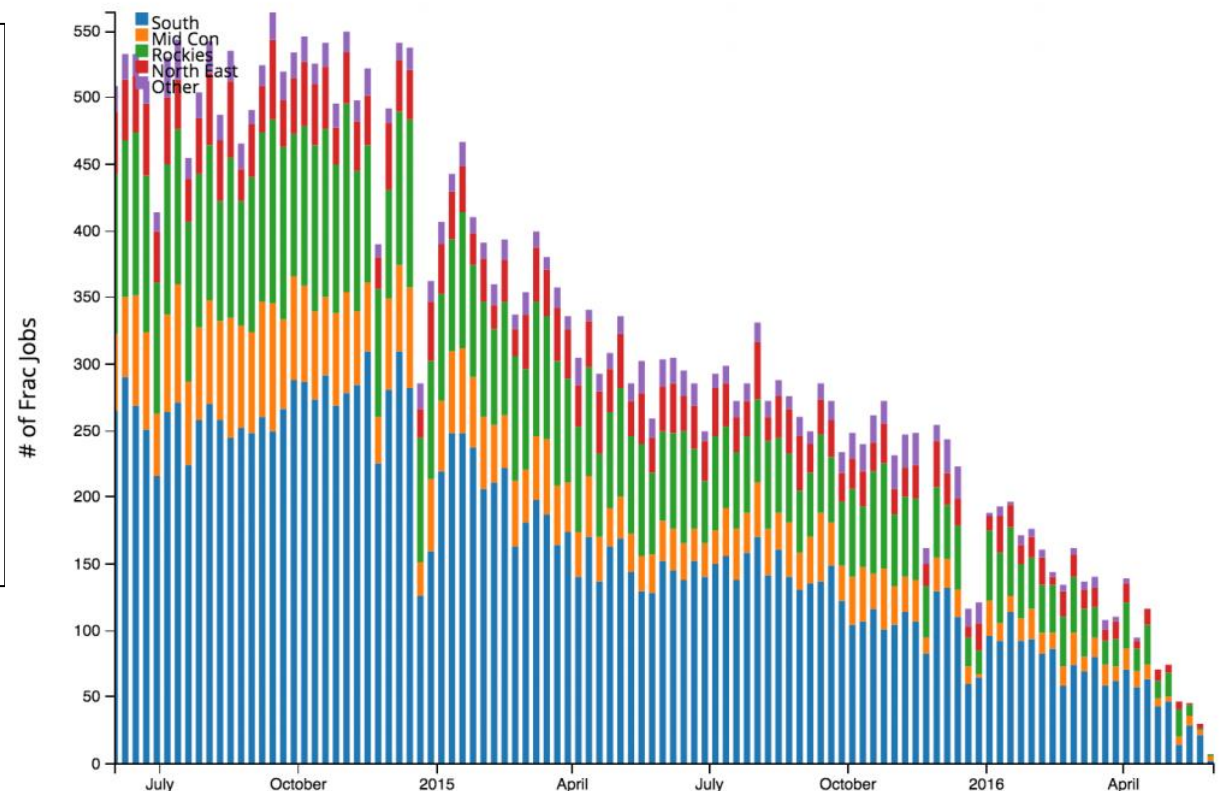
Wellhead Breakeven Prices by Play and Spud Year

USD/Boe





...while overall fracking-related water use peaked in 2014, average water use per well has doubled since 2013, from **2.6 million gallons per well** to **5.3 million gallons per well** at the end of January 2016.



