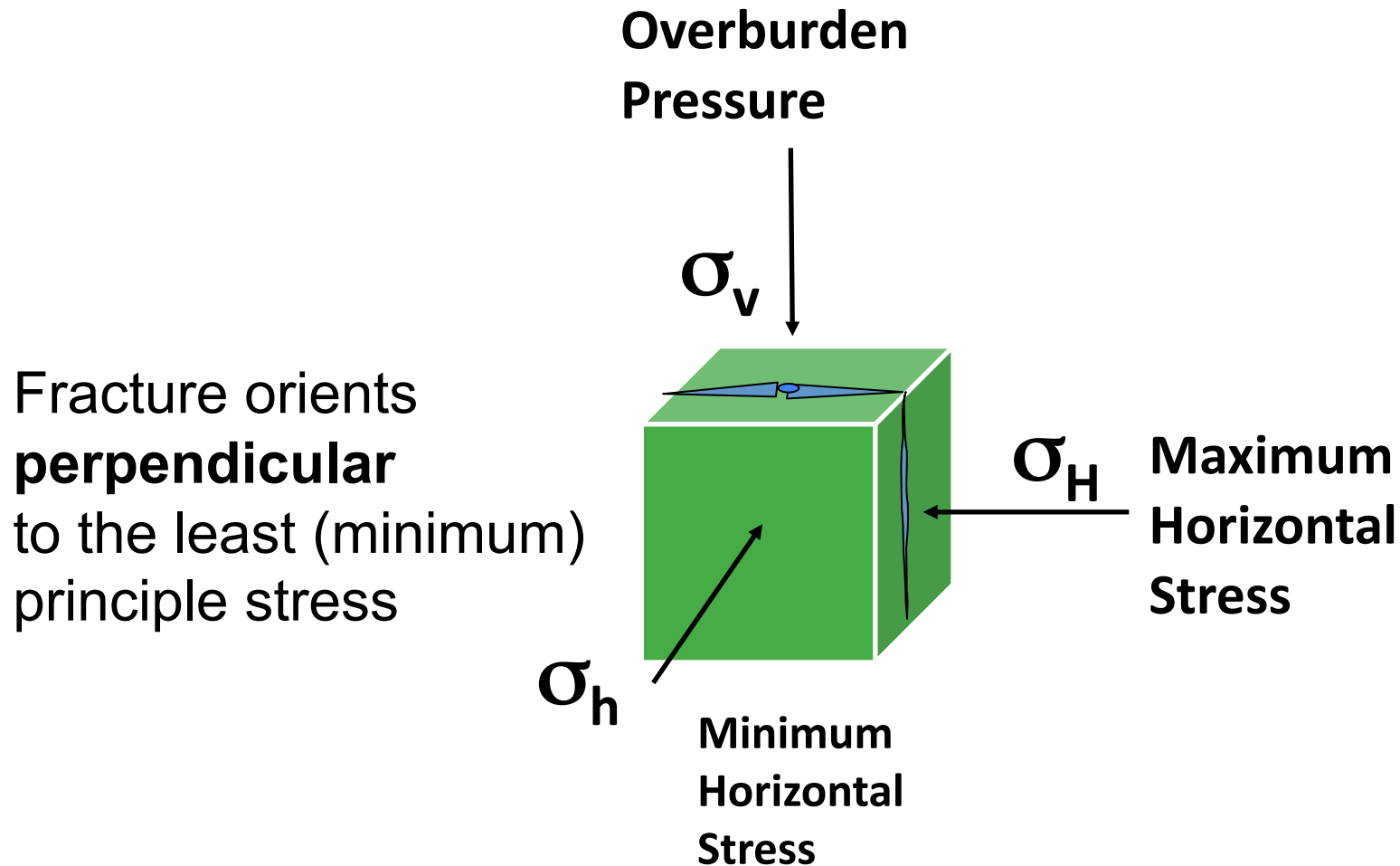
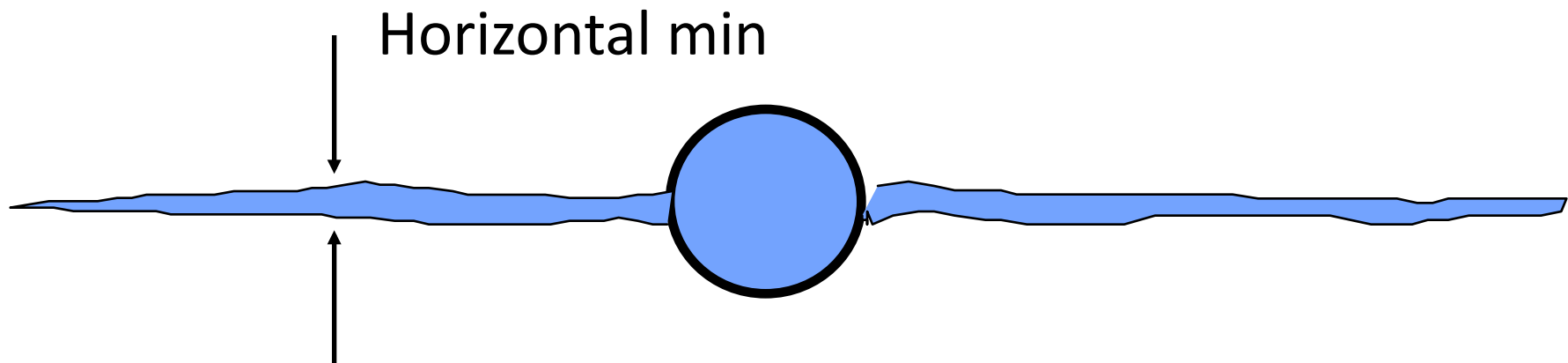


