

Fracking Facts

a citizen perspective

Texas

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Wyoming

An aerial photograph of North Dakota, showing a patchwork of agricultural fields in various shades of green and brown. Numerous small, bright red and orange rectangular markers are scattered across the landscape, primarily concentrated in the central and eastern portions of the state. These markers likely represent specific locations of interest, such as oil wells or industrial sites. The text "North Dakota" is overlaid in white in the lower-left quadrant.

North Dakota

Let's Look at some Major Concerns:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

New Technology brings New Risks

Air Pollution

Water Pollution

Surface Impacts

Property Values/Insurance Availability

Human Health Impacts

Democracy

Darling Downs, QLD, Australia

How long has fracking been around?

The current form of fracking has only been around for 7 years!

Hydraulic Fracturing Technological Milestones ¹⁴	
Early 1900s	Natural gas extracted from shale wells. Vertical wells fracked with foam.
1983	First gas well drilled in Barnett Shale in Texas
1980-1990s	Cross-linked gel fracturing fluids developed and used in vertical wells
-> 1991	First horizontal well drilled in Barnett Shale
1991	Orientation of induced fractures identified
-> 1996	Slickwater fracturing fluids introduced
1996	Microseismic post-fracturing mapping developed
1998	Slickwater refracturing of originally gel-fracked wells
-> 2002	Multi-stage slickwater fracturing of horizontal wells
2003	First hydraulic fracturing of Marcellus shale ¹⁵
2005	Increased emphasis on improving the recovery factor
-> 2007	Use of multi-well pads and cluster drilling

-From NYS SGEIS draft, page 5-32, 2009

How long has fracking been around?

The current form of fracking has only been around for 7 years.

The oil/gas industry says:

“Fracking has been around for over 60 years.”

What they don't say: *The modern differences in scale, technology, and amount of materials used are on the order of hundreds to one.*



	Well type	Pressure	Pump size	Fluid amount	Fracking fluid	Depth
Then	Vertical Single well	2500 psi	under 300 hp	app. 10,000 gallons	Foam	500 feet
Now	Horizontal Multiple-well pads	over 13,000 psi	over 2,400 hp	app. 5,000,000 gallons	Toxic chemical mix	app. 8,000 feet vertical, plus 8,000 feet horizontal, or more!

Freshwater Use

Fracking has used Billions of gallons of Colorado's precious freshwater, and plans to use Billions more!

The oil/gas industry says:

Fracking's water use represents only a small part of Colorado's total water use.

What they don't say: In gallons:

175 Billion freshwater gallons for 35,000 wells (@5m gl/well) have been used.

Annually, enough to supply the freshwater needs of the city of Aurora, or all of Boulder County. (79,000 households, 300,000 people)

One of the 400 trucks required to deliver water and supplies for each well!



Jobs

**Most jobs are not directly with the fracking companies.
Those directly hired by the companies are usually not locals.**

The oil/gas industry says:

Fracking employs a lot of people in Colorado.

What they don't say:

Perhaps less than 1 in 5 of those are **directly** employed by the fracking industry.

A study in Pennsylvania of a similar claim of jobs created found that only about 15% of those jobs were directly tied to the fracking industry.



What's More:

“ Many industry jobs are not filled by local residents, and a boom town effect, including escalating cost of living and other social problems, has been documented in places where an extraction industry rapidly arises.”

-Midwest Energy News (2013)



North Dakota

Drilling Leaks

Unless applied perfectly, the cement fill has multiple points where it can and does fail routinely!

The oil/gas industry says: *The cement used is very durable.*

What they don't say: The problem is not the cement quality, it's the *application*.

***90% of failures occur at casing connections
(the leading cause of water contamination).***

“Cementing...usually comes at the end of operations and at the time that everything is wrapping up and everyone's wanting to move on to the next well. As such, it's sometimes botched. A lot more time and money is then spent fixing it, or worse, recovering from a horrible aftermath.”