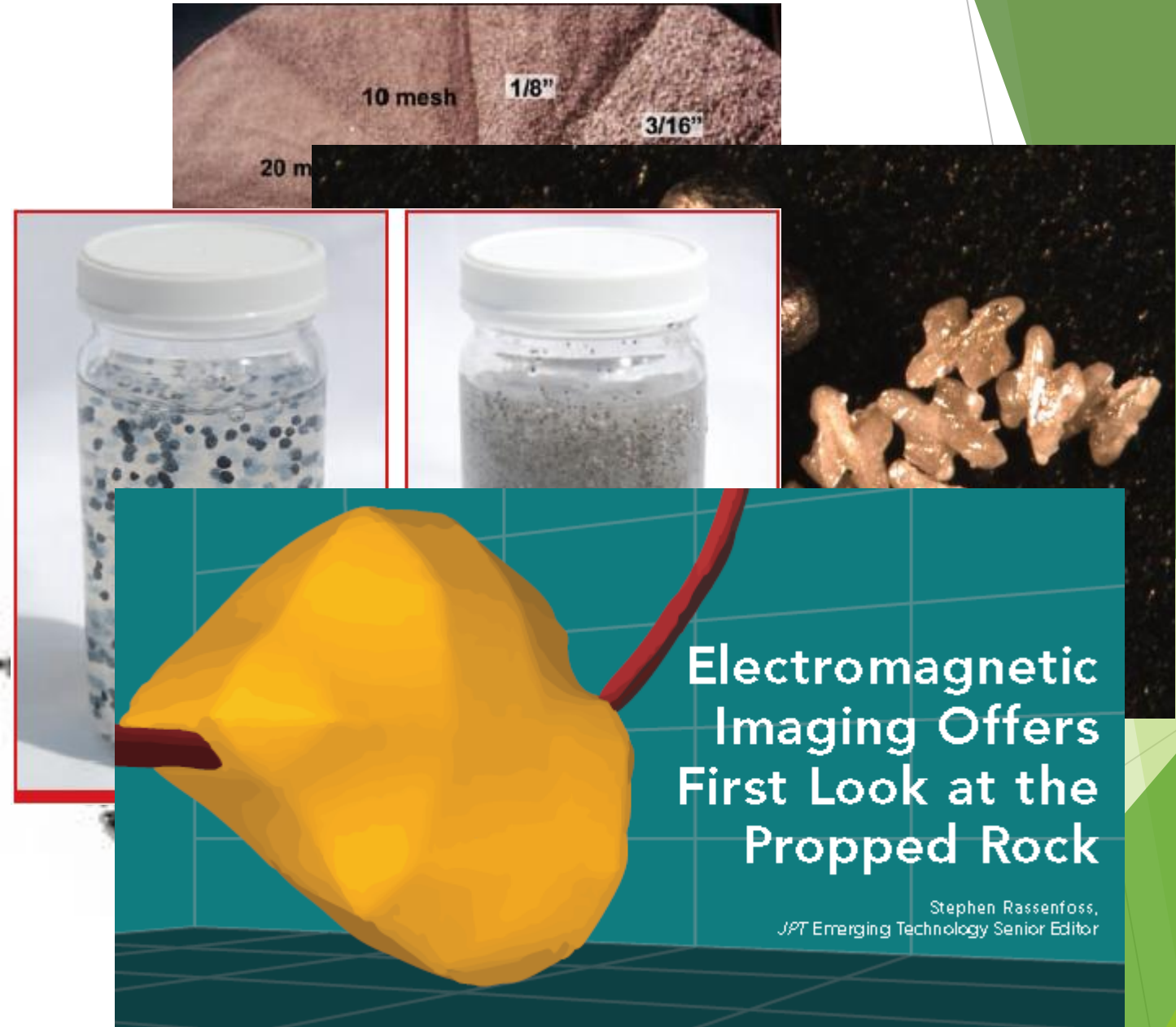
Enabling Technologies

Farther, Faster, Cheaper

- ▶ Fracturing Proppants / Fluids
- ▶ Fracturing Diversion
- ▶ Downhole Tools
- ▶ Engineered Completions
- ▶ Processes
- ▶ Data Analytics

