Addressing Water Well ‘Problems’ and Complaints in Areas of Unconventional Resource Development: 
Appearances are Deceiving and Solutions Are Many*

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Key Comments

Industry’s image
Results of misinformation--Bans on hydraulic fracturing in countries, numerous states, provinces, and cities

Some domestic water well facts
95% rural Americans get their drinking water from a groundwater source. Although Well Owner Associations recommend annual maintenance and testing, most owners do not do any; few test for methane).

Leading-up to the complaint of water well problems
Play develops. Well stimulation. Landowners access misinformation.
Landowner’s well problem develops after oil or gas well development.
Complaints follow.

Water quality complaints
Odor, taste, color, sediment and/or gas

Symptoms, causes, and results of water well problems
Low yield due to tight aquifer. Dry season. Drawdown. Fouling of well screen or pump. Pump damage. Poor design and/or age of well.
Naturally occurring bacteria, minerals, etc.
New releases, casing leaks, spills (least common).
Methane in ground water
    Septic field, fuel storage, barn animals, garage

Preparing and handling complaints that *will* come:
    Establish a baseline program. Educate water well owners. Distinguish methane in
    aquifer from produced gas. Some water well symptoms may be related to
    vibrations from construction, seismic exploration, and hydraulic fracturing
    activities.

Summary
    Lack of maintenance and testing (most common)
    Poor construction, poor aquifer or lifespan of a well
    Historic drilling or mining activities
    Natural in place gas, migration or seepage
    Proper designed baseline and monitoring program can:
        Educate stakeholders
        Establish pre-drill baseline conditions
        Monitor variability
        Prepare you with answers to the complaints
        Mitigate risk.

*Selected References*


*Selected Websites*


Colorado Oil and Gas Conservation Commission (COGCC), How Well do You Know Your Water Well? COGCC, Division of the Colorado Department of Natural Resources. Website accessed October 17, 2013. [http://cogcc.state.co.us/Library/WaterWellBooklet.pdf](http://cogcc.state.co.us/Library/WaterWellBooklet.pdf)
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Outline

- Industry’s Image
- Domestic Water Well Facts
- Leading up to the Complaint
- The Water Well Symptoms & Causes
- How to Prepare for and Handle the Complaints that Will Come.
The Environmental Rules

- Environmental Problems are Emotional
- Environmental Solutions are Technical
- Environmental Decisions are Political

Author Unknown
The Public Image of Oil and Gas Development
GASLAND Debunked

- Several cases in Piceance & Denver Basins, Colorado, USA
- Colorado Oil & Gas Conservation Commission publishes a letter correcting inaccuracies in Gasland.
- Only one case related to oil & gas operations, (but not shown to be from fracking.)
- Others all showed biogenic shallow or coal bed gas.
- How many people who saw the movie heard about that?
Results of Misinformation?

- Bans on Hydraulic Fracturing
- Countries
  - France
  - Bulgaria
- Many States, Provinces & Cities
Water Well Owner Facts

- About 95% of all rural Americans get their drinking water from a groundwater source
- 42 million depend on wells for their water
- Groundwater provides:
  - 37% of public water supplies
  - 95% of self-supplied household water
- Well Owner Associations Recommend Annual Maintenance and Testing
  - *Most Owners Don’t Do Any!*
- Few Test for Methane
Colorado

- 25,700 Active Wells
- 40,000 P&A Wells
- 270,000 Water Wells
- 203,000 Residential/Household
Common Well Problems

1. Poor Water Production (Quantity)
   - Well Goes Dry or has Low Yield Rates

2. General Water Quality
   - Odors, Taste, Color, Staining, etc.
   - Sediment
   - Bacteria - Slime

3. Gases in the Water
Reasons for Problems are Many

- Lack of Routine Testing & Maintenance
- Poor Installation & Construction Practices
- Poor Aquifer Conditions

Photos Courtesy Anthony Gorody
Private Wells Exceed EPA Standards

- *Private water wells are not required to meet US-EPA drinking water standards.*
- Many exceed primary or secondary standards.
- Most Domestic Water Wells Contain Measurable Dissolved Hydrocarbons (Mostly Methane)
  - Majority Contain Bacterial Gas
  - Some Contain Gas From Natural Seeps or Historic Production Activities
U.S. Geological Survey's National Water-Quality Assessment Program

USGS News Release, 2011

• About 20% of untreated water samples from public, private, and monitoring wells across the nation contain concentrations of at least one trace element, such as arsenic, manganese and uranium, at levels of potential health concern, according to a new study by the U.S. Geological Survey.

• 10% actually contained two or more trace elements exceeding human health benchmarks.

• Trace elements in groundwater exceed human health benchmarks at a rate that far outpaces most other groundwater contaminants, such as nitrate, pesticides, and volatile organic compounds (VOCs).
  • 5,000 well sample set in USGS NWQAP
  • http://www.usgs.gov/newsroom/article.asp
  • http://water.usgs.gov/nawqa/trace/pubs/sir2011-5059
The Complaint Sequence

1. CBM, Tight Sand, or Shale Play Develops
2. + Hydraulic Fracturing Well Stimulation
   • No Previous Production History, or...
   • Previous History Drilling – Possibly Old, or….
   • Severed Mineral Rights
3. Leasing Acquisition
4. Owners Google “Fracking” and see the images
5. Operator Begins Drilling Program, then…
6. A Landowner’s Water Well Develops a Problem….
7. The Land Owner Calls and Complains
After they drilled that oil/gas well, my water well ___________!!!!!! *(Fill in the Blank)*

- ... Stopped Working
- ... Went Dry
- ... Has Sediment, or Slimy Stuff
- ... Has Gas Bubbles, or Methane
- ... Tastes Awful, Salty
- ... Smells
- ... Blew Up!