Health Impacts of Fracking

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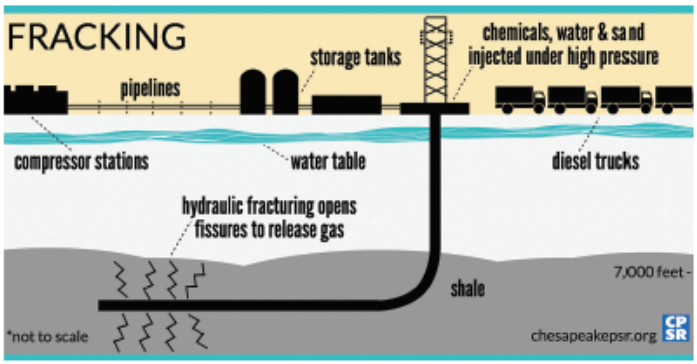
Rapidly Growing Evidence



Hydraulic fracturing is a well-stimulation technique in which large volumes of water, sand and chemicals are injected under high pressures into deep rock layers to force open fissures to extract oil or gas. The term "fracking" refers to hydraulic fracturing, but it often is used more broadly as shorthand for the full life cycle of UGDP activities, including trucking, well pad construction, drilling, hydraulic fracturing, handling and disposal of chemicals and waste waters, processing and storage of gas, compressor stations, pipelines and more. All of these phases have significant negative effects on human health and the environment.

Mining, transport and storage of gas and oil have always had the potential for spills, air and water pollution and explosions. A growing body of scientific information suggests that unconventional gas and oil development and production (UGDP), commonly referred to as "fracking," has its own broad array of negative impacts. In Colorado, the use of hydraulic fracturing has multiplied the number of fields mined and placing them much closer to families and neighborhoods. Fracking uses hundreds of chemicals mixed with millions of gallons of water and sand to fracture deep rock formations to allow the gas and oil to percolate out. The additional threats include soil and water spills of highly toxic fracking fluids, increased use of our precious water, more air pollution, and higher release of methane that worsens climate change.

Three states, Maryland, New York and Vermont, have concluded that it was too unsafe for public health to allow fracking in their states. Five countries have enacted bans, along with six that call for a moratorium. The peer-reviewed scientific literature now includes more than 700 studies on the impacts of fracking; most were published in just the last three to five years. **Of the studies looking specifically at health impacts, more than 80 percent document risks or actual harms.**[1]

Infrared picture (bottom) revealing emissions from condensate tank

Fracking's Health Impacts

Air Pollution Fracking operations release toxic gases. Among the most dangerous are certain volatile organic compounds (VOCs), which are released at every stage of methane gas drilling, storage and transport. VOC's include the BTEX complex (benzene, toluene, ethylbenzene and xylene). Benzene and formaldehyde can cause cancer and, EPA states, benzene's cancer risks occur at any level. All four BTEX compounds can affect the nervous system and several of these four toxins are known to cause birth defects, impact the reproductive system, kidneys, lungs and liver.[2] The Colorado Department of Public Health and Environment evaluation of air toxics showed an elevated risk of neurologic problems, eye, nose and throat symptoms and breathing risks when the levels of the multiple air pollutants from oil and gas wells were combined. [3]

Besides risks, epidemiologic studies now show direct impacts on health. In July 2016, researchers at the Johns Hopkins Bloomberg School of Public Health and collaborating institutions analyzed medical records of more than 35,000 Pennsylvania asthma patients, ages five to 90 years old, and found a statistically significant association between living close to active fracking operations and **mild to severe asthma exacerbations.**[4]

In 2015, researchers at the University of Pennsylvania and Columbia University reported an increase in **cardiac and neurologic hospitalizations** in two Pennsylvania counties with active fracking operations, compared with a neighboring county where such operations had been banned.[5]

A study of births between 1996 and 2009 conducted by Dr. Lisa McKenzie and colleagues at the Colorado School of Public Health reported that mothers in rural Colorado who lived in the highest density of and greatest proximity to fracked wells were twice as likely to have babies born with neural tube defects, and 30% more likely to have babies born with congenital heart defects compared to those with no wells within 10 miles.[6]

A more recent study conducted by researchers at the Colorado School of Public Health found that children and young adults diagnosed with acute lymphocytic leukemia were up to four and a half times more likely to live in areas with the highest density/proximity to wells as compared to those not living within a 16 kilometer radius.[7]

All of these just-mentioned conditions can be fatal or cause lifelong disabilities.

Fracking can also contribute to community disruption and stress. The noise from intensive truck traffic and 24-hour-a-day operations can contribute to significant health problems like heart disease, sleep disorders and depression.