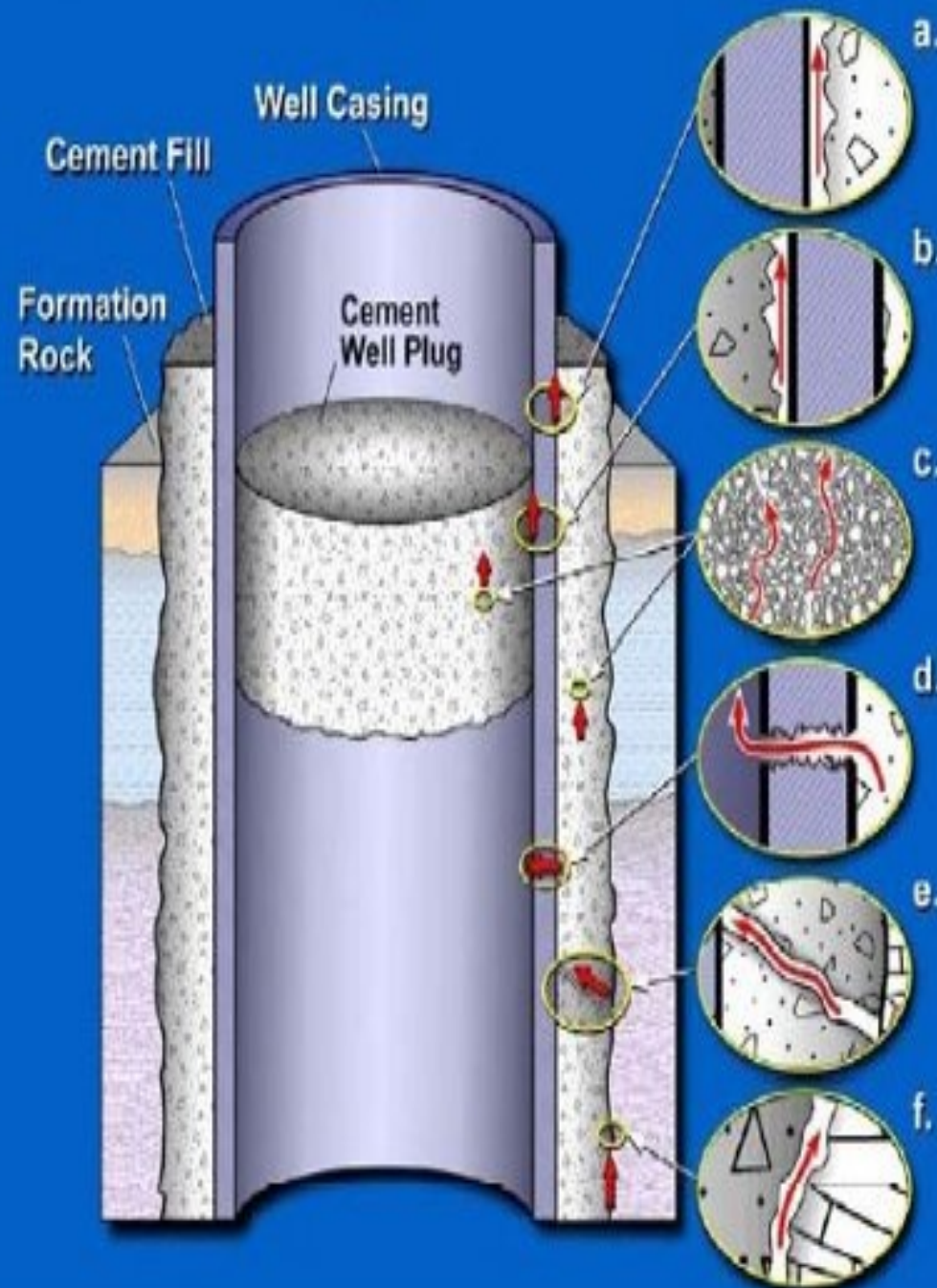
“Unfortunately, the cement job is not regulated.”

-Forbes Magazine, 2012



Unless applied perfectly, the cement fill has multiple connection points where it can and does fail routinely.

Potential Gas Migration Paths along a Well



“Pennsylvania’s Department of Environmental Protection has tracked gas leaking from wells across the state. **They found 6.2 percent of new gas wells were leaking in 2010, 6.2 percent in 2011 and 7.2 percent so far in 2012.**”

-timesunion.com (NY)

...leaks and methane migration are routine items of "high risk noncompliance"

-Alberta Energy 2011 Field Surveillance Report

Fracking Fluid - what's in it?

A typical 5mil gal frack includes 25,000 gallons of chemicals, many poisonous!

The oil/gas industry says: *Fracking fluid is mostly water and sand.*

What they don't say: *A 5mil gal frack includes 25,000 gallons of chemicals!*

While mixtures are similar, each company can claim its is unique, therefore a “proprietary trade secret,” and refuse to disclose the names of the chemicals to the public.

The “Halliburton Loophole” (spearheaded by Dick Cheney) exempts fracking from the Safe Drinking Water Act. (Fracking also has exemptions from the Clean Air Act and the Clean Water Act.)



Some of the toxic substances found either in fracking fluid or in the flowback brine:

- BTEX compounds/VOC's (benzene, toluene, xylene, ethylbenzene) - human carcinogens, neurological toxins, endocrine disrupters
- Arsenic - poison
- Methanol (found in antifreeze and paint solvent) - fatal in high doses
- Diesel Fuel (greatest threat to drinking water) - human carcinogen
- Lead - human carcinogen, developmental disorders
- Formaldehyde (used in embalming fluid) - lung and reproductive damage
- Sulfuric Acid (used in car batteries) - human carcinogen
- Uranium 238 and Radium 222/226 - radioactive contaminants

Spent Fracking Fluid - what happens to it?

