

Investing in Oil, Gas, and Other Commodities

What You Need to Know

Not Your Typical Talk

- More discouraging than encouraging.
- Motivation?
 - Still empowering.
 - A Challenge! Let's duke it out!
 - Avoid pitfalls.
 - A case study for other industries?
 - It's just darn fascinating!
- Frameworks and Tools



Typical Skydive:

- 13,000 feet altitude
- 1 min. Freefall

This would be ~4 min free fall

Kola Superdeep Well ~ 40,230 feet deep!!!!!!!!!!

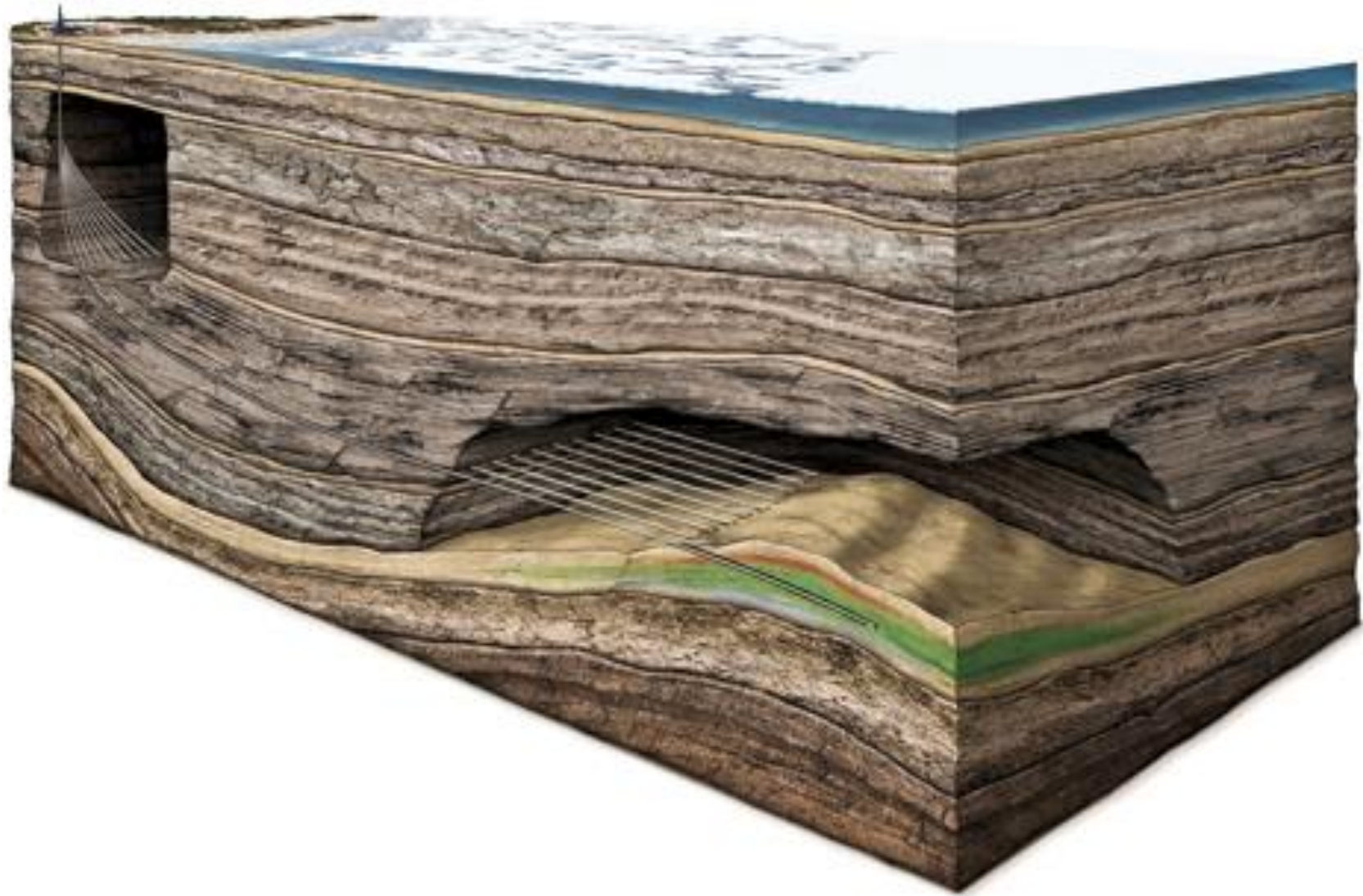
6 inch diameter!

1 unit width → 80,000 units
length

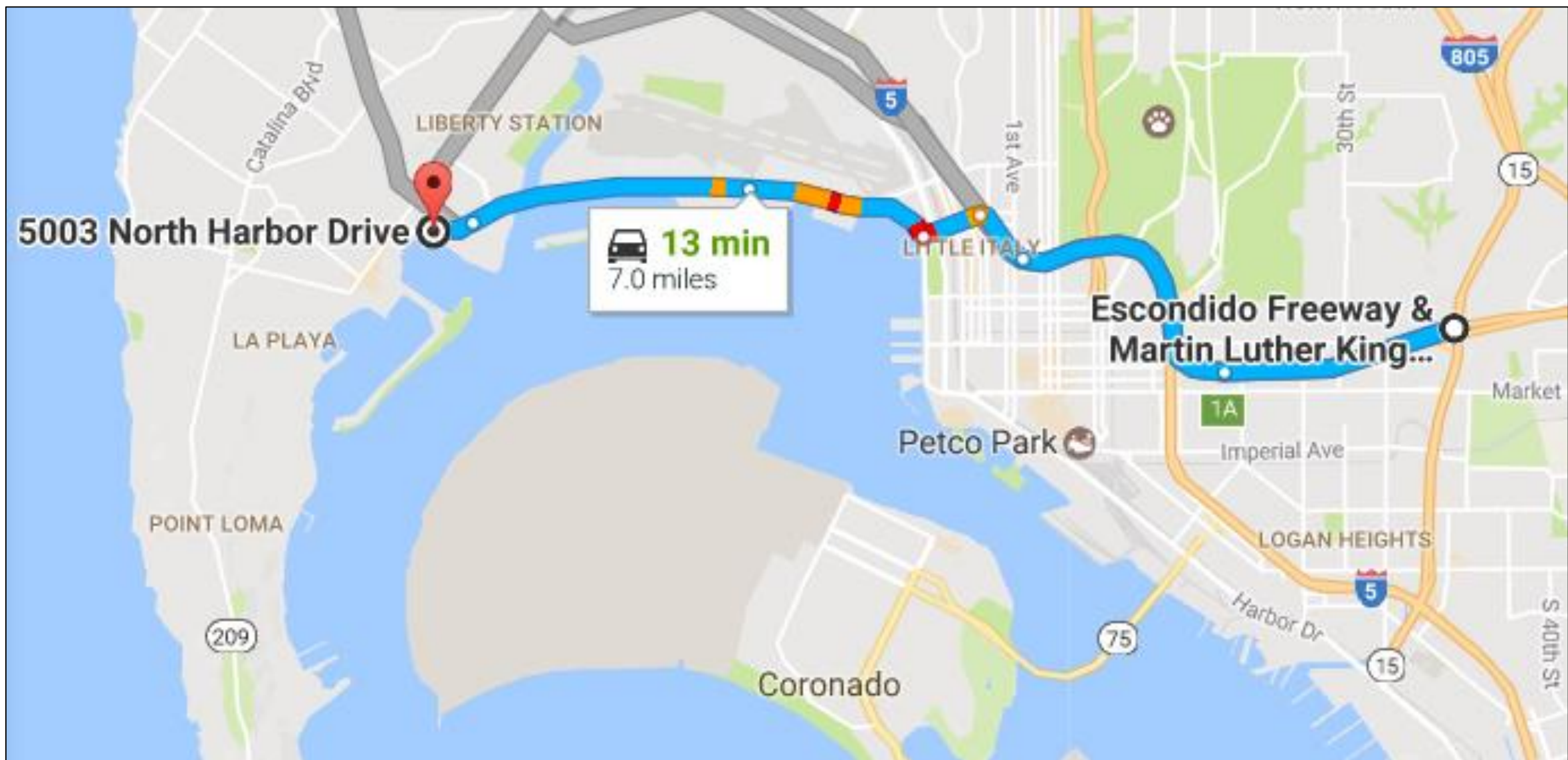
Human Hair: 17 to 181 μm

- 4.5 to 47.8 ft





Sakhalin-I: Over 7 miles horizontal displacement.



Fascinating?

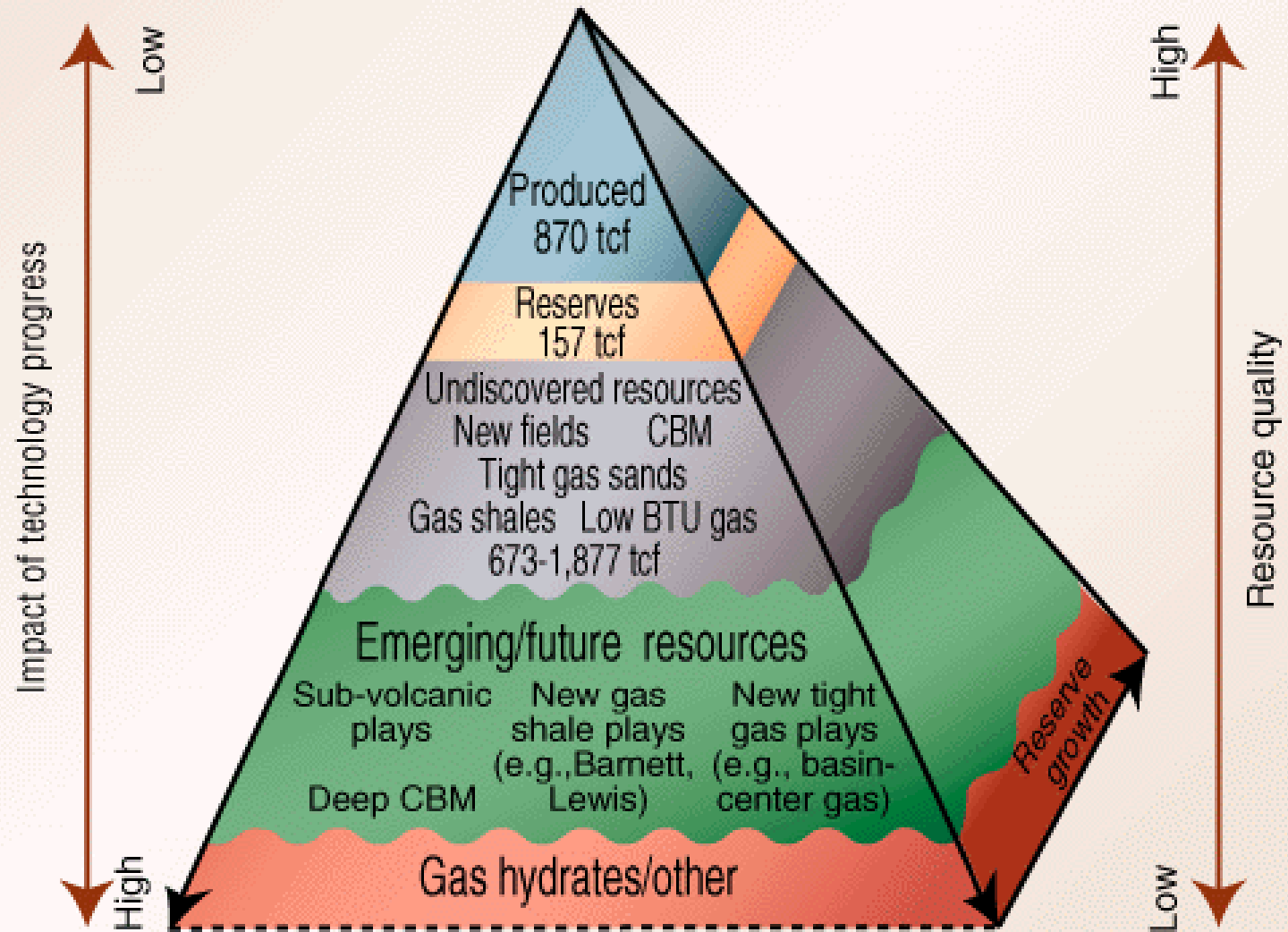
- Market Complexity
 - Globally integrated (except for NG)
 - Political “Oil Weapon”
- Technological Feats
 - Deepest well ever drilled.
 - Gamma rays, MRIs, Nuclear Logs, etc.
 - Directional drilling.
- Which is why we are never going to run out!!! (next slide)

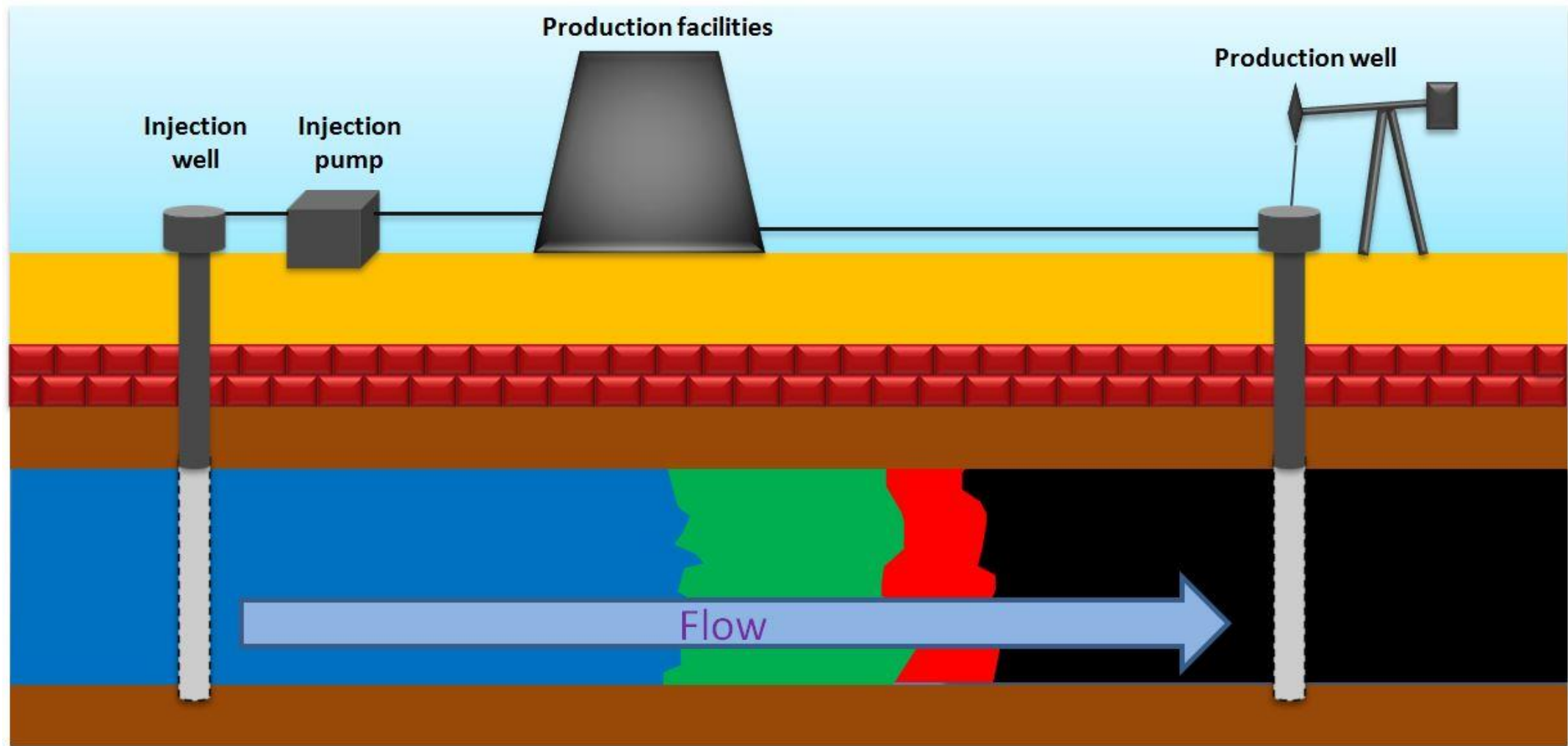
Don't speculate on PRICES (running out)

- Never, ever, ever, ever speculate on where *global* oil or gas *prices* are going.
- We will never run out:
 - Only a fraction recovered from existing projects
 - Oil Shale in Colorado
 - Oil Sands in Canada and Venezuela
 - Methane Hydrates
- Beware sweeping, global narratives
 - Thomas Malthus – “The Coal Question”
 - Matthew Simons – *Twilight In The Desert*
- Consumable, non-agriculture commodities.
 - Gold – It's never destroyed, so it doesn't disappear at some point.
 - Agriculture – We have a high level of confidence in our ability to create more.