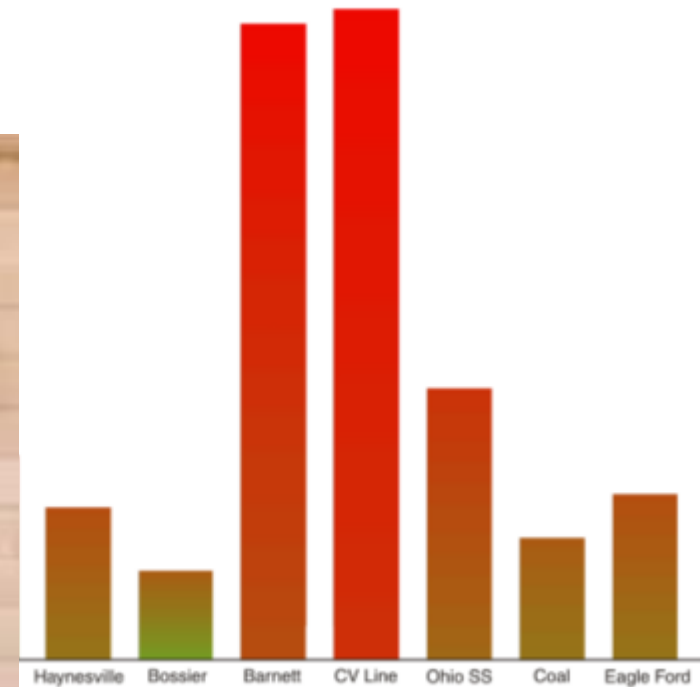
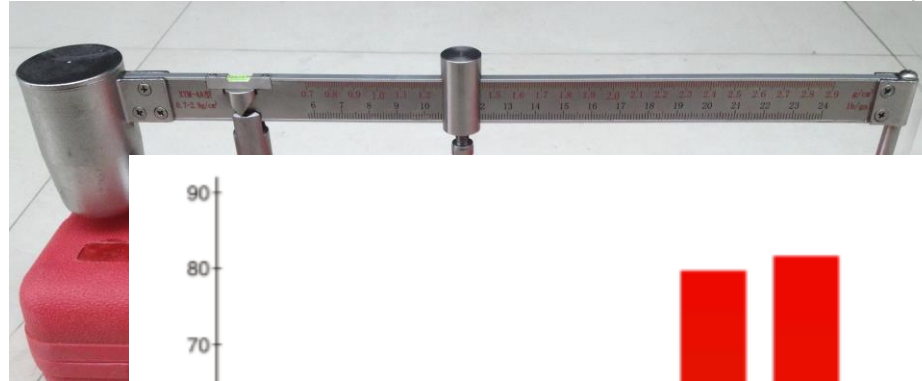
Proppants

