What's in that fracking fluid?

Pennsylvania discloses the chemicals used by the drilling companies

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PENNSYLVANIA — It's something many people in the Upper Delaware region want to know: what chemicals are being used by the natural gas industry in its drilling processes?

The Pennsylvania Department of Environmental Protection (DEP) notes that while companies may keep their fracking "formulas" proprietary, the individual ingredients are public record in Pennsylvania. The agency supplied **The River Reporter** with a list of chemicals that may be used during the fracking process. Any of them may be present in the wastewater generated and may be stored temporarily in open pits at the site.

We asked researchers at The Endocrine Disruption Exchange (TEDX) to analyze the list for its potential health effects. TEDX is a non-profit organization that reviews and interprets scientific research focused on the effects of synthetic chemicals on human and animal health. TEDX president Dr. Theo Colborn has published, lectured and testified extensively on the effects of chemicals on the developing endocrine, immune, metabolic and nervous systems.

The tables and graphs presented here were generated by that organization. Of the 59 chemicals on the list, several were synonyms for the same chemical (e.g. Isopropanol, Isopropyl Alcohol, Propan-2-01). When this occurred, the names were combined to create a final list of 54 chemicals.

TEDX staff searched the literature for health effects associated with the 54 chemicals and broke them into 14 different health effect categories commonly used in government toxicological literature. The table below shows the number of chemicals out of the 54 that have effects on at least 10 health categories.

			# of Categories
2-butoxyethanol	13	Monoethanolamine	11
Ethylhexanol	13	Dazomet	10
Formaldehyde	13	Acetic Anhydride	10
Glutaraldehyde	13	Isopropanol	10
Boric Acid	12	Propargyl Alcohol (Prop-2-yn-1-01)	10
Ethane-1,2-diol (ethylene glycol)	12	5-chloro-2-methyl-4-isothiazotin-3-one	10
Ethylene Glycol	12	Sodium Bicarbonate (NaHCO3)	10
Methanol	11	Diesel	10

Fracking chemicals associated with ten or more health effect categories.

Controlling fracking fluids

Defenders of the fracking process say that in the Marcellus Shale it is safe because the process takes place well below the water table that provides drinking water.

The water is injected deep underground through lined wells that prevent the fracking fluid from contaminating the water in the higher part of the earth beneath the drill site.

Critics, however, argue that the casings around the well bore that are intended to prevent fracking fluids from entering the ground water supply have failed in the past, and will likely fail in the future in at least some instances.

Further, a large amount of fracking fluid comes back out of the well after drilling, and can then contaminate air and ground water if not properly handled. The chemicals pose a threat to human health until they are disposed of.

