

Oil and Gas 101

Presented by:

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Importance of Oil and Natural Gas

TECHMAP

“Fractured - Language Lies and Energy” - Mark Mathis

- **T**ransportation
- **E**lectricity
- **C**ooking
- **H**eating
- **M**anufacturing
- **A**griculture
- **P**roducts

Oil and Natural Gas are good things!

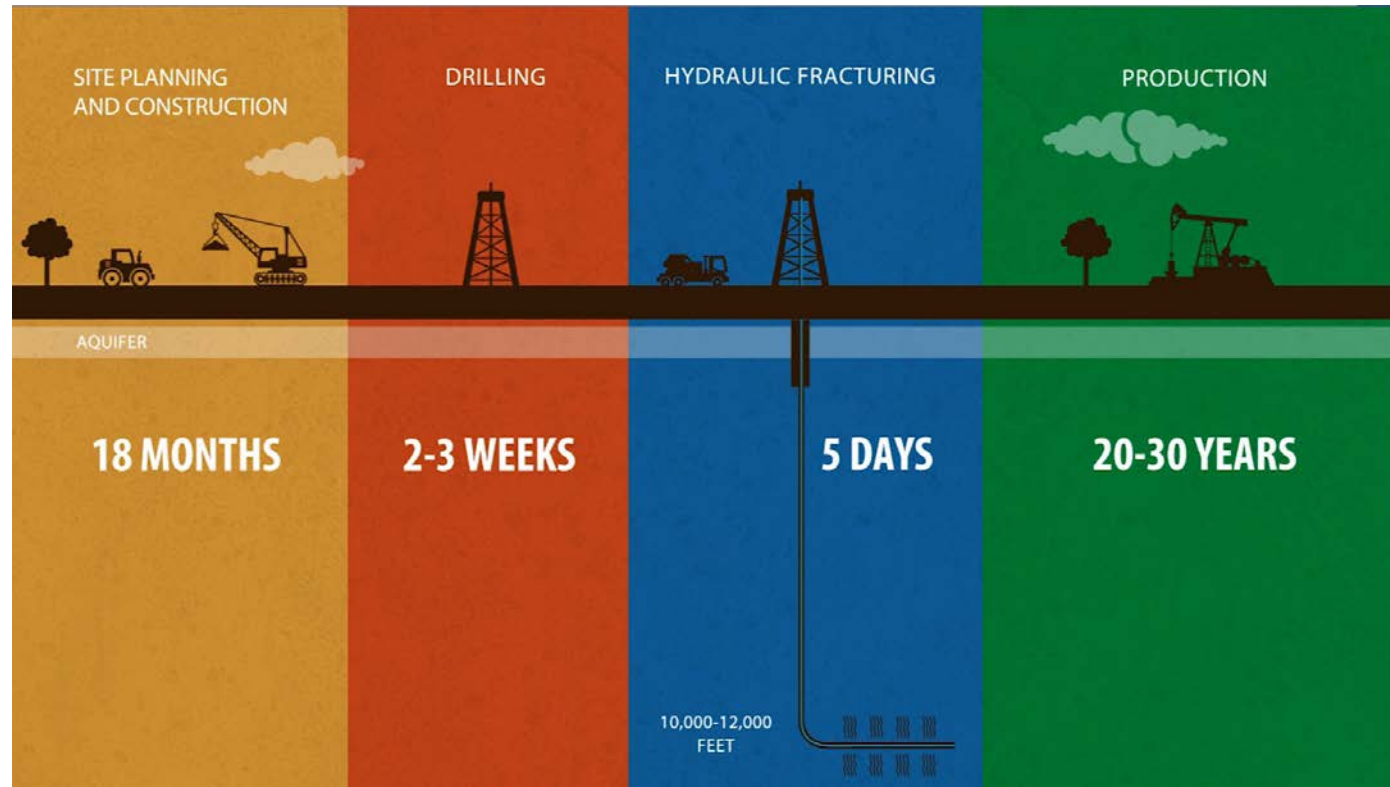
They provide us with safer, more comfortable, better, and longer lives.

