

Presentation on Hydraulic Fracturing and Water Use  
Meeting of the Water and Natural Resources Committee

August 29, 2013

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**OCD REBUTTAL – September 20, 2013**

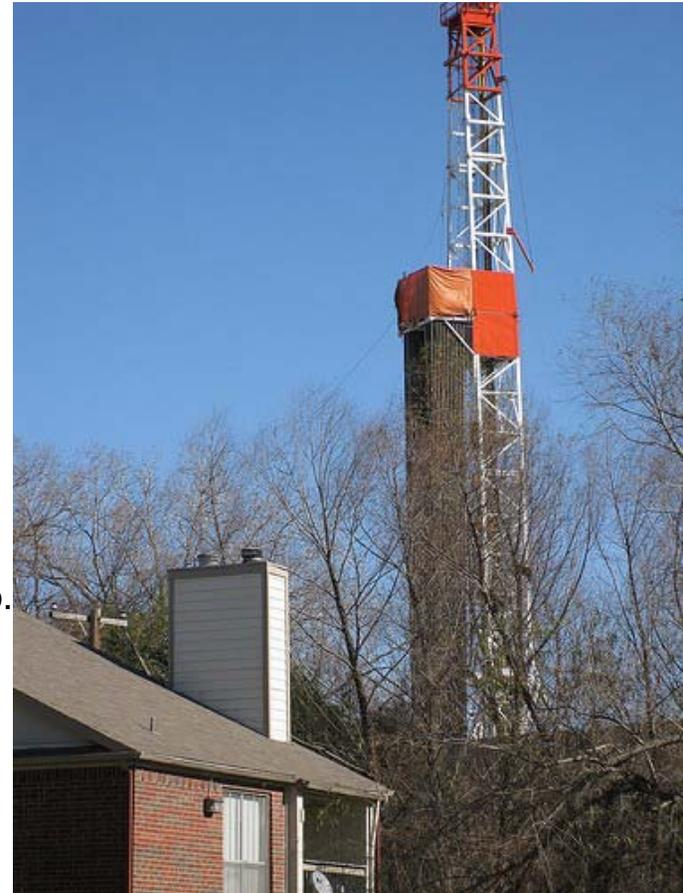
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# Who we are:

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

The **OIL CONSERVATION DIVISION** of the Energy, Minerals and Natural Resources Department administers laws and rules related to the oil, gas and geothermal industries of New Mexico. The Oil and Gas Act, the Water Quality Act, and the Geothermal Resources Conservation Act authorize OCD to enforce primary statutory mandates.



## Why there is a lack of trust about hydraulic fracturing

- **OGAP:** Claim 1: Hydraulic Fracturing is not injection.
  - Rejected by 11<sup>th</sup> Circuit Court of Appeals in the LEAF decision

**OCD-** Hydraulic fracturing is well stimulation technique where fluids consisting primarily of water and sand (99.5%) and small amounts of chemicals are injected under high pressure into an oil or gas producing formation, creating fissures that allow resources to move freely from rock pores where it is trapped.
- Claim 2: Hydraulic Fracturing has no risk.
  - 2004 EPA report undertook no scientific study
  - **2014 EPA study will remedy that deficiency**

**OCD-** There have been no cases of ground water contamination due to hydraulic fracturing anywhere in the U.S., including New Mexico. Rules are enforced for well casing requirements and protection of ground water, public safety and the environment.
- 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

**OCD-** No reports of ground water contamination from hydraulic fracturing have been reported.
- Claim 4: Hydraulic Fracturing has been done this way for 50 years.
  - Horizontal drilling and fracturing technology **have changed**

**OCD-** Oil and gas drilling technology is continuously advancing to find ways to extract resources at lower cost and with less impact on the environment. Some of the benefits of recent drilling advances include less surface disturbance (with fewer surface facilities, wells, pipelines and gathering systems) and reduced truck traffic.

## OGAP: 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

**OCD-** Three iterations of the “Pit Rule”—which regulates pits, below-grade tanks and sumps used in connection with oil and gas operations for the protection of fresh water, public health and the environment—have been enforced since 2008 and they address any possible contamination pathways from pits. Complex regulations for design, construction, maintenance, operation, and closure of all pits—which have been addressed since 2008 and are included in the 2013 pit rule—have greatly reduced releases and contamination in New Mexico.

## OGAP: Use of diesel in fracking

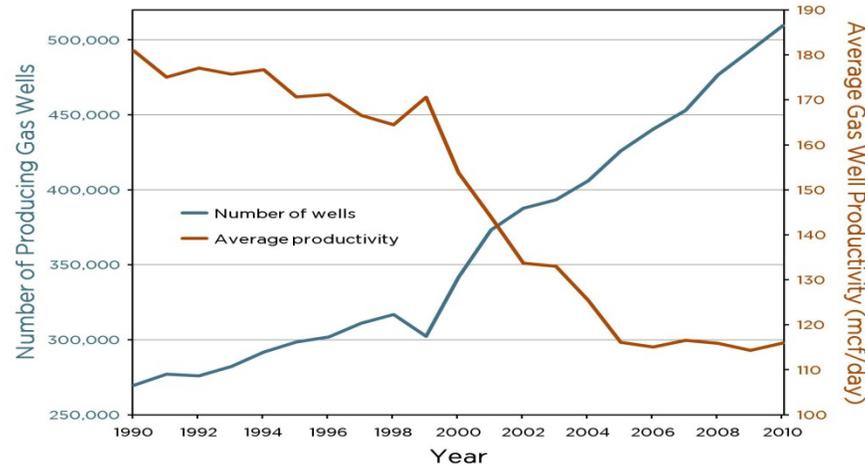
- Between 2005 and 2009, oil and gas service companies injected 32.2 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states.

**OCD-** The U.S. Environmental Protection Agency has authority to regulate the use of diesel in hydraulic fracturing and released draft guidance for oil and gas hydraulic fracturing activities using diesel fuels in 2012.

- 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.

**OCD-** Each application for permit to drill includes information about approximate depths to groundwater. Well design specifications are set to protect groundwater resources, with multiple layers of cementing and casing extending beyond drinkable water sources.

# OGAP: The Rat Race: Drilling more just to keep up



**OCD-** The graph presented in the OGAP report distorts the 2 Y-axis labels to over-emphasize the decline in production and increase in producing gas wells over 20 years. Over the past 6 years, the data from 2007 through 2012 show less than a 3% increase in well count and a 4% decline in production. Commodity prices play a huge role in how many wells are drilled and how many wells continue to produce.

	2007	2008	2009	2010	2011	2012
New Mexico gas well count	26,813	27,592	27,852	27,809	27,760	27,610
Production (cubic feet)	1,295,013,698	1,457,217,237	1,397,259,641	1,321,478,627	1,262,731,730	1,251,237,600

## OGAP: 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>

**OCD-** Oil production in New Mexico is still increasing from shale exploration and development. There are no indications that shale production is short-lived, and because these types of wells are relatively new, understanding about decline curves is still developing. Shale production techniques are still improving.

## OGAP: 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

**OCD-** Several initiatives address the use and reuse of water in all of its forms. The NM Drought Task Force established subcommittees on brackish water and produced water.

- 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

**OCD-** The goals of the Produced Water Task Force are:

- Reduce the amount of fresh water used in oil and gas operations
- Treat produced water for re-use in production operations
- Consider treatment of oilfield waters and brines for beneficial use in other applications outside of oil and gas operations

The OCD has published a notice to operators explaining the process and support for re-use of produced water, frack fluids, and other oil field liquids.

# **OGAP: 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+

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

**OCD-** Each shale formation has unique geologic conditions and operators must use site-specific techniques for the formation. Use and re-use of oil field fluids in New Mexico should be our focus. Even across New Mexico fracture fluid volumes vary depending to region and formation. In 2012, the average gallons of water per well used for hydraulic fracturing in Eddy County was close to 1 million gallons (with approximately 50% horizontal and 50% vertical wells), while the average water used per well for fracturing in San Juan County is closer to 200,000 gallons.

**OGAP: Marcellus data: source of water  
used – 2011**

<b>Source Type</b>	<b>Amount (million gallons)</b>	<b>Percent</b>
Ground Water	21.1	3
Purchased Water	70.0	9
Surface Water	662.2	81
Reused Frack Water	60.0	7
<b>Total</b>	<b>813.4</b>	<b>100</b>

**OCD-** Not relevant to New Mexico.

## OGAP: Comparison of HF Disclosure Forms filed with OCD and 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.

**OCD-** There are operators who are not in compliance with NM regulations on filing the Hydraulic Fracturing Fluid Disclosure online with the OCD. The OCD database indicates that there have been 1,219 disclosure forms filed with the OCD, but not in FracFocus, while 150 forms were filed in FracFocus but not with the OCD. Notices of non-compliance are being sent to operators and follow-up will reduce these discrepancies. Regardless, OGAP methodology and figures shown are flawed:

- The rule requiring filing of the form with OCD was not effective until February 12, 2012. A comparison with the FracFocus data for all of 2012 is not correct.
- Companies file with the OCD under different names and identifiers, but all names are rolled up in FracFocus. Thus, Occidental may be listed on FracFocus, but OXY USA Inc., Occidental Permian Ltd., and OXY USA WTP Limited Partnership report production separately to OCD.
- Some of the wells listed in FracFocus do not belong to the operators reporting them. There is a question of quality control.
- Wells “approved” is not the same as wells “completed.” Operators may permit a group of well for field development that may take years to complete. For instance, Yates Petroleum currently has 50 permitted wells in SE New Mexico with only 2 rigs working. This equates to 2-year permit inventory.

**OGAP: 2012 - New wells in New Mexico**  
**water use voluntarily reported via FracFocus**

County	Volume of Water		Acre-feet		Number of wells		Average water per well (gal)		River Basin
	OGAP	OCD	OGAP	OCD	OGAP	OCD	OGAP	OCD	
Eddy	317,839,615	775,574,478	975	2,380	313	781	1,015,462	993,053	Pecos
Lea	201,993,006	247,319,016	620	759	157	203	1,286,580	1,218,320	Pecos; TX Gulf Upper CO;
Rio Arriba	14,108,687	15,385,734	43	47	83	70	169,954	219,796	Rio Grande
San Juan	17,179,215	21,362,082	53	66	93	87	184,723	245,541	Upper CO
All wells/All counties	558,257,402	1,074,441,144	1,713	3,297	673	1,176	829,506	913,640	

OCD volumes are measured in gallons and represent reports from February 15, 2012 - December 31, 2012.

\*\* NOTE: Operators are amending 2012 HFFD forms daily so these numbers are approximate and will increase.



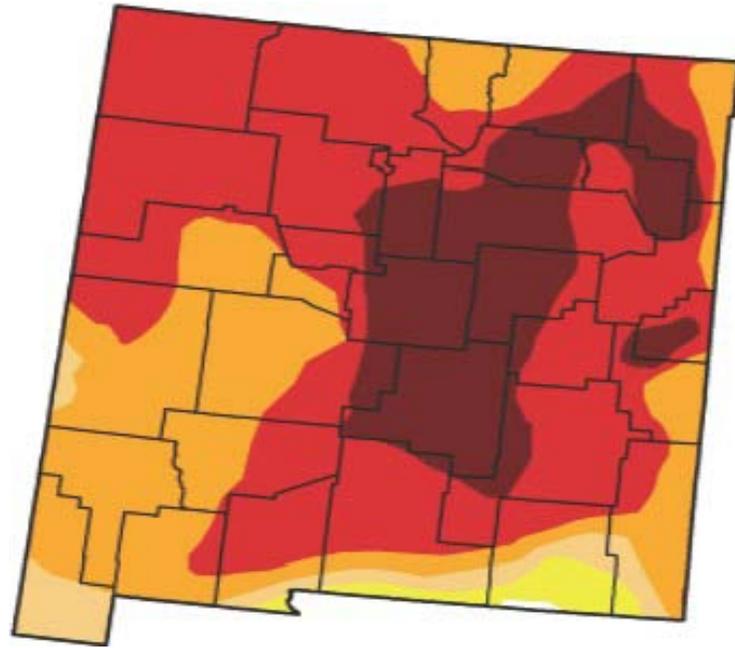
OGAP: 2012 Locations of new wells in New Mexico

# OGAP: U.S. Drought Monitor

August 13, 2013  
Valid 7am-EST

## New Mexico

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.77	93.00	86.06	19.60
Last Week (08/06/2013 map)	0.14	99.86	96.65	93.61	68.84	20.60
3 Months Ago (05/14/2013 map)	0.00	99.04	97.63	81.68	44.14	0.00
Start of Calendar Year (01/01/2013 map)	0.00	99.93	60.24	25.74	0.00	0.00
Start of Water Year (09/25/2012 map)	0.00	99.93	60.24	25.74	0.00	0.00
One Year Ago (08/13/2012 map)	0.00	99.93	60.24	25.74	0.00	0.00



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

<http://droughtmonitor.unl.edu>



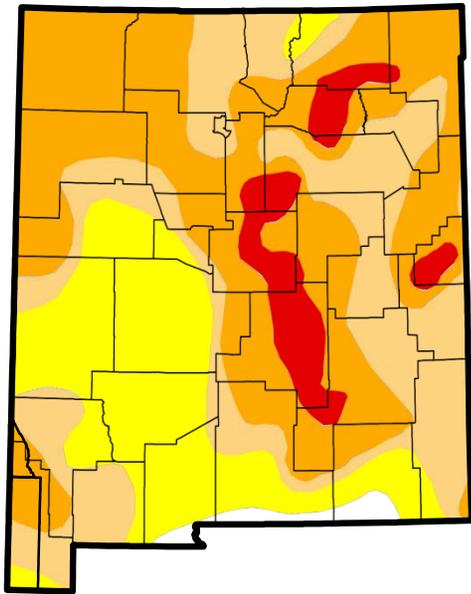
Released Thursday, August 15, 2013  
Michael Brewer, National Climatic Data Center, NOAA

# *OCD: U.S. Drought Monitor*

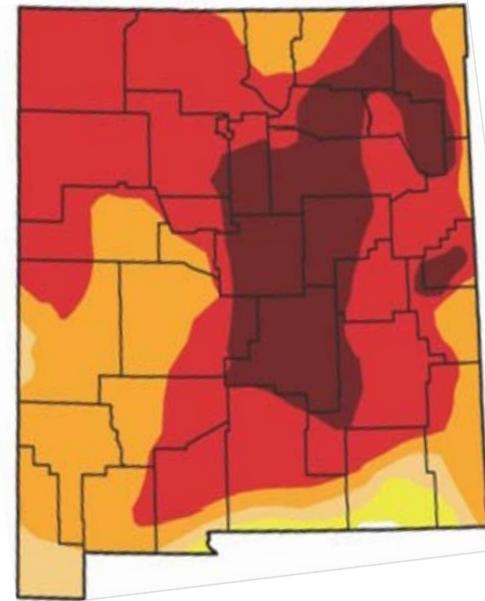
**Dramatic Changes in a Month**

U.S. Drought Monitor, as presented by OGAP

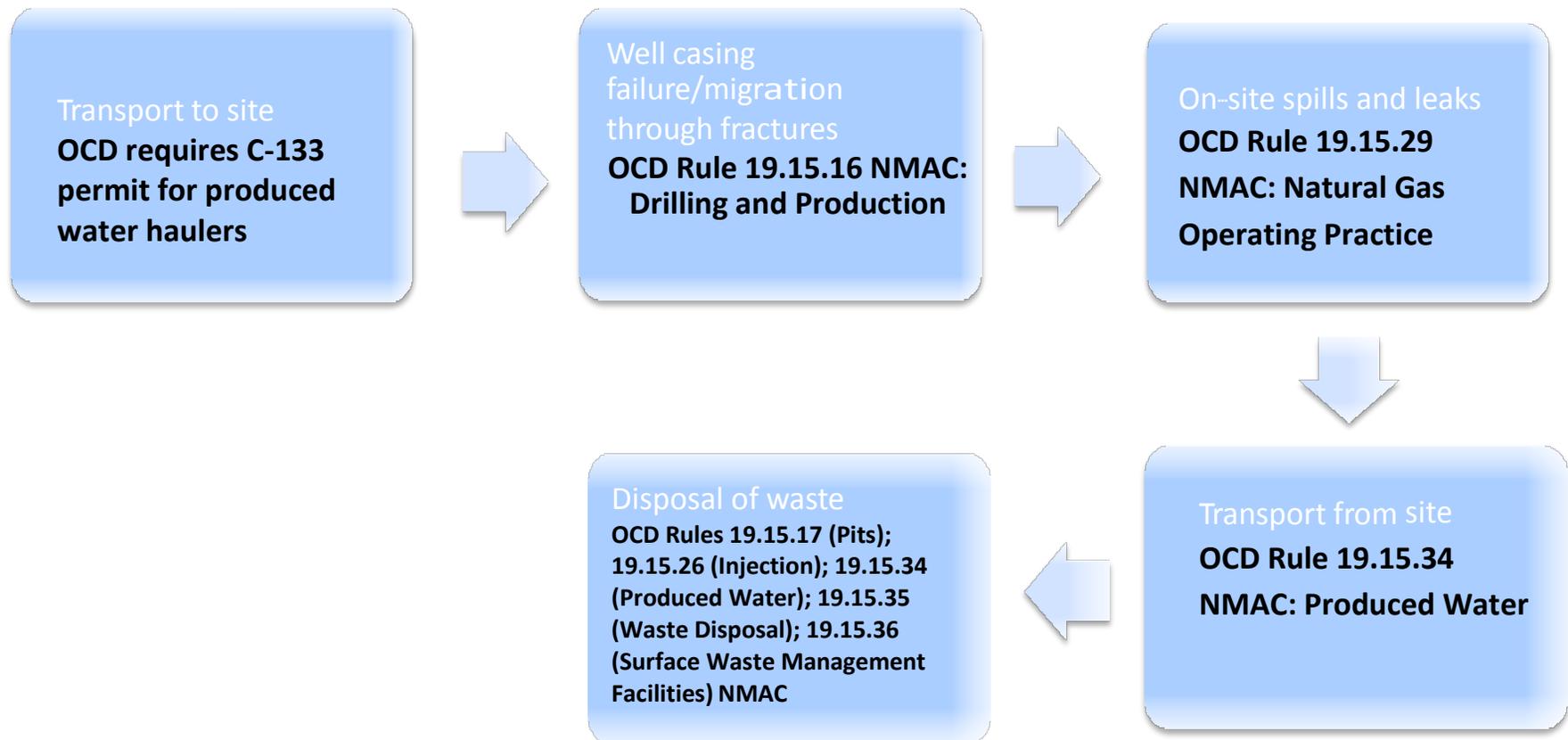
**September 17, 2013**



**August 13, 2013**



## OGAP: Sources of Water Contamination



**OCD-** Regulations address each source of potential water contamination.

## OGAP: 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.

**OCD-** Discussions are being held to analyze incidents of fracture communications in New Mexico.

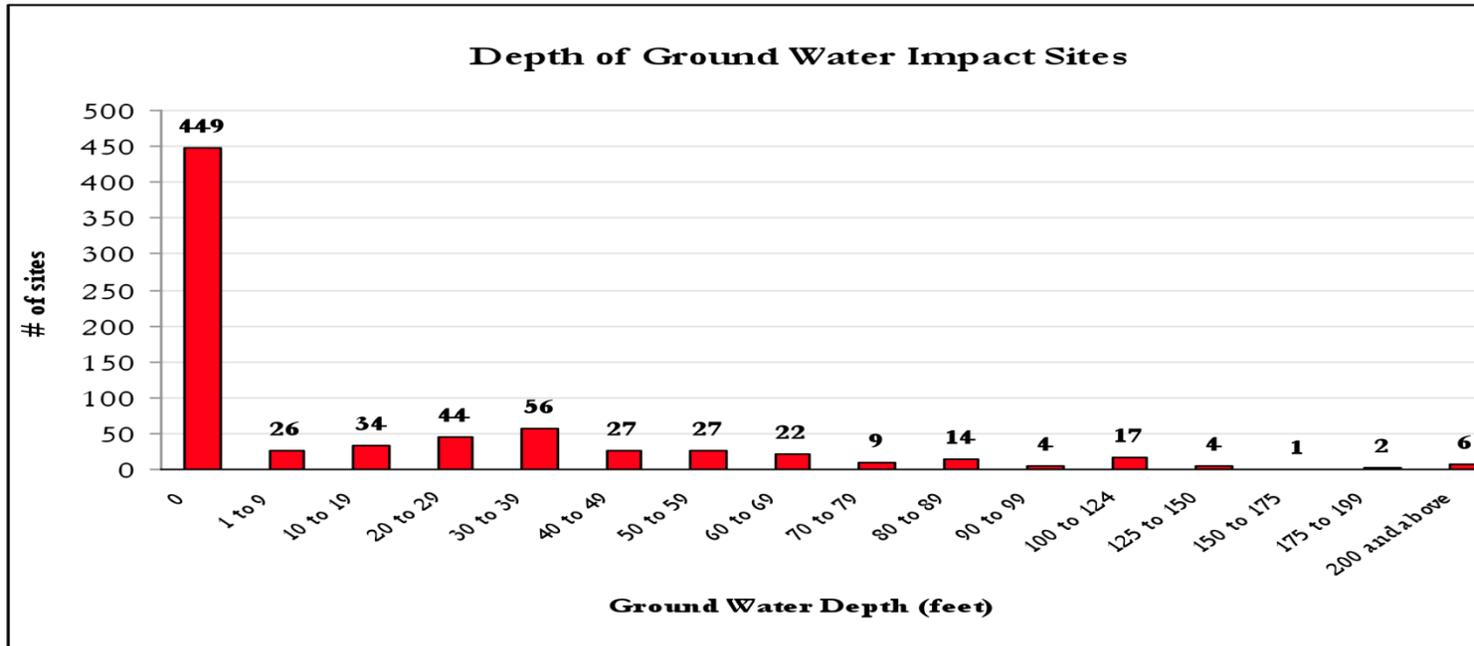
# OGAP: New Mexico Groundwater Contamination Events by Facility Type -- through mid-2005

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.

**OCD-** Since 2005 the OCD has been engaged in prevention of these events through 3 rounds of promulgating the “Pit Rule” and other remediation and reclamation efforts. For public information, OCD Online now provides current data on spill reports at: <https://wwwapps.emnrd.state.nm.us/ocd/ocdpermitting//Data/Incidents/Spills.aspx>

## OGAP: New Mexico data on water contamination



**OCD-** Does this graph reference oil and gas drilling, hydraulic fracturing, or other sources of impact? Does impact necessarily mean contamination? What is the time frame? Ground water at 0 feet?

## OGAP: 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.

**OCD-** There are no citations for this information covering 19 years. NM only has data back to 2000. It is unknown if the above figures actually apply to New Mexico.

## OGAP: State Baseline Water Testing Policies

	before drilling and after	samples required to test	on what types of wells tested	protocol	possible types of contaminations
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