30-40% of front range ozone on bad air days is due to release of VOC's from oil and gas drilling and nitrous oxide from vehicles causing higher rates of asthma, chronic heart and lung disease exacerbations, especially harming those who work or play outside.[8] *Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson counties, along with parts of Larimer and Weld counties have violated EPA ozone standards since they were set in the 1970s under the Clean Air Act.*[9]

Water Use, Spills, Fires and Explosions

Fracking Fluid: A typical frack uses 5 million gallons of freshwater. If 2,500 wells are fracked each year, the amount of water could supply the entire city of Aurora annually.[10] Each frack uses about 25,000 gallons of chemicals. A 2011 Congressional report states that between 2005 and 2009, 14 oil and gas service companies used more than 2,500 hydraulic fracturing products containing 750 chemicals and other components. Twenty-nine of those chemicals found in 650 products are known or possible human carcinogens, are regulated under the Safe Drinking Water Act, or are listed as hazardous air pollutants under the Clean Air Act including formaldehyde, benzene and lead.[11] Naturally occurring salts and toxic heavy metals, like arsenic and radioactive elements, also contaminate the "flowback water" that is brought back up to the surface from deep fracks. The Energy Policy Act of 2005, influenced by Vice-President Cheney, contained a loophole that exempted fracking from safety regulations under the Safe Drinking Water Act.

Spills: There are about two industry self-reported spills per day in Colorado. The Colorado Oil and Gas Conservation Commission (COGCC) requires documentation of all spills but doesn't aggregate

the data or evaluate ways to reduce spills. Of the 509 spills reported in 2016, 82% were on private land and flowback fracking fluid was the source of over half of the spills. 32% were within 1500 feet of an occupied building, but no distance was reported for 52% of the spills.[12] Data from COGCC was analyzed by researchers at the University of CO-Boulder showing that some spills didn't report amounts, and less than half occurring in 2014 were "cleaned up" or closed by 2016. Sixteen percent of spills from 2008-2011 have not been closed.[13]

Gas explosion north of Greeley requiring evacuation. *Kelsey Brunner-Greeley Tribune*

Earthquakes: In Colorado, this very dirty flowback water is injected deep underground because it's too expensive to clean, thus removing it from the water cycle at the very time that Colorado needs more water due to climate change. A recent study by researchers at the University of Colorado concluded that waste water injection well have caused earth-quakes in the Colorado/New Mexico Raton Basin.[14]

Fires/Explosions: Between 2006 and 2015, Colorado experienced at least 116 *reported* oil and gas fires and/or explosions.[15] The actual number is thought to be larger, as many incidents are unreported—the COGCC requires reporting only in cases that "require medical treatment" or cause "significant damage to equipment or well site".

Natural Gas is Bad News for Climate Change

Fracking also affects human health through its contribution to climate change. Natural gas is largely methane, a greenhouse gas 86 times more potent than CO2 in the 20-year timeframe.[16] Recent studies show that large amounts of methane leak into the atmosphere throughout the lifecycle of gas production. As a result, fracking, transporting and burning natural gas for electricity is likely as bad as or worse for climate change than coal or oil.[17]

Climate disruption is a public health emergency. It affects human health and safety directly and indirectly, through extreme weather events including heatwaves and extreme storms, as well as their consequences like drought, spread of infections from vector-born organisms, and exacerbation of underlying illnesses from air pollution. In Colorado we have seen increases in wildfires, with 25% of the largest wildfires in the past 45 years occurring between 2010 and 2012.[18] Smoke from wildfires increases ozone and particulate matter in the air.[19] It also threatens food production, access to safe, clean water, social stability and global security.

Conclusion: Slowing climate change requires all sectors of society to transition rapidly to clean, renewable energy and to adopt land use practices that help stabilize the climate. Fracking blocks both goals and commits society to additional decades of fossil fuel dependence. We strongly recommend much stronger adherence to the current regulations, stiffer fines and adequate cleanup. Halting of new permits should occur immediately to protect the health and safety of Coloradans.

For further information or to take action, join Physicians for Social Responsibility. www.PSR.org
Call 503-819-1170 to join the Colorado PSR working group.

Information and first graphic, courtesy Chesapeake PSR and content from PSR's report: *TOO DIRTY, TOO DANGEROUS.* www.psr.org/resources/too-dirty-too-dangerous.html. (2017)

For more info on policy in Colorado: “Fracking in Colorado: A Citizen’s Handbook”http:/www.sierraclub.org/rocky-mountain-chapter/fracking-guide

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