Rock Stress with Fracture (Anisotropy in the Rock)

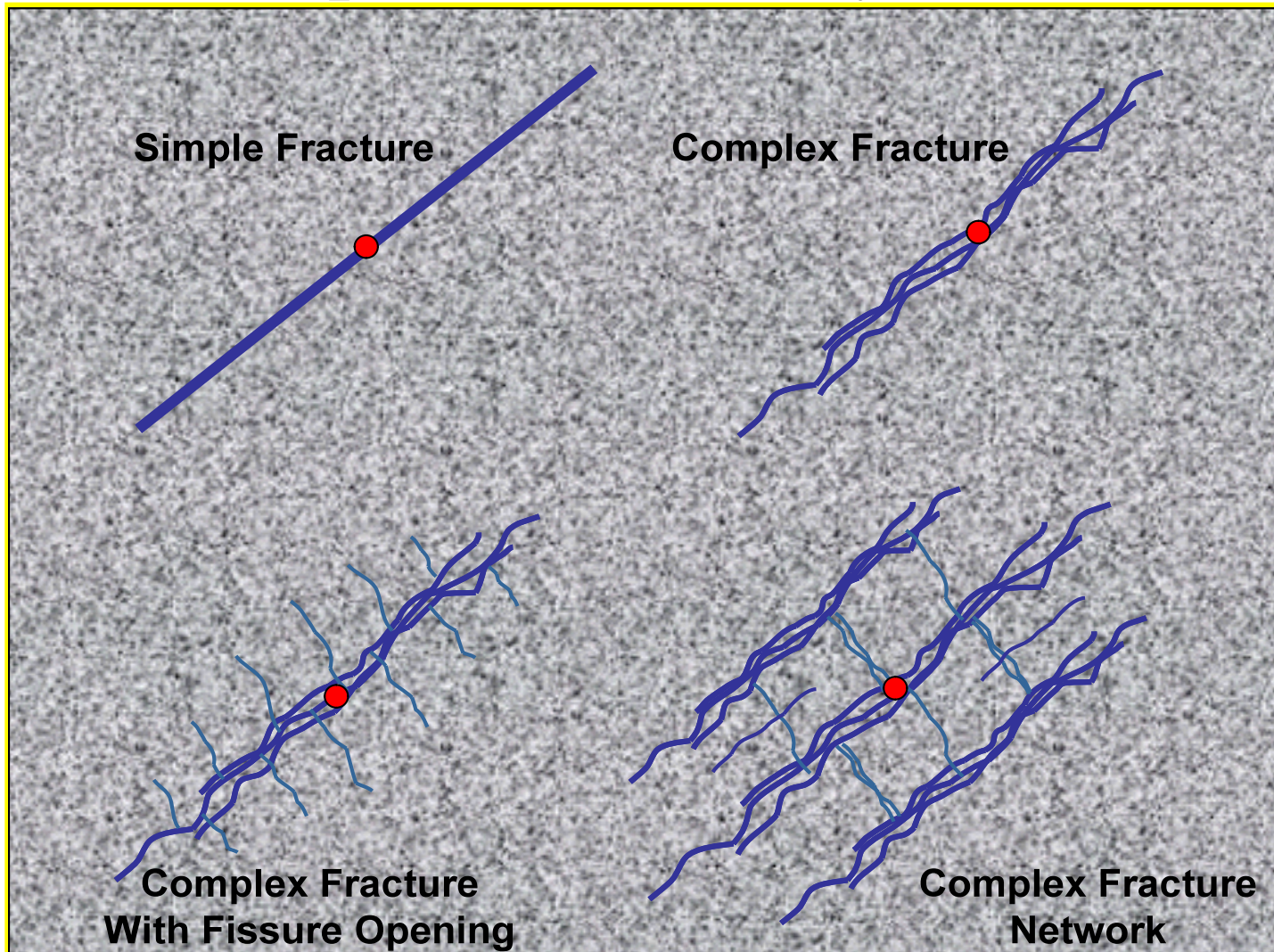


Fracture Orientation

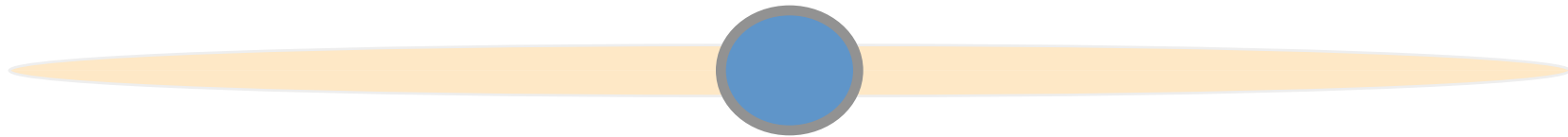


Hydraulic Fractures Initiate and continue perpendicular to the Least Principle Rock Stresses.

