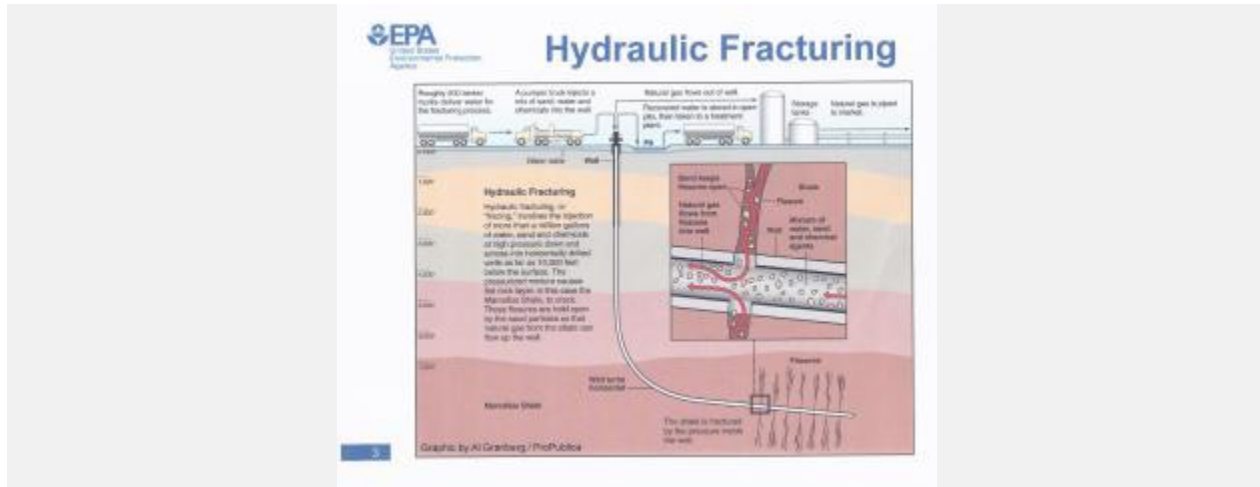
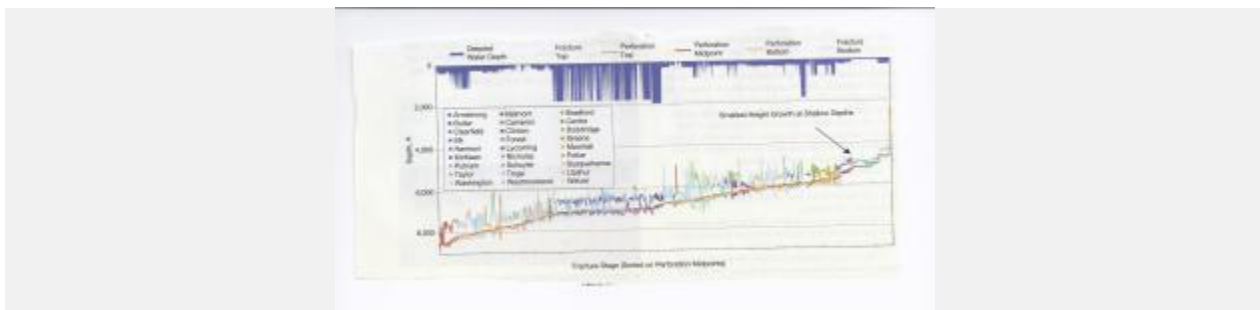


“Digging deeper” into fracking issues



Source: EPA

The controversies regarding the use of hydraulic fracturing and horizontal drilling to liberate huge quantities of natural gas and oil now recoverable from shale formations will not soon go away. And the vigorous opposition to “fracking” should not and will not stop until the regulations that have been put in place are seen to be rigorously enforced and the fracking will only be carried out where the gas is found in very deep locations many thousands of feet below aquifers that supply drinking water. That is not to say that there will be no more complaints about fracking. There will still be some cases where hazardous chemicals present in the deep formations will be brought to the surface with the drilling water and this will require special water treatment before it is released into streams. There will be cases where drill pipe casing itself fractures, causing leakage of gas and oil to the surface. But this has been happening ever since oil and gas drilling got started and cannot be totally eliminated. And in many areas, land owners who are not getting rich from leasing drilling rights under their properties, will complain that they are getting stuck with fracking problems without getting the benefit of income from leasing.

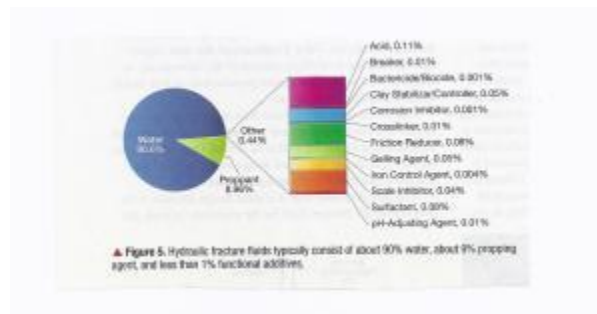


Source: Chemical Engineering Progress
AICHE

The graphic at left plots information from seismic and drilling surveys made at several points in the Marcellus formation. The lower, rising line shows the depth of natural gas bearing shale far below the aquifers at the same location. Drilling is or will be carried out several thousand feet below the lowest

point in the aquifers. The liberated gas and oil rises to the surface through piping inside drill casing and is then treated and sent to the ultimate users. Fracking at level of the aquifers (down to 2000 feet below the surface) should and presumably will not be permitted.

The next graphic shows the materials used in the fracturing process. The most important is, of course, the water sent down the well at very high pressure. In the water is the “proppant”, either sand or coated steel balls, that facilitates the breaking up of the shale formation by blasting with the water/proppant mixture. Small amounts of relatively well-known chemicals are added to the water for various purposes as shown. The final graphic below identifies the chemicals and lists their normal, consumer-oriented uses. The fact that these are well-known and relatively benign chemicals does not mean that you would want them in your drinking water. But that is what regulations are intended to avoid.



Government and corporations involved in energy supply are strongly committed to the process of fracturing shale formations to supply our country with boundless amounts of inexpensive natural gas. However, this process requires large amounts of water and therefore competes with farmers and other water users for this increasingly scarce resource. This, rather than drinking water contamination, is

Table 2. Most fracture fluid additives are common substances encountered in daily life.

Type of Additive	Function Performed	Typical Products	Common Use
Bleach	Kills bacteria	Glutaraldehyde	Dental disinfectant
Breaker	Reduces fluid viscosity	Ammonium persulfate	Hair bleach
Buffer	Controls the pH	Sodium bicarbonate	Heartburn-relief medicine
Clay stabilizer	Prevents clay swelling	Potassium chloride	Food additive
Gelling agent	Increases viscosity	Gum	Ice cream
Crosslinker	Increases viscosity	Borate salts	Laundry detergent
Friction reducer	Reduces friction	Polyacrylamide	Water and soil treatment
Iron controller	Keeps iron in solution	Citric acid	Food additive
Surfactant	Lowers surface tension	Isopropanol	Glass cleaner
Scale inhibitor	Prevents scaling	Ethylene glycol	Antifreeze

a more serious problem.

Source: <http://chemengineeringposts.wordpress.com/2012/09/23/digging-deeper-into-fracking-issues/>