- ▶ Micro Proppants
- ▶ Aspherical
- ▶ Lightweight
- ▶ Detectable



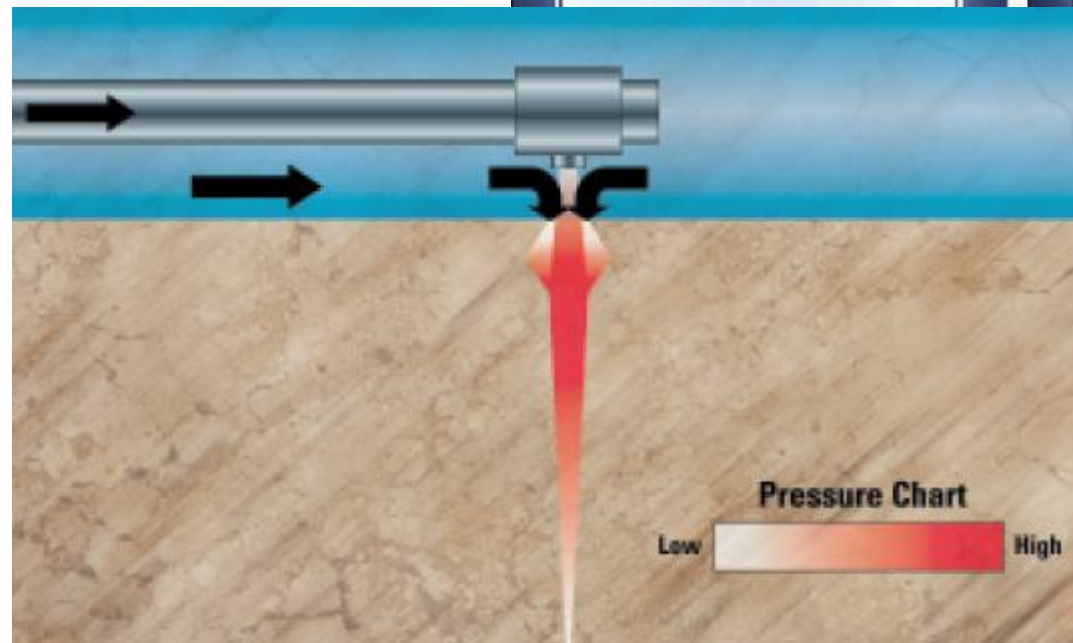
Fracturing Fluids

- ▶ Slickwater
- ▶ Linear / Crosslinked Gels
- ▶ ViscoElastic



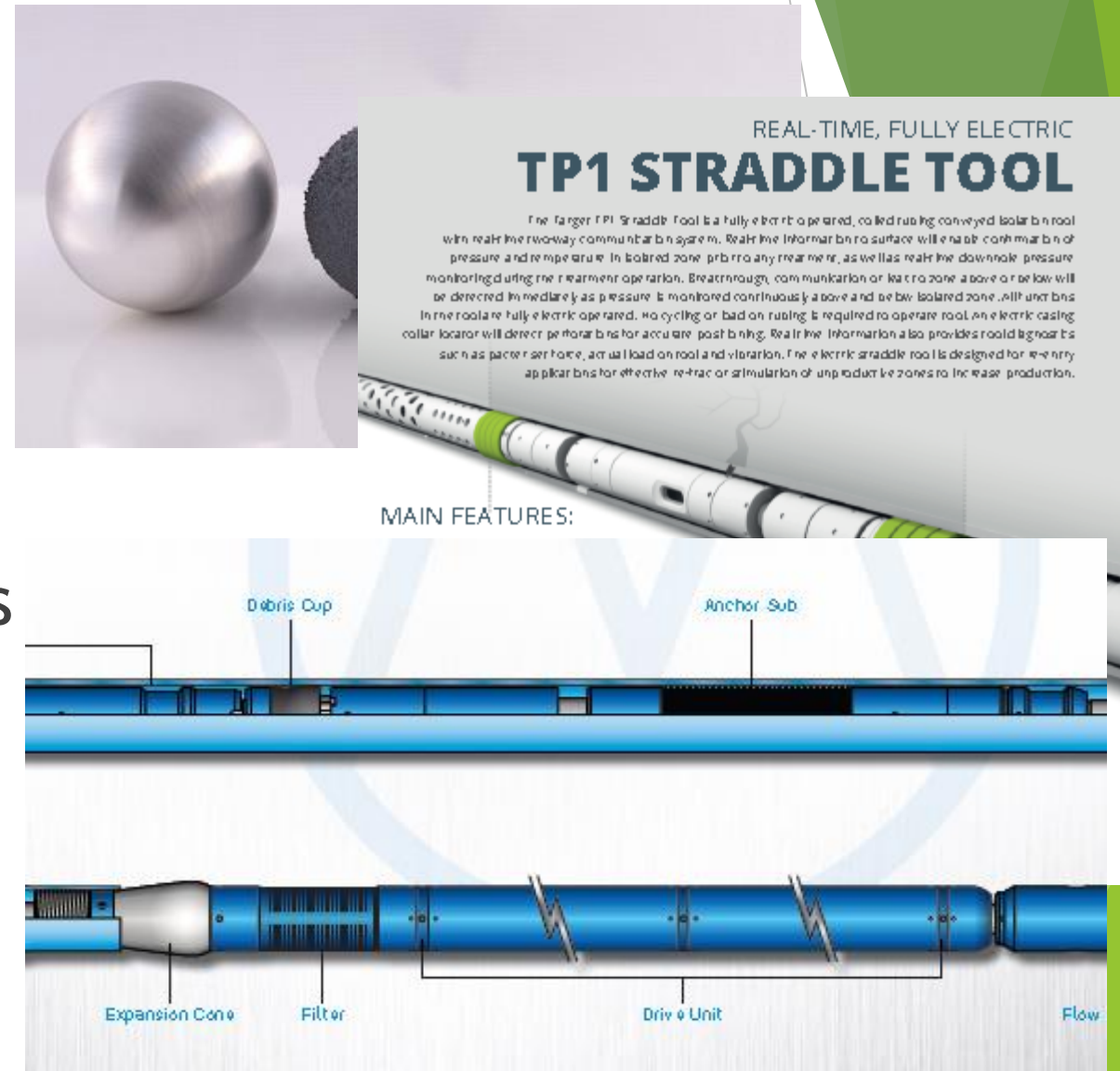
Diversion

- ▶ Sized Particles
- ▶ Fibers
- ▶ Fiber Balls
- ▶ Abrasive Tunnel



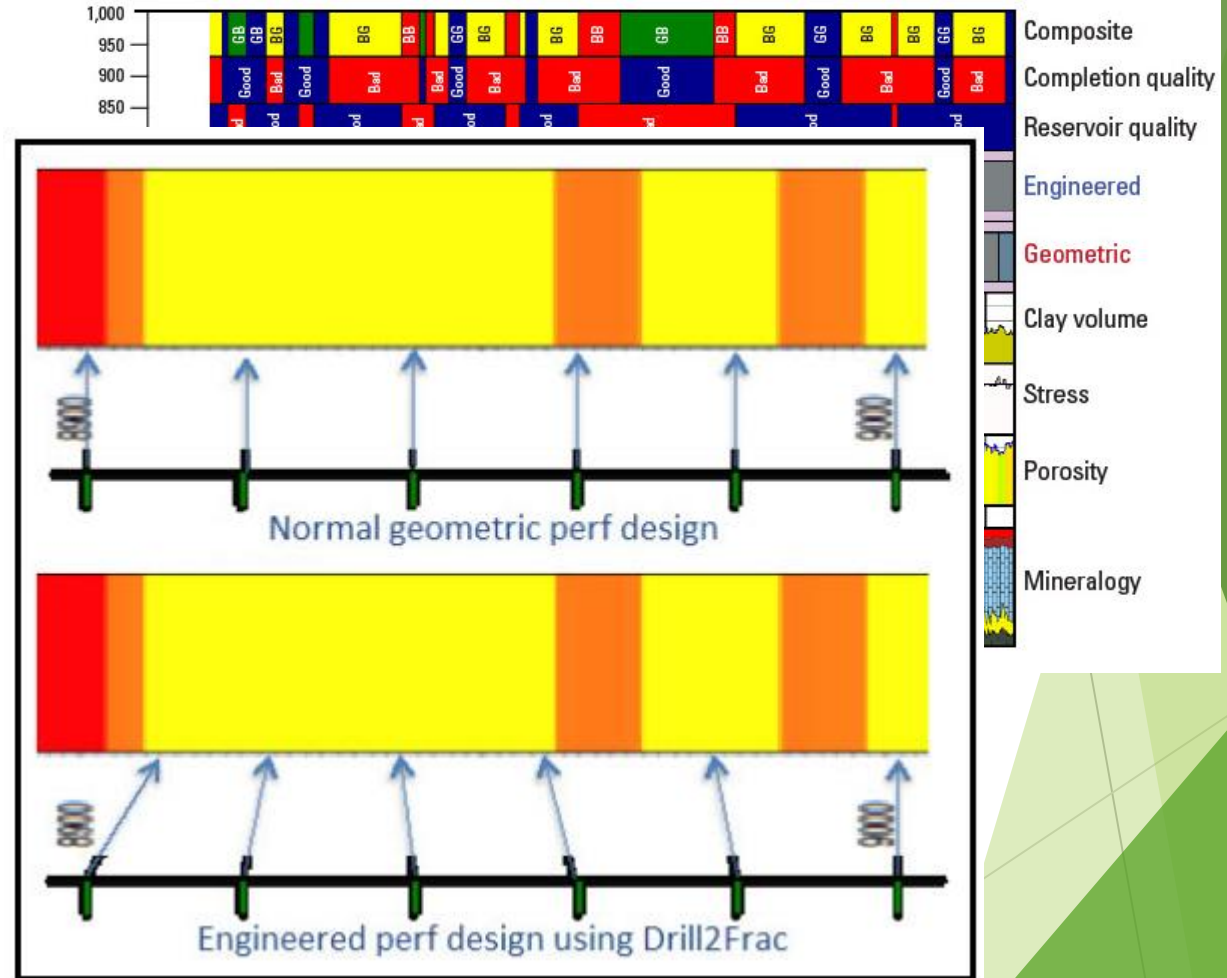
Downhole Frac Tools

- ▶ Dissolvable Components
- ▶ Straddle Packer Pinpoint Injection
- ▶ Expandable Patches & Plugs



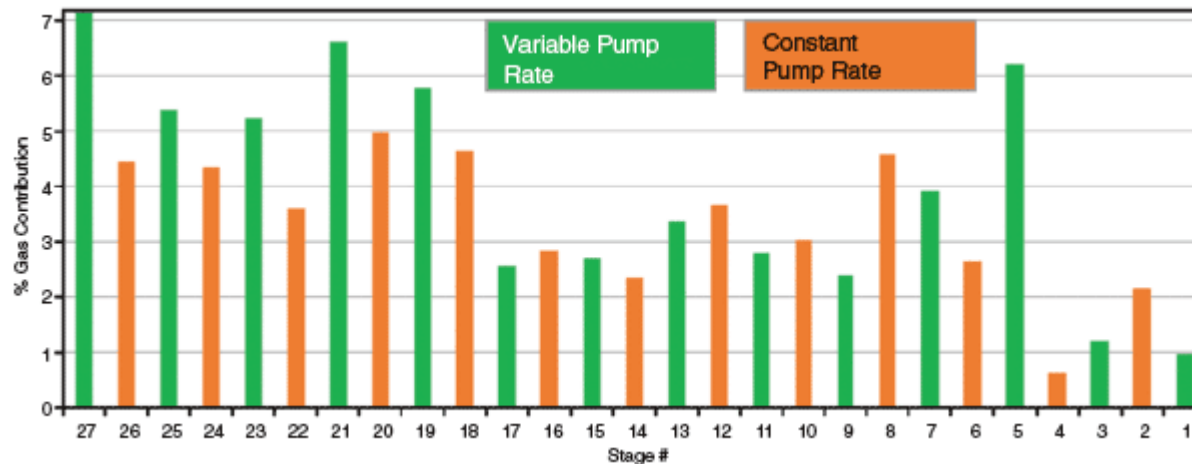
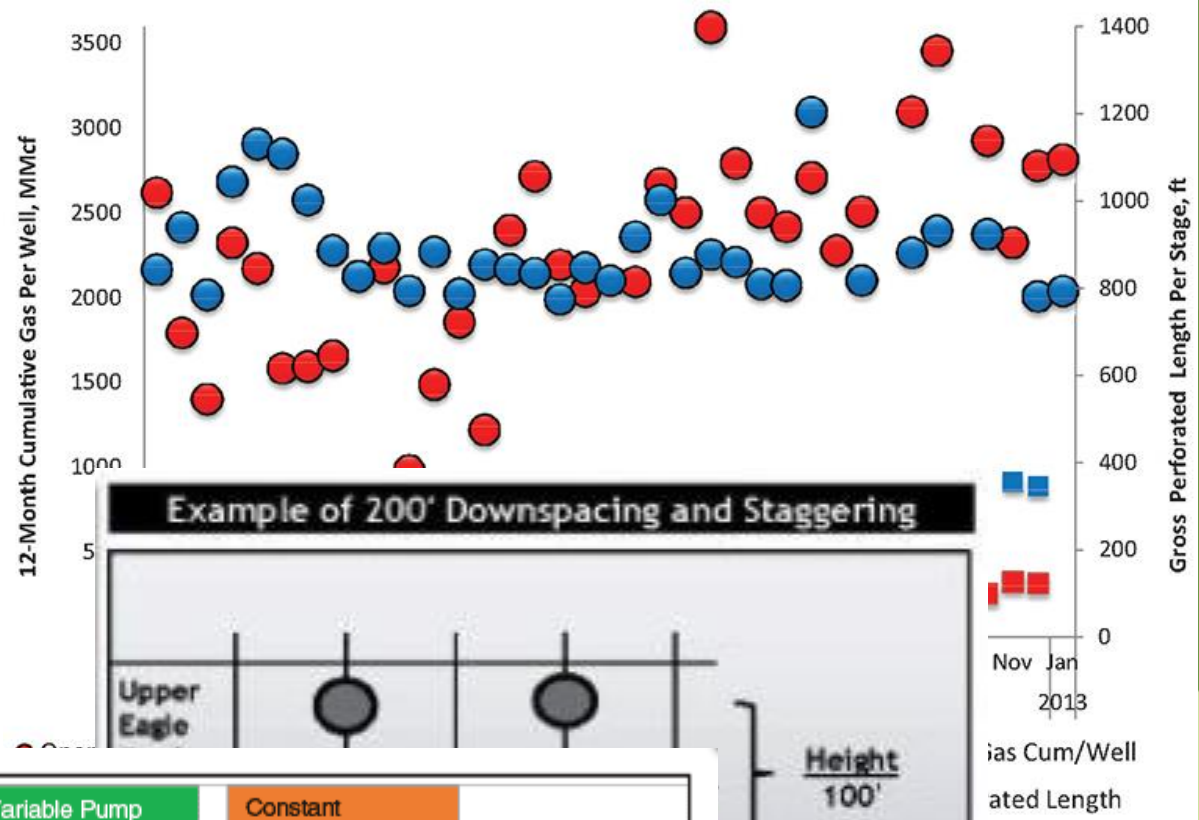
Engineered Completions

- ▶ Geometric Completion
- ▶ Engineered Completion - logs
- ▶ Engineered - Drilling Data



Improved Processes

- ▶ Stage / Cluster Spacing
- ▶ “Stagger Stack”
- ▶ Injection Rate Cycling



Data Analytics

“The Next Big Thing

- ▶ Processing, Sensors, Storage
- ▶ People replaced by Processors?
- ▶ Where ‘Big Data’ in unconventional next?

JPT

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PRESIDENT'S COLUMN

Big Data and the Next Big Thing

Janeen Judah, 2017 SPE President



SPE presidents are asked a lot of questions, and I suppose that's true of anyone who stands in front of an audience as an authority figure. I have learned to expect many of the same questions, no matter the audience: What will the price of oil do? When will the industry turn around? How is the industry managing post-Big Crew Change? What are you going to do to “fix” the situation of women in the industry? What is your view on climate change?

Thank you!
Questions?