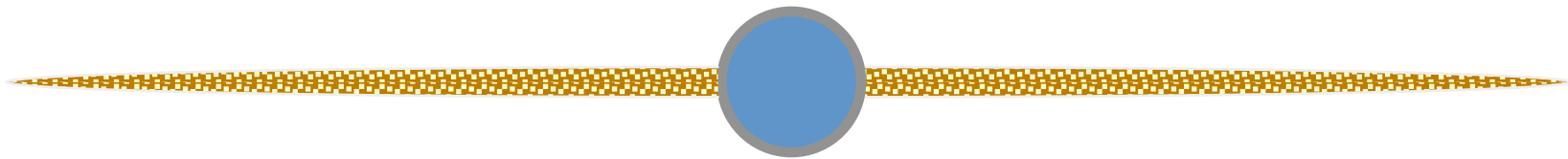
Complex Fracture Systems



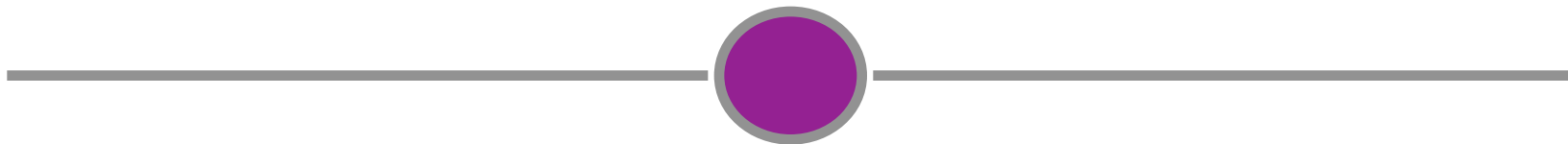
Fracturing Concepts



Open Fracture During Pumping



Closed Fracture With Proppant

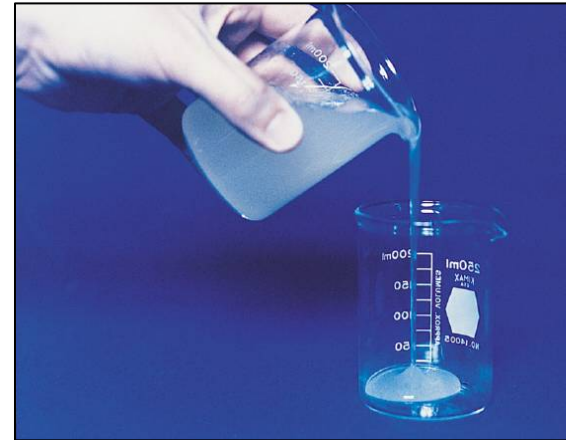


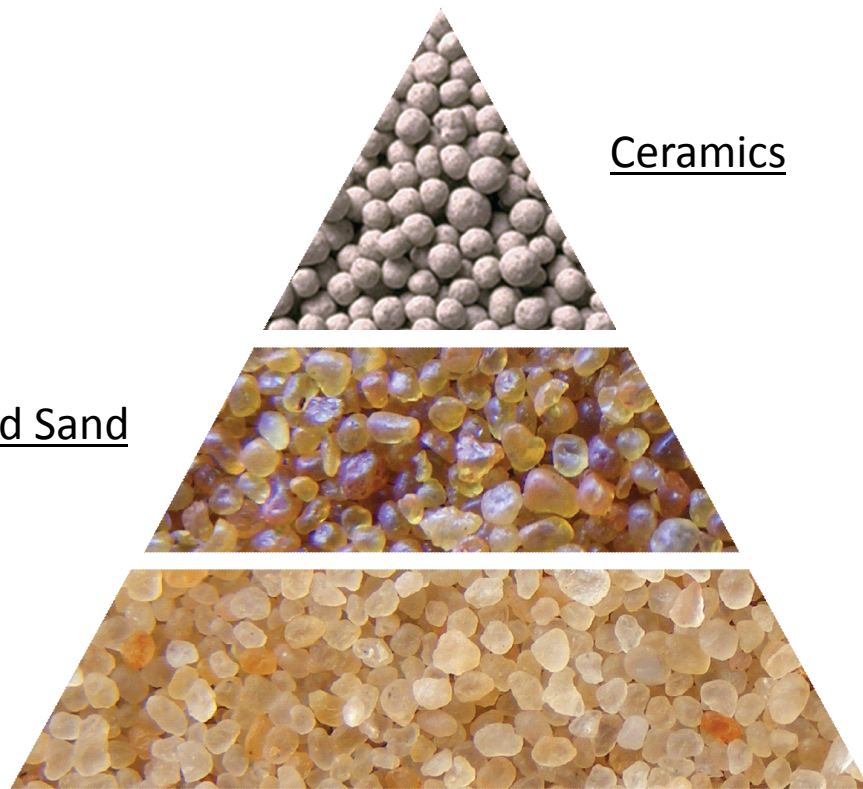
Closed Fracture Without Proppant

Gelling Agents



Fracturing fluid usually consists of water thickened with guar