Most of the fracking fluid remains underground. What flows back is often re-injected underground. Either way, long term consequences are unknown.

The oil/gas industry says: They're trying to find ways to reuse the waste fluid and flowback brine

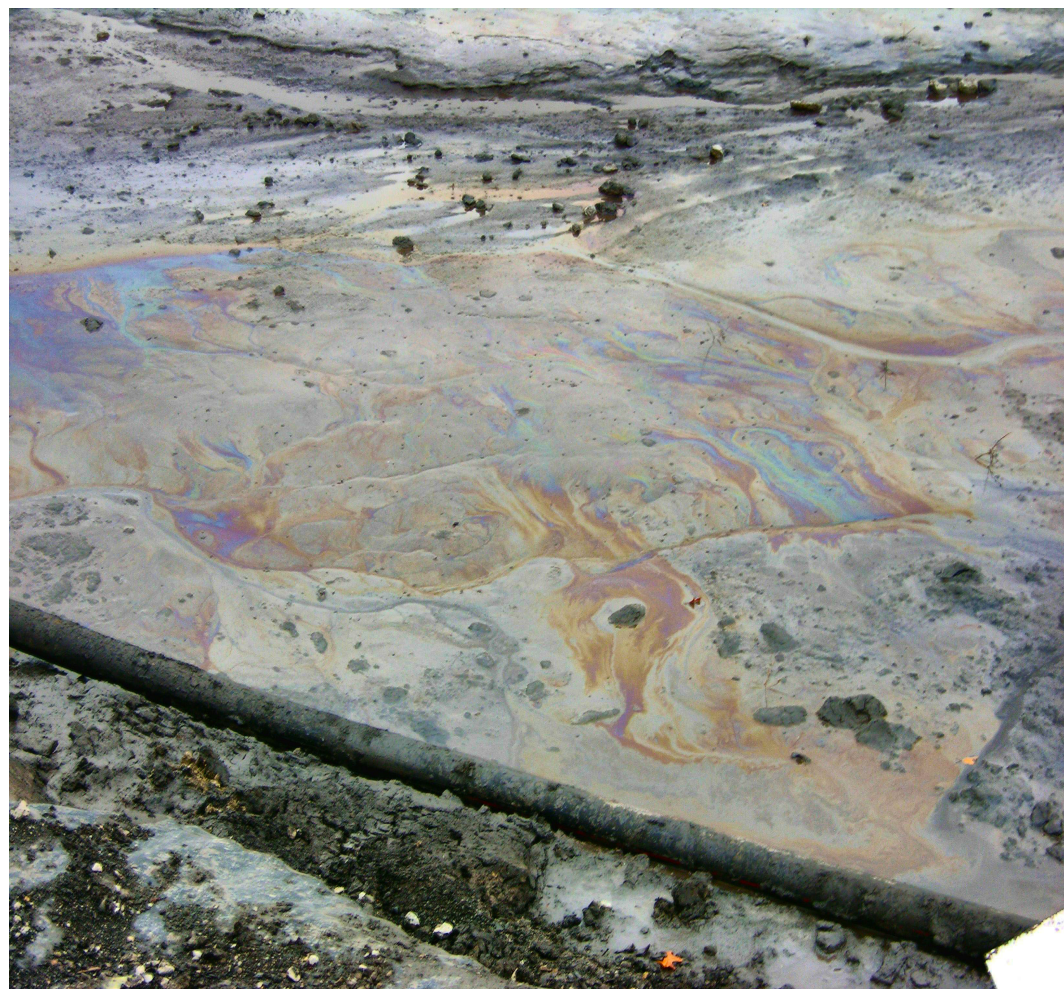
What they don't say:

Fracking fluid (with all its freshwater) is too toxic to be used for anything but fracking.

70-85% of the toxic waste fluid remains underground with unknown longterm consequences.

What's recovered is usually re-injected underground with unknown longterm consequences.

Traditionally flowback was stored in surface ponds, or "pits", bottom-sealed (theoretically) with liners



Two Texas Waste Pits

← This one overflowed during a rainstorm, spilling its contents into Black and Denton Creeks.



EXHIBIT 39: CURRENT PRODUCED WATER MANAGEMENT BY SHALE GAS BASIN.

Shale Gas Basin	Water Management Technology	Availability	Comments
Barnett Shale	Class II Injection Wells	Commercial and non-commercial	Disposal into the Barnett and underling Ellenberger Group
	Recycling	On-site treatment and recycling	For re-use in subsequent fracturing jobs
Fayetteville Shale	Class II Injection Wells	Non-commercial	Water is transported to two injection wells owned and operated by a single producing company
	Recycling	On-site recycling	For re-use in subsequent fracturing jobs
Haynsville Shale	Class II Injection Wells	Commercial and non-commercial	
Marcellus Shale	Class II Injection Wells	Commercial and non-commercial	Limited use of Class II injection wells
	Treatment and discharge	Municipal waste water treatment facilities, commercial facilities reportedly contemplated	Primarily in Pennsylvania
	Recycling	On-site recycling	For re-use in subsequent fracturing jobs
Woodford Shale	Class II Injection Wells	Commercial and non-commercial	Disposal into multiple confining formations
	Land Application		Permit required through the Oklahoma Corporation Commission
	Recycling	Non-commercial	Water recycling and storage facilities at a central locations
Antrim Shale	Class II Injection Wells	Commercial and non-commercial	
New Albany Shale	Class II Injection Wells	Commercial and non-commercial	

Spills

O/G surface spills and leaks are common, and contaminate local water.

The oil/gas industry says: *“Surface spills are readily discoverable.”*

What they don't say: Then why have **17%*** of the more than 2,000 industry-reported Colorado spills from 2008 to 2012 resulted in verified groundwater contamination?

*** 40% water contamination rate over the same period for Weld County, home to the Colorado's largest concentration of fracked wells.**

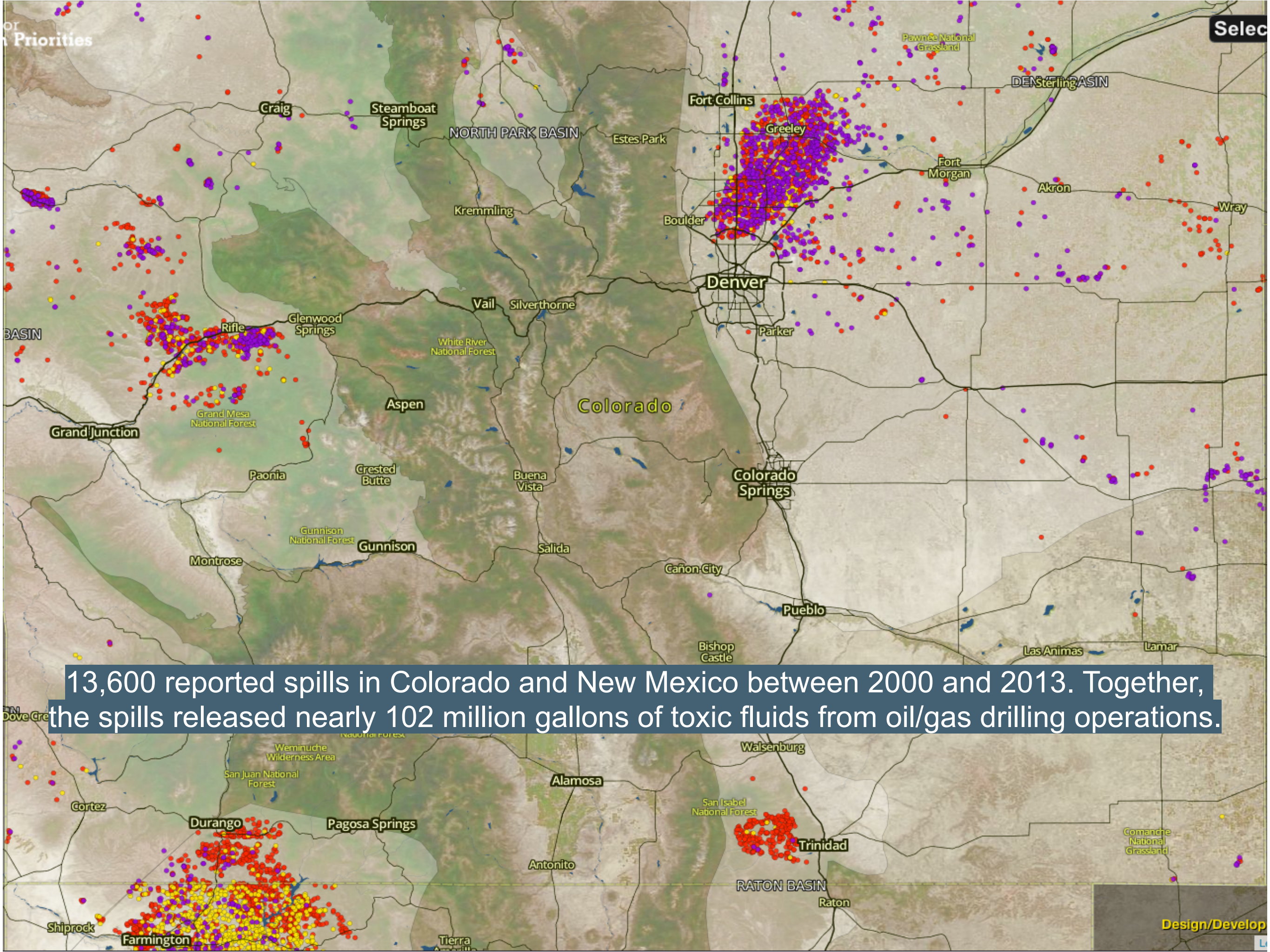
Frack Tanks Floating in Weld County



And what about the floods of Sept. 2013?

“A total of 1149 barrels – 48,250 gallons – of oil or condensate spilled during the flooding. A total of 1035 barrels – 43,479 gallons, of produced water (fracking flowback) – also spilled. (April 16, 2014)”

- Colorado Oil and Gas Conservation Commission (COGCC)



13,600 reported spills in Colorado and New Mexico between 2000 and 2013. Together, the spills released nearly 102 million gallons of toxic fluids from oil/gas drilling operations.

Earthquakes

High-pressure fracking injection wells cause earthquake swarms!

The oil/gas industry says:

No connection to fracking has been proven.

What they don't say:

Fracking's connection to earthquake swarms is well-established and settled. The connection is to the high-pressure, injection wells.

In 1960's & '70's tests, pressurized waste liquid injection was used to trigger, and even turn on and off, earthquakes in CO - Colorado Geological Survey

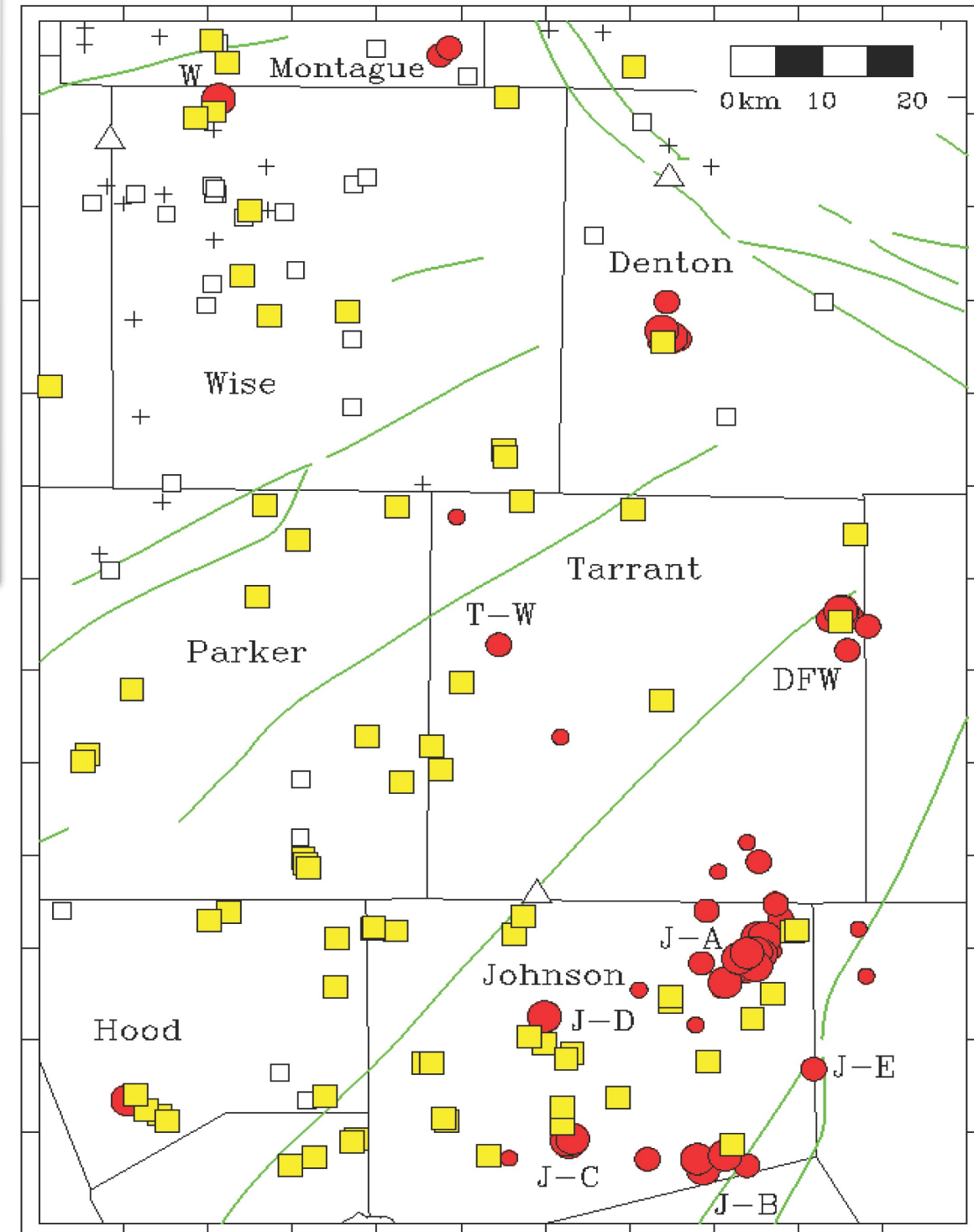
In April 2014, the state of Ohio accepted a report conclusively linking a Youngstown-area earthquake swarm (the name given to clusters of low-magnitude, fracking-caused earthquakes) to a leaking waste-fluid injection well.

As a result, restrictions were added to Ohio's permitting process.

One study, at the University of Texas' Institute for Geophysics, found clear correlation between injection wells and Earthquake Swarms

Red dots: Earthquake epicenters

Yellow squares: Injection well sites



Property Values, Mortgages, and Insurance

Fracking can depress home prices and real estate markets, with mortgages and insurance becoming less available.

- *Mortgages prohibiting gas drilling* becoming common, e.g. Sovereign Bank's Mineral, Oil and Gas Rights Rider
- *Property values were reduced by up to 24%* when properties used groundwater- Duke University
- *Non-renewal of insurance policies* on properties containing well sites a “*new trend...*” says Jim Goldstein, town supervisor of Lebanon, NY.
- Policies often contain a “*pollution exclusion*” limiting homeowners ability to collect health-fracking damages.
- *Fear among home buyers is driving down home prices*, drying up entire real estate markets in heavily fracked areas. “*Some don't want to even look at anything remotely close to any existing or proposed well sites,*” Boulder real estate agent Nanner Fisher, to the *Colorado Independent*.



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Health Effects

The fracking industry and its politicians thwart government studies and investigations, but the evidence from independent scientists and top research institutions is clear...

The oil/gas industry says:

No official, government studies have conclusively linked fracking activities with negative health or environmental effects.

What they don't say: Why. Consider: Two years after its 2011 preliminary report blaming fracking for aquifer contamination in WY, the EPA, under intense pressure from the industry and industry politicians, abandoned its continuing investigation, instead turning it over to the very drilling company suspected of causing the contamination.

(In May 2014, the Colorado legislature voted against conducting a study on the health effects of fracking, following intense industry lobbying.)

This has been the pattern noticed by citizen watchdog groups - abandonment of studies, backtracking on allegations, closed investigations by the EPA under heavy industry pressure.

However, non-industry scientists and researchers have persevered..

Water Pollution: Confirmed

From an **Associated Press** analysis:

**“4 states (Pennsylvania, Ohio, West Virginia and Texas)
confirm water pollution from drilling”**

Contamination from Fracking Chemicals: Confirmed

From a **University of Texas** study of the Barnett Shale:

“...arsenic, selenium, strontium and total dissolved solids (TDS) exceeded the Environmental Protection Agency’s Drinking Water Maximum Contaminant Limit (MCL) in some samples from private water wells located within 3 km of active natural gas wells. Methanol and ethanol were also detected in 29% of samples.”

Radioactive Contamination: Confirmed

A **Duke University** study of the Marcellus Shale found:

“...dangerous levels of radioactivity and salinity at a fracking disposal site near Blacklick Creek, which feeds into water sources for Pittsburgh and other western Pennsylvania cities.”

Dangerous Levels of Methane and Benzene Air Emissions: Confirmed

NOAA (National Oceanic and Atmospheric Administration):

“...Colorado’s Front Range oil and gas boom has been emitting three times more methane than previously believed — 19.3 tons an hour.”

“...also measured industry emissions of cancer-causing benzene and smog-forming volatile organic compounds (VOC’s) at levels up to seven times higher than government agencies have estimated.”

- as reported by the Denver Post, May 2014

Yale University:

“Forty separate types of equipment are known to be potential sources of methane emissions during the (process of) fracking...”

(Methane is 20-30 times more potent a greenhouse gas than carbon dioxide.)

Endocrine Disrupting Chemicals (EDC): Confirmed

**From a University of Missouri School of Medicine study,
published in the Journal *Endocrinology*:**

“...water samples from drilling sites had higher levels of EDC (endocrine-disrupting chemical) activity that could interfere with the body's response to androgens, a class of hormones that includes testosterone, as well as the reproductive hormone estrogen. Drilling site water samples had moderate to high levels of EDC activity, and samples from the Colorado River – the drainage basin for the natural gas drilling sites – had moderate levels.”

Newborn Birthweight and Health Effects: Confirmed

Cornell:

“The introduction of drilling increased low birth weight and decreased term birth weight on average among mothers 2.5 km of a well compared to mothers 2.5 km of a future well.”

Princeton, Columbia, MIT:

“...proximity to fracking increased the likelihood of low birth weight by more than half, from about 5.6 percent to more than 9 percent. The chances of a low Apgar score, a summary measure of the health of newborn children, roughly doubled, to more than 5 percent.”

And, as if this all weren't enough...

The Oil/Gas industry is now hiring ex-military “Psyops” (psychological operations) specialists to compromise citizens and grassroots groups opposed to fracking.

The Psyops officers and their industry handlers refer to such citizens as “*insurgents*”.

So...

Do you want a fracking well...

...in your neighborhood?

...near you children's school?

...near your home?

**Don't you think you
should at least have
a choice?**

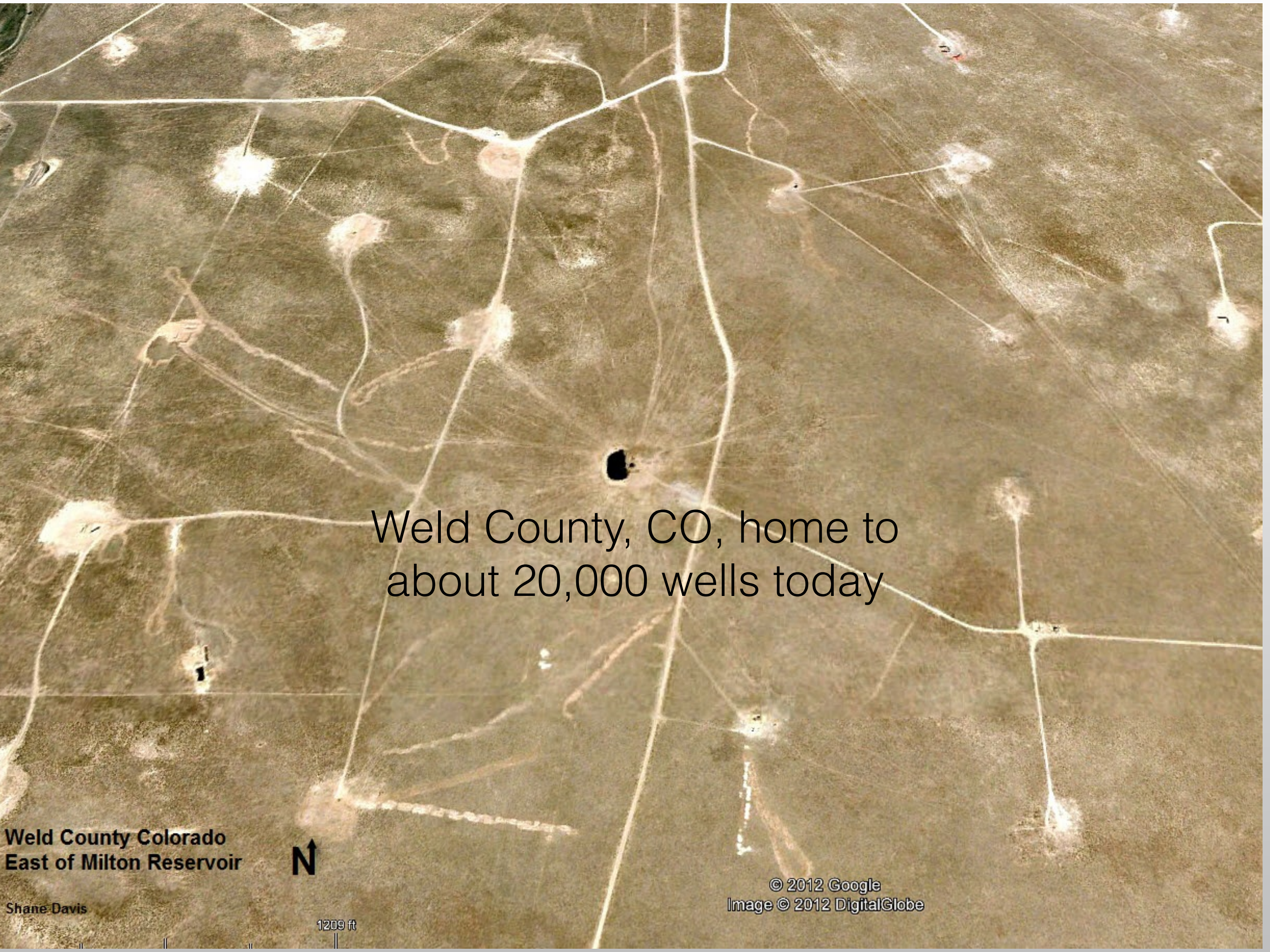


"Fracking is the DDT of our times."

- Sandra Steingraber, biologist and author

"Making fracking safe is simply not possible"

- Lou Allstadt, former Mobil Oil Executive VP



Weld County, CO, home to
about 20,000 wells today

Weld County Colorado
East of Milton Reservoir

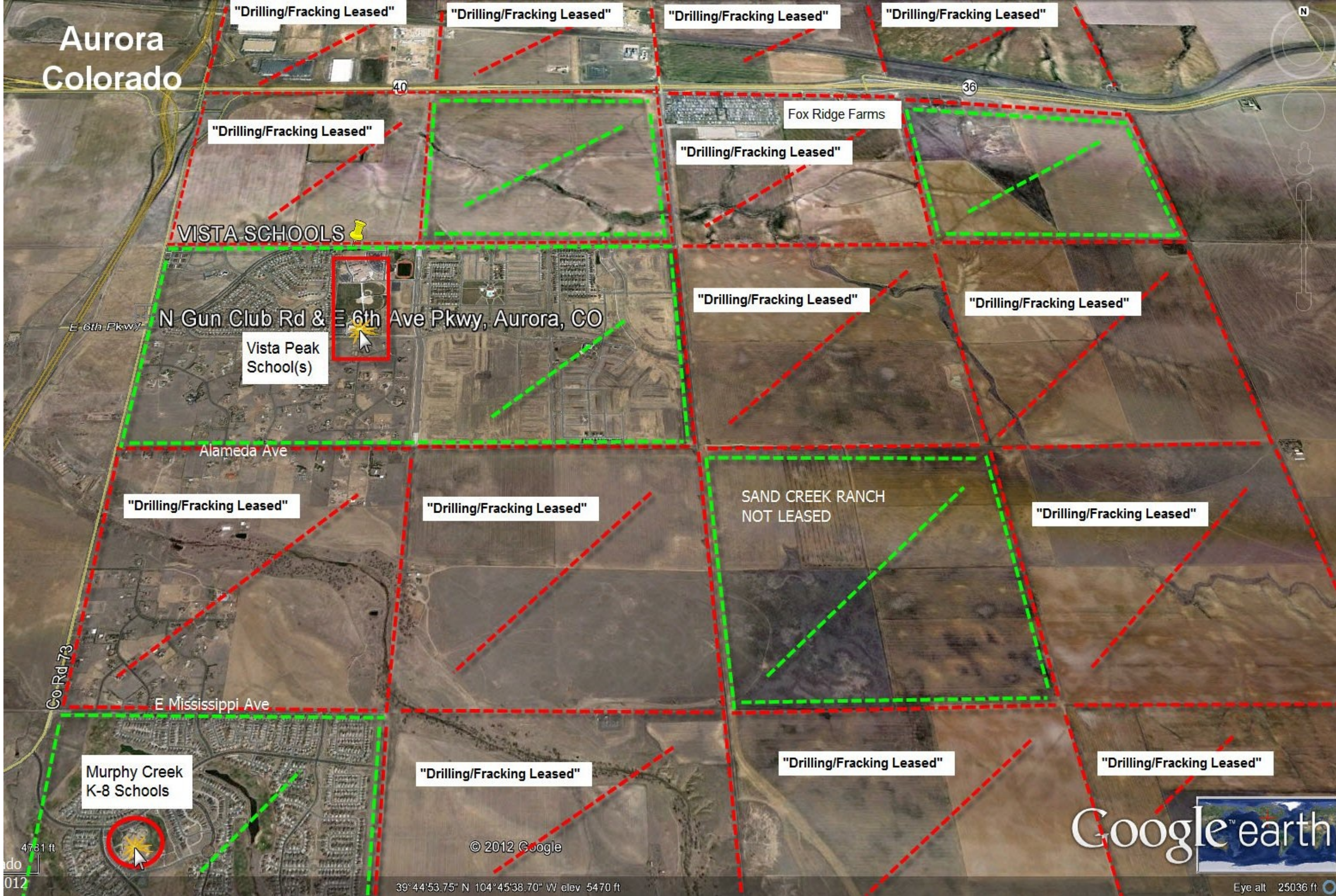


Shane Davis

1209 ft

© 2012 Google
Image © 2012 DigitalGlobe

Aurora
Colorado



With tens of thousands more planned!

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Credits

Slide

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Credits

Slide

How long fracking:

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- slide show presentation, Dr. Anthony Ingraffea, Cornell

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Have a choice pic:

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