Presentation on Hydraulic Fracturing and Water Use

Meeting of the Water and Natural Resources Committee

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Bruce Baizel
Director,
Energy Program and Oil & Gas Accountability Project
Earthworks
bruce@earthworksaction.org
970.259.3353

Who we are:

EARTHWORKS is a nonprofit organization dedicated to protecting communities and the environment from the impacts of irresponsible mineral and energy development while seeking sustainable solutions.

EARTHWORKS Oil & Gas Accountability Project - OGAP

Why there is a lack of trust about hydraulic fracturing

- Claim 1: Hydraulic Fracturing is not injection.
  - **Rejected by 11th Circuit Court of Appeals in the LEAF decision**
- Claim 2: Hydraulic Fracturing has no risk.
  - 2004 EPA report undertook no scientific study
  - **2014 EPA study will remedy that deficiency**
- Claim 3: Hydraulic Fracturing is carried out safely.
  - 2007 New Mexico sampling showed **presence of toxics**
  - Use of diesel in violation of the 2003 MOU with EPA
  - All scientific studies have shown impacts from drilling and HF
- Claim 4: Hydraulic Fracturing has been done this way for 50 years.
  - Horizontal drilling and fracturing technology **have changed**

The complex and increasingly toxic nature of drilling

"Although pit fluids are not groundwater, 17 constituents were present in the OCD pit fluid samples at concentrations that exceed the WQCC Ground Water 3103 Standards."

– from NMOCD testimony during the 2007 pit rule hearing

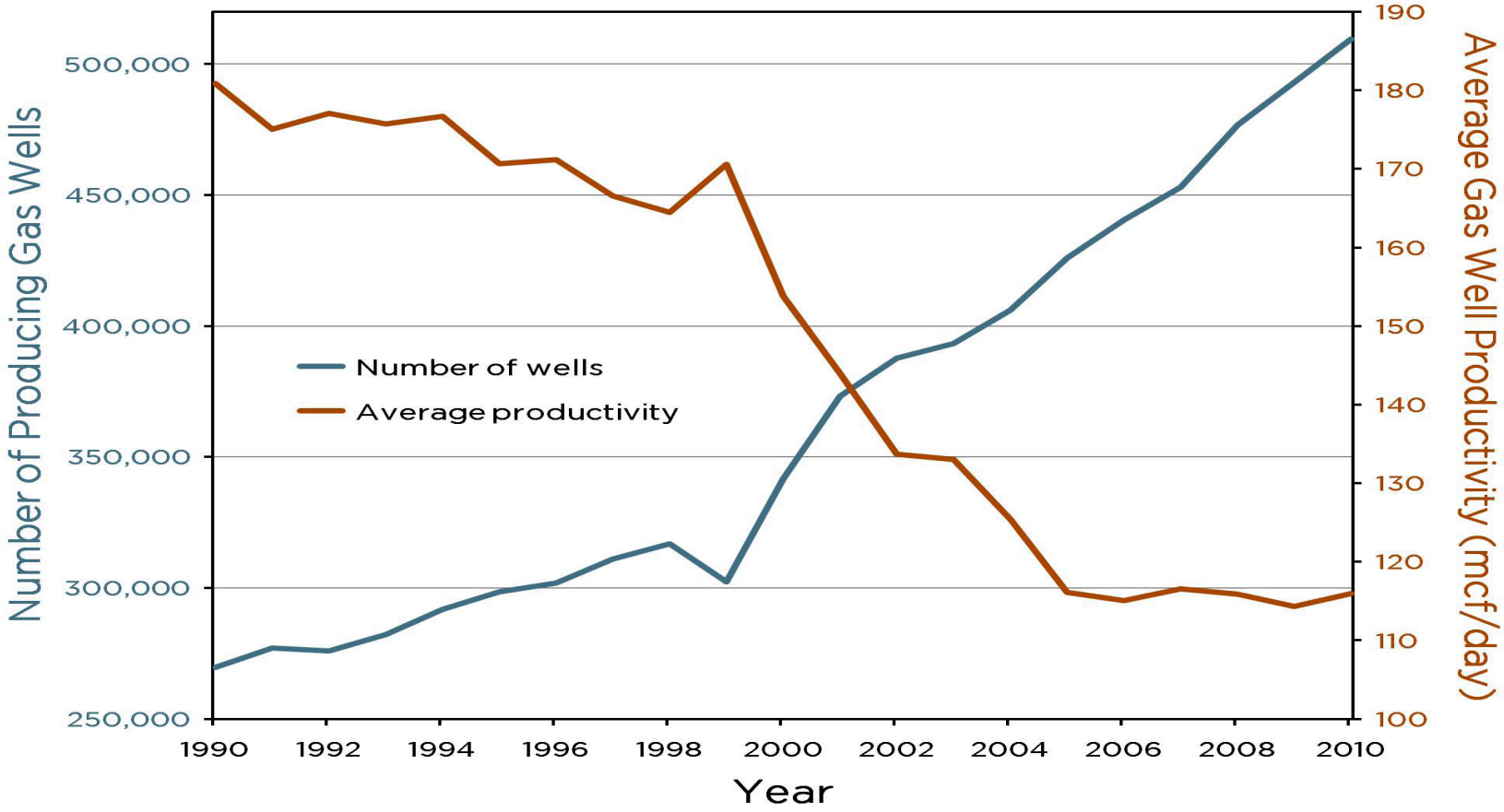
New Mexico OCD'S 2007 PIT SAMPLING PROGRAM – constituents that exceeded the WQCC Ground Water Standards

- Naphthalene
- Benzo(a)pyrene
- Phenol
- Benzene
- Toluene
- m,p-Xylene
- Chloride
- Fluoride
- Total Chromium
- Sulfate
- pH
- Total Dissolved Solids
- Total Arsenic
- Total Barium
- Total Cadmium
- Total Mercury
- Total Lead

Use of diesel in fracking

- Between 2005 and 2009, oil and gas service companies injected 32.2 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states.
- None of the oil and gas service companies could provide data on whether they performed hydraulic fracturing in or near underground sources of drinking water, stating that the well operators, not the service companies, track that information.

The Rat Race: drilling more just to keep up



Shale Oil Production – Short-lived Wells

- Bakken: Production curves are bottoming out after 5 – 7 years of production.
- Eagle Ford: Production curves bottom out after 4 years of production (2008-2011 data)

- http://www.postcarbon.org/reports/DBD-report-FINAL.pdf

Water Quantity Issues

- **Accurate assessments of the water quantity needed are lacking.**
  - Few reliable estimates statewide or by river basin as to the amount of water needed to drill and fracture the permitted or estimated numbers of wells
  - Uncertainty due to:
    - Absence of coordinated state evaluation of water needs for shale production;
    - Variability in the number of wells that will actually be drilled;
    - Variation in the ability to use recycled fluid instead of fresh water;
    - Uncertain legal availability of water for this use; and
    - Geological variation by formation and water basin

COMPARISON OF WATER NEEDS FOR HYDRAULIC FRACTURING IN DIFFERENT REGIONS

Water needed per fracture operation (gallons/well)

• Fruitland coal	50,000 – 350,000
• Niobrara	1 – 5,000,000
• Barnett shale	2,300,000
• Haynesville shale	2,700,000
• Marcellus shale	3,800,000
• Eagle Ford shale	8,000,000+

Note: 5 million gallons is approx. 15 acre-feet of water

Marcellus data: source of water used – 2011

Source Type	Amount	Percent
Ground Water	21.1 million gallons	3
Purchased Water	70.0 million gallons	9
Surface Water	662.2 million gallons	81
Reused Frack Water	60.0 million gallons	7
Total	813.4 million gallons	100

Comparison of HF Disclosure Forms filed with OCD and with FracFocus - 2012

Company	OCD (well approved 2012)	FracFocus (started in 2012)
Occidental	2	65
Apache Corp	61	151
BP America	8	6
Chesapeake	17	21

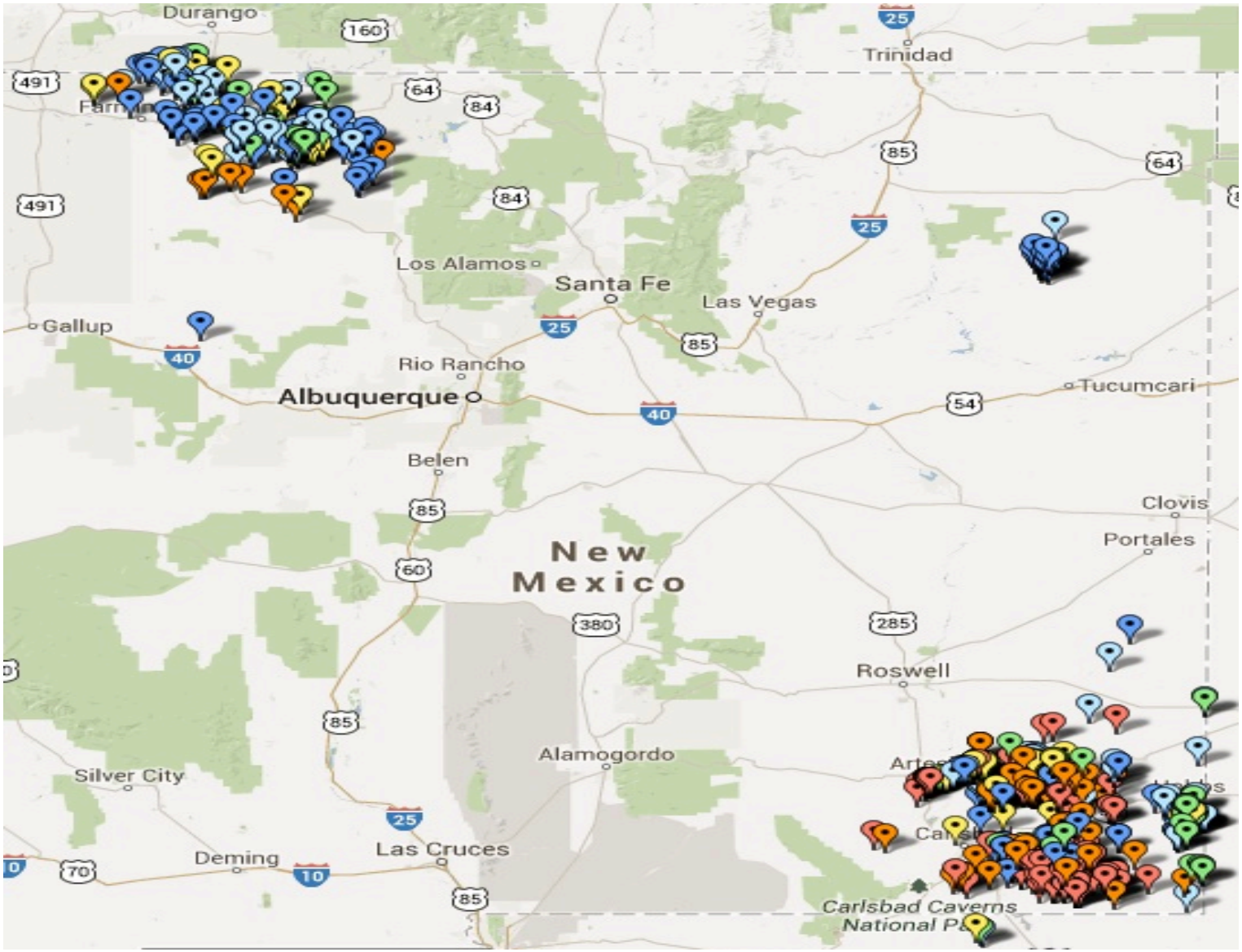
The differences between the OCD filings and the filings with FracFocus illustrate the issue of the lack of quality control and uncertainty about the accuracy of what is being filed. And this is only a sample comparison; we did not look at every filing or company.

2012 – New wells in New Mexico:

water use voluntarily reported via FracFocus

County	Volume of water (gal.)	Acre-feet	Number of wells	Average water per well (gal.)	River Basin
Eddy	317,839,615	975	313	1,015,462	Pecos
Lea	201,993,006	620	157	1,286,580	Pecos; Texas Gulf
Rio Arriba	14,108,687	43	83	169,984	Upper Colorado; Rio Grande
San Juan	17,179,215	53	93	184,723	Upper Colorado
All wells/All counties	558,257,402	1,713	673	829,506	

2012 – locations of new wells in New Mexico



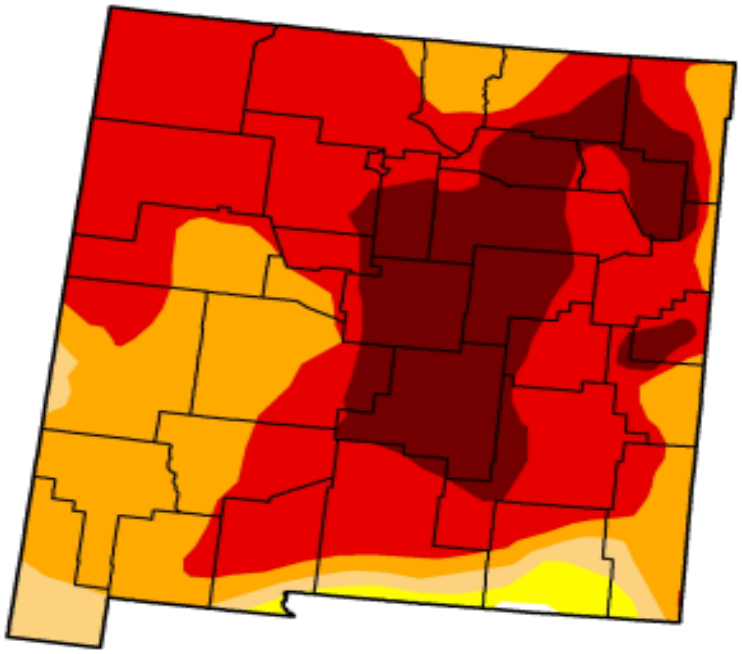
U.S. Drought Monitor

New Mexico

August 13, 2013
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.77	93.40	66.46	19.80
Last Week (08/06/2013 map)	0.14	99.86	98.65	93.61	68.84	20.60
3 Months Ago (05/14/2013 map)	0.00	100.00	99.04	97.63	81.68	44.14
Start of Calendar Year (01/01/2013 map)	0.00	100.00	98.83	94.05	31.88	0.97
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	62.56	12.25	0.66
One Year Ago (08/07/2012 map)	0.00	100.00	99.93	80.24	25.74	0.00



Intensity:

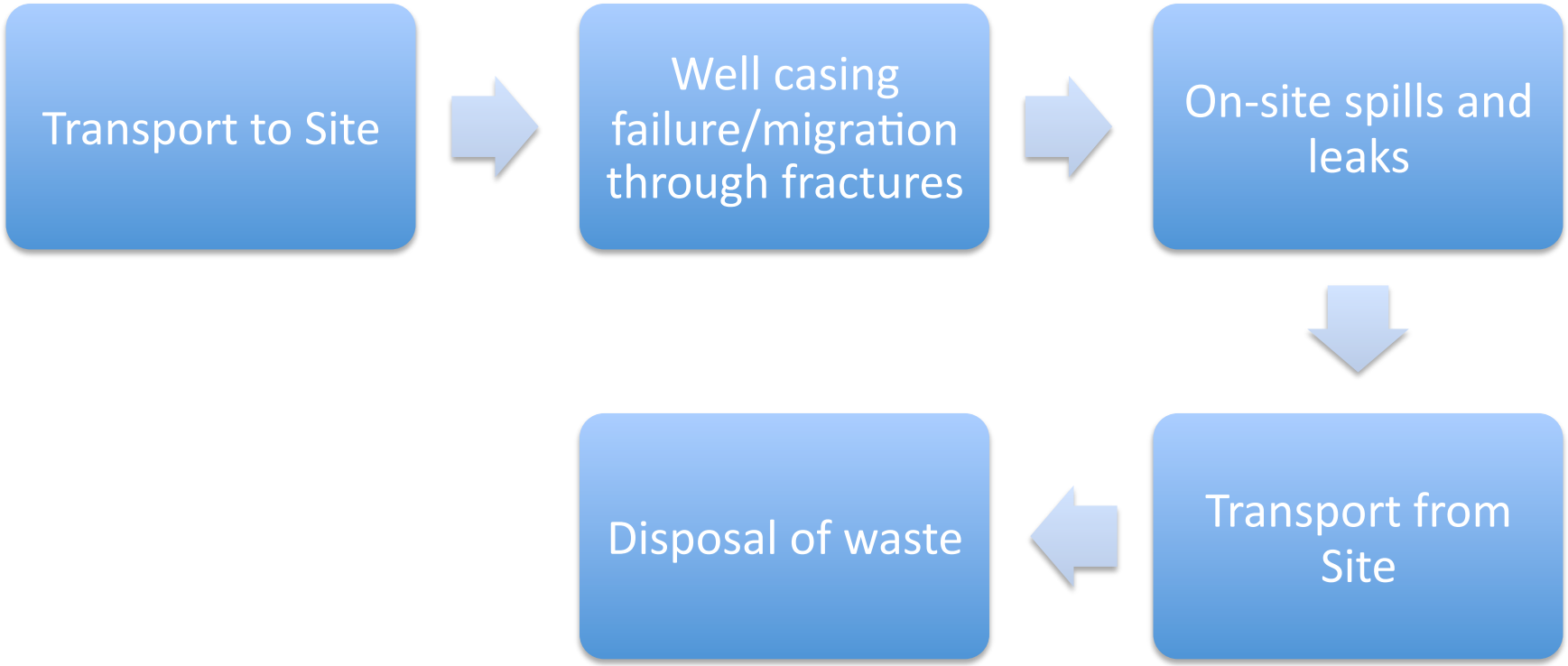
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, August 15, 2013
Michael Brewer, National Climatic Data Center, NOAA

Sources of Water Contamination



Following the fractures

- The Garza case noted that fractures were more art than science, and talked of a 3000 foot out of zone fracture in the trespass context.

  http://www.supreme.courts.state.tx.us/historical/2008/aug/050466.htm

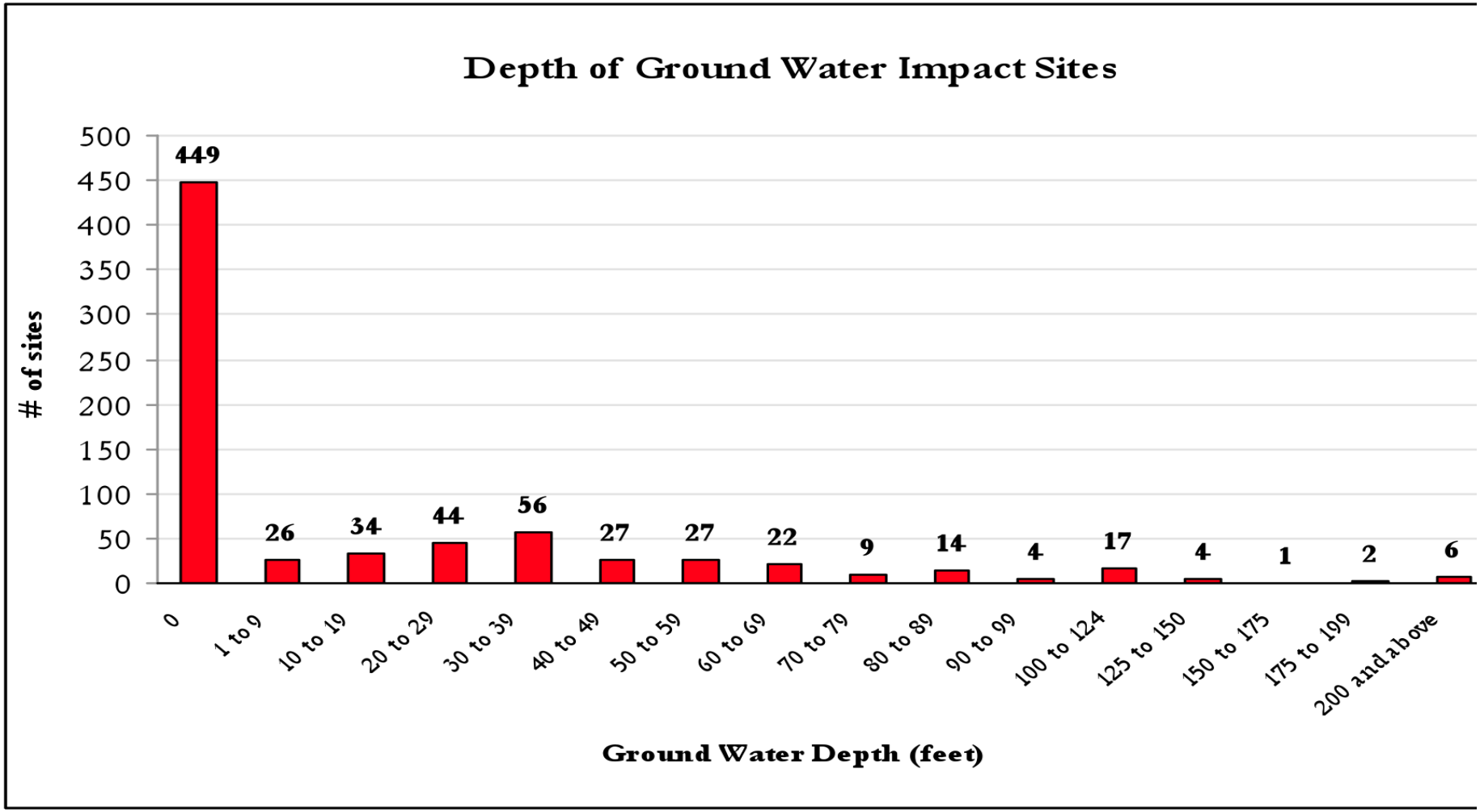
- The Handren study (2011):
  - Over the course of performing the stimulations in the well communication was achieved to wells spread over more than 600 acres. The farthest well that was "hit" by water from one of the stimulations was 1,500' away. A total of six wells were affected by water from the study well's stimulations.
  - As well density increases the complexity of subsequent fracture stimulation interaction with adjacent wells increases.

New Mexico Groundwater Contamination Events by Facility Type - through mid-2005

Brine Well	Class V Well	Pipelines	Pits	Tank Battery	Unknown
7	5	266	398	50	17

Note that all types of facilities are included here.
We know of no follow-up analysis done since this review by OCD.

New Mexico data on water contamination



Spills and 'Incidents'

- State data from 1990 through 2008 in Colorado and New Mexico indicated that:
  - 6% of natural gas wells have spills, and;
  - there is an average rate of 1.2 to 1.8 incidents per 100 gas wells that impact groundwater.
- State data in West Virginia showed a 1.5 per 100 well incident rate.
- As a consequence of this pattern of contamination, **ten states** either require or are considering requiring pre-drilling baseline water testing.

State Baseline Water Testing Policies

State	Required testing before drilling and after	At least 4 water samples required to test	Distance limitations on what types of wells tested	Include sampling protocol	Includes most possible types of contamina-tions
Wyoming	X	X	X	X	X
Colorado	X	X	X	X	X
Idaho	X		X	X	
Ohio			X	X	
W. Virginia			X	X	
Illinois	X	X	X	X	X