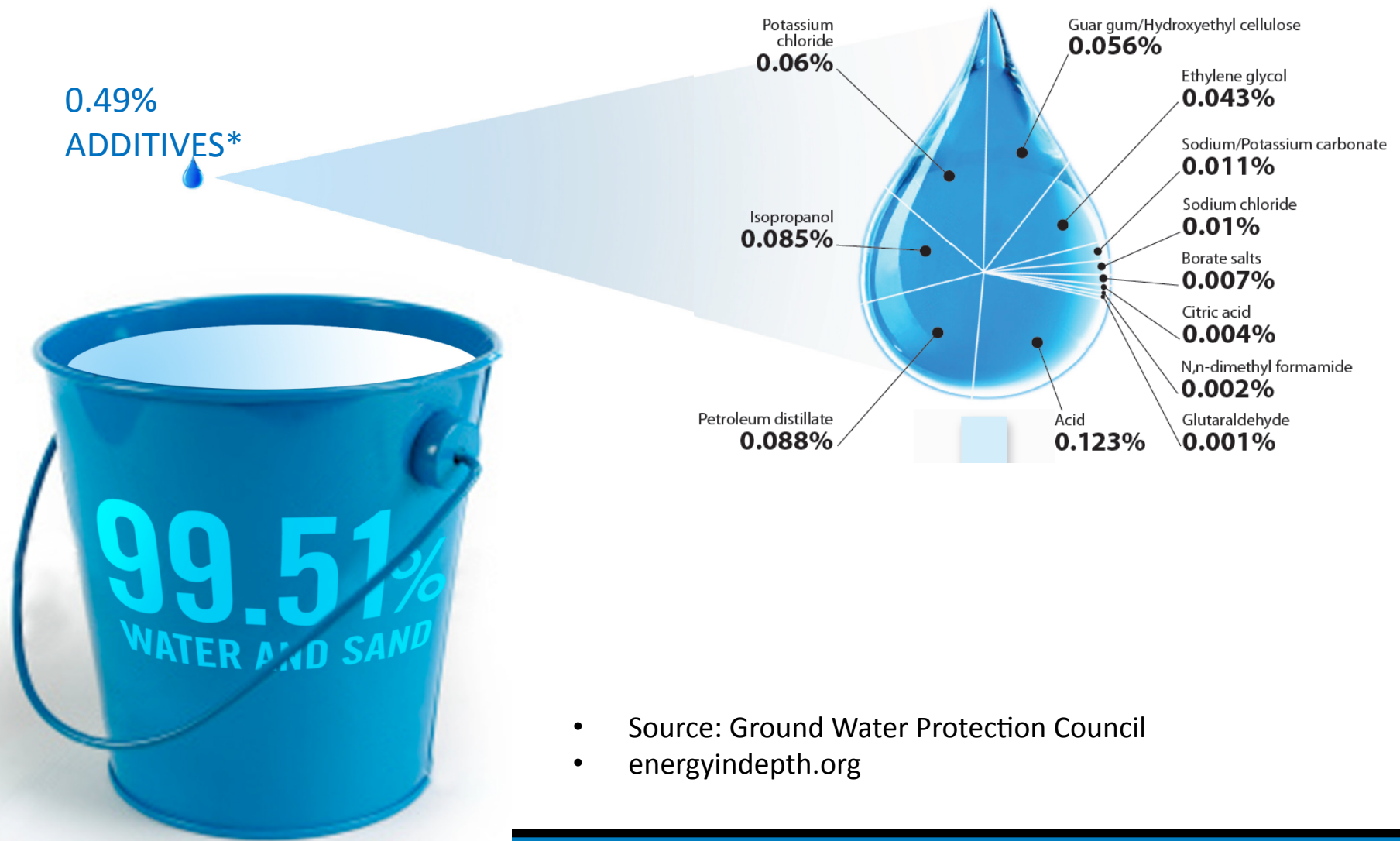


Ceramics

Resin Coated Sand

Uncoated Sand





- Source: Ground Water Protection Council
- energyindepth.org



WRONG ON DISCLOSURE

GasLand myth:

“Fracking chemicals are considered proprietary.” (1:00:56)

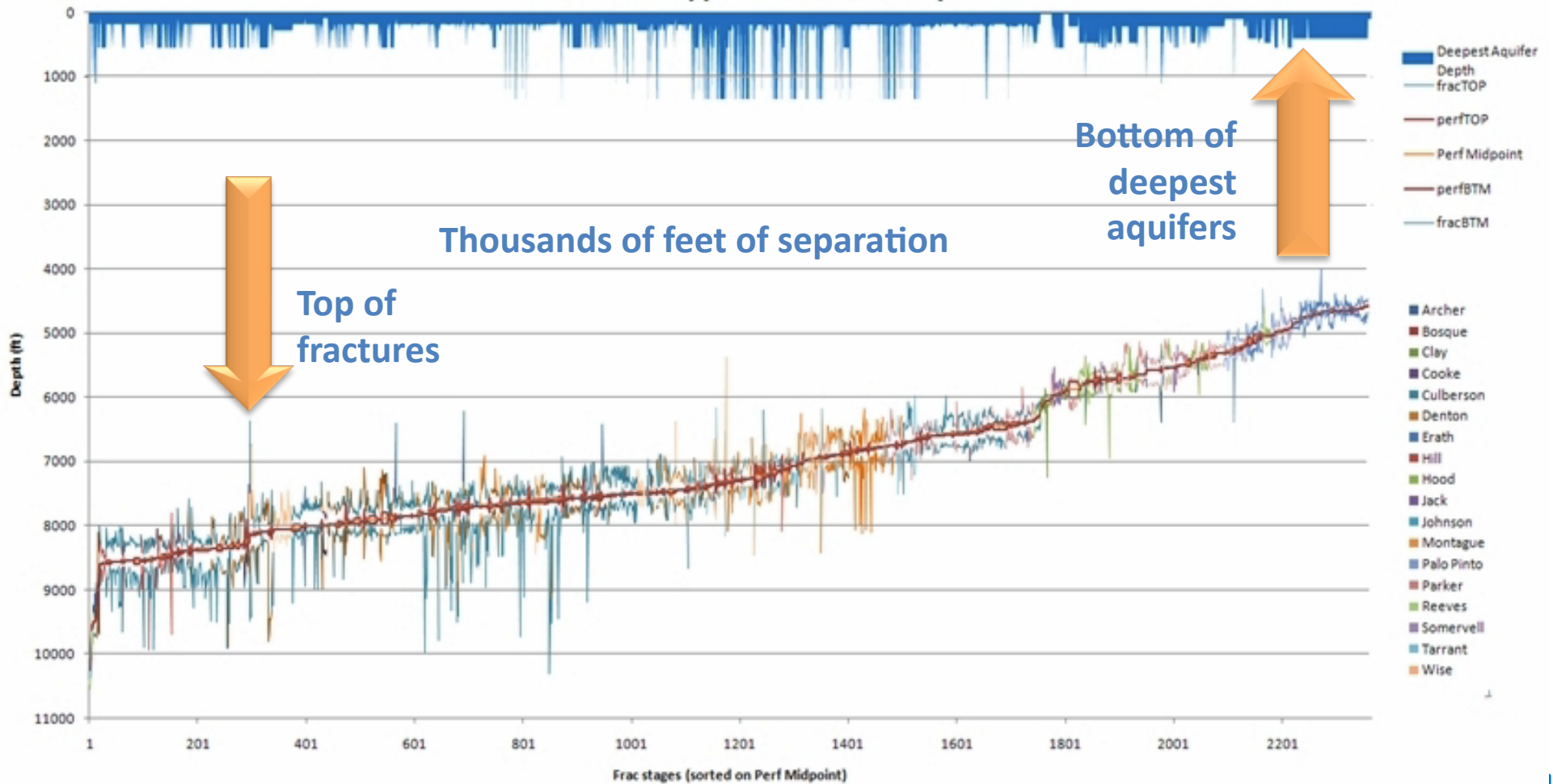
“TruthLand” - Factual Film

Actual truth:

- ✓ The **entire universe of additives used in the fracturing process** is known to the public and the state agencies that represent them.
- ✓ Not only do individual states mandate disclosure, the federal government does as well. The Occupational Safety and Health Administration (OSHA) mandates this information be kept at every wellsite, and made readily available to response and medical personnel in case of an emergency.

