

## The Unhealthy Consequences of Marcellus Drilling

by Sue Smith-Heavenrich

*Broader View Weekly*, March 4, 2010

Drilling in Marcellus shale may have an impact on New Yorker's health. That's the message from two chemists and a medical doctor who spoke about the consequences of industrial drilling during a recent forum at Tompkins Cortland Community College.

Thomas Shelley, a chemical safety and hazardous materials specialist, noted that when an industrial accident happens in the United States, those who are affected by pollution have to prove that an industry caused the contamination. In the European Union (EU), the burden of proof falls on corporations to prove that their actions have caused no harm to the public or the environment.

The EU, Shelley said, has adopted a "precautionary principle" that forces manufacturers to show that their products will not harm health, and has banned hundreds of cancer-causing chemicals.

An issue of particular importance with drilling is the lack of transparency; companies don't have to reveal the chemical make-up of their hydro-fracturing mixtures. The DEC lists 207 different fracking products in their draft Supplemental Generic Environmental Impact Statement (SGEIS), Shelley said; but only 48 of those have even partial disclosure of their chemical constituents.

"The names of products really don't let you know what's in them," Shelley said. He pointed to one called Opti-Kleen – something that sounds like it could be used clean your contact lenses.

### **Chemicals Raise Health Concerns**

The problem with fracking chemicals is that many of them may cause serious health effects at low doses. One of those chemicals is 2-butoxyethanol, a solvent found not only in fracking fluids but also in industrial cleaning solutions. 2-butoxyethanol has been found to affect the human endocrine system at doses as low as 0.02 parts per million.

Chemicals like 2-butoxyethanol are called "endocrine disruptors". An endocrine disruptor is a man-made chemical that, when absorbed into the body, mimics hormones or blocks hormones, disrupting the body's normal function. It may change the level of natural hormones or stop production of hormones altogether. By changing the way hormones travel through the body, endocrine disruptors affect the functions that hormones perform to control our health. Some of the problems that have been related to these synthetic chemicals include infertility, ADHD, autism, diabetes, thyroid disorders, and even childhood and adult cancers that have been found to be linked to fetal exposure to the chemicals.

It takes only a small quantity of endocrine disrupting chemical to impact health, said Adam Law, a physician who specializes in endocrinology. Concentrations on the order of parts per trillion are enough to alter gene expression. With concentrations so low and often no visible effects until much later – sometimes decades – it is hard to trace the chemicals causing the problems.

Law pointed to one study that showed 40 percent of the chemicals used in shale drilling are endocrine disruptors. Still another problem is that fracking chemicals injected underground into the shale – where the temperature is between 120 to 140 degrees – react, forming new chemicals such as trihalomethanes.

Given the complex chemistry of fracking, and the potential for chemical reactions underground, there needs to be more studies, Law said. He also said that it is time for the gas drilling industry to disclose what goes into their fracking fluids so state regulators can assess risk.

“We need to know what’s going into the ground and we need to know whether we can deal with the wastewater,” Law said.

### **Fracking Only Part of the Problem**

Still, fracking isn’t the biggest concern, said SUNY Oneonta biochemist Ron Bishop. Even if no chemicals were used in drilling, the stuff coming up out of the ground would bring a slew of heavy metals, radioactive elements, salts and gases.

“More than any other kind of rock, shales selectively trap heavy metals such as lead, arsenic, barium, strontium, and chromium,” Bishop said. He added that Marcellus brines contain the radioactive elements uranium, thorium and radium. Recent tests by the Department of Environmental Conservation (DEC) showed that in some Marcellus wastewater, radioactive materials occur naturally at levels 250 times EPA allowable levels, and thousands of times higher than levels allowed in drinking water. But natural gas drillers aren’t even required to test for radioactivity, Bishop said.

Marcellus shale is a relatively thin layer, only a couple hundred feet thick, so gas drillers use horizontal drilling to maximize the amount of shale they fracture, Bishop said. And horizontal drilling means pumping more water – and more chemicals – down the well bore. These chemicals include biocides to kill subsurface microorganisms, surfactants to keep the drilling mud slippery, and corrosion inhibitors to stave off the effects of salts. Over 75 percent of them are hazardous to human health.

“But hydrofracking is not the bogeyman,” Bishop said. “You’re more likely to have problems with transporting the chemicals.” It will take a lot of trucks to haul the 10 to 30 tons of chemicals needed to frack each horizontal well bore, and even more trucks to haul away the contaminated wastewater.

Health is affected by more than the chemicals, too. Drilling activity and traffic create high levels of dust that will contribute to air pollution and respiratory problems of people living nearby. The diesel and natural gas emissions from trucks, compressors, pumps and other equipment contain a complex of benzenes, toluene, and xylene, as well as other

volatile organic compounds that contribute to respiratory illnesses such as asthma. Methane escaping from vents and flaring also contributes to the air pollution.

As with the chemicals underground, the pollutants in the air may combine to form new compounds. Diesel exhaust combined with nitrous oxides forms ground level ozone. Ozone in the upper atmosphere protects us from damaging ultraviolet rays, but at ground level it burns holes in the alveoli of lungs and in plant leaves. Ozone can damage forage and food crops, decreasing yields in alfalfa, grapes, pumpkins and leafy vegetables.

*Videos of the forum are archived at <http://www.shaleshock.org/shaleshock-video/natural-gas-with-un-natural-consequences-the-health-risks-of-shale-gas-drilling/>*