THE NATURAL GAS RESOURCE PYRAMID

Lower-48 States






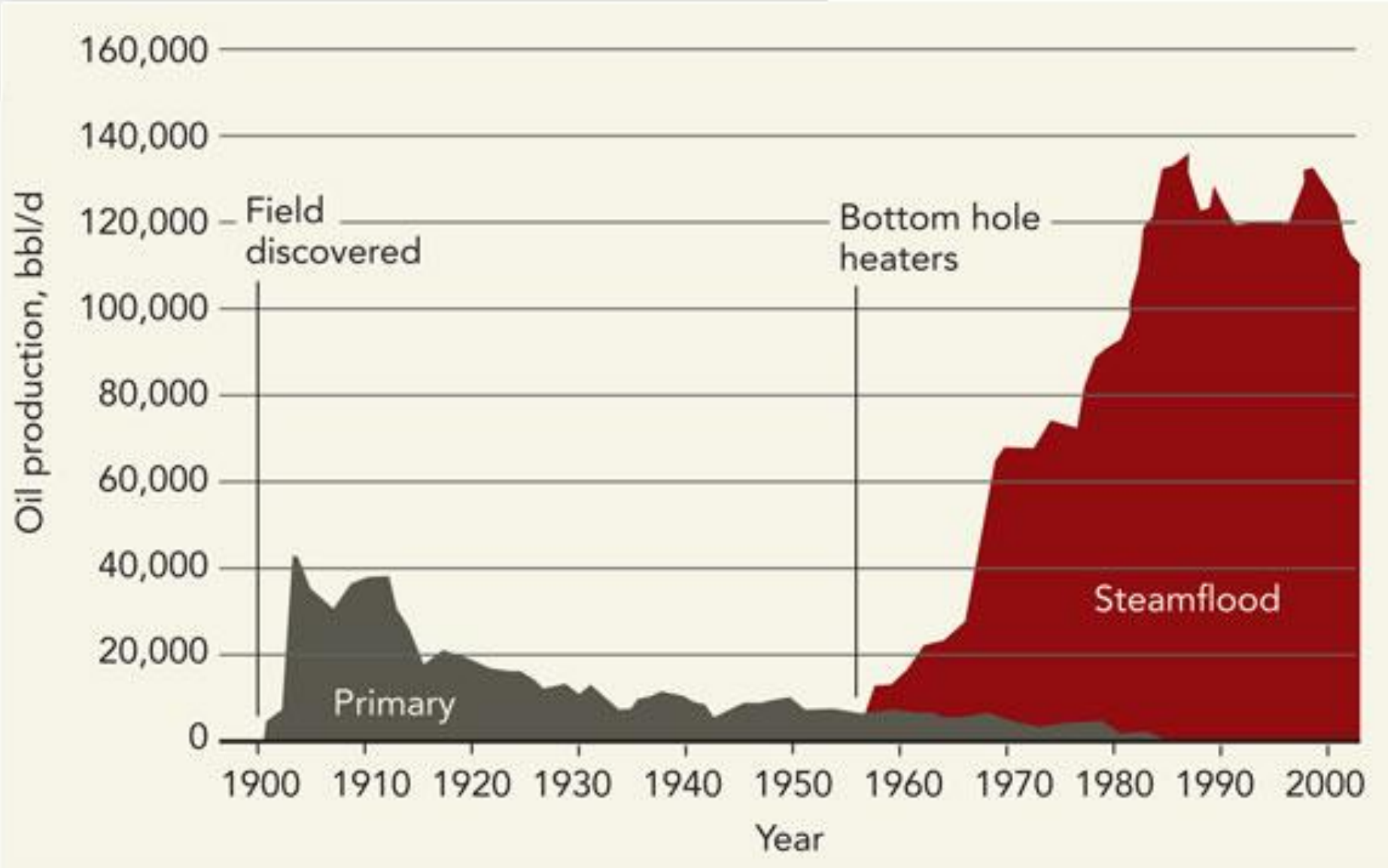
 - Drive water

 - Polymer solution

 - Surfactant

 - Oil and water

KERN RIVER PRODUCTION CHART



Kern River, California

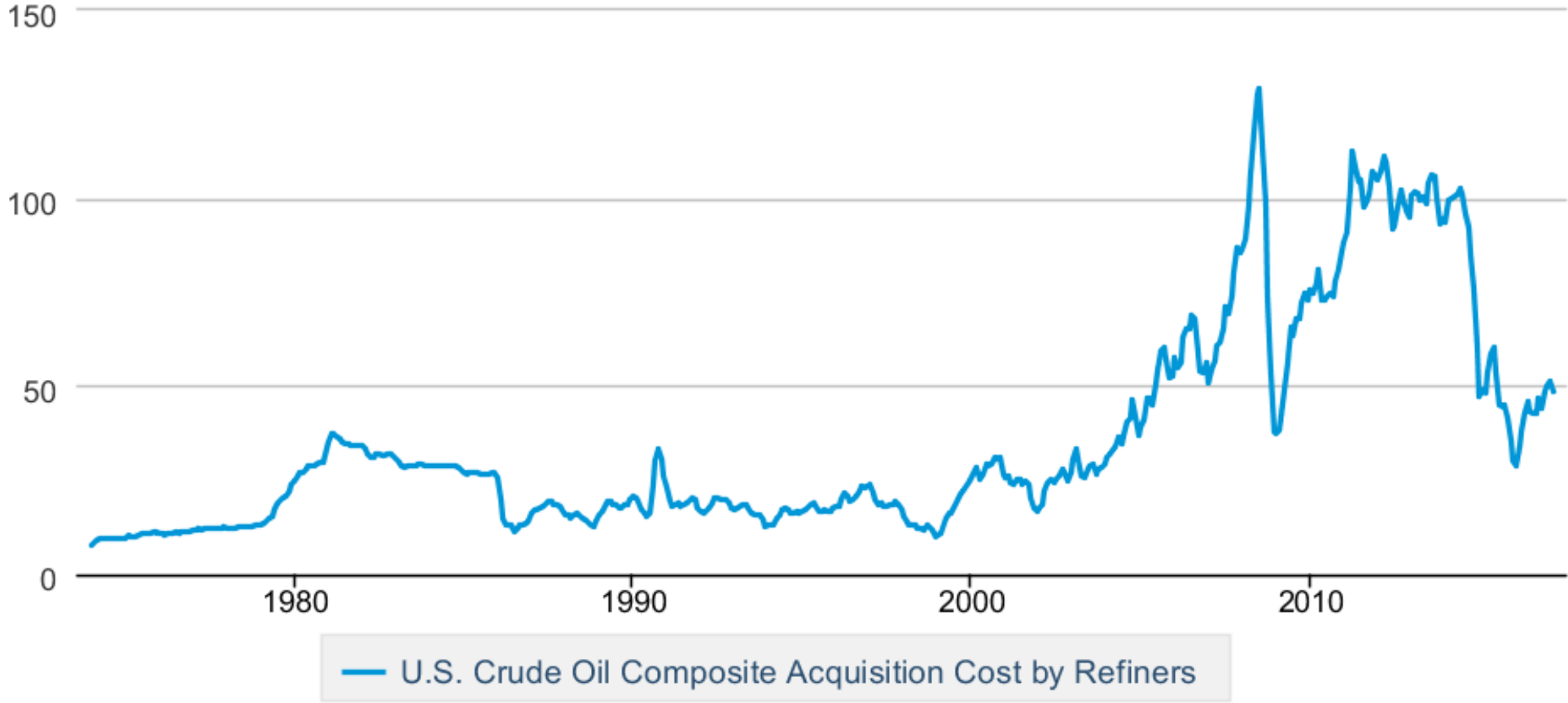


Duri, Indonesia



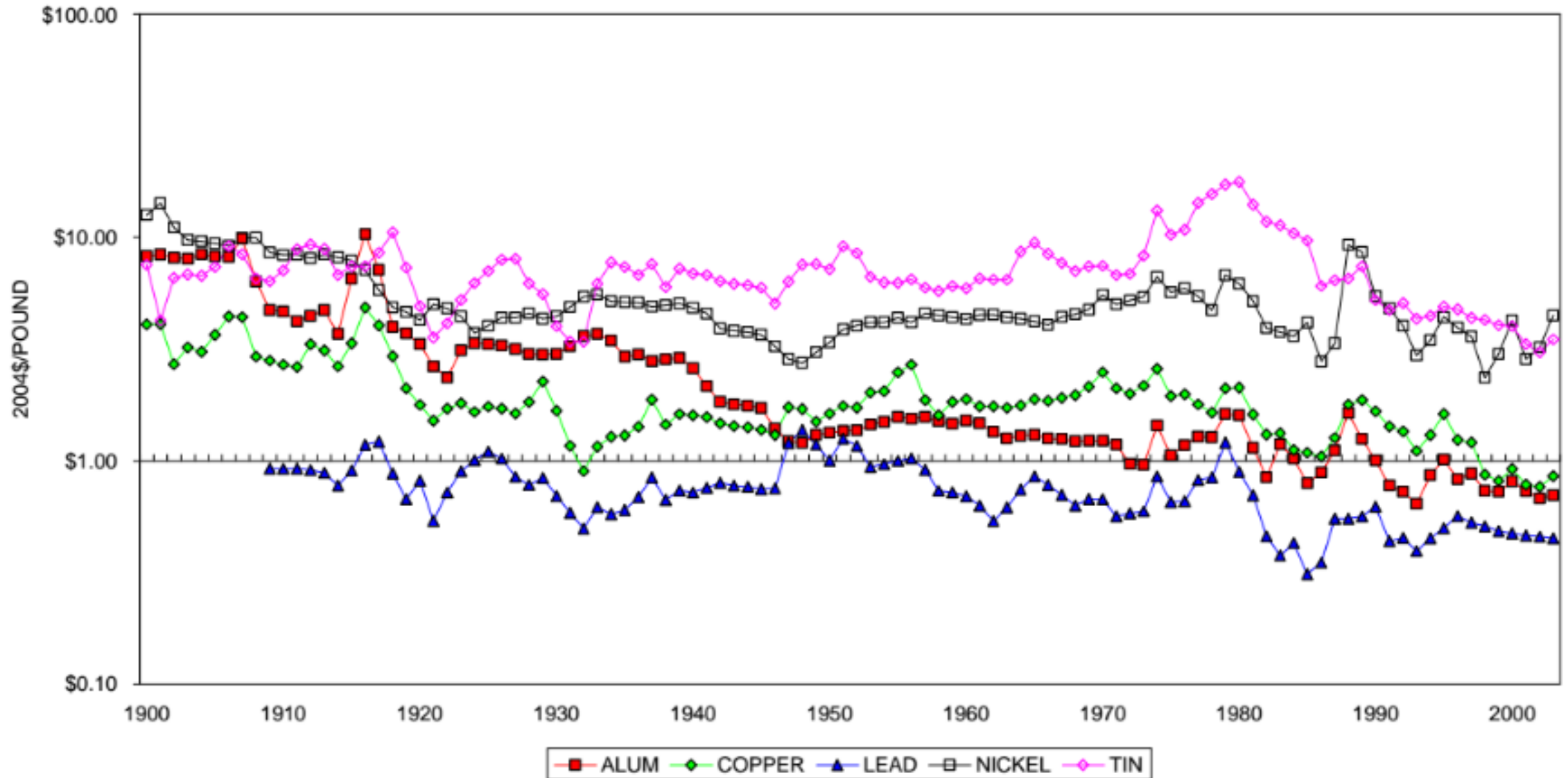
U.S. Crude Oil Composite Acquisition Cost by Refiners

Dollars per Barrel



Source: U.S. Energy Information Administration

Mineral Prices (log scale)

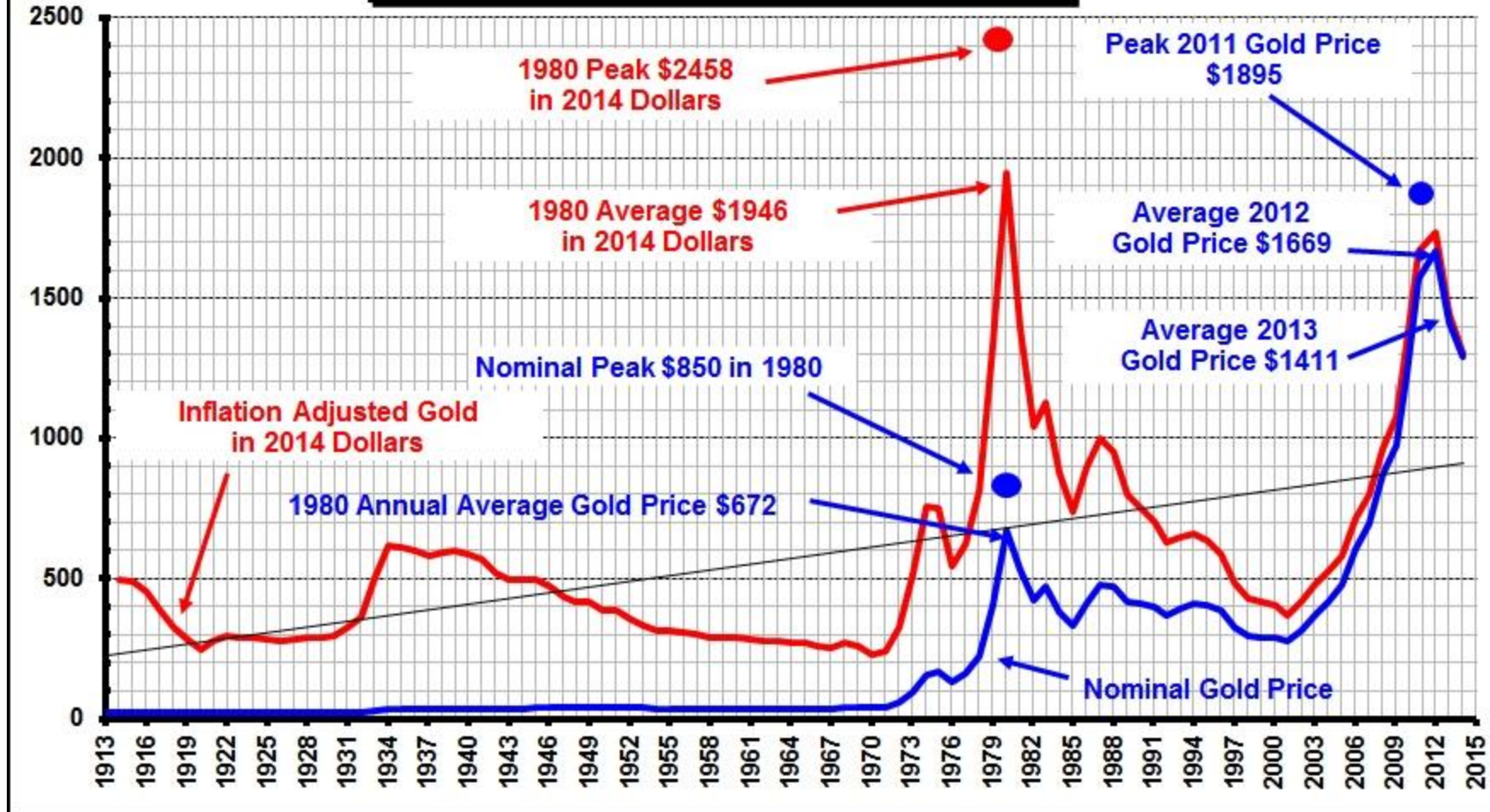


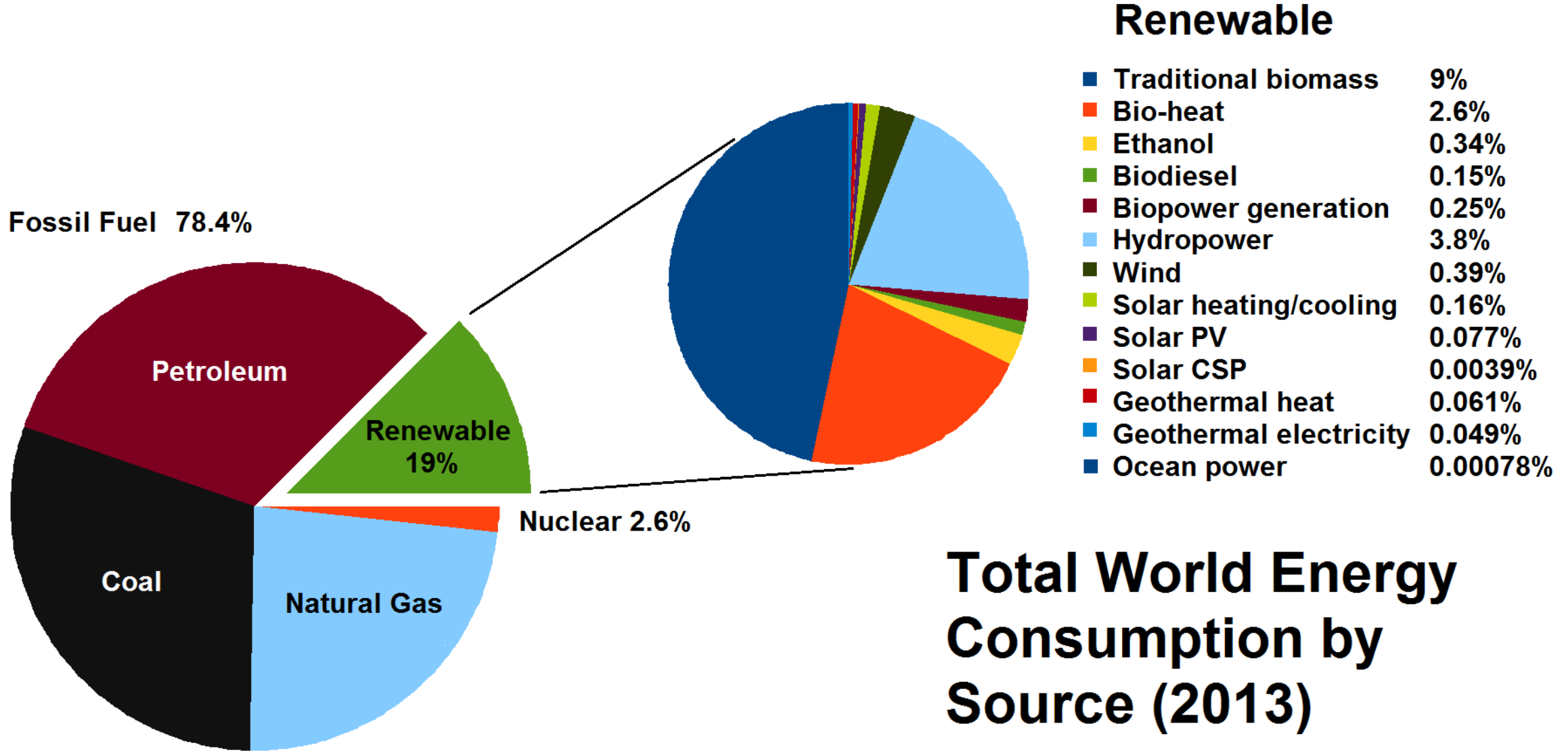
Inflation Adjusted Annual Average Gold PRICES (1914-Current)

