

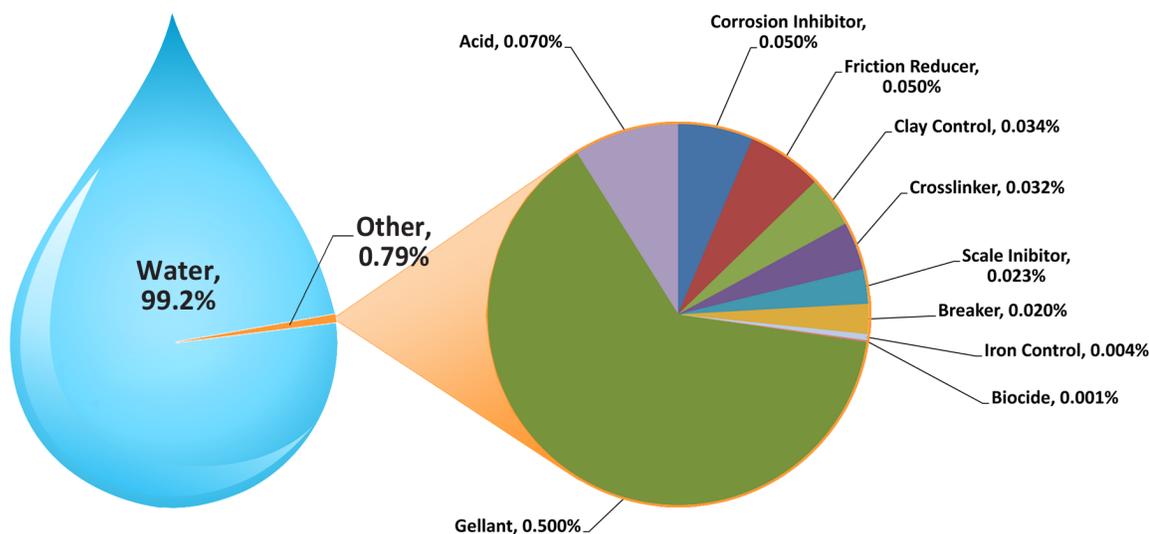
Shale Gas Development Challenges – A Closer Look

Fracture Fluids

Key Points:

- Shale fracture fluid, or “**slickwater**,” is largely composed of water (99%); but a number of additives are mixed in with it to increase the effectiveness of the fracturing operation. These additives vary as a function of the well type and the preferences of the operator.
- **Hydraulic fracturing fluids** can contain hazardous chemicals and, if mismanaged, spills could leak harmful substances into ground or surface water. However, good field practice, governed by existing regulations, “should provide an **adequate level of protection**” from fracturing fluid risks.¹

Average Hydraulic Fracturing Fluid Composition for U.S. Shale Plays



Source: Fracfocus date August 2012

Slickwater is mostly water, with a relatively consistent 0.5 to 2.0 percent comprised of additives.

Information Source: <http://fracfocus.org/>

¹ Massachusetts Institute of Technology, “MIT Study on the Future of Natural Gas,” June 6, 2011, Chapter 2: Supply, page 41.

- **Disclosure of additives** contained in these fluids is an important issue, which some states have addressed through legislation.
- **FracFocus**, a joint effort by the Ground Water Protection Council (GWPC) and the Interstate Oil and Gas Compact Commission (IOGCC) and sponsored by the U.S. Department of Energy, is an online registry for companies to publicly disclose the chemicals used in hydraulic fracturing. As of November 2012, more than 30,000 well sites and 200 companies were registered on the site (<http://fracfocus.org/>), and eight states were using it for regulatory reporting.



Photo by: Daniel Soeder, USGS

Proper management and use of **fracturing fluids** is one of the keys to shale gas production environmental protection. These fluids are critical to the fracturing process – for example, a single well hydrofracture in the **Marcellus Shale** formation of the Northeastern U.S. may require **2 million to 5 million gallons** of fracturing fluid, an average of **25 percent** of which may be returned to the surface as “**flowback**” water (see “*Shale Gas Development Challenges – A Closer Look: Water*”).² Fracturing fluids are primarily **water**, with a small amount of **chemical additives** and **sand**. Some additives used in fracturing fluid are known to be toxic, but data are limited for other additives.³ If the chemical additives in fracturing fluid are not properly handled, they can pose a risk to surface and/or ground water. **FracFocus** (see above), a joint effort by the **Ground Water Protection Council (GWPC)** and the **Interstate Oil and Gas Compact Commission (IOGCC)** and sponsored by DOE, is an online registry for companies to publicly disclose the chemicals used in hydraulic fracturing.

Produced water and fracturing fluids returned during the flowback process contain a wide range of **constituents** (some of which occur naturally but others of which are added through the drilling and hydraulic fracturing process) and pose a risk to water quality if not properly managed. This water is typically treated to remove metal ions and other dissolved materials, and then **recycled** for future use, or released back into the environment via **discharge to rivers** (as authorized under the **Clean Water Act**), or **deep underground injection** (as authorized under the **Safe Water Drinking Act**). Regulations may also allow recovered fracturing fluids to be disposed of at appropriate commercial water facilities. Fracturing fluid that does not return to the surface during the well’s production is confined by thousands of feet of rock layers and stays underground.

² “Water Treatment Key to Hydraulic Fracturing’s Future,” Rigzone, http://www.rigzone.com/news/article.asp?a_id=97222, retrieved on November 2, 2012.

³ Government Accountability Office, “Unconventional Oil and Gas Development: Key Environmental and Public Health Requirements,” September 2012, page 41.