Petroleum provides so much more than just fuel for our cars.

<https://powerpastimpossible.org/>

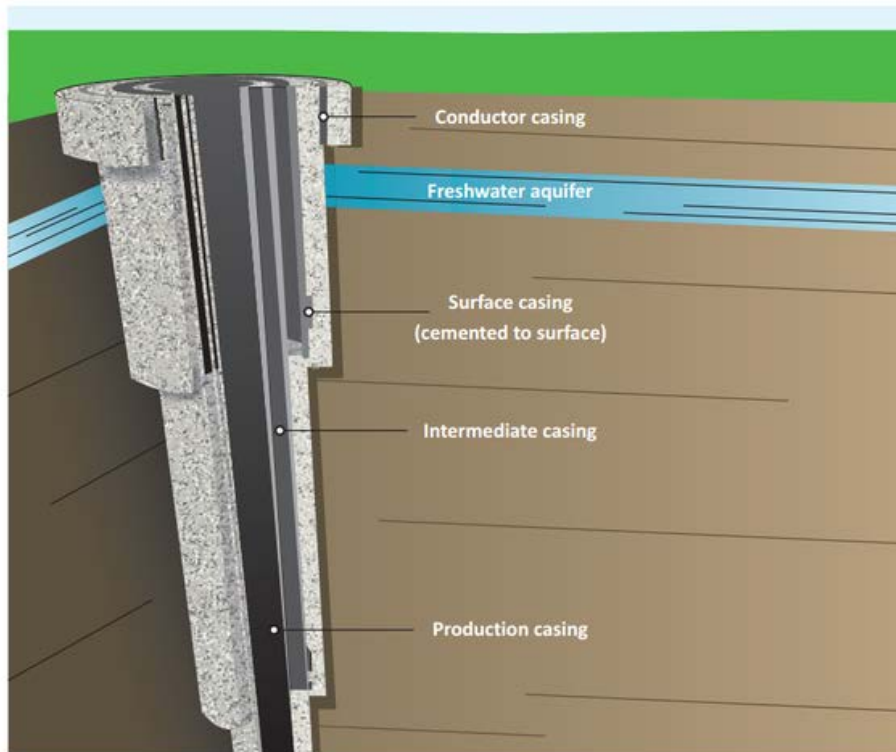
The Life Cycle of a Well

(Courtesy of ConocoPhillips)

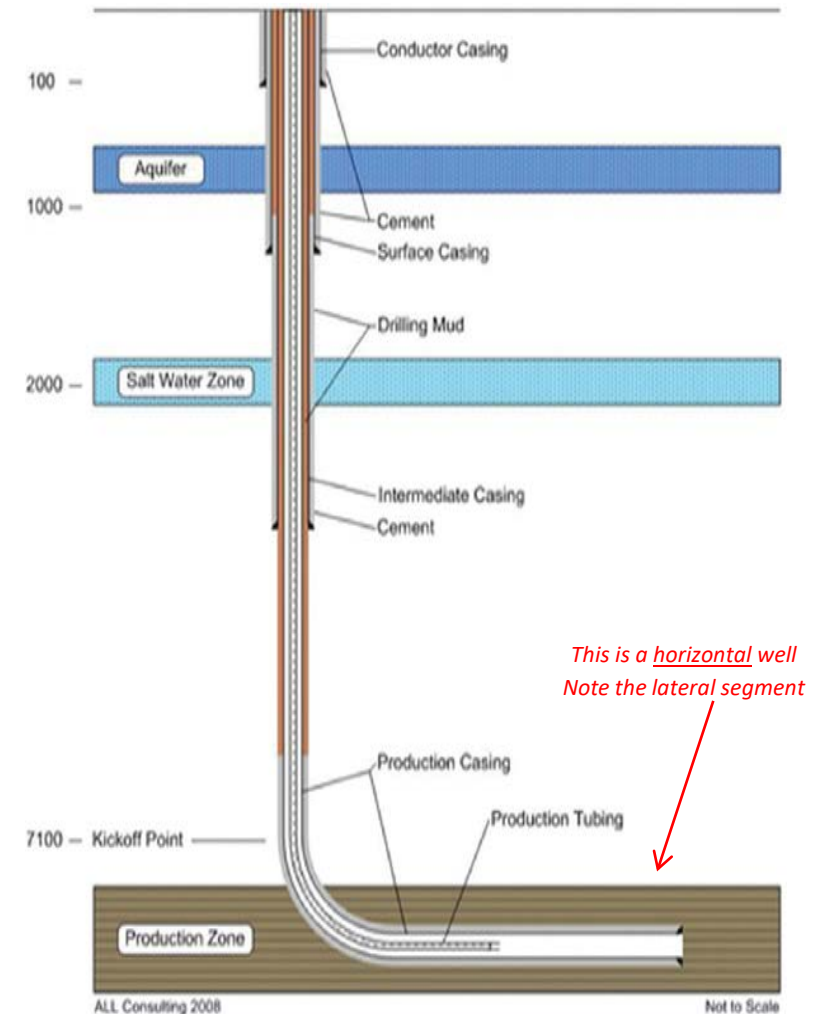


Well Construction to Protect Aquifers

Figure 1.2 ▶ Typical well design and cementing



Source: Adapted from ConocoPhillips.



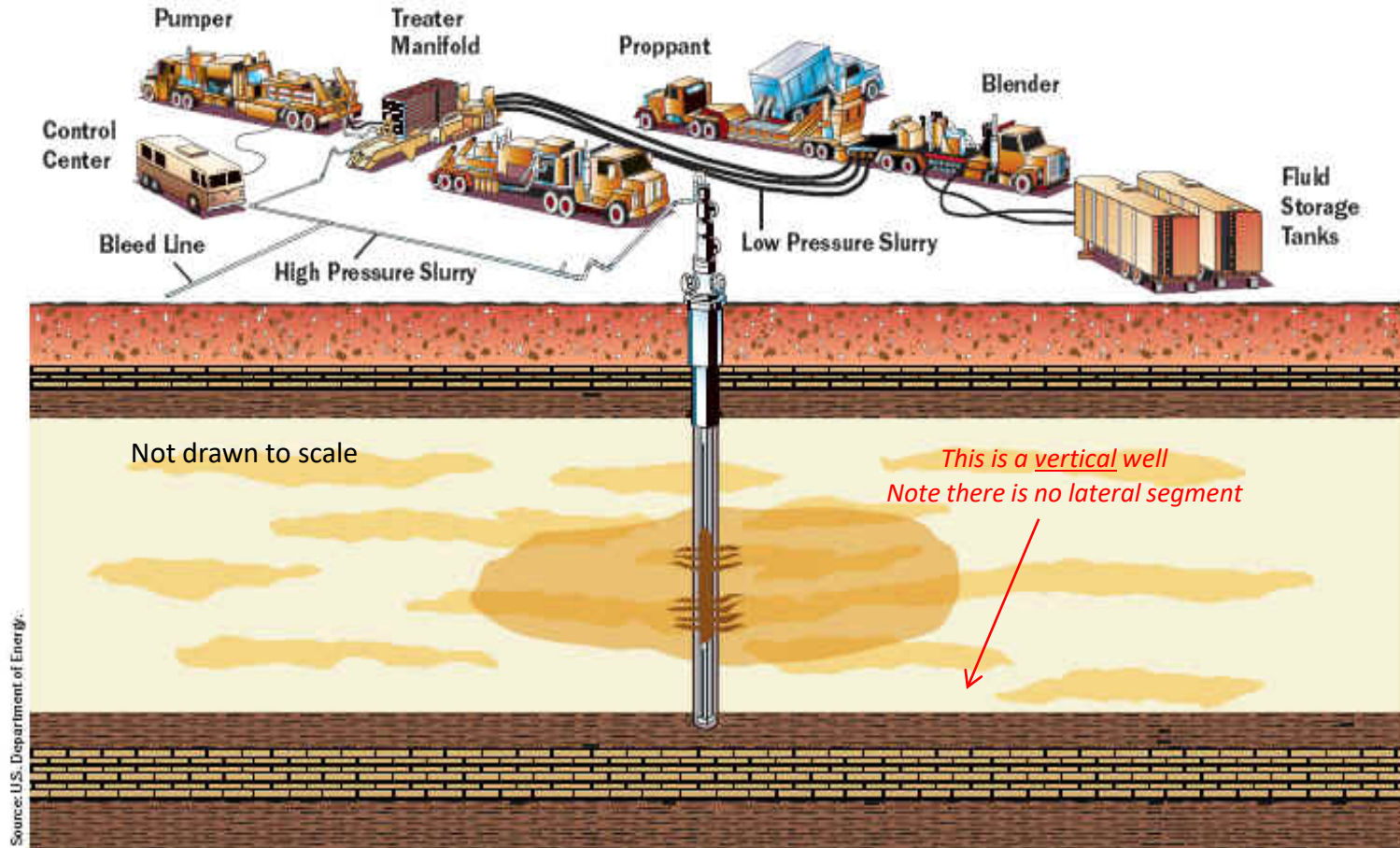
A New Mexico Fact: Lea County has over 14,700 producing O&G wells. The first dates back to 1928. Lea's domestic water comes from the Ogallala aquifer and is excellent quality.

Hydraulic Fracturing - Frac'ing

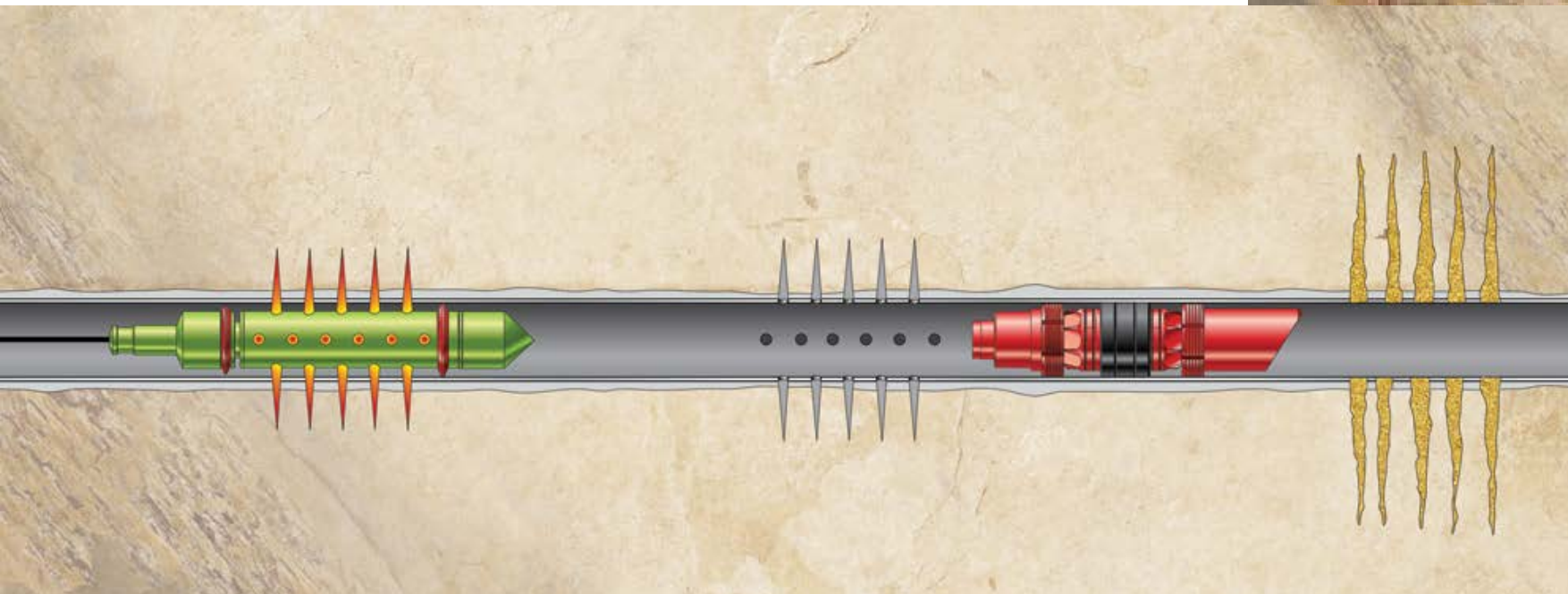
- **Hydraulic fracturing** is a heavily-regulated process in which a mixture of 99.5% water and sand is injected into wells to loosen oil deposits thousands of feet beneath the surface
- **Hydraulic fracturing** is the fracturing of rock by a liquid.
- ✓ **Hydraulic fracturing** is a type of well stimulation. It is designed to increase production above the normal predictions. Increases of 10X to 20X are not uncommon. *A new 50 bpd well might produce 750 bpd after fracing.*
- **Hydraulic fracturing**, commonly known as fracing, is a technique in which water (typically) is mixed with sand and common additives. The mixture is then injected at high pressure into a wellbore to create fractures allowing formation fluids to more easily flow to the wellbore. As the hydraulic pressure is removed from the well, the small grains of proppant (usually sand) hold these fractures open.

Conventional Frac - Vertical Well - Just the Basics

Exactly what is hydraulic fracturing?



Horizontal Well Fracturing Plug and Perf



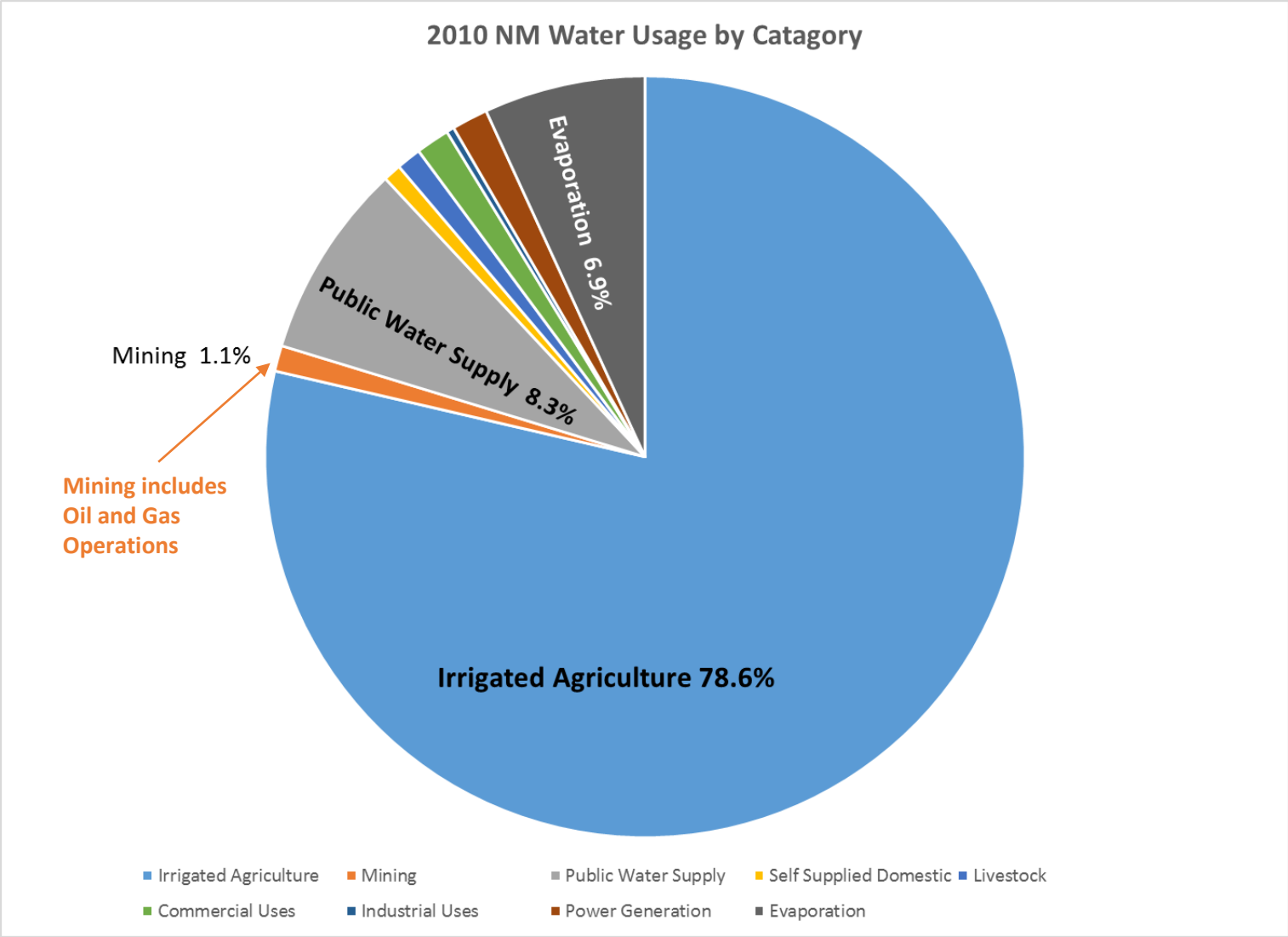
Multistage Hydraulic Fracturing

1. Perforate - Shoot small holes (2 to 3 feet long) through the casing and cement.
2. Pump frac stage.
2. Set bridge plug.
3. Repeat steps for each stage.

2010 NM Water Usage

Category	percent
Irrigated Agriculture	78.62
Public Water Supply	8.32
Evaporation	6.87
Power Generation	1.53
Commercial Uses	1.43
Mining	1.09
Livestock	1.05
Self Supplied Domestic	0.76
Industrial Uses	0.33

Data from the NM Office of State Engineer



Water Usage – Hydraulic Fracturing

- How much water is used per frac job?
 - Conventional frac jobs – less than 2500 barrels.
 - Horizontal wells in 2014 averaged 100,000 barrels.
- Where does this water come from?
 - Fresh and brackish water
 - Water wells
 - Surface water – lakes, ponds, streams
 - Produced water – advancing technology allows more water to be cost effectively reused.
 - ✓ Flow back water from previous frac jobs (cleaned and recycled)
 - ✓ Water that has been produced with oil from offset wells (cleaned and used).

New Mexico Seismicity

Earthquakes in New Mexico – NM Bureau of Geology and Mineral Resources

<http://tremor.nmt.edu/faq/here.html>

Dr. Northrop from UNM listed 1,111 NM earthquakes occurring between 1869 and 1975 .

Socorro has been the site of many earthquakes.

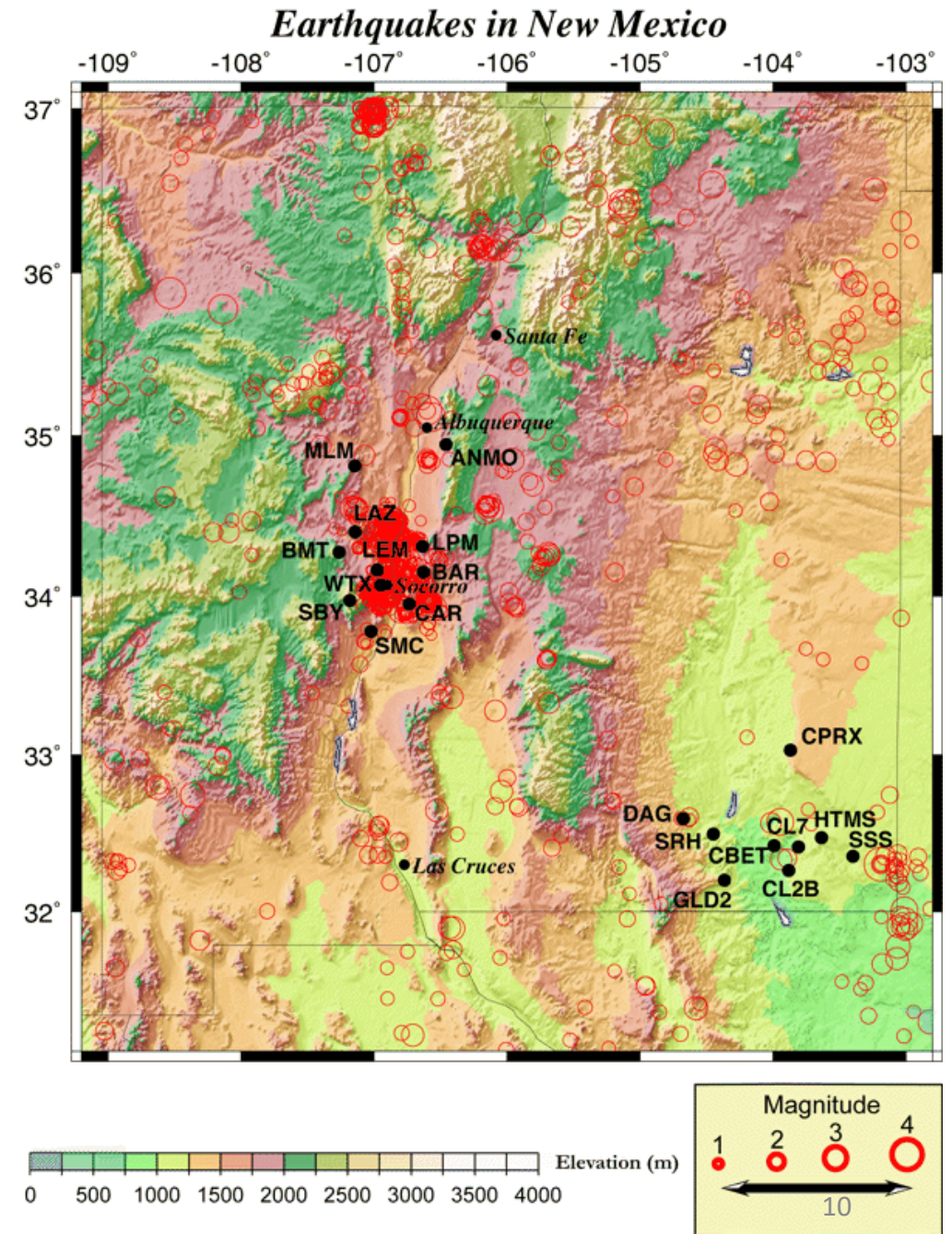
As a side-note, he stated a few small earthquakes have been caused by human activity. Atomic explosions, water reservoirs, and O&G activity.

Facts from USGS – U. S Geological Survey (U.S. Department of the Interior)

<https://earthquake.usgs.gov/research/induced/myths.php>

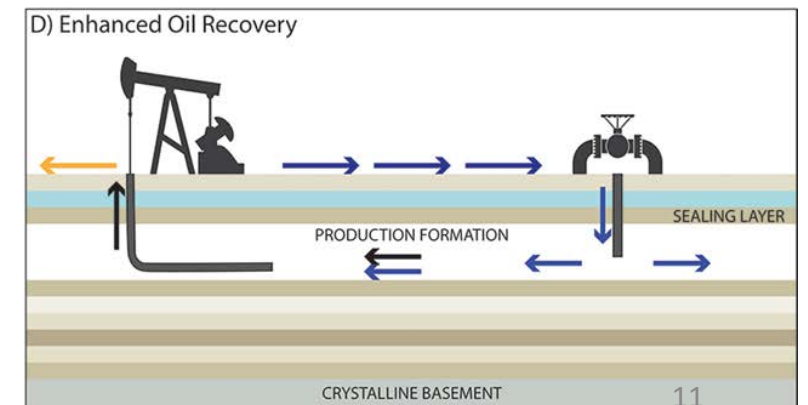
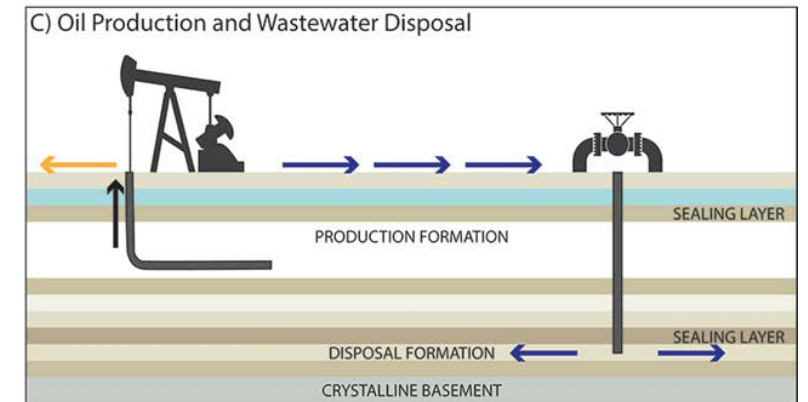
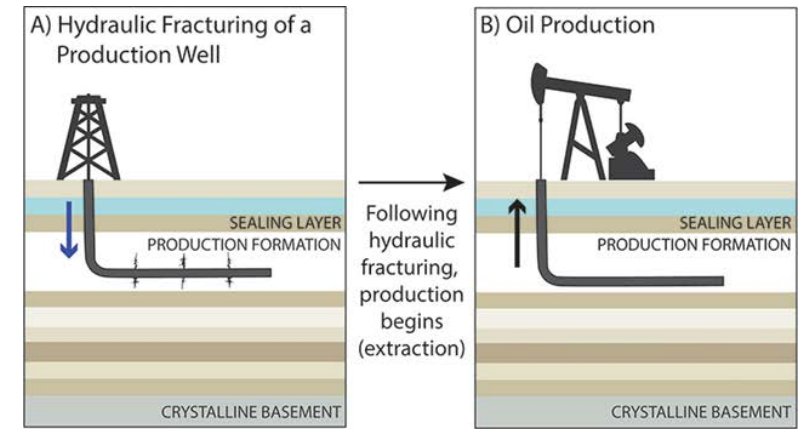
Hydraulic fracturing is not causing induced seismic activity.

Wastewater is produced at all oil wells, not just hydraulic fractured sites.



Produced Water Disposal

- Most oil and gas wells naturally produce water with the oil and gas. The vast majority of this water is from prehistoric oceans that existed when the oil and gas was formed.
- This “produced water” is normally reinjected into a deep non-productive underground formation.
- Wells that use water during the completion process (hydraulic fracturing or acidizing) will produce most of this water back for disposal or treatment/reuse.
- In 2016 SE NM, oil wells produced 6 barrels of water for each barrel of oil. In NM, oilfield water disposal is closely regulated and monitored by the OCD (Oil Conservation Division).
- The largest water producers are “water-floods”, a form of enhanced oil recovery. The majority of their “produced water” is cleaned and then reinjected to recover more oil.



Energy Research and Development For New Mexico

at New Mexico Junior College

- New Horizons Foundation

- NHF is bringing new technology and manufacturing to: Lea County; New Mexico; and the Permian Basin to stimulate new sustainable economic growth.
- Funded by NMJC and Lea County.
- **Unique access to thousands of cutting edge technologies from all 35 Department of Defense Laboratories in the United States.**
- Current projects on-the-ground include: sound suppression, metal construction/repair, well stimulation, and water reclamation.

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New Mexico Junior College

Success Through Learning

- I invite you to learn more about the oil and gas industry. NMJC offers *“Introduction to the Oil and Gas Industry”*, quarterly. This two day class provides a big picture overview of the industry.
- NMJC is a two year community college located in Hobbs, NM offering certificates, associate’s degrees, and workforce training.

Please contact me if you have questions or if I may be of service:

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Thank you for your time and attention