Technology Improves Understanding of Fracing Impacts

Barnett Mapped Frac Treatments/TVD

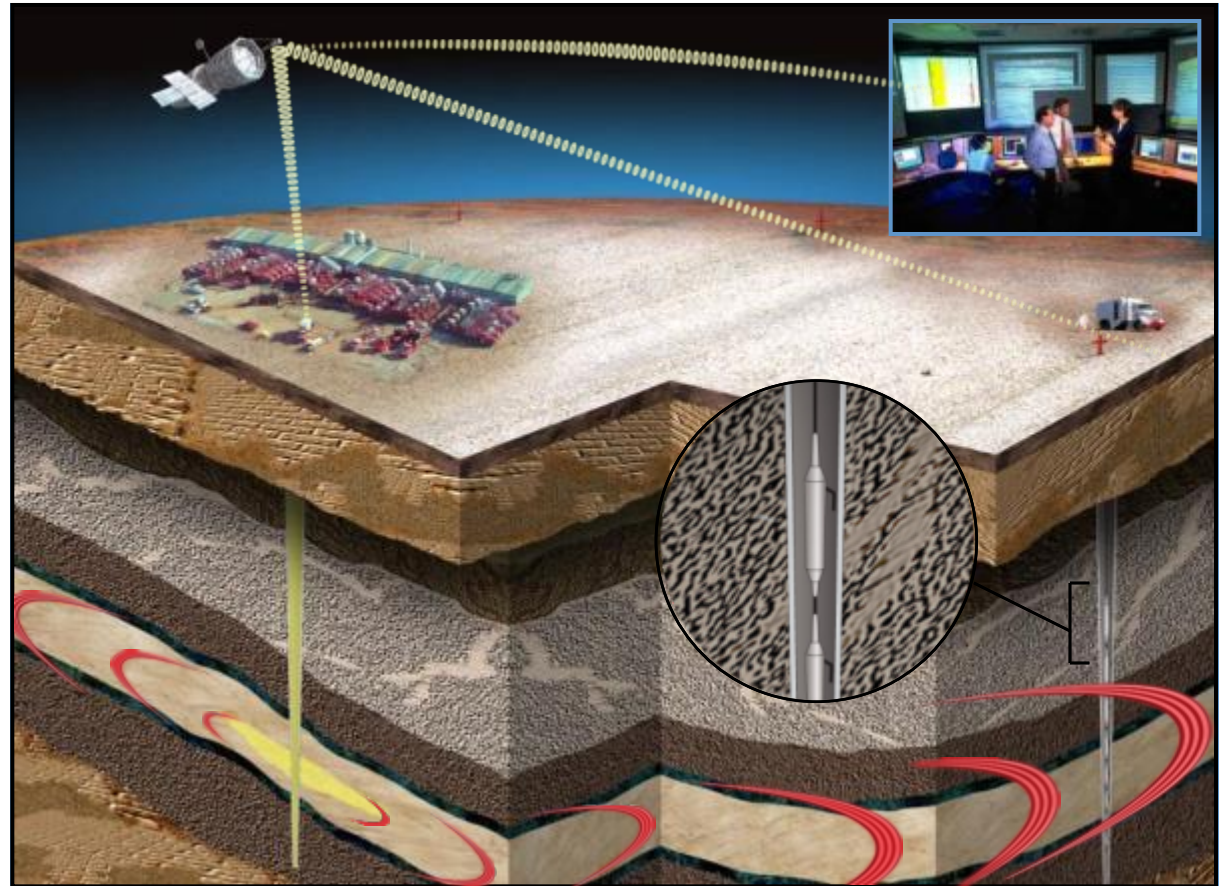


Fracture Height Determination – Microseismic

Fracture Evaluation

