Fracked to Death

The public health consequences of Hydraulic Fracking
Outline: Threats to Public Health

• Living near Fracking
  • Air Pollution
  • Frontline communities

• Fracking Fluids and Wastewater
  • Forever chemicals
  • Radioactivity

• Noise Pollution

• Gas Stoves
Living near Methane Fracking
Air Pollution Near Fracking Wells

The chemicals coming out of wells include:

• Methane (obviously)
• Nitrogen Oxides: NO, NO2
• Volatile Organic Compounds exceeding risk levels
  • Hydrogen sulfide
  • Benzene
  • Toluene
  • Mixed Xylenes
  • Formaldehyde

• 2022 Situation: “There are almost no (air pollution) monitoring stations near the fracking wells,” Li said. “Almost all the monitoring stations are in urban areas.”
Ozone from fracking in Colorado

Nitrogen oxide emissions from hydraulic fracturing nearly double state's original estimates

HF accounts for more ozone-causing emissions than all cars and trucks along the Front Range.

45 percent of nitrogen oxide emissions and 41 percent of VOC emissions.

https://www.cpr.org/2023/01/05/ozone-data-fracking-emissions/
Health outcomes from living near fracking operations:

1. Premature Births/extreme pre-term
2. Low-birth weight infants/pregnancy complications
3. Higher infant mortality
4. > Hospitalizations
5. > Migraines
6. > Upper respiratory tract infections
7. Children have 2X rate of lymphoblastic Leukemia

Study by Harvard T.H. Chan School of Public Health published in Nature Energy

The closer people 65 and older lived to wells, the greater their risk of premature mortality

https://insideclimatenews.org/news/27012022/fracking-air-pollution-health-pennsylvania/
https://www.niehs.nih.gov/health/topics/agents/fracking/index.cfm
Nitrogen Oxides, VOCs, Ozone

• A group of related gases: NOx (including NO2)
• VOCs are cancer-causing and generate Ozone
  • Outside – oil/gas operations such as fracking
  • Inside – gas stoves
• Health Effects of NO2/Ozone (American Lung Association):
  • Airway inflammation
  • Coughing and Wheezing
  • Decreased lung function
  • Increased likelihood of emergency visits (who pays for this? Not big gas!)
  • Asthma attacks
  • 2016 study of 350,000 cancer patients showed shorter life spans with more pollution
NO2 + O3
(Nitrogen dioxide plus ozone)

**Synergistic effect:** Together they really destroy proteins

https://pubs.rsc.org/en/content/articlelanding/2014/OB/c4ob01577k

_Organic & Biomolecular Chemistry_

**Oxidative damage of aromatic dipeptides by the environmental oxidants NO2• and O3†**

L. F. Gamon, a J. M. White b and U. Wille *a
Port Arthur Texas: LNG

• One plant emits 11,000 tons of sulfur dioxide, and particulate matter annually
• 2X state avg. Cancer, Heart, Lung and Kidney disease
• 98% Black, 2/3rd below the poverty line
• Sempra is planning a major LNG build

Portland Texas: LNG

• Cheniere’s massive LNG plant exceeded permitted limits for soot, carbon monoxide and VOC hundreds of times since 2018
• No fines: Texas just RAISED THE LIMITS
• Residents cite large flares to burn off gas, and air quality so much worse
• 83% increase in emissions
Fracking infrastructure? Not in my backyard, says Exxon CEO

A Texas utility has had the nerve to plan a water tower right next to Rex Tillerson’s own horse ranch!
Fracking fluids & wastewater
Water Pollution with Forever Chemicals

• Per- and polyfluoroalkyl substances (PFAS)
• Enhanced water-resistant properties (Teflon and Foams)
• Also acts as a lubricant (Wells?)
• Accumulate in water, soil and Bioaccumulate in people/animals
• Extremely long half-life (hence name)
• Only recently discovered a microbe to break these bonds in sewage sludge but only anaerobically

PFOS – a subset of PFAS compounds

The Carbon-Flourine bonds are some of the strongest in organic chemistry
This report recommends that the Centers for Disease Control and Prevention (CDC) update its clinical guidance to advise clinicians to offer PFAS blood testing to patients who are likely to have a history of elevated exposure.
“Salting the Earth” w/ forever chemicals

FOREVER CHEMICALS: polyfluoroalkyl substances (PFAS), used to lubricate hydraulic fracturing (“fracking”) **1,200 wells in six U.S. states (130 Companies)**

At one fracking site in Glasscock county, Texas, drilling operators injected **324 pounds of PFASs in a single well**

“One measuring cup of PFOA could contaminate almost 8bn gallons of water.”

- Injected into wells that are known to leak into groundwater
- Flaring releases these chemicals
- Huge ground-level pools that can run off

https://www.theguardian.com/commentisfree/2021/jul/21/toxic-forever-chemicals-pfas-fracking
Bioaccumulation of PFAS: PFASs from sediments and water can accumulate in marine organisms. Animals higher up the food chain accumulate more PFAS.

Eating just one freshwater fish could be equal to a month of drinking water contaminated with 48 parts per trillion of PFOS, EWG researchers calculated. Last year, the EPA lowered the level of PFOS in drinking water it considers safe to 0.02 parts per trillion.

The new EWG study found that the median total PFAS level in freshwater fish was 278 times higher than that of commercially sold fish tested in the last three years.
Leaving behind polluted waters

Navajo (Diné) Nation: Hand-painted sign “Entering Energy Sacrifice Zone”

59,000 gallons of toxic fracking water

https://www.theguardian.com/us-news/2021/apr/04/navajo-nation-fracking

In 2015, broken North Dakota pipeline carrying produced water spilled about 3 million gallons of contaminants into a nearby creek.
Concentrated Radioactivity from “recycling”

TENORM: Radium 226

After an illegal dumping of close to 2,000 tons of dangerous sludge and contaminated materials across the street from two schools, a Kentucky community struggles with what to do next.
Noise Pollution

Review
Public health implications of environmental noise associated with unconventional oil and gas development

Highlights
- Reviewed non-auditory health outcomes from environmental noise exposure.
- Potential outcomes include annoyance, sleep disturbance, and cardiovascular disease.
- Oil and gas operations produce noises at levels that may increase health risks.

Noise pollution from fracking may harm human health
by Brett Israel, University of California - Berkeley

Fracking the Bakken Formation in North Dakota. Credit: Joshua Doubek

Fracking creates noise at levels high enough to harm the health of people living nearby, according to the first peer-reviewed study to analyze the potential public health impacts of ambient noise related to fracking.
Gas Stoves & Indoor Pollution
Gas Stoves

https://www.health.harvard.edu/blog/have-a-gas-stove-how-to-reduce-pollution-that-may-harm-health-202209072811

• Children in households with gas stoves 42% MORE LIKELY to have asthma
• Annual gas emissions from stoves = 500,000 cars
• NO and NO2 emissions linear relationship to gas burned
• Exceed outdoor safety limits within minutes of cooking
• Lots of unburned gas: 21 different VOCs from cooking (benzene, hexane, toluene)
• 3/4 of methane leaked when STOVES NOT RUNNING