

Fracking Impact on Health

High Volume Hydraulic Fracturing (HVHF) or “fracking” is a technique to extract natural gas from shale. This controversial process requires over 7 million gallons of water and about 205,000 to 905,000 pounds of chemicals *per frack*. One well can be fracked 10 or more times and there can be up to 10 wells on one pad. What chemicals are being used and how the water is treated throughout the operation’s lifecycle could have dramatic impacts on our health and the environment.

The 2005 Energy Policy Act included an amendment that prevented use of the Safe Drinking Water Act to regulate hydraulic fracturing. This process is also no longer regulated by sections by the Clean Air Act, CERCLA, CWA or EPCRA.

Few peer reviewed papers have been completed on the health impacts of fracking. There is therefore a desperate need for more studies to be done before drilling increases. For example, more than 250 health care professionals signed a letter asking NY Gov. Cuomo to conduct a health impact assessment before drilling continues.

Dr. Theo Colburn has uncovered 632 chemicals used in fracking and has determined the health effects of 353 of them. Approximately 40-50% could affect brain/nervous system, immune and cardiovascular system and kidneys, 37% could affect the endocrine system and 25% could cause cancer and mutations. Many of the chemicals have 10 or more adverse health effects.

Air Pollution- Respiratory Impacts

➤ Over 80% of fracking chemicals are respiratory toxins.

➤ Diesel exhaust from the use of machinery, trucks and fugitive drilling emissions can cause respiratory illness, wheezing in infants and cardiovascular events. An estimated 2,400 industrial truck trips are required for each fracturing event; residents near the site and used roads may be exposed to increased levels of these pollutants.

➤ At every stage of production and delivery, tons of toxic volatile compounds (VOCs), including BTEX, other hydrocarbons and methane, can escape and mix with nitrogen oxides (NOx) from the exhaust to produce ground-level ozone. One molecule of ground-level ozone can burn deep alveolar tissue in lungs, causing them to age prematurely. Chronic exposure causes asthma, COPD, and is particularly dangerous to children whose lungs are still developing. It can spread up to 200 miles beyond the immediate region where it is being produced. Ozone is also damaging to the stoma of leaves.

➤ A study of air pollutants in the Barnett Shale area, where natural gas extraction is prevalent, found emissions of smog forming compounds up to 307 tons per day from oil and gas sources in 2009. Also, 2009 emissions of greenhouse gases like CO₂ and CH₄ were 33,000 tons per day of CO₂ equivalent. This is equivalent to greenhouse gas emissions from two 750MW coal-fired power plants.

➤ Increases in respiratory problems and asthma are common in communities near drilling sites. A Texas hospital serving six counties near drilling sites reported asthma rates three times higher than the state average. It was reported in Wyoming that residents were complaining of bloody noses caused by ozone level two thirds higher than EPA maximum health limit of 75ppb.

➤ The EPA has detected a fracking chemical, 2-butoxyethanol (2-BE), in water wells in the town of Pavillion, Wyoming. Hydraulic fracturing companies use 2-BE as a foaming agent or surfactant in 126 products. 2-BE is easily absorbed and can cause hemolysis, the breakdown of red blood cells, and damage to liver, spleen and bone marrow.

➤ A report by the U.S. House of Representatives Committee on Energy and Commerce, entitled *Chemicals in Hydraulic Fracturing*, states that 21.9 million gallons of 2-BE products were injected between 2005-2009. The safety standard of 2-BE is TLV/TWA 25 ppm – parts per million.

➤ The EPA also found benzene, another carcinogen, at 50 times its safety level as well as phenols, acetone, toluene, naphthalene and traces of diesel fuel.

Wastewater

➤ Throughout HVHF operations, water, toxic chemicals, crystalline silica (sand) and drilling muds are mixed and pressurized to open fissures underground to release and carry natural gas. About 20-70% returns to the surface as produced wastewater which is then stored in lined pits to evaporate into the air, stored in tanks or sprayed as brine on your streets. What does stay underground is taken out of the water cycle until it may migrate up into our aquifers. The produced wastewater can be radioactive due to radon rock formations and elements such as strontium. Any amount of radon exposure is carcinogenic.

➤ There is no adequate state regulation of wastewater disposal or a comprehensive underground water monitoring system or accurate data sheets on spills. A ProPublica investigation into fracking has found court and government documents of more than 1,000 cases of water contamination in CO, NM, AL, OH and PA.

➤ Recent studies have detected deep shale methane in water wells near drilling sites. Once it evaporates into unventilated homes methane acts as an asphyxiates which displace air and can cause breathing and other health problems. It is also explosive at high concentrations, as demonstrated near Cleveland, OH when a house exploded from a concrete casing failure leading to high methane concentrations

➤ Industry representatives have said there isn't cause for concern due to the low concentrations of chemicals in their operation. But Dr. Theo Colburn points out that, "numerous systems, most notably the endocrine system, are extremely sensitive to very low levels of chemicals, in parts per billion or less. The damage may not be evident at the time of exposure but can have unpredictable delayed, life-long effects on the individual or/and their offspring...Further compounding this concern is the potential for shared toxic action of these contaminants, especially those affecting the same or multiple organs."



Chemicals Components of Concern: Carcinogens, SDWA-Regulated Chemicals, and Hazardous Air Pollutants

Chemical Component	No. of Products	Chemical Category
Methanol (Methyl alcohol)	342	HAP
Ethylene glycol	119	HAP
Diesel	51	Carcinogen, SDWA, HAP
Naphthalene	44	Carcinogen, HAP
Xylene	44	SDWA, HAP
Hydrogen chloride	42	HAP
Toluene	29	SDWA, HAP
Ethylbenzene	28	SDWA, HAP

Mental Health

➤ Although it is rarely mentioned, mental health is impacted by shale gas development as well. According to sociologists who have been studying the shale gas boom, as well as previous boom and bust scenarios, impacted communities have dramatic changes. Rural areas specifically are threatened by the stress of losing community structure as the area becomes industrialized and fractured between those who profit and those who don't. Like previous boom and bust situations there is a documented increase in alcoholism, violence, psychiatric and physical complaints. At a conference sponsored by the University of Pittsburgh, Simona Perry, PhD, stated she conducted a recent survey in rural Bradford County, PA. Many replied that they cherish their way of life and some felt that the gas developments were changing what they loved. Aaron Barchowsky, PhD, pointed out that stress in general can impact a variety of diseases. The stress of losing your community, health, property value and way of life can have negative effects.

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Learn more: Colburn, T. *Natural Gas Operations from a Public Health Perspective*, International Journal of Human and Ecological Risk Assessment, 09/2011
Chemicals Used in Hydraulic Fracturing, U.S. House of Representatives Committee on Energy and Commerce, 04/2011.

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