



UNIVERSITY OF
CALGARY

Faculty of Law

Fracking Earthquakes: Induced Seismicity and the Potential Liability

Sustainability Conference of American Legal Educators,
ASU

Tempe, Arizona, May 7-9, 2015

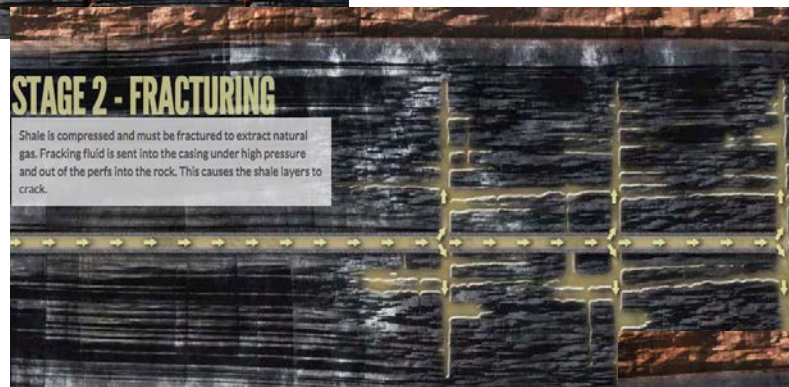
Fenner Stewart

May 8, 2015

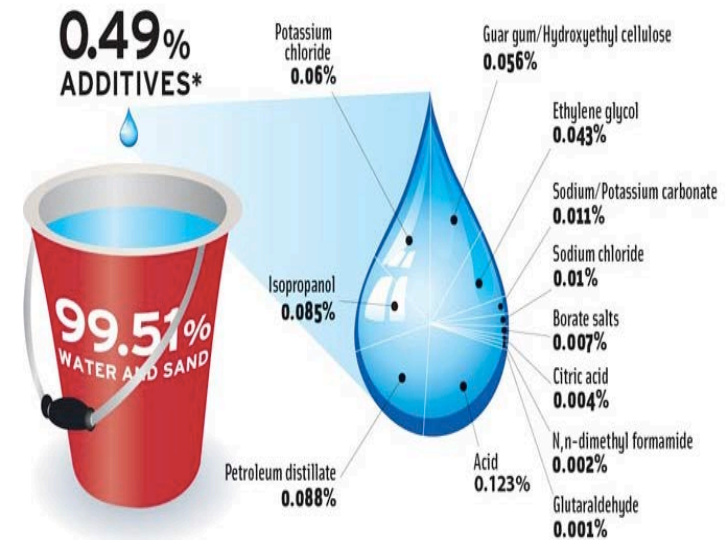
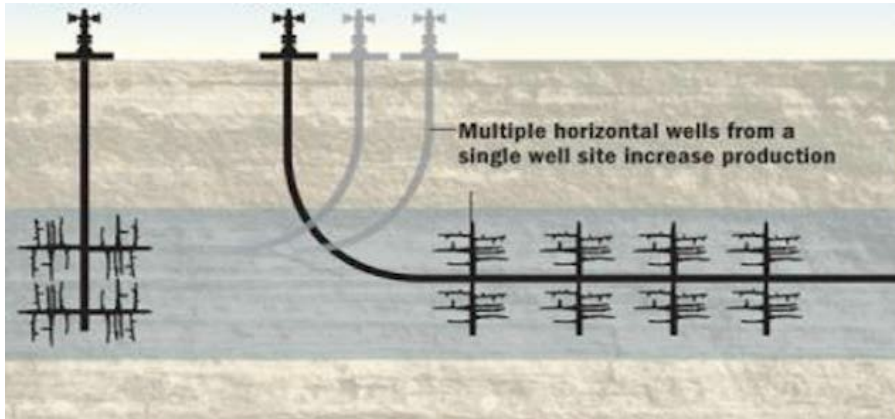
- Hydraulic Fracturing
- Fracking & Earthquakes
- Regulators
- Industry
- Litigation