Chemicals that can move through air

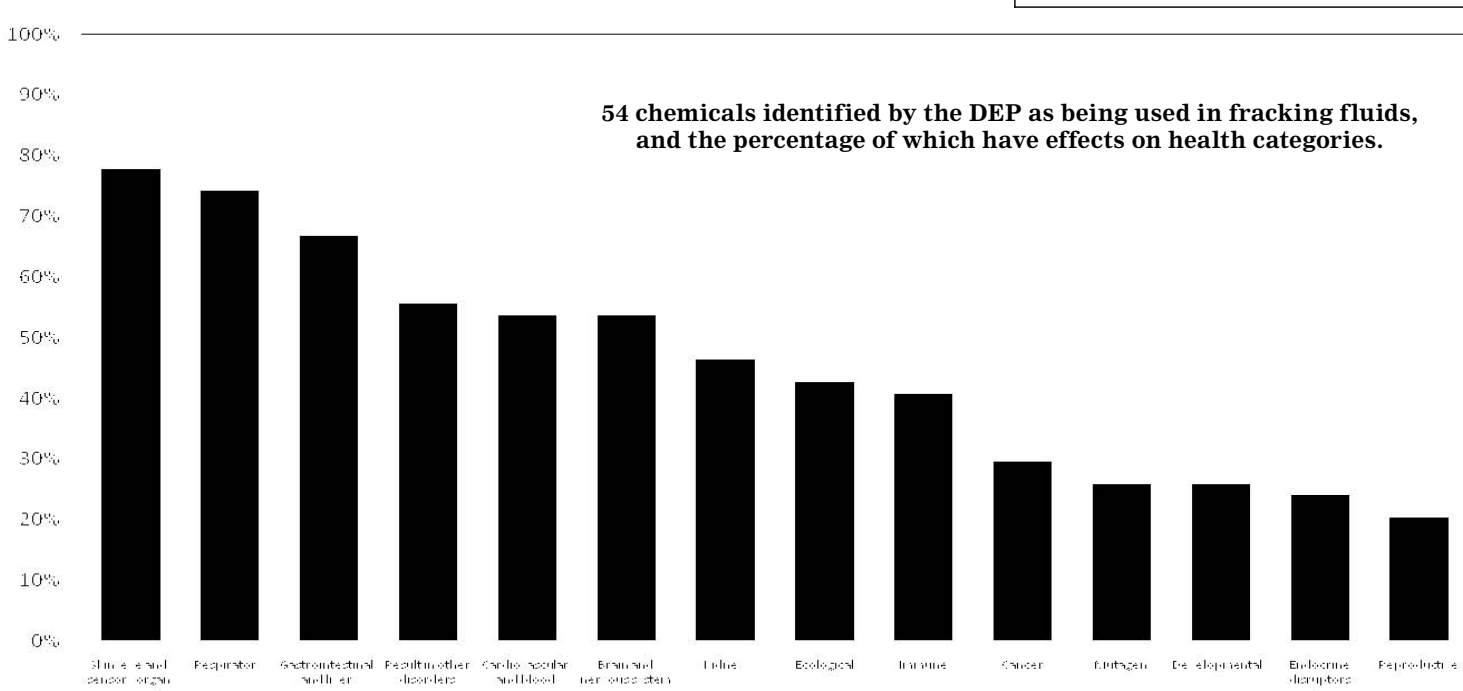
Of the 54 chemicals identified by DEP as being used in fracking fluid, 21 are readily airborne. As noted in the table below, all of these chemicals can harm the eyes, skin, respiratory tract, gastrointestinal tract or liver.

		Percent of Chemicals
		100%
		100%
		100%
		95%
		90%
		90%
		81%
		71%
		52%
		48%
		43%
		33%
		33%
		29%

Chemicals that can move through water

Of the 54 chemicals identified by DEP as being used in fracking fluids, 34 are soluble, allowing them to move into surface and underground water.

		Percent of Chemicals
		100%
		94%
		91%
		76%
		76%
		74%
		62%
		62%
		56%
		41%
		32%
		32%
		32%
		29%



Most of the chemicals in the above chart were associated with skin, eye and sensory organ irritation and toxicity, followed by respiratory effects, gastrointestinal and liver effects.

The "Other" category includes such effects as death, teeth effects, etc. The most often cited effect in this category is the ability of the chemical to cause death.

The "Ecological" category refers to damage to a wide variety of birds, fish, amphibians, or other aquatic species.

Fracking fluid complaints and identification

According to a report from the Oil & Gas Accountability Project, citizens from many states have reported negative impacts to water quality in the wake of hydraulic fracturing.

The report says, "Common complaints include: murky or cloudy water, black or gray sediments, iron precipitates, soaps, black jelly-like grease, floating particles, diesel fuel or petroleum odors, increased methane in water, rashes from showering, gassy taste and decrease or complete loss of water flow."

The report continues, "In most cases, the agencies conducting follow-up water quality sampling do not know what chemicals have been used in fracturing operations because companies are not required to disclose this information. Consequently, state agencies do not test for all fracturing fluid chemicals. Citizens have also experienced soil and surface water contamination from spills of hydraulic fracturing fluids."