In August 2014 Dollars

© www.InflationData.com

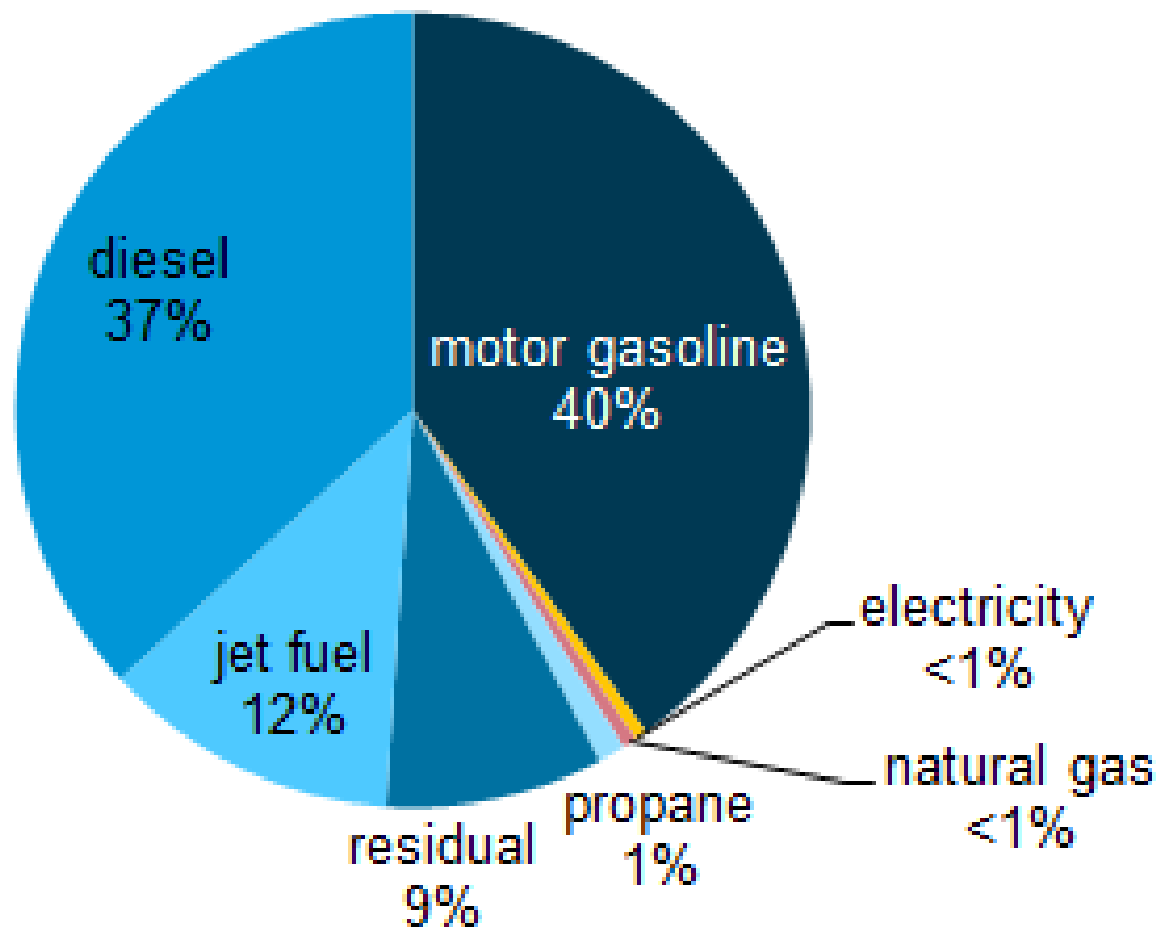
Updated September 2014





World transportation consumption by fuel, 2012

percent of world total (energy equivalent basis)



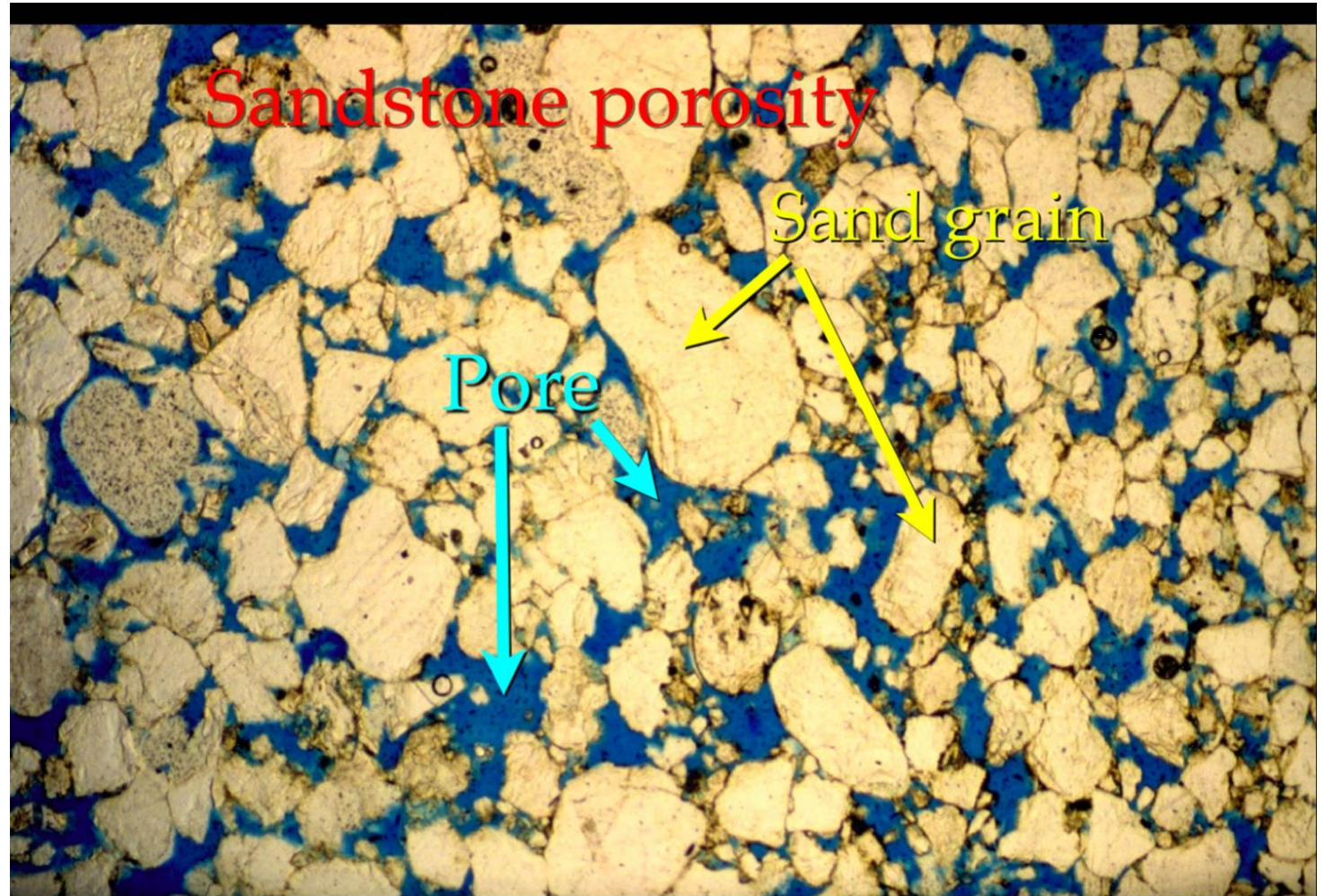
total = 103 quadrillion Btu

If You Insist

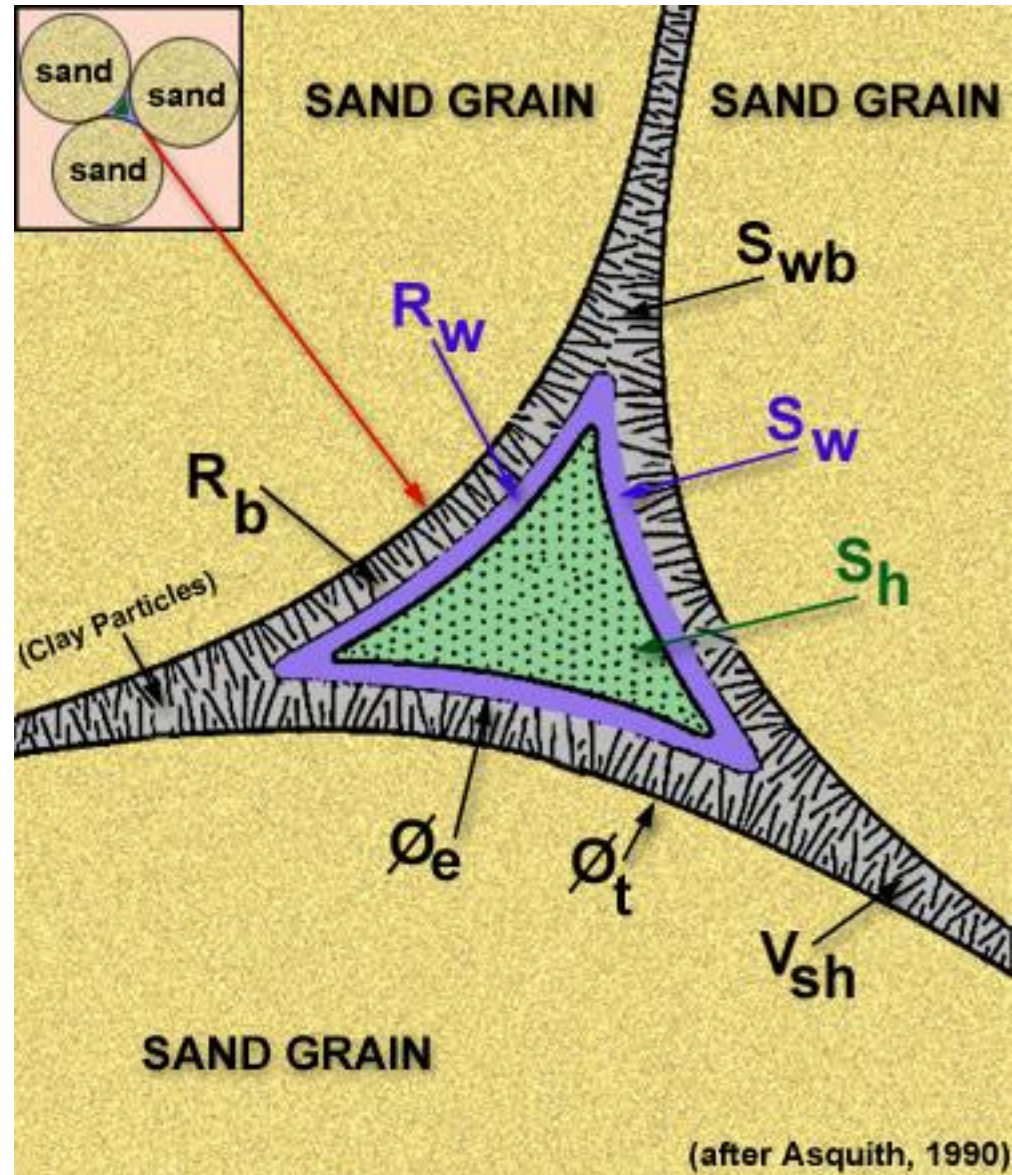
- Tendency to underestimate short-term disruptions.
 - And how hedging can extend effects.
- Tendency to underestimate long-term equilibrium (i.e. that at some point the cost of supply takes over).
- Be wary of global narratives.
- Better odds predicting *directional, relative, regional* changes.

Quick Primer

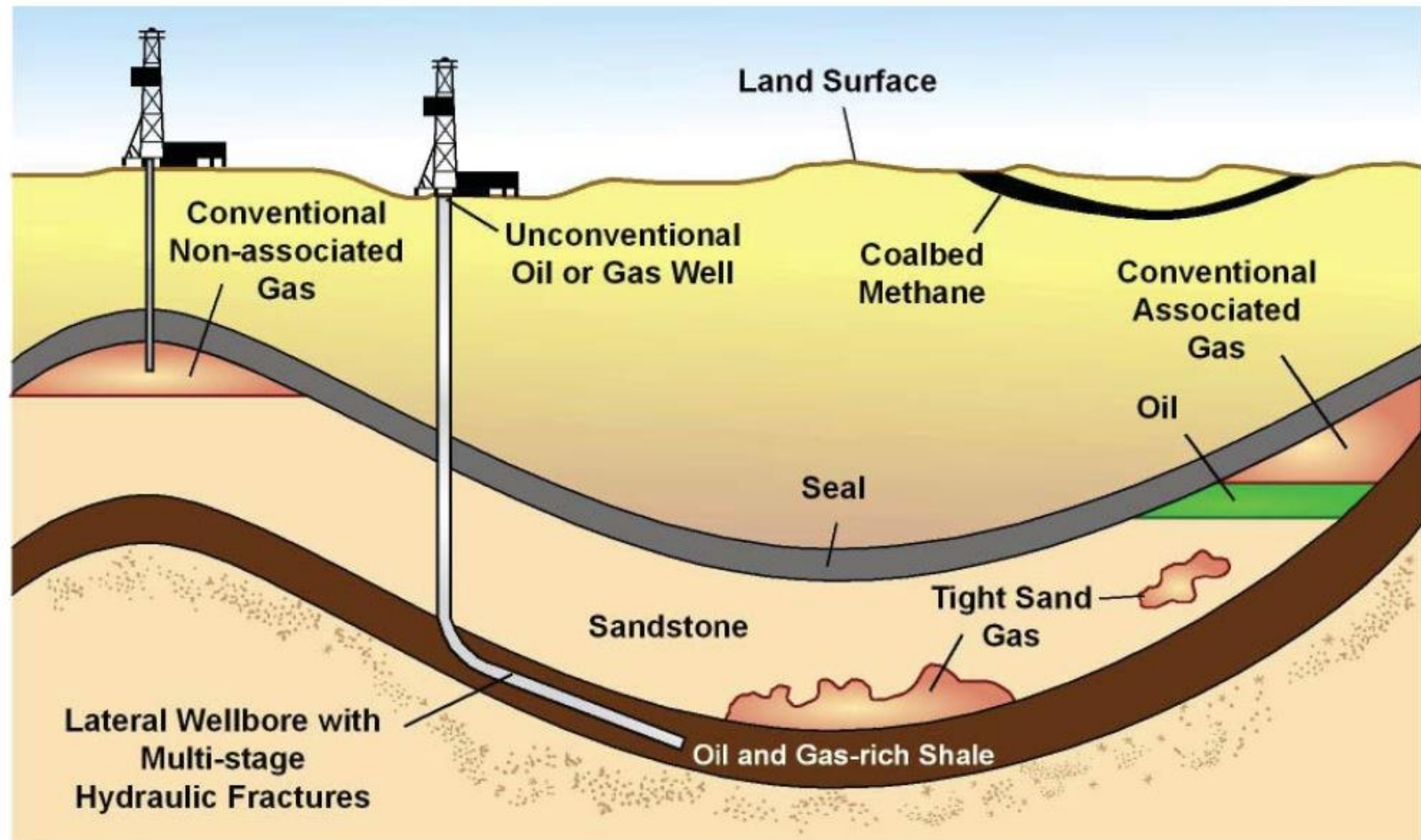
- Upstream (aka “Exploration & Production” or “E&P”)
 - Drilling, “Fracking”, etc.
- Midstream
 - Interstate Pipelines (sometimes more)
- Downstream
 - Refineries



Inside the Matrix!!!