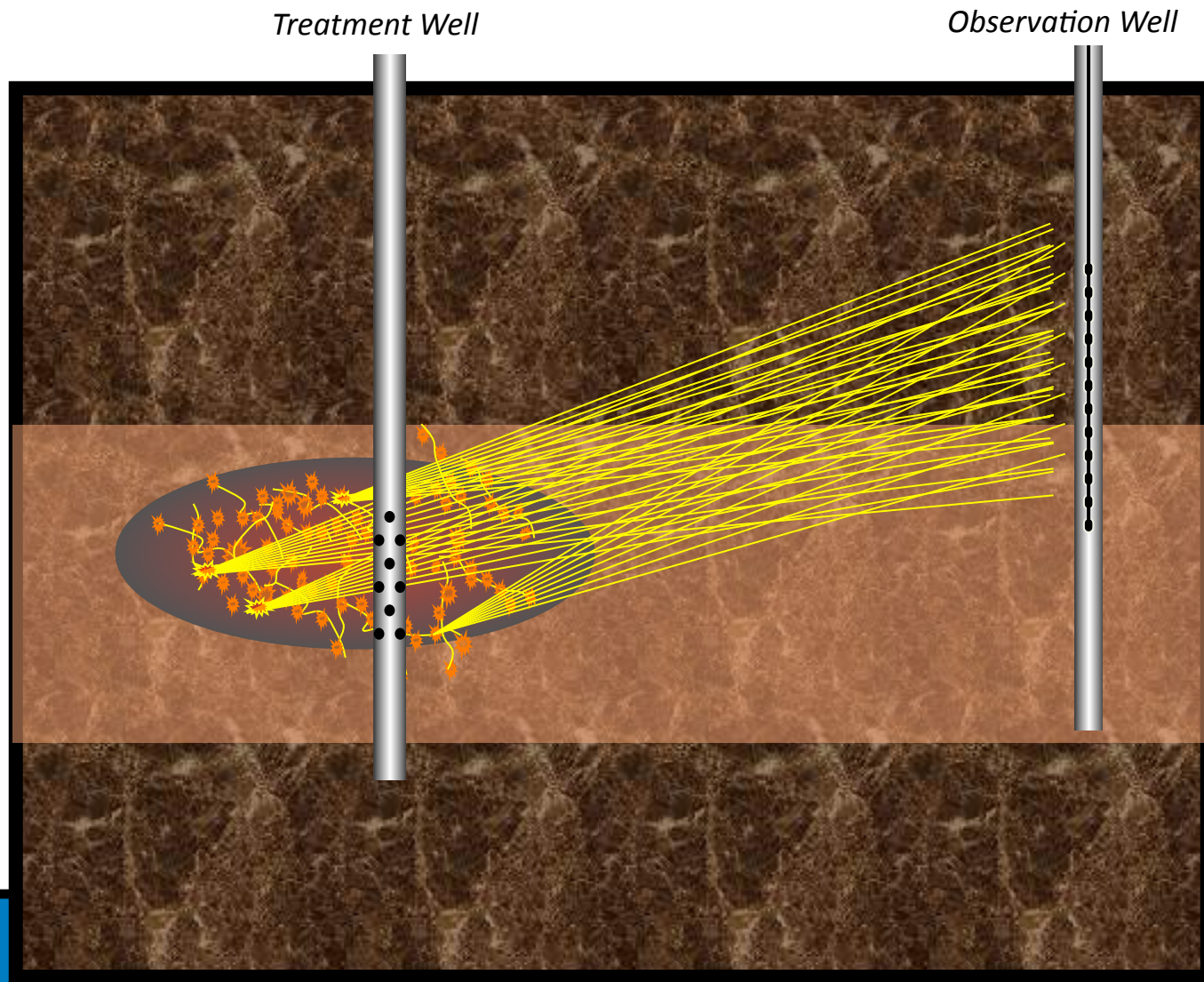
Microseismic Monitoring

- Fracturing process generates “nano” level microseismic events
- Geophones in monitor well identify and map precise location of events

