



# Something in the Air

## Hydraulic Fracturing's Impact on Air Quality



Blue Ridge Environmental Defense League

# What is hydraulic fracturing?

Hydraulic fracturing better known as “fracking” is a way to release previously unattainable gas deposits from deep within the ground. This is achieved by drilling vertically down through the earth from hundreds, to thousands of feet, then drilling horizontally for long distances, and injecting thousands to millions of gallons of water laden with a cocktail of toxic chemicals (fracking fluid) into the shale in order to release the gas.

# How does it impact air quality?

- Diesel exhaust from the large numbers of trucks needed to construct, service, and complete a well.
- Emissions from on-site equipment.
- Fugitive emissions from:
  - The process itself (drilling, flowback fluids, etc)
  - Waste pits
  - Storage tanks
  - Flaring
  - Blowing sand and dust



(Drilling fluid, looking west at line, Dimock, PA, Spring 2009)



# Examples of typical pollutants and associated health effects

- Volatile Organic Compounds (VOC's) such as:
  - Benzene
  - Toluene
  - Ethylbenzene
  - Xylene

This group of chemicals is collectively known as "BTEX" (1)
- Particulate Matter- Known as PM10 and PM2.5, these tiny particles bypass the body's natural filters and embed themselves deep in the lungs. They cause inflammation, and carry other harmful substances such as carcinogens with them. (2)
- Acrylonitrile- Open pits and wastewater tanks emit deadly reaction products. Acrylonitrile is a by-product formed from the breakdown other substances used at well sites. It is toxic and a carcinogen. (3)

# Examples of typical pollutants and associated health effects

- Ozone precursors- Ozone causes impairment of lung function. (4)
  - Coughing
  - Throat irritation
  - Pain, burning, or discomfort in the chest when taking a deep breath
  - Chest tightness, wheezing, or shortness of breath
- Radon Gas- is a known carcinogen
- Silica Sand- Silicosis is a lung disease, can be acute or chronic and is incurable. (5) (6)
- ? Because there are so many emission sources on each site all using dozens if not hundreds of different chemicals, with little or no testing or monitoring, it is unknown exactly what is present.

# Regulatory Issues: Federal Level

In early 2013, the Inspector General of the United States Environmental Protection Agency found that:

- EPA Has Limited Air Emissions Data for Several Key Oil and Gas Production Processes and Sources
- EPA Lacks Data to Develop and Improve Emission Factors Impacting Key Decisions for Many Oil and Gas Processes
- Oil and Gas Production Emissions Data in EPA's NEI (National Emissions Inventory) Are Incomplete
- Limited Data Could Affect Decision-Making, Impacting Human Health and the Environment (1)

*“Harmful pollutants emitted from this industry include air toxics such as benzene, toluene, ethylbenzene, and xylene; criteria pollutants and ozone precursors such as NO<sub>x</sub> and VOCs; and greenhouse gases such as methane. These pollutants can result in serious health impacts such as cancer, respiratory disease, aggravation of respiratory illnesses, and premature death. .”*

- Exemption from certain provisions of the Clean Air Act (8)
  - The oil and gas industry is exempted from the aggregation provisions of the federal Clean Air Act. Typically, smaller facilities under common control or in close proximity to one another are aggregated as one major source requiring a permit and pollution control.
  - Certain hazardous air pollutants (HAPS) such as Hydrogen Sulfide (H<sub>2</sub>S) are not required to be controlled. H<sub>2</sub>S is a very toxic gas linked to difficulty breathing, irritation, nausea, unconsciousness, even death.
- US EPA “Green Completion” measures (9) (10)

Green completion is the term used to describe requirements that were put in place following a lawsuit brought against the USEPA by environmental organizations. Originally scheduled to take full effect in 2012, but due to industry pushback some aspects of the rule were delayed until 2015. At this time, it is unclear if there will be enough equipment available for full implementation, or what further challenges the regulations will face. The purpose of the rule is to capture gas being freely vented into the air and thus the volatile organic compounds like benzene that travel with it. In addition, other emission sources such as waste pits, tanks, trucks, and other on-site equipment are not addressed.

# What other states are doing

- Colorado has proposed new air quality regulations that should go into effect next month. (11)
  - Highlights of the state of Colorado's proposed emissions rules:
    - A first-in-the-nation requirement for leak detection from tanks, pipelines and other drilling and production processes, using instruments such as infrared cameras, as well as repair.
    - Instrument-based monthly inspections on "large sources" of emissions.
    - A timeline for repairing leaks.
    - New, more stringent limits on emissions from devices located near where people live and play.
- Dallas, Texas is increasing the setback between the boundary of the fracking operation to the property line of adjacent occupied dwellings and other places people work live and play to 1500 feet. (12)
- Even though studies showed that benzene measured above safe levels at well sites in Pennsylvania beyond their 625 foot setback, the Pennsylvania Department of Environmental Protection has yet to act. (13)

# North Carolina

- The North Carolina Division of Air Quality (DAQ) is doing baseline air monitoring in Lee County.
- DAQ continues to monitor the national picture and has taken a “wait and see” attitude. It has been stated that they are following the federal guidelines; which are not stringent enough and could be delayed or weakened before full implementation.
- There is no proposal for mobile air monitoring around well sites at this time.
- There will not be a permit required for “upstream” activities, those which generally create the largest volumes of uncontrolled pollutants.
- The North Carolina General Assembly did not charge the Mining and Energy Commission to develop specific rules for the protection of air quality.
- The Mining and Energy Commission has proposed a 500-foot setback for occupied dwellings with the ability to apply for a variance to 250 feet in some cases.

# What's Known

- Colorado
  - The Colorado School of Public Health found that oil and gas development was responsible for most of the benzene, nitrogen oxide and sulfur dioxide in Garfield County. In the case of benzene, the industry contributed five times more than any other emission source. (14) (15)
- Texas
  - In Karnes City, Texas Commission on Environmental Quality inspectors using handheld monitors found VOC levels so high they failed to collect samples and vacated the sites. (16)
- West Virginia
  - “A substance believed to cause cancer in those exposed to it over an extended period of time is in the air near Marcellus Shale fracking sites, according to Wheeling-Ohio County Health Department Administrator Howard Gamble. "The levels of benzene really pop out. The amounts they were seeing were at levels of concern," said Gