



IN THE SPIRIT OF FULL DISCLOSURE

*99.5% of fracturing solution is comprised of water and playground sand.
The rest? It's not exactly a secret.*

It's become one of the most popular talking points among those who oppose the responsible development of natural gas from the Marcellus Shale: namely, that a "toxic brew" of chemicals used in the exploration process is threatening the public's drinking water supplies. And maybe even worse than that? They're "secret" chemicals -- unknown to state regulators, unavailable to medical personnel and first responders, and hidden from the public at large.

There's only one problem with that point: It's not true. In fact, the entire universe of elements and materials used in the shale gas development process is submitted in writing to public agencies such as PA DEP, and available upon request. And what will you find on those material listing sheets? A lot of things that you probably shouldn't drink, to be sure, but stuff just as easily found beneath your kitchen sink and inside your kitchen cupboard.

If the goal of state regulators is to ensure that public supplies of drinking water remain safe, then having regulations in place to ensure the sound construction, maintenance and long-term integrity of the well are paramount. Fortunately, Pennsylvania has some of the most stringent well construction rules in place anywhere in the nation – and natural gas producers call on some of the most advanced technology in the world to meet and exceed those regulations every day.



Drilling for Natural Gas in the Marcellus Shale Formation Frequently Asked Questions

Can drilling companies keep the names of chemicals used at drilling sites a secret?

No. Drilling companies must disclose the names of all chemicals to be stored and used at a drilling site ... as part of the permit application process. These plans contain copies of material safety data sheets **for all chemicals** ... This information is on file with DEP and is available to landowners, local governments and emergency responders.

Source: Marcellus FAQ fact sheet, PA DEP; accessed on 4/20/10

"Overall the concentration of additives in most slickwater fracturing fluids is a relatively consistent 0.5% to 2% with water making up 98% to 99.5%. ... [M]any of these additives are common chemicals which people regularly encounter in everyday life."

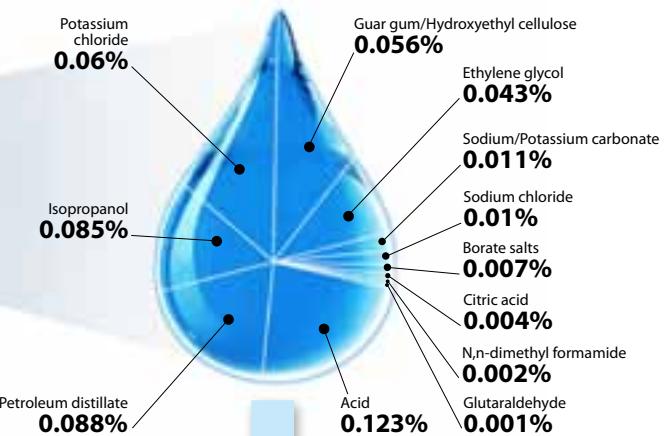
— U.S. Department of Energy / Ground Water Protection Council, April 2009

Typical Solution Used in Hydraulic Fracturing

0.49%
ADDITIVES



Source: DOE, GWPC: Modern Gas Shale Development In the United States: A Primer (2009)



"MSDS" – Is that some sort of gang?

Not exactly. Material Safety Data Sheets, commonly known as MSDS, are informational materials required by the federal government to be kept on site in cases where industrial chemicals are in use – from natural gas wells, to factories, to hospitals, even grocery stores. These sheets are provided to state regulators, and available to first response and medical personnel in case of an accident at the site. They are also widely available on the Internet.



What steps are taken during well construction to protect drinking water?

Well construction processes are designed to ensure maximum protection of the water supply and nearby ecosystems. Each well is lined with steel pipe casing – some, several inches thick – that extends below the depth of all shallow aquifers and beneath an impervious layer of rock that prevents any migration of fluids up into the drinking water supply.

Production casing is used at depths below the surface casing, keeping any fluids or other material in the well bore from entering the surrounding rock formations. The wells are also filled with concrete near the surface, and a new bore is drilled through the concrete, adding an extra layer of protection.

Compound*	Purpose	Common application
Acids	Helps dissolve minerals and initiate fissure in rock (pre-fracture)	Swimming pool cleaner
Glutaraldehyde	Eliminates bacteria in the water	Disinfectant; Sterilizer for medical and dental equipment
Sodium Chloride	Allows a delayed break down of the gel polymer chains	Table Salt
N, n-Dimethyl formamide	Prevents the corrosion of the pipe	Used in pharmaceuticals, acrylic fibers and plastics
Borate salts	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps and cosmetics
Polyacrylamide	Minimizes friction between fluid and pipe	Water treatment, soil conditioner
Petroleum distillates	"Slicks" the water to minimize friction	Make-up remover, laxatives, and candy
Guar gum	Thickens the water to suspend the sand	Thickener used in cosmetics, baked goods, ice cream, toothpaste, sauces, and salad dressing
Citric Acid	Prevents precipitation of metal oxides	Food additive; food and beverages; lemon juice
Potassium chloride	Creates a brine carrier fluid	Low sodium table salt substitute
Ammonium bisulfite	Removes oxygen from the water to protect the pipe from corrosion	Cosmetics, food and beverage processing, water treatment
Sodium or potassium carbonate	Maintains the effectiveness of other components, such as crosslinkers	Washing soda, detergents, soap, water softener, glass and ceramics
Proppant	Allows the fissures to remain open so the gas can escape	Drinking water filtration, play sand
Ethylene glycol	Prevents scale deposits in the pipe	Automotive antifreeze, household cleaners, deicing, and caulk
Isopropanol	Used to increase the viscosity of the fracture fluid	Glass cleaner, antiperspirant, and hair color

"[M]ost additives contained in fracture fluids including sodium chloride, potassium chloride, and diluted acids, present low to very low risks to human health and the environment."

— DOE/GWPC, May 2009