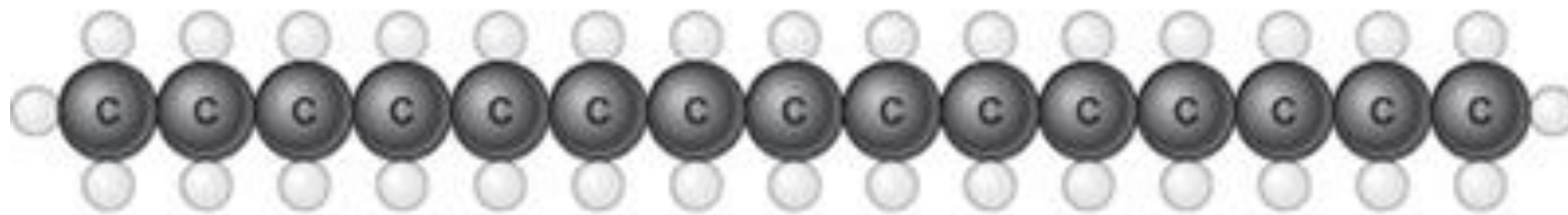


The Geology of Conventional and Unconventional Oil and Gas



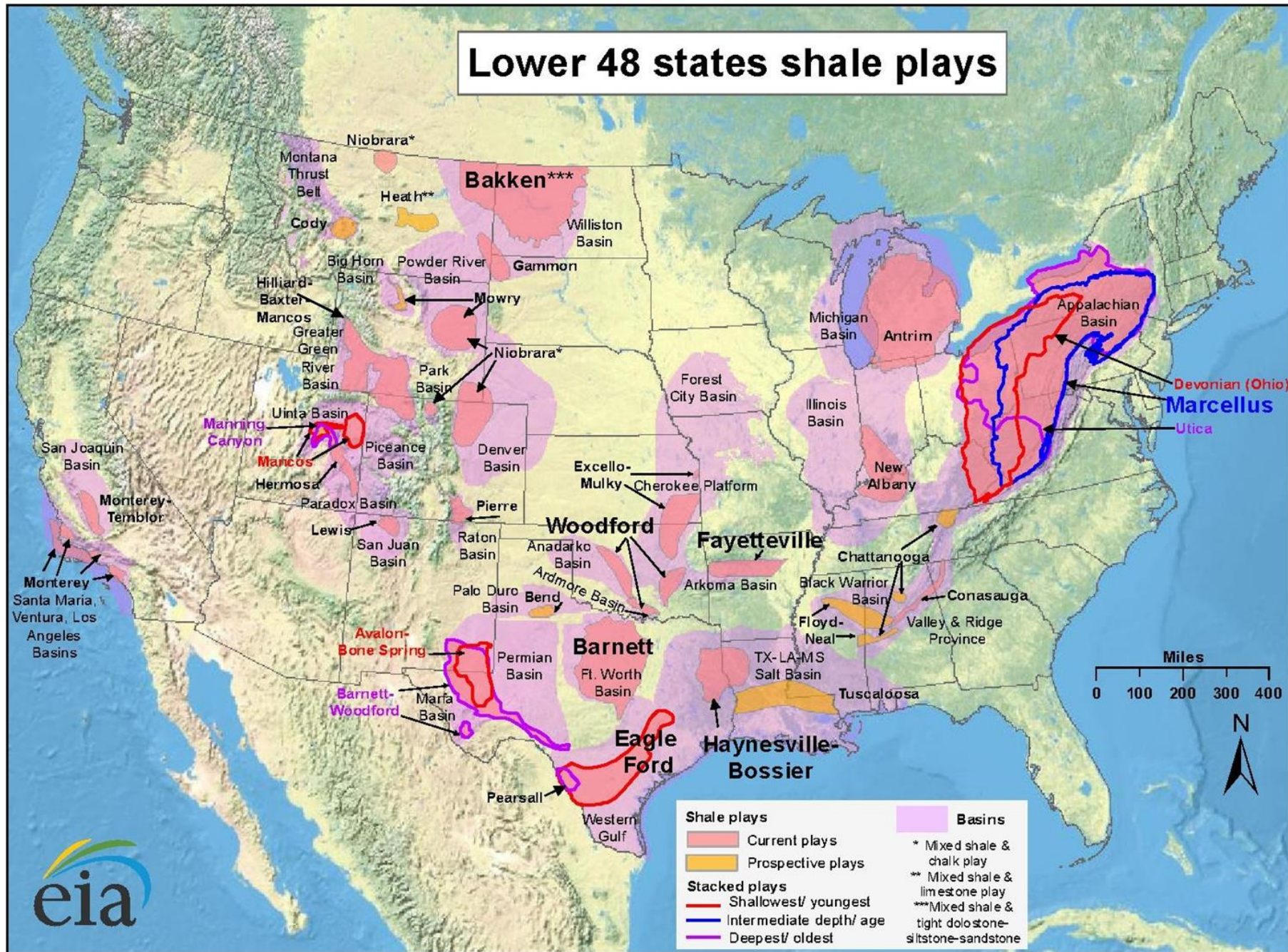
Source: EIA

Spectrum

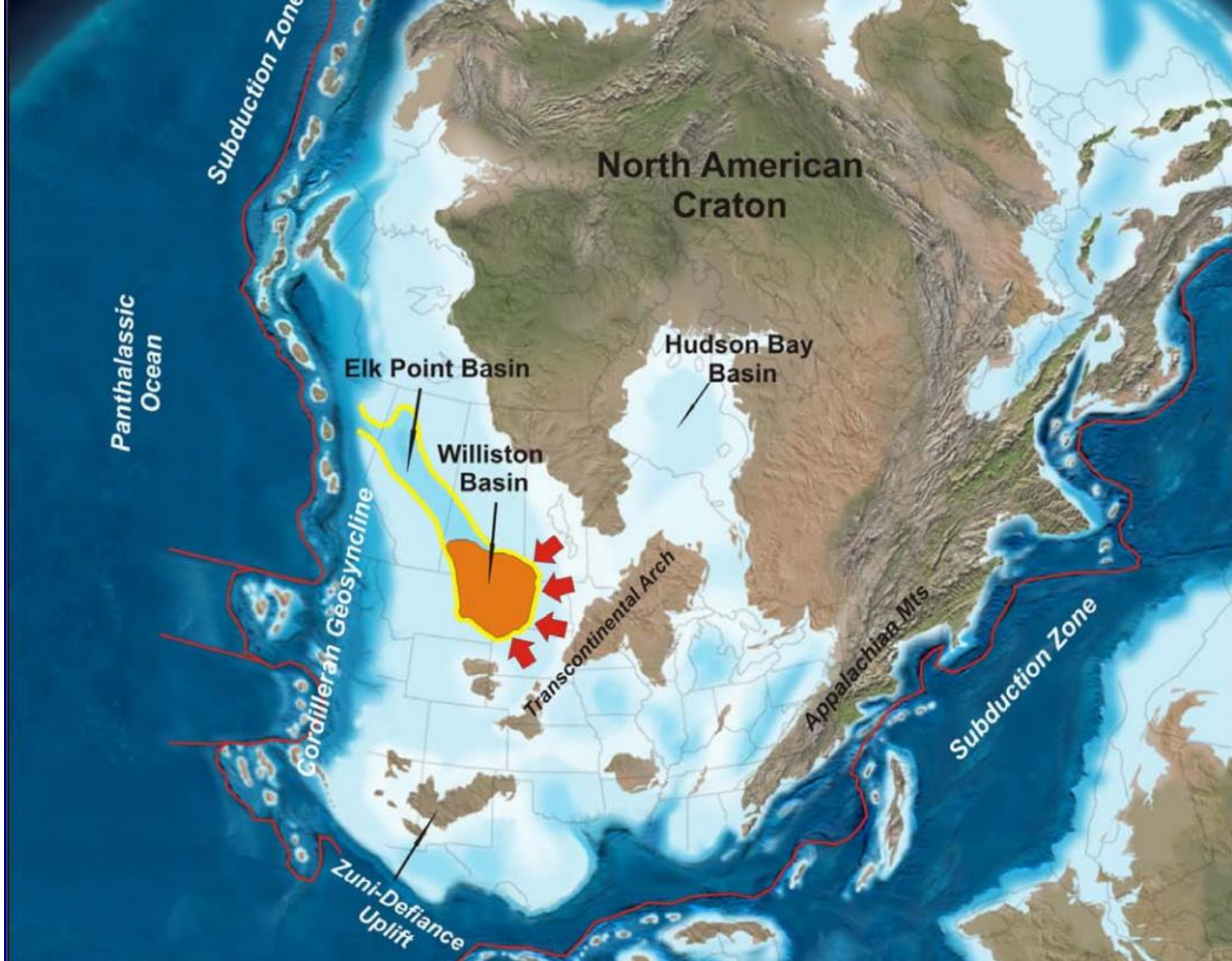


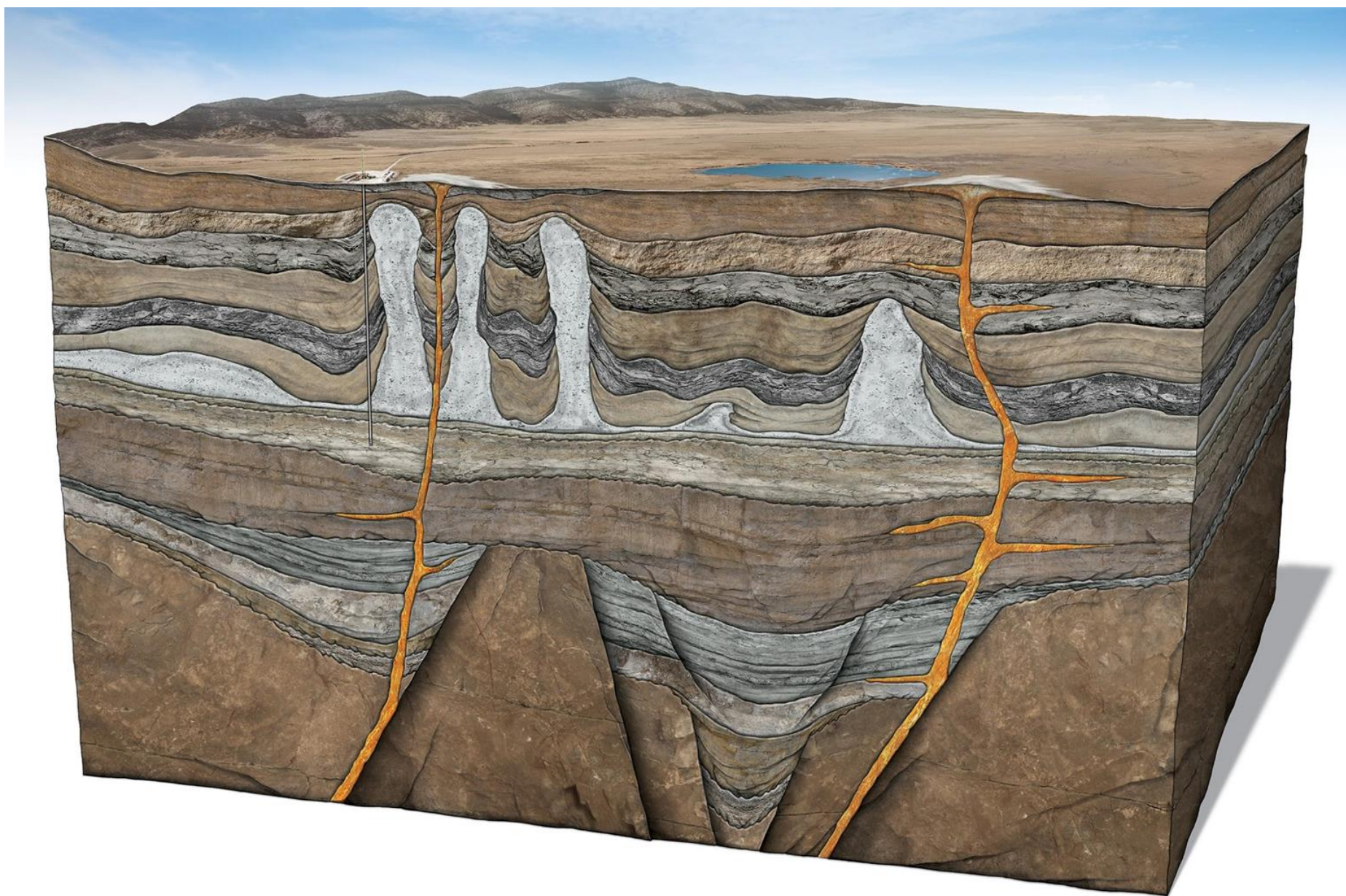


Lower 48 states shale plays



Source: Energy Information Administration based on data from various published studies. Updated: May 9, 2011

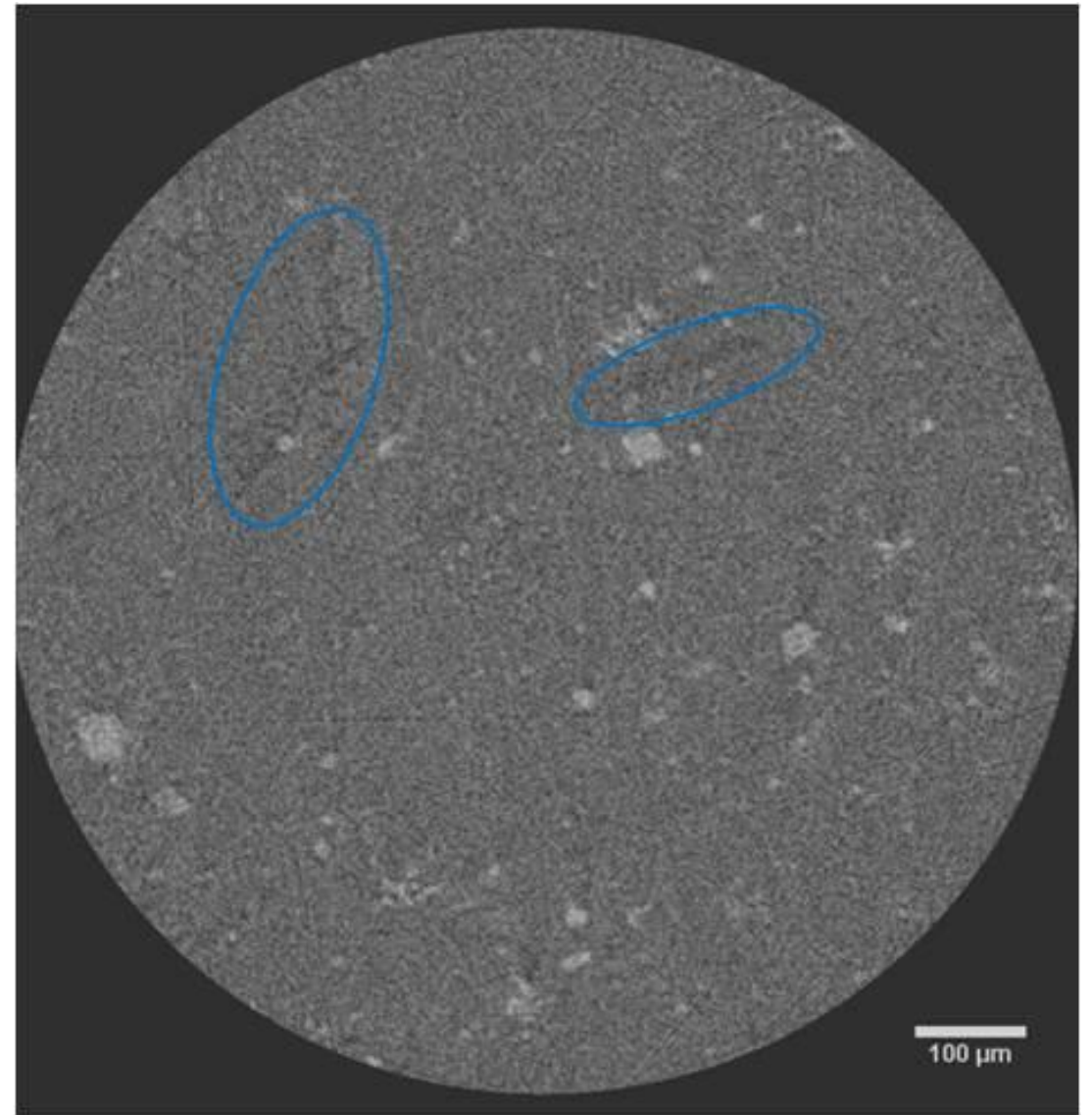
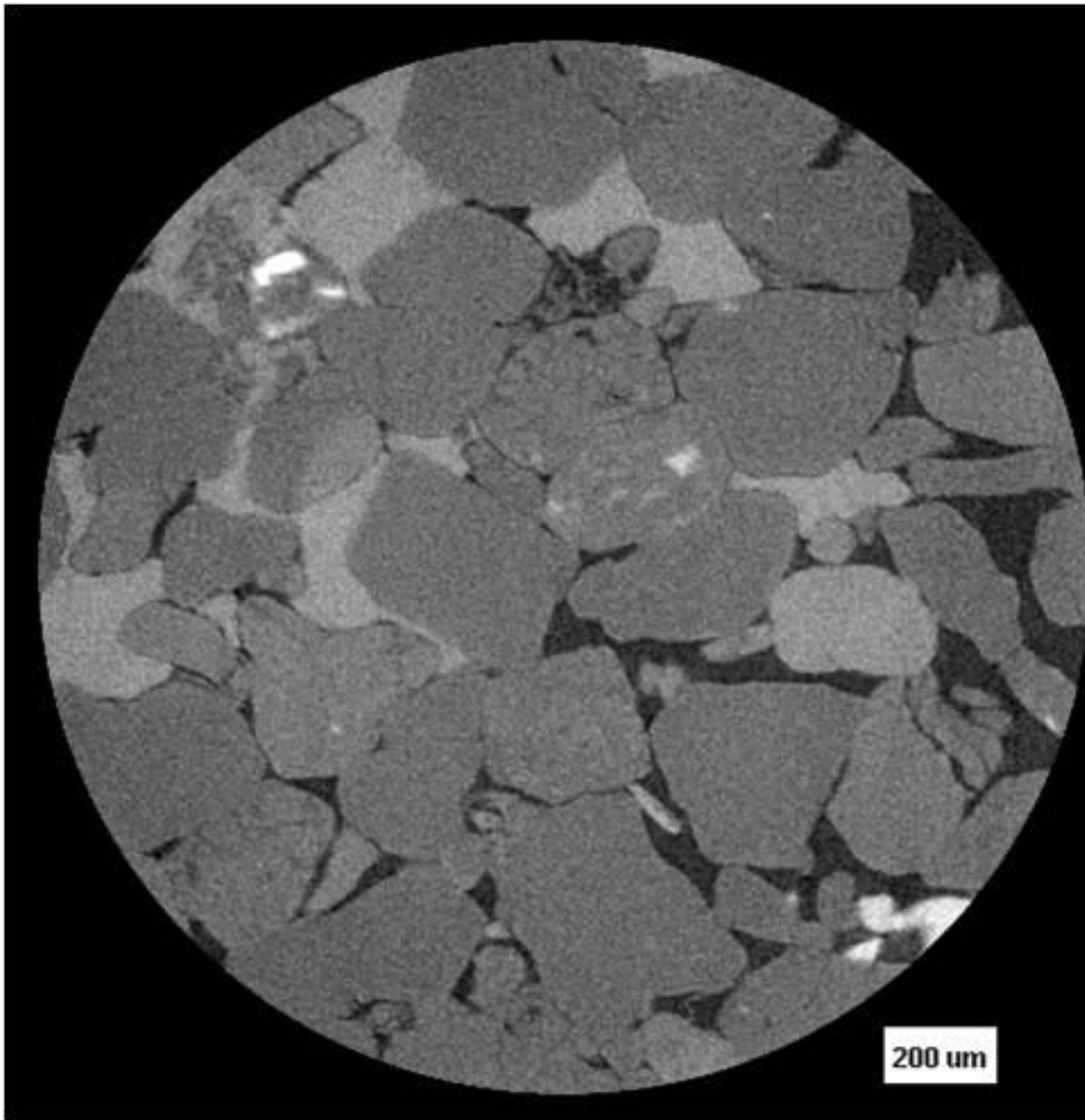