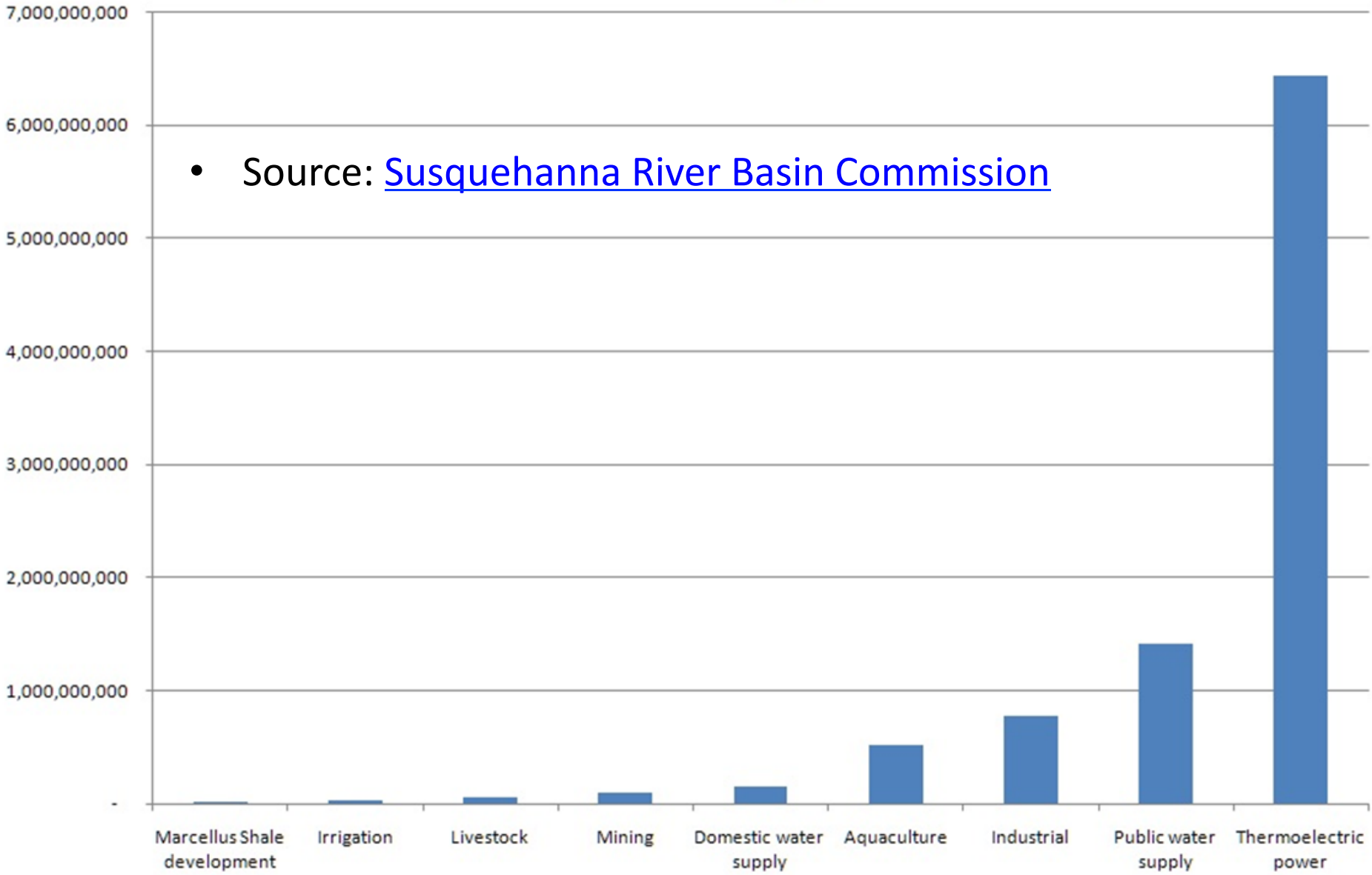


Closer Look

Microseismic Monitoring



Pennsylvania Surface and Groundwater Withdrawals by Industry Gallons Per Day



Sources of Information

STRONGER

In-depth peer review of the HF regulatory programs in OH, PA, OK, LA and CO
www.strongerinc.org



IOGCC/GWPC

FracFocus website operational & making well by well information available to the public
www.FracFocus.org



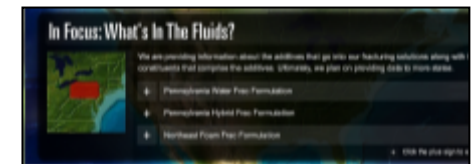
Energy In Depth

Energy In Depth launches new grassroots initiatives in northeast PA, southern NY and eastern Ohio
www.Energyindepth.org



Halliburton

Hydraulic Fracturing microsite contains detailed fluid information and educational material
www.Halliburton.com/HydraulicFracturing



Energy Getting Cheaper & Cleaner

- U.S. is only major emitter that's actually reducing emissions.
 - ❖ U.S. Emissions have fallen 7.7% since 2006 (International Energy Agency)
- Shale gas emits roughly ½ the emissions as coal and 30% less than conventional oil.
- Creating jobs in the Oil & Gas Industry and pull through in other sectors.
- Cheap abundant Natural Gas is revitalizing domestic manufacturing.
- U.S. becoming less dependent on nasty authoritarian petro-states.

Closing Perspective



- *Natural Gas*
 - *True game changer providing abundant US Energy, Job Creation, etc.*
- *Hydraulic Fracturing*
 - *Engineered and well understood process with proven 60 year track record*
- *Your Energy Future*
 - *Depends on informed decisions*