Hydraulic Fracturing - Stages

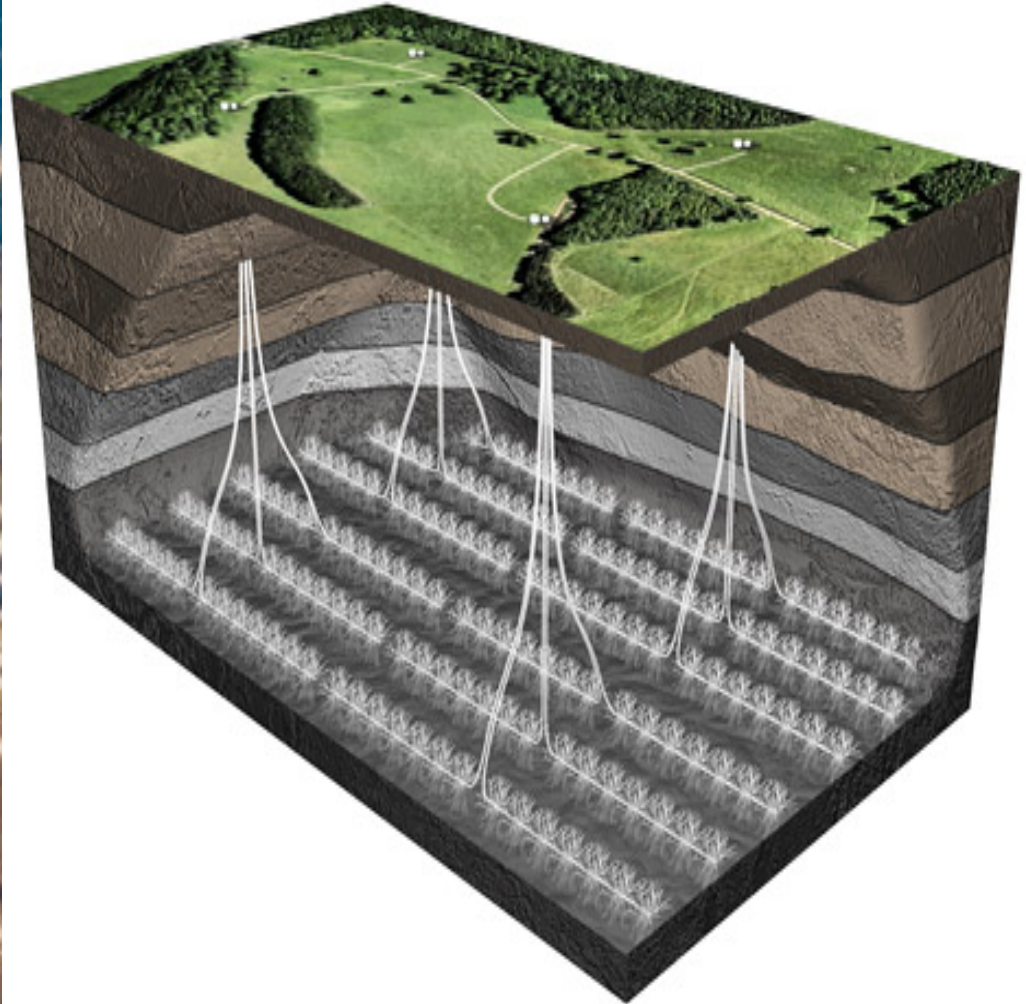


Hydraulic Fracturing – Key Innovations



Harold Hamm & Larry Nichols Marry Fracturing & Directional Drilling

Hydraulic Fracturing – Development



Hydraulic Fracturing Fields



Map of U.S. Shale Plays

Fracking & Earthquakes –USGS Report

- A new USGS report outlines a preliminary set of models to forecast potentially induced seismic activity.
- In doing so, it mentions that new areas of seismic activity are occurring "near deep fluid injection wells or other industrial activities capable of inducing earthquakes."



U.S. Geological Survey

New Insight on Ground Shaking from Man-Made Earthquakes

Released: 4/23/2015 9:00:00 AM

USGS focuses on "industrial operations that dispose of wastewater by injecting it into the ground"

Federal Scientists Map The Rise Of Man-Made Earthquakes Caused By Fracking Injection Wells

By Maria Gallucci [@mariagallucci](#) m.gallucci@ibtimes.com on April 23 2015 12:26 PM EDT

USGS Adds Fracking-Induced Quakes to Seismic Projections

by [s.e. smith](#) | April 29, 2015 | 8:30 am

Earthquakes Linked To Fracking Activity Are On The Rise, U.S. Government Says

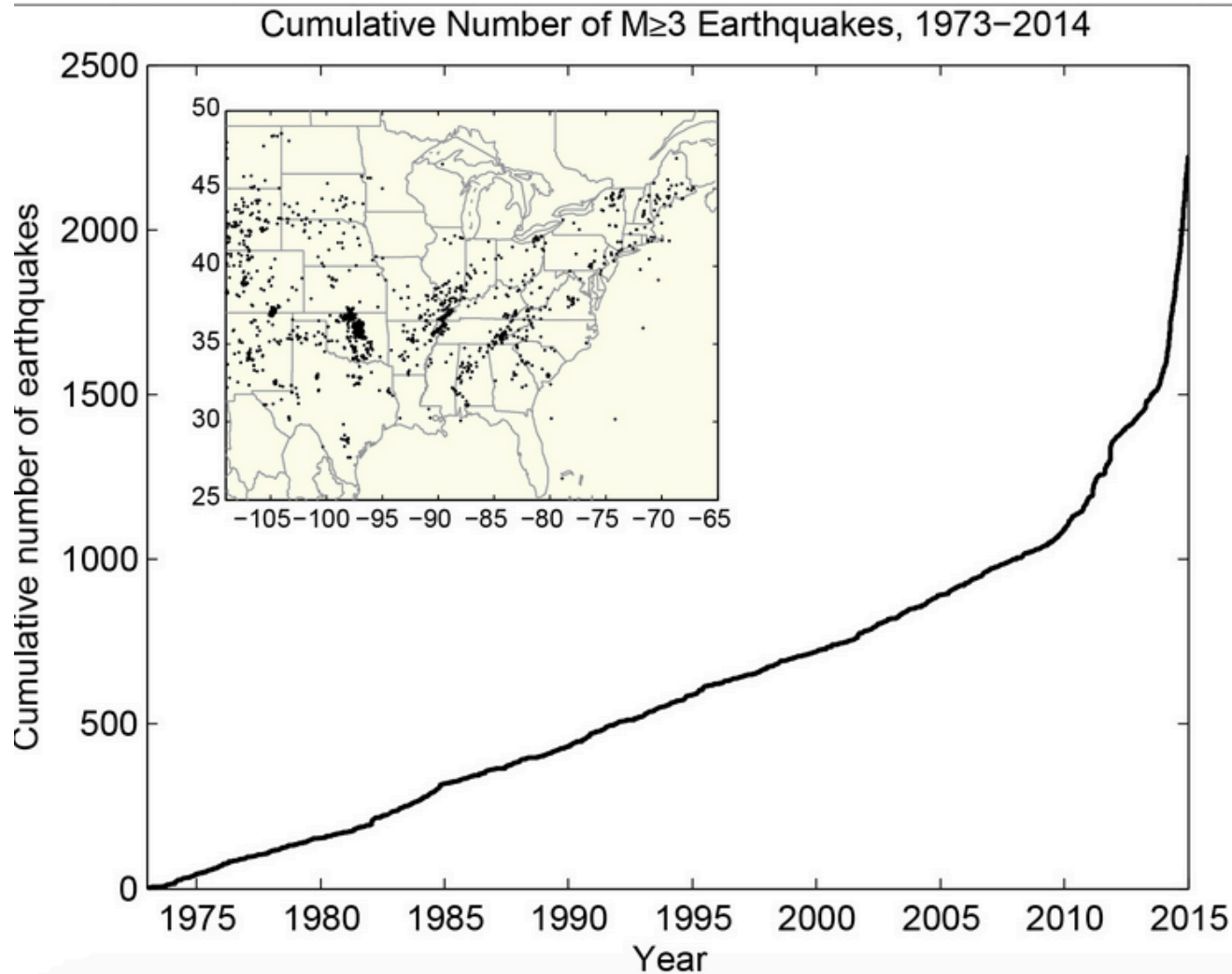
BY [EMILY ATKIN](#) [@](#) POSTED ON APRIL 24, 2015 AT 12:17 PM

Fracking Could Be More Dangerous Than We Realize

May 1st, 2015 by [Roy L Hales](#)

*News Reports on Induced Seismicity & Fracking
From April 23th to May 1st 2015*

Fracking & Earthquakes – Frequency

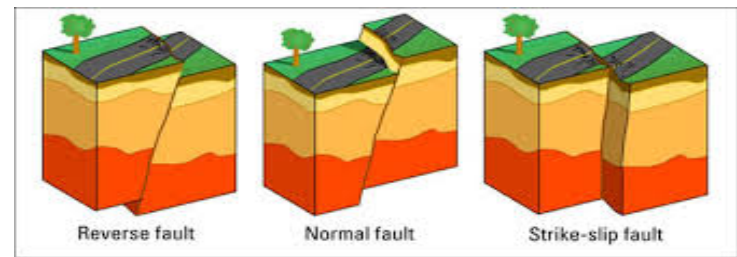
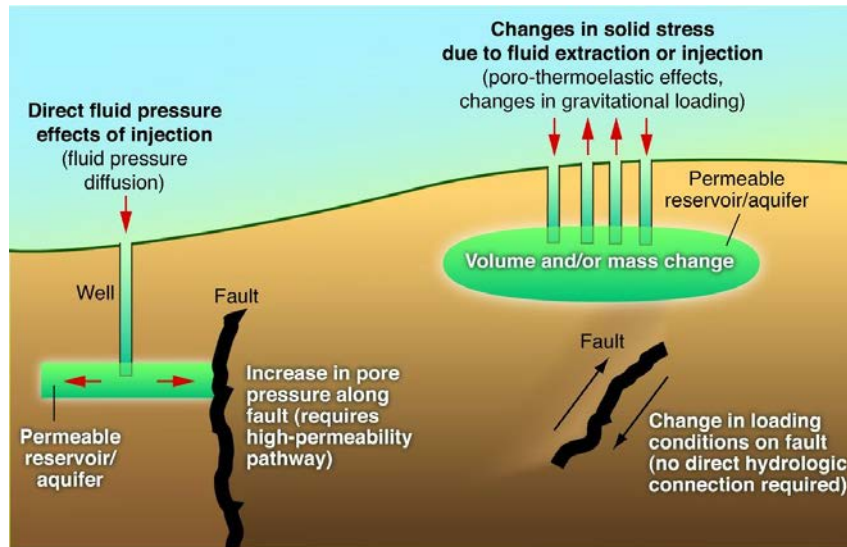


Number of Earthquakes Dramatically Increase In Central and Eastern U.S.

Credit: USGS

- “To a large extent, the increasing rate of earthquakes in the mid-continent is due to fluid-injection activities used in modern energy production”
- “These injection activities include: (i) [wastewater injection] (ii) [enhanced oil recovery] (iii) [hydraulic fracturing] (iv) [carbon capture and storage] (v) [enhanced geothermal systems].”
 - McGarr et al. *Coping with earthquakes induced by fluid injection* 347:6224 SCIENCE 830 (2015).
 - Most of the authors are from the USGS

Fracking & Earthquakes – Theories

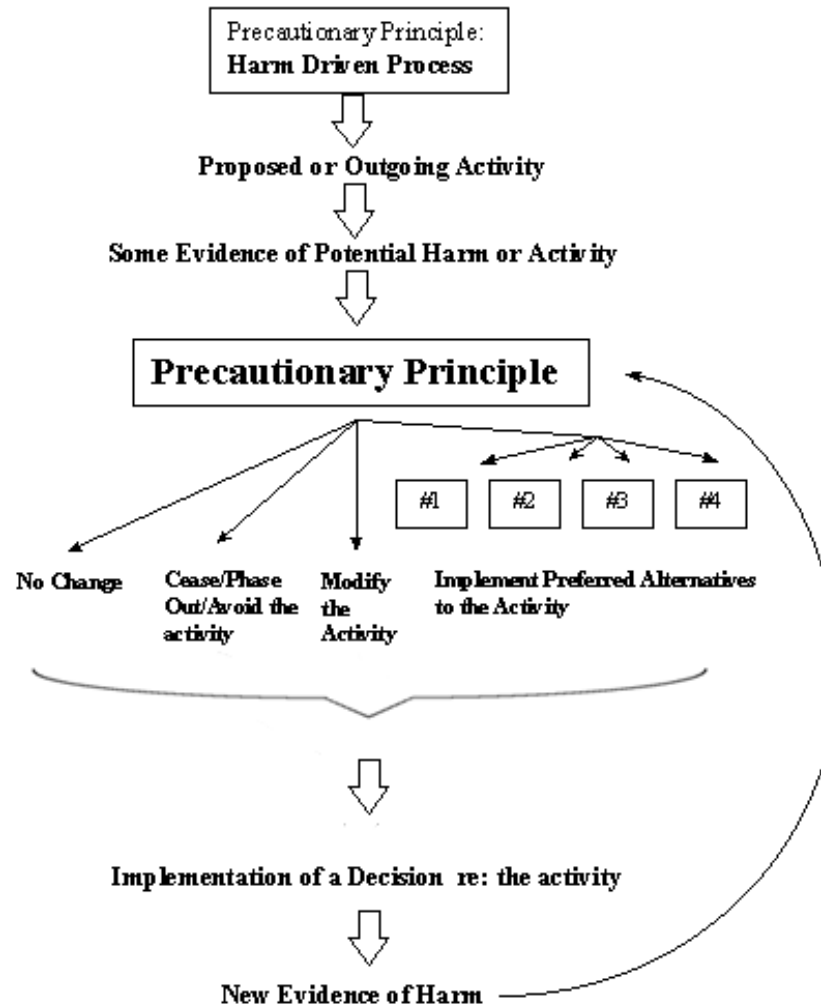


Changing Pressure And/Or Lubricating Along The Fault

US government says drilling causes earthquakes – what took them so long?

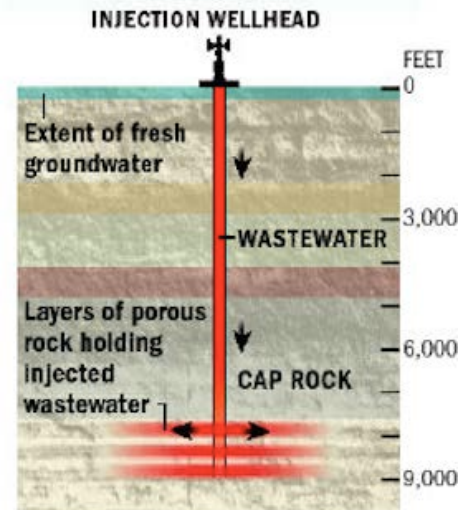
US Geological Survey backpedals on previous research on wastewater fracking-induced earthquakes that have shaken eight states in last seven years

Fracking & Earthquakes – Europeans & Risk



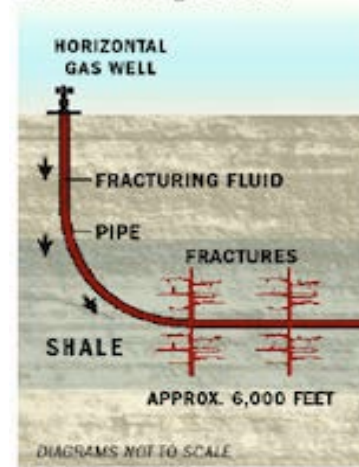
Regulators – A Lingering Presumption

At a typical injection well, drilling wastewater is pumped from tanker trucks to storage tanks, then it is sent thousands of feet below ground into porous rock.



FRACKING

To break up shale and release natural gas and oil, companies inject millions of gallons of water, sand and chemicals into wells. The mixture is injected under pressure, which fractures, or "fracks," the shale and releases natural gas and oil.



- “These injection activities include: (i) [wastewater injection] (ii) [enhanced oil recovery] (iii) [hydraulic fracturing] (iv) [carbon capture and storage] (v) [enhanced geothermal systems].”
 - McGarr et al. *Coping with earthquakes induced by fluid injection* 347:6224 SCIENCE 830 (2015).

*Until Recently, Many Took The Position That Earthquakes Were
Caused By Injection Wells—Not Fracking*

Regulators – A Lingering Presumption

State Regulator	Response to Induced Seismicity
Arkansas Oil and Gas Commission	<ul style="list-style-type: none"> Strong enough relationship b/t <u>injection wells</u> & seismicity to shut down wells and have a moratorium on new ones (2011)
Colorado's Department of Natural Resources' Oil & Gas Conservation Commission	<ul style="list-style-type: none"> U.S. gov. injected chemical weapons into wells, causing seismicity (1960s) Regulations on <u>injection wells</u> (1960s) The State has challenged local <u>fracking bans</u> (ongoing push and pull)
Ohio Department of Natural Resources	<ul style="list-style-type: none"> "Probable connection" b/t <u>fracking</u> & seismicity (2014) Regulations on monitoring seismicity around <u>fracking operations</u> (2014) Regulations on <u>injection wells</u> (Amendments are probable) Ohio Supreme Court: <u>local govs</u> cannot regulate <u>fracking</u> (2015)
Oklahoma Corporation Commission	<ul style="list-style-type: none"> Seismicity "<i>cannot be entirely attributed to natural causes</i>" (2015) Regulations on <u>injection wells</u> (Amendments, forthcoming) The State have passed two bills through the House limiting local <u>govs</u> ability to limit <u>fracking</u> (2015)
Railroad Commission of Texas	<ul style="list-style-type: none"> No link b/t <u>injection wells</u> & seismicity Regulations on <u>injection well</u> (Amendments, 2014) The State has banned local <u>fracking bans</u> (2015)

■ Scientific Position



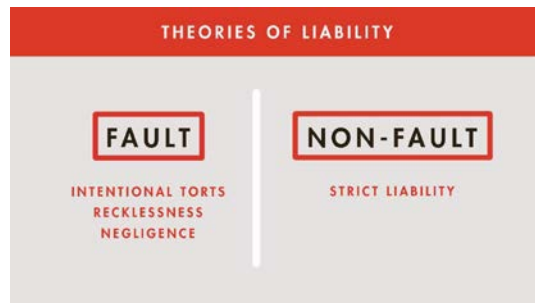
- To avoid public distrust, the results of seismic network operations ought to be placed into the public domain in near real time.
- “Open sharing of data can benefit all stakeholders, including industry, by enabling the research needed to develop more effective techniques for reducing the seismic hazard.”
 - McGarr et al. *Coping with earthquakes induced by fluid injection* 347:6224 SCIENCE 830 (2015).

■ Industry Position



- Must not acknowledge link between fracking and seismicity prior to the establishment of clear scientific evidence
- Must mitigate potential liability by engaging in earnest scientific research

- To date, no lawsuit has successfully linked fracking to earthquakes.
- Tangentially referred to the issue in:
 - *Hiser v. XTO Energy Inc.*, 2013 U.S. Dist. LEXIS 140667 (E.D. Ark. Sept 20, 2013).



DUTY
BREACH
CAUSATION
+ DAMAGES
NEGLIGENCE

Nuisance Law (Tort)

- Definition: An unreasonable and/or substantial interference with a person's use and enjoyment of her real property by actions on nearby real property



Strict Liability, Nuisance, Negligence, Trespassing

Litigation – The Recipe For Industry Success

FEIDER
MOTION TO DISMISS
... by counsel, moves this Honc



*If Corps Cannot Get The Case Dismissed, Then They Have Been
Able To Secure Settlements with NonDisclosure Agreements*