www.geoart.com

Shale Revolution





1 - 100 nanometer pore spaces

Rulison Atomic Explosion Shakes Earth in Big Area

Atomic Research
RMN 9-11-69 P. 1, 6
By GEORGE KANE
Rocky Mountain News Writer

GRAND VALLEY, Colo.—The wind was finally right Wednesday—after six days of being wrong. The ground rolled, like sea waves. Rock slides poured down from more than a dozen peaks in the surrounding mountains. A little girl cried hysterically, and her mother held her and comforted her.

Project Rulison, the 40-kiloton underground nuclear blast seven miles south of here, was triggered on schedule. The explosion shook a wide area.

At exactly 3 p.m. Wednesday, Atomic Energy Commission (AEC) scientists pressed the button that detonated the bomb designed to unlock some 12 trillion cubic feet of gas which is trapped 8,442 feet under the Rulison Field.

The success of the joint government-private industry venture will not be known immediately, but officials at the site of the explosive experiment tentatively termed it an apparently "good shot."

There were widely scattered reports of minor damage within a 10-mile radius of the blast site. In Grand Valley, several brick chimneys were tumbled and a twin chimney on one home toppled down 15 feet away from an elderly woman watching the explosion site. She wasn't injured.

Heavy shock waves rumbled through the Grand Valley area within three seconds after the nuclear device was detonated, causing slides visible on more than a dozen mountain peaks.

Small bands of protesters reportedly were in the area of the blast—which had been sealed off 1½ hours before the

shot by law enforcement agencies—but helicopter sweeps of the mountainsides revealed only five persons.

All were reportedly brought down by helicopters—two of them in the vicinity of the observation site for the blast.

The pair, a young man and woman, refused to identify themselves. They were taken into custody by Deputy U.S. Marshal Wallace Allen. A Garfield County deputy sheriff said the pair would be charged with trespassing.

Inside the five-mile blast area perimeter, structures were shaken, a couple of windows cracked, some groves of aspen trees downed, but an inspection of the area showed only minor damage.

A few telephone lines leading to the site of the blast, being developed by Austral Oil Co., were also downed. A geiger counter reading showed absolutely no traces of radioactivity in the area a half-hour after the detonation.

A minor disruption took place immediately before the blast. Since early

morning, about 40 pickets protesting the experiment had been stationed outside the observation area, which consisted of a large tent put up on a mesa 2½ miles east of Grand Valley.

Aspen businessmen, artists, women and high school students in the group protested the impending explosion, debating with AEC and other officials who stopped at the gate.

One—Tom Benton, owner of Benton Studio Gallery in Aspen—extracted from CER Geonuclear Corp. civil engineer Hal Aronson a statement that, should Rulison prove successful, as many as 100 other such nuclear detonations are on the drawing board.

"We admire your public spirit," Benton told him.

"Thank you," Aronson said. "This is going to be the Pittsburgh of the West," Benton said.

"I don't think so," Aronson said, explaining the purposes of the project and

**Another story and more pictures on Page 5.
Full page of pictures on Page 94.**

citing the minimal danger. "I was born and raised in Colorado. I don't want it ruined, either."

"Do you live here now?" Benton asked.

"No."

"You're using nuclear power like dynamite," Benton told him.

"What else are you going to use?" Aronson asked.

"The pill," Benton said.

Project Rulison, sponsored by Austral Oil Co. to the tune of some \$6 million, and the federal government with a more than \$1 million tab, was an explosion twice the force of the atomic bomb



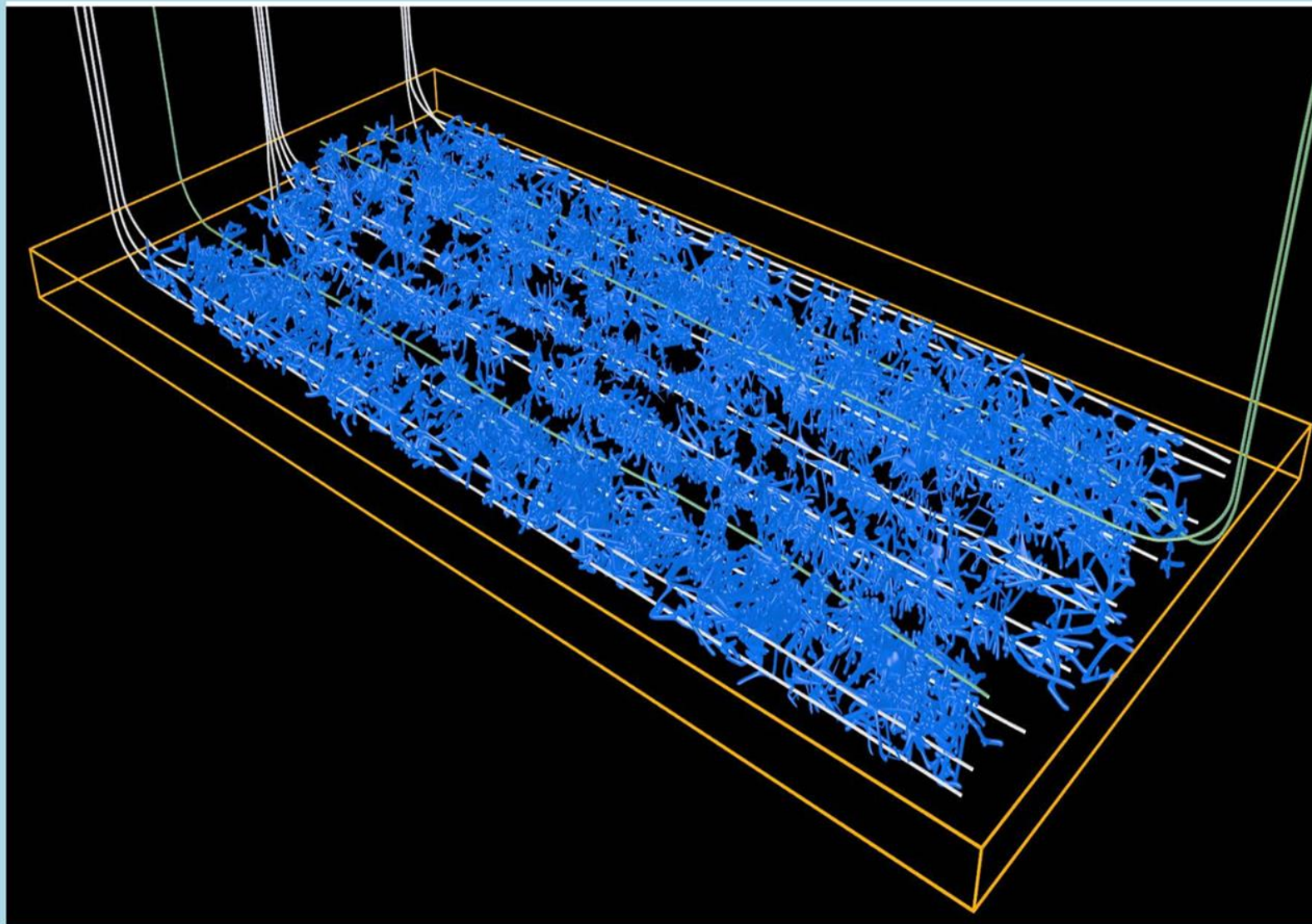
Google: "Project Rulison"



The Energy Consulting Group

Bakken: Filling In the Blanks

September 2014



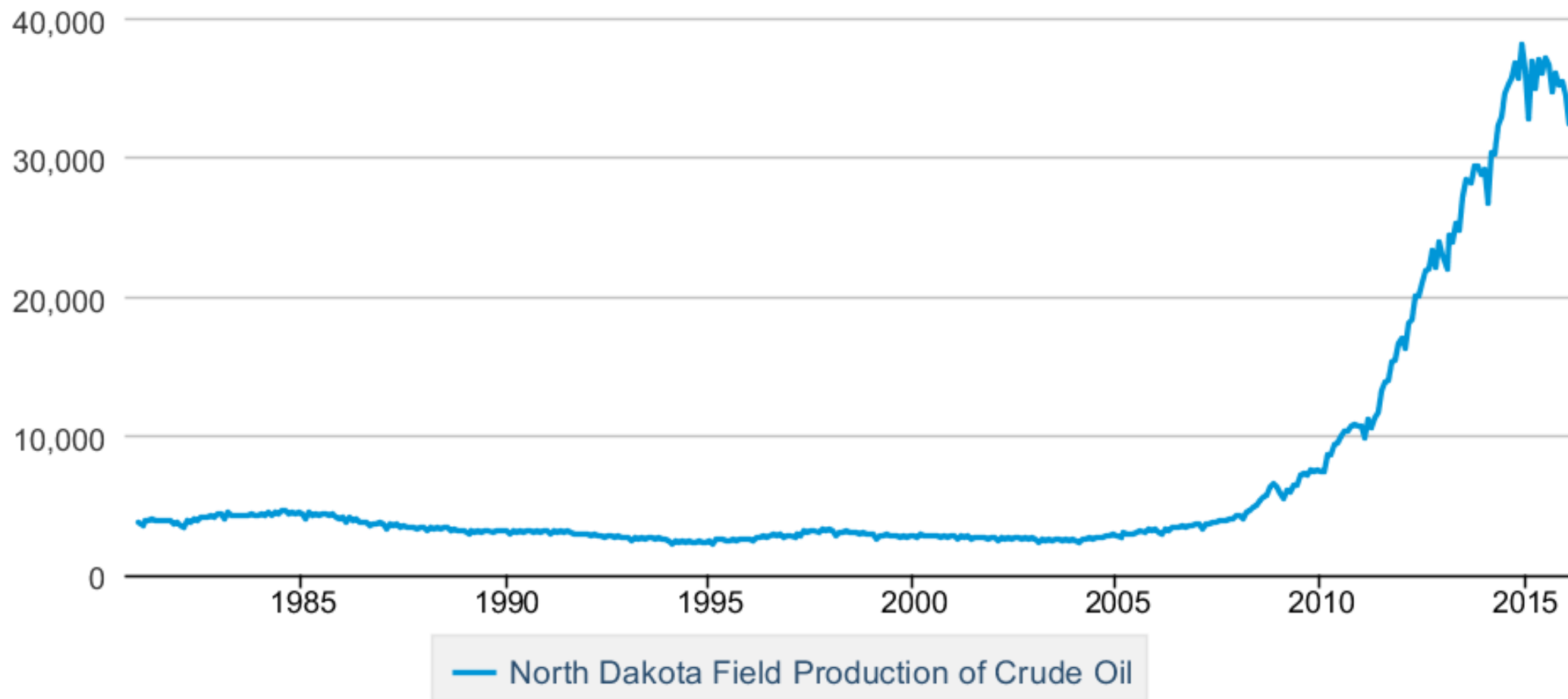
The Energy Consulting Group
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William Severns All Rights Reserved

Source: Continental Resources

All representations are approximate, and
subject to change without notification.

North Dakota Field Production of Crude Oil

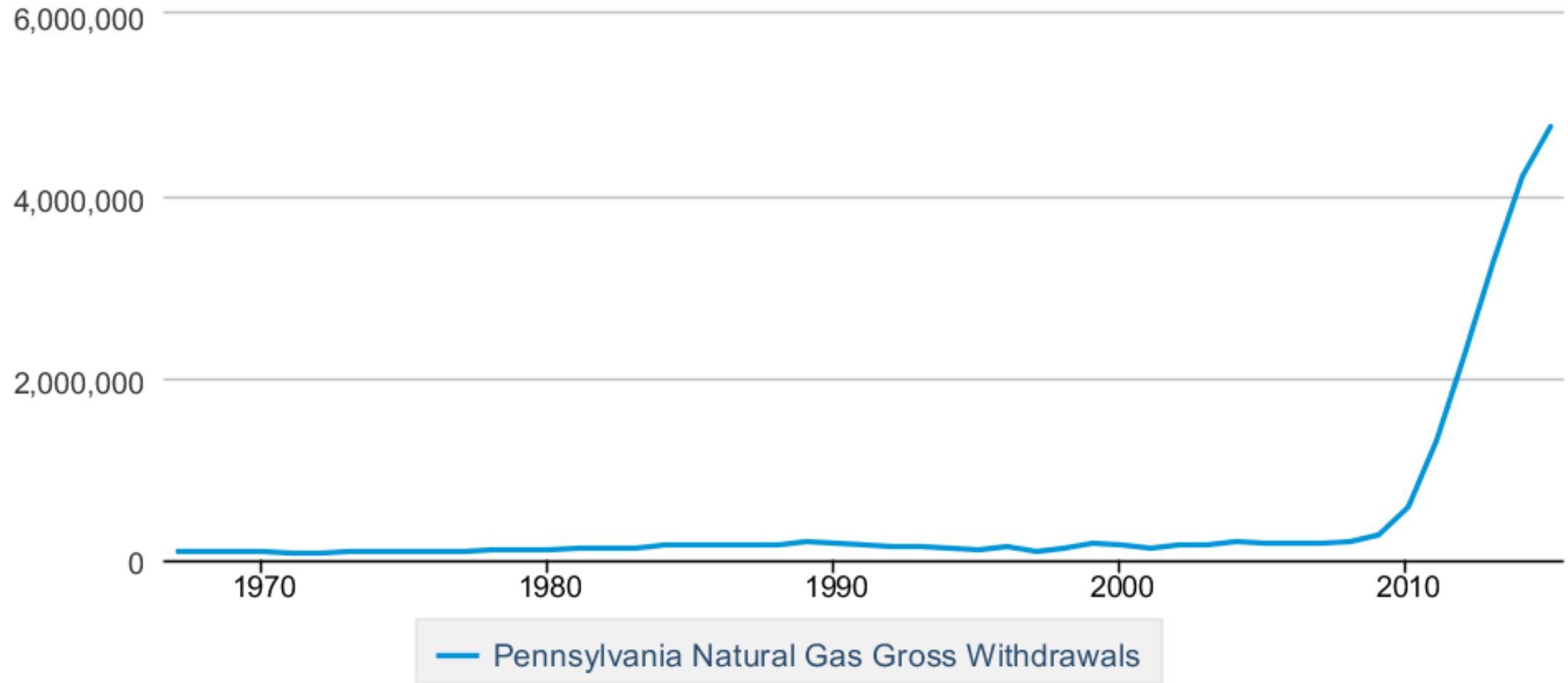
Thousand Barrels



Source: U.S. Energy Information Administration

Pennsylvania Natural Gas Gross Withdrawals

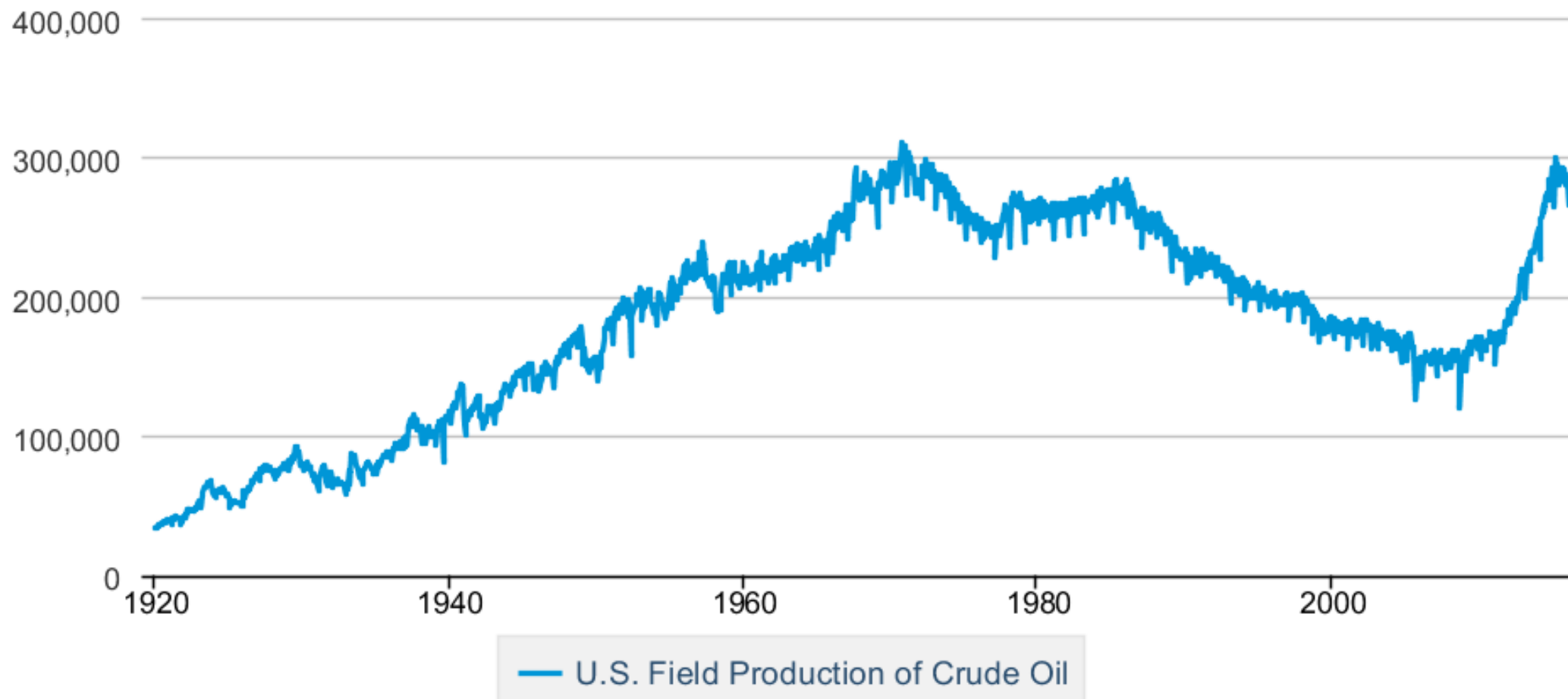
Million Cubic Feet



Source: U.S. Energy Information Administration

U.S. Field Production of Crude Oil

Thousand Barrels



Source: U.S. Energy Information Administration

How To Approach E&P

- Economic Moats
 - Is there a reason to believe *the company* can make money?
 - Brands
- Information Advantage
 - Is there a reason to believe *you* can make money?

Reserve Reports

- Not intuitive
- U.S. Rules \neq Canadian Rules
- Price sensitive

E&P Management

- Lore, Mystique, Adventure
- Attracts
 - Charlatans
 - Ball Chasers (Wildcatters!)
 - The Real Deal

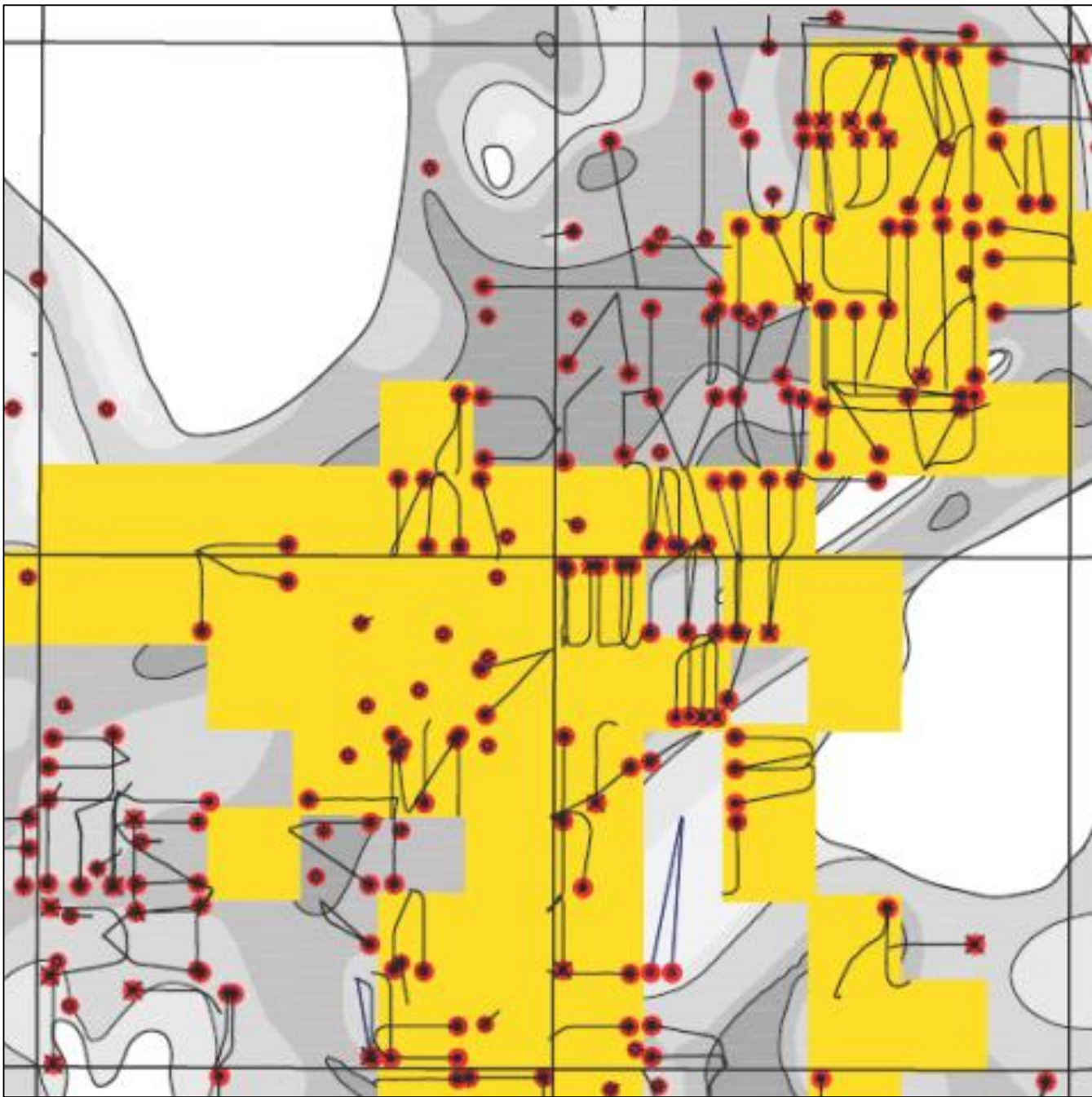


Big Picture Ideas

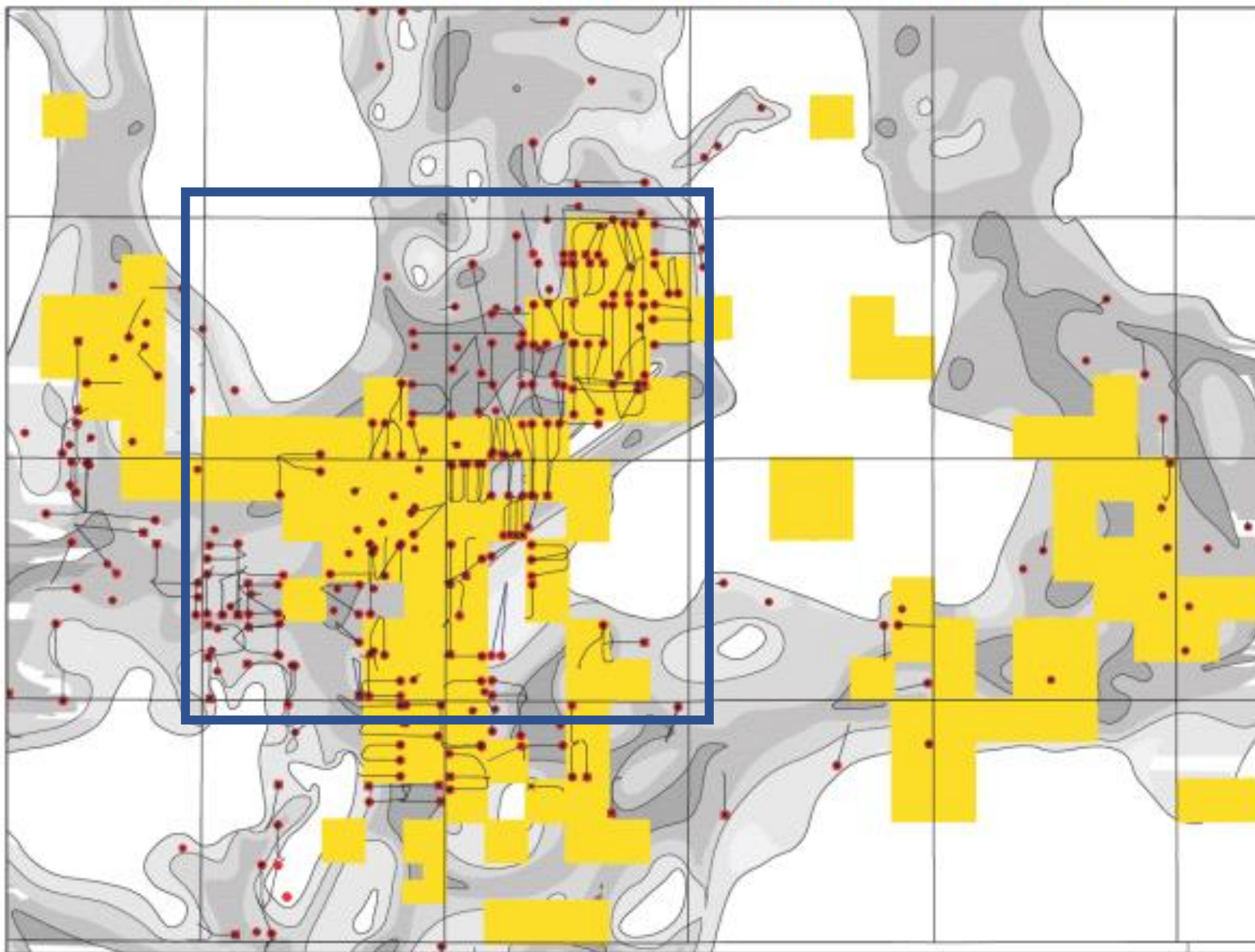
- Basins! – All oil and gas that has been produced and that ever will be produced comes from sedimentary basins.
 - Possible exception w/ methane hydrates.
 - Pipelines
 - Stacked pay

Case Studies

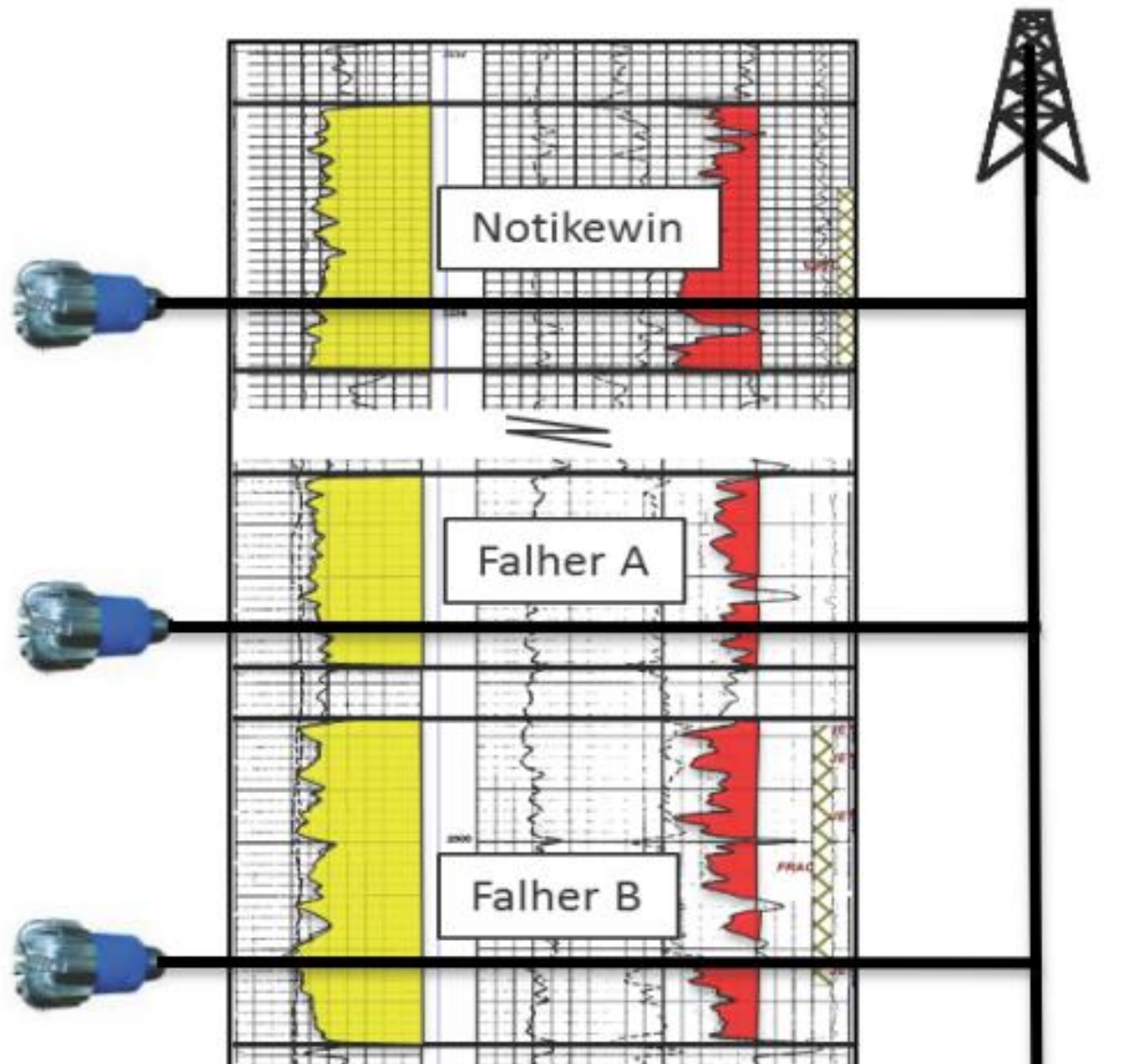
- SandRidge Energy
 - Midstream liability
- Halcon Resources
 - Great jockey, bad horse/track
- Stone Energy
 - Hard truths
- Bellatrix Energy
 - Stacked pay example
- Range Resources
 - Blessing *and* Curse of Abundance



GREATER FERRIER AREA CORE SPIRIT RIVER PLAY



SPIRIT RIVER STACKED SANDS



General Commodity Takeaways

Questions

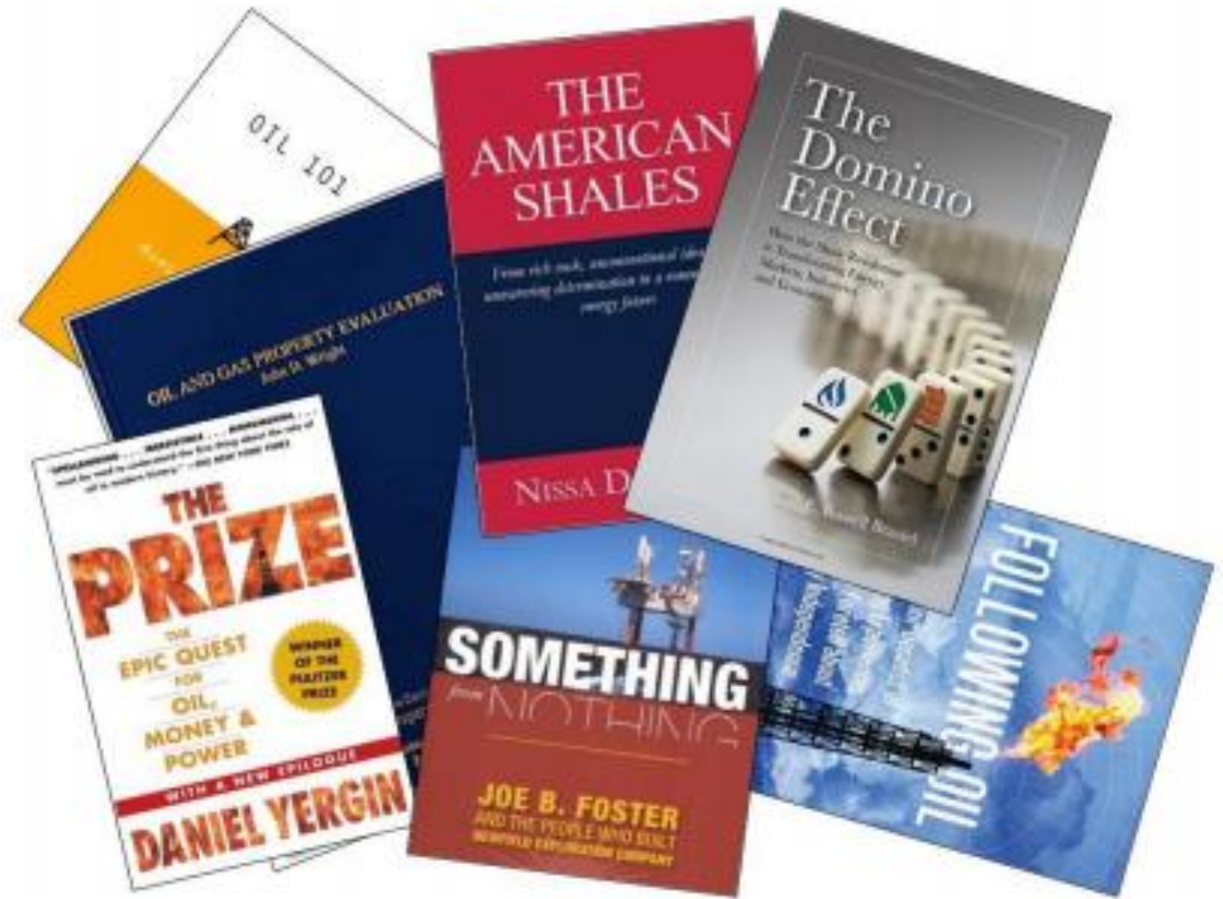
don@deepdrillinginsights.com

Information Resources

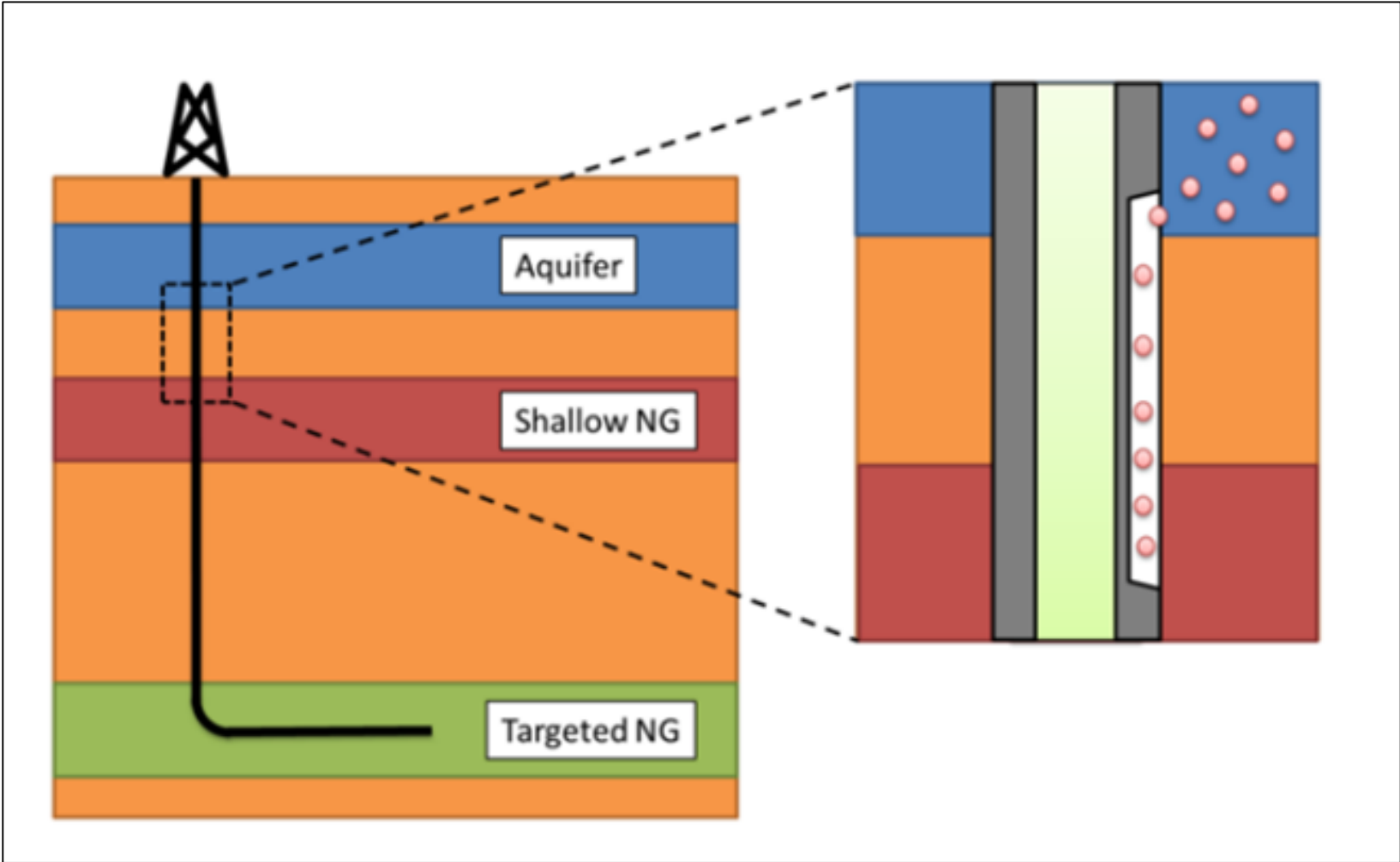
- Energy Information Administration (www.eia.gov)
- RBN Energy Blog
 - [disclaimer: I'm a contributor]
 - Interesting Note: Qualitative over Quantitative
- *Always across time*.
 - This is an industry subject to hype and optimism. It's a mix: Both hype and authentic advances.
 - "Oil exists in the minds of men."
- Think like a detective
 - Triangulate / Build a case from multiple sources (e.g. promo press release)

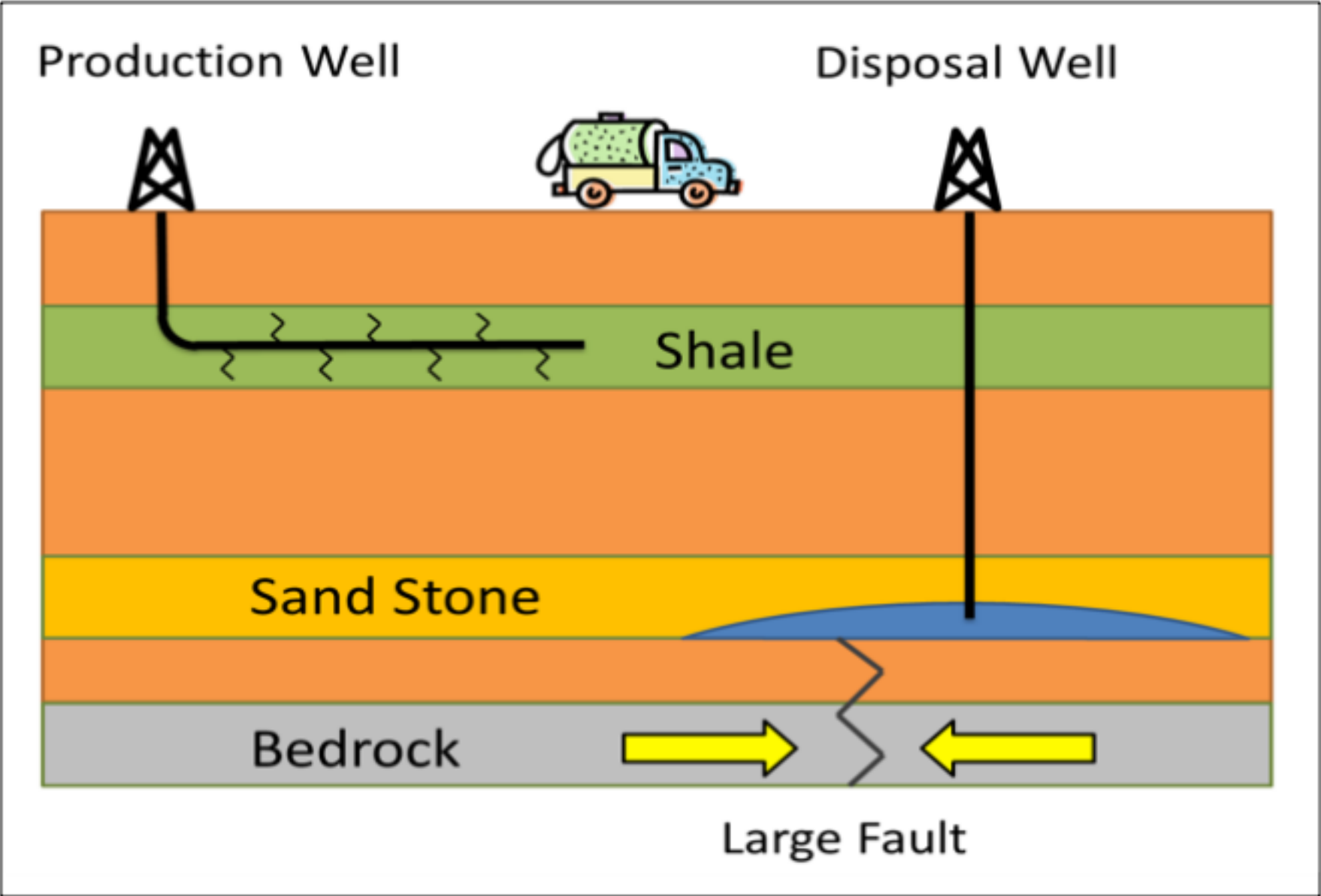
Books

- Markets
 - Oil 101
 - The Domino Effect
- History
 - The Prize
 - The Quest
 - The Oil and The Glory
- E&P
 - The American Shales
 - Something From Nothing



Environmental
&
Safety Concerns





Well Logging

Well Logging

Resistivity

Gamma Ray

Gamma-Gamma (Gamma Absorption)

Neutron Logs

Sonic Porosity

Nuclear Magnetic Resonance (NMR)

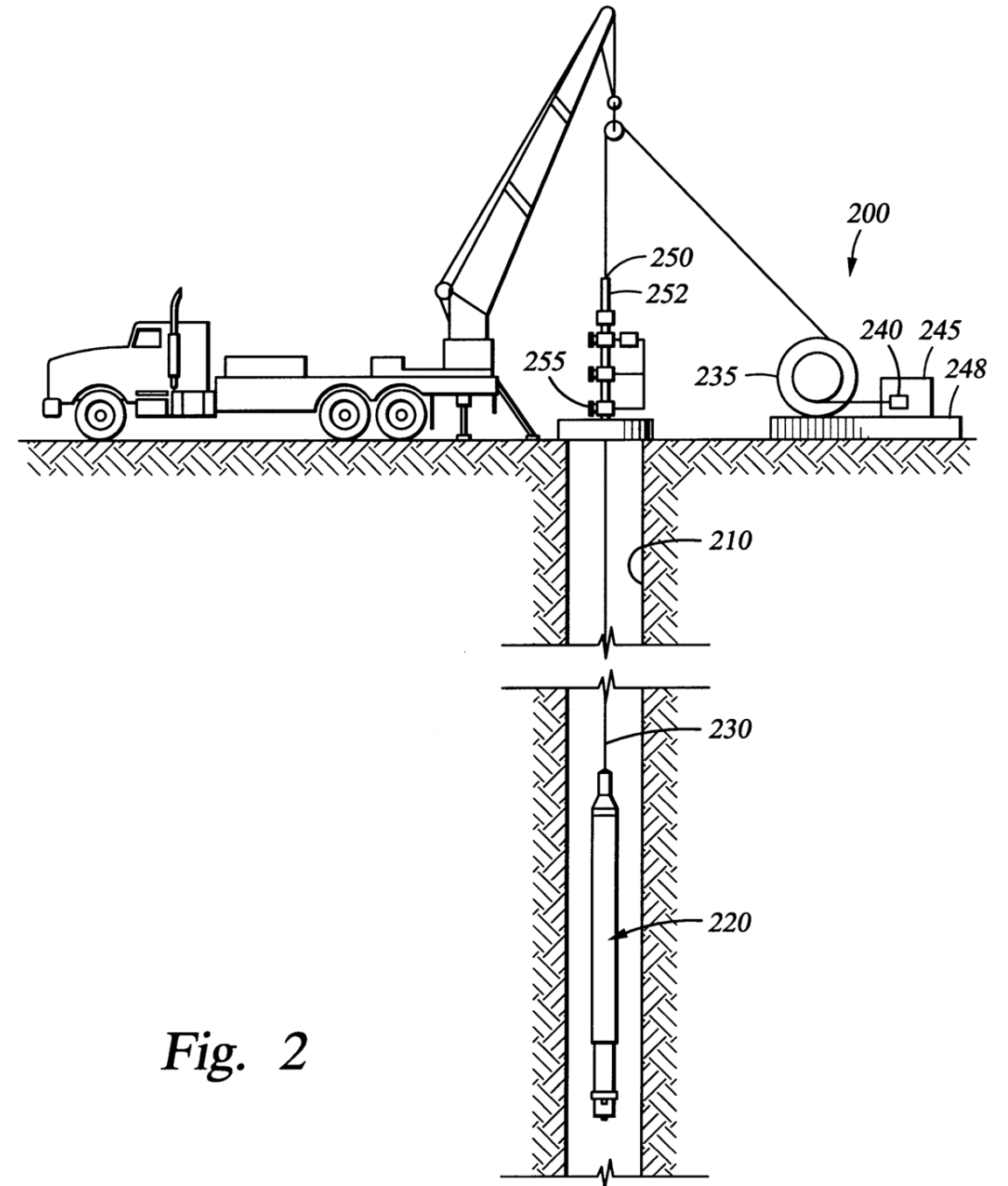
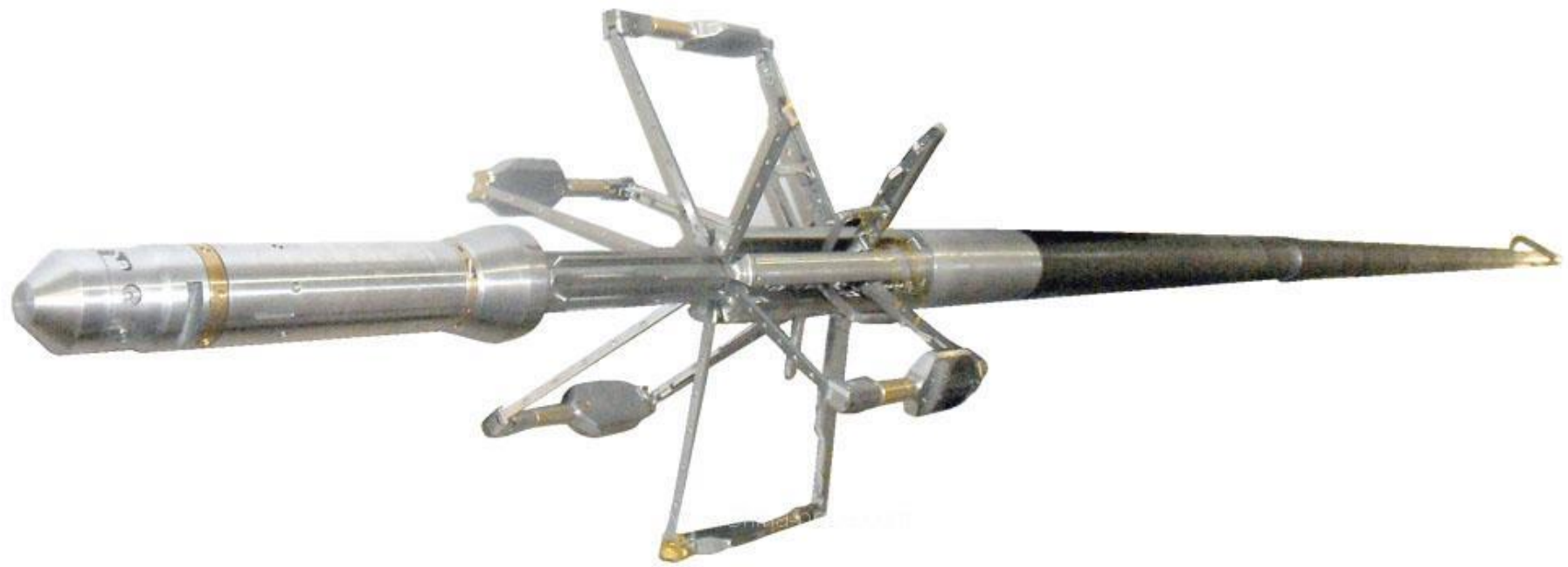
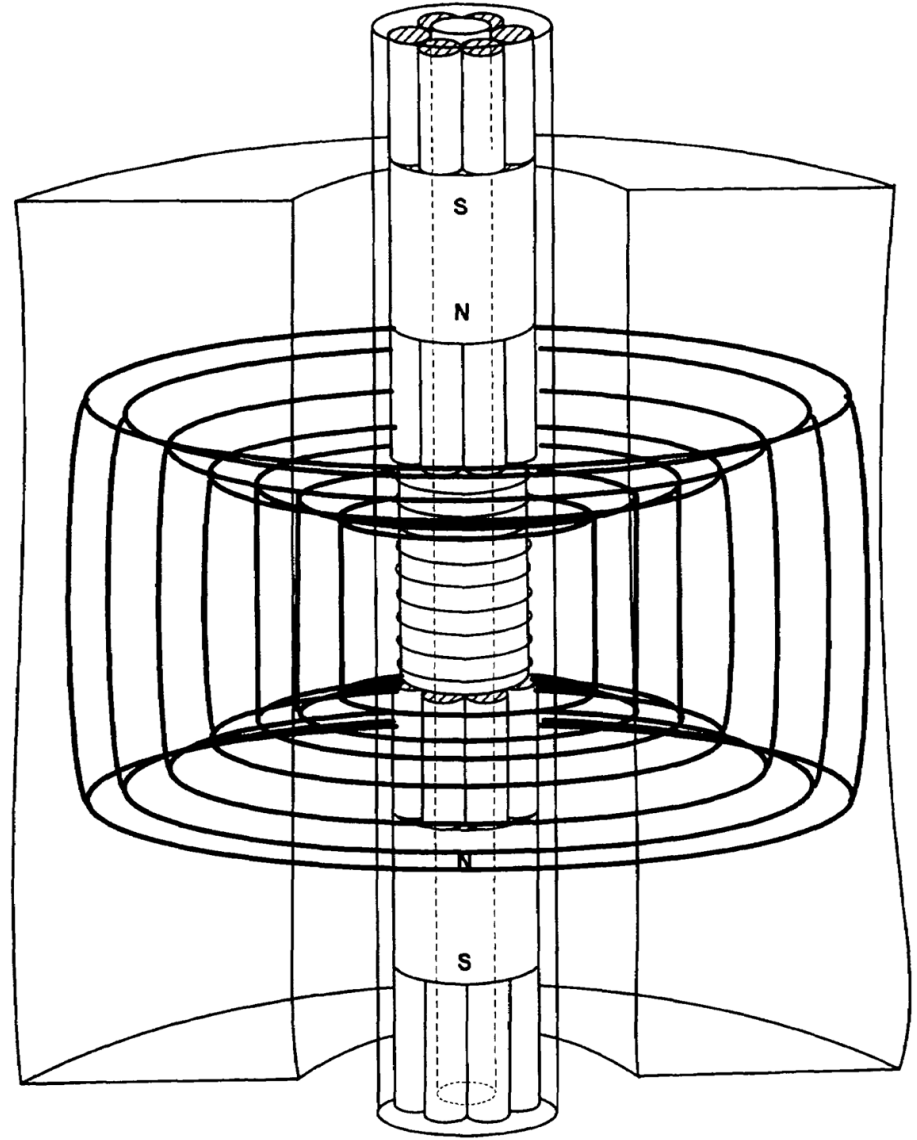
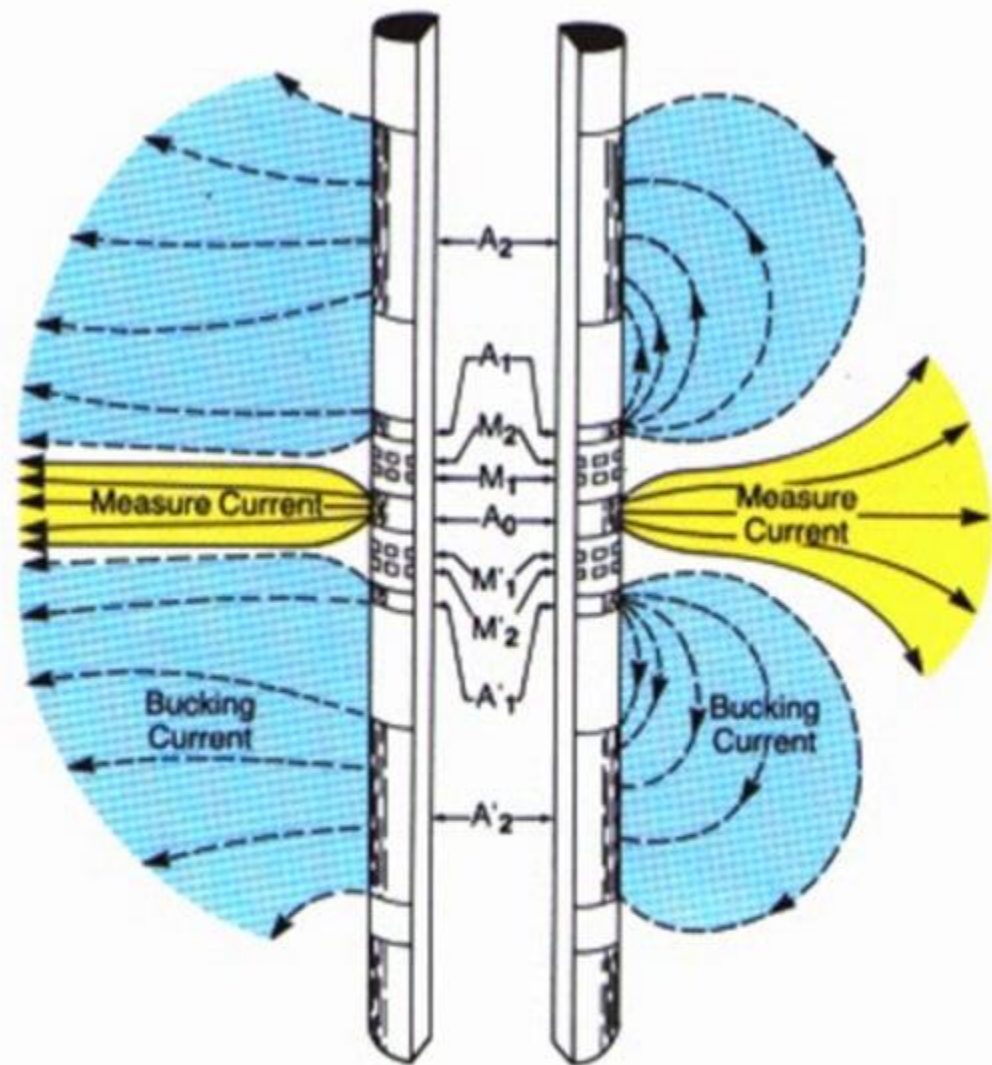
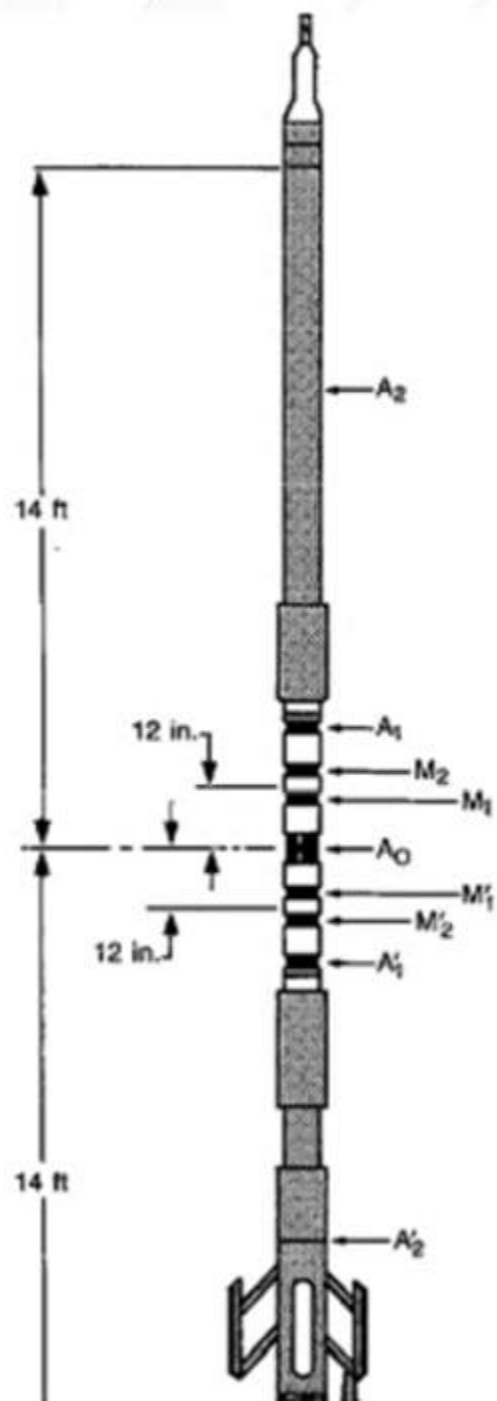


Fig. 2



www.China-ogpe.com





LLD

A_0 Measure Current Electrode

M_1 }
 M_2 } Monitoring Electrode

LLS

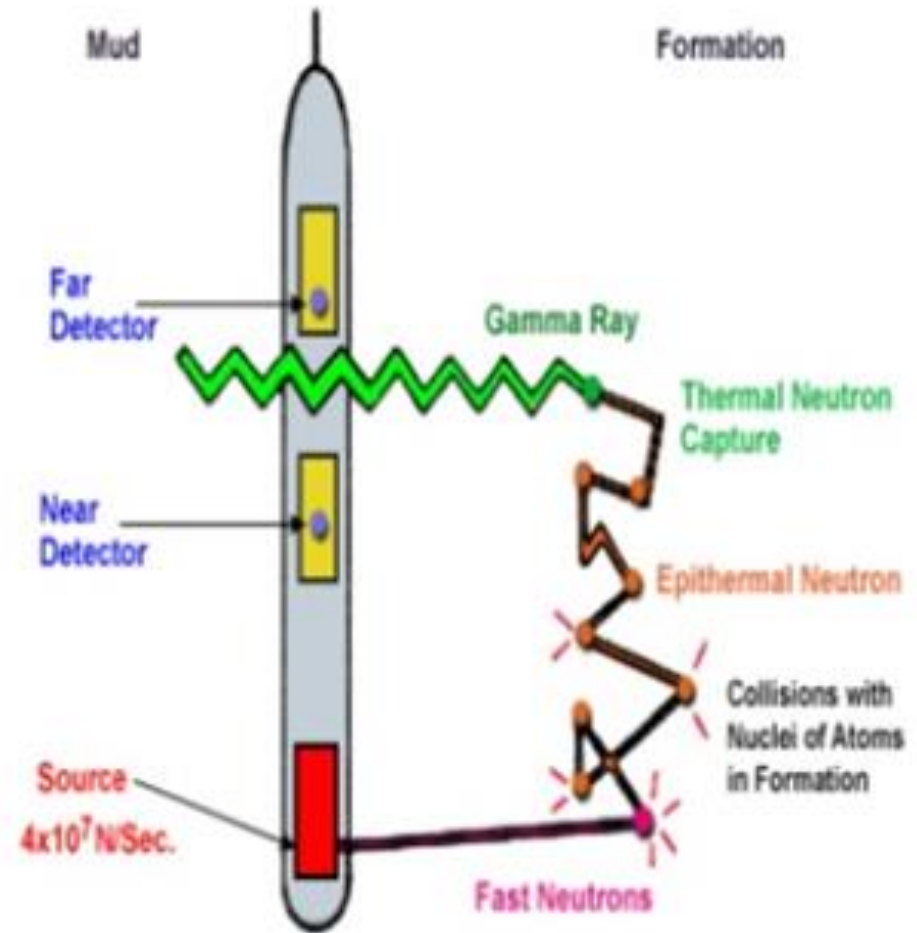
A_0 Measure Current Electrode

M_1 }
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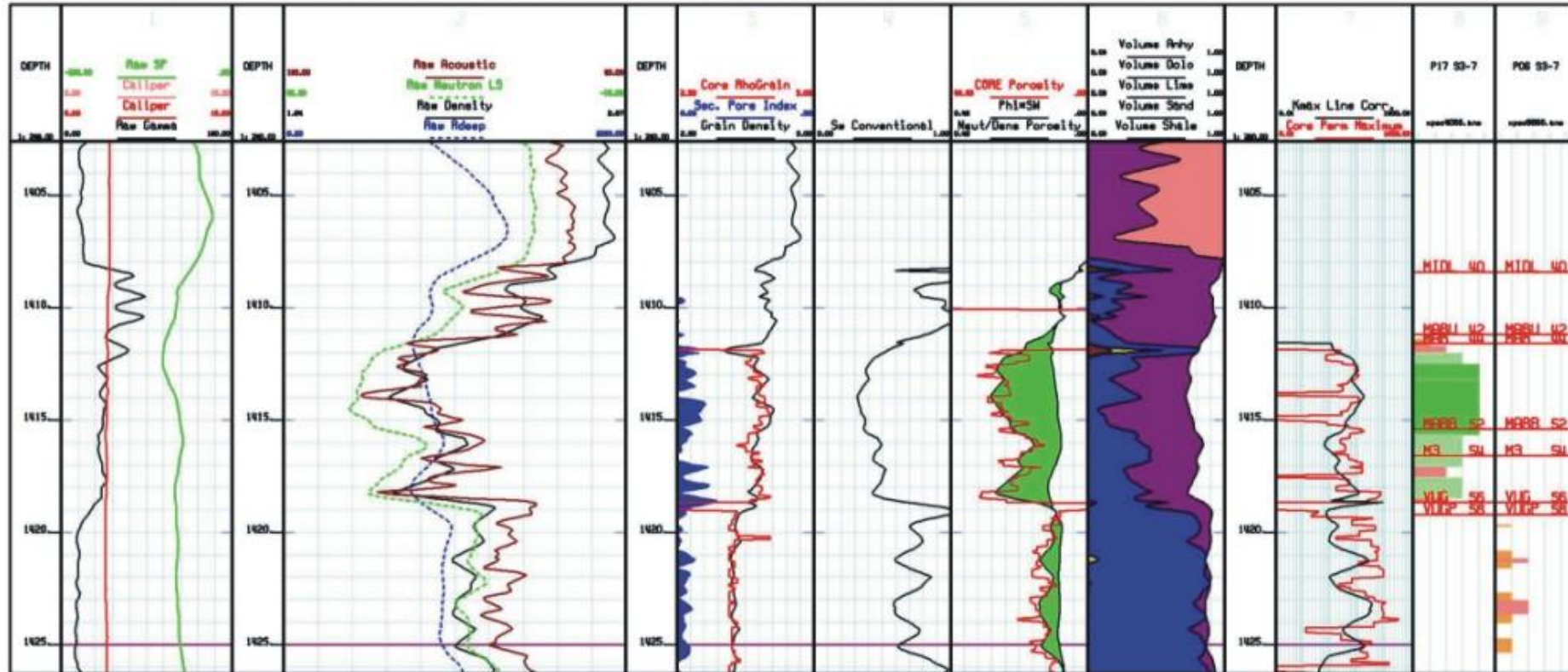
1200

Neutron Porosity Logs

Epithermal neutrons, Thermal neutrons, and Gamma rays released from capture.



Single Well Analysis: Complex Lithology Example



Single Well Analysis Example: Complex Lithology

Raw Data

Basic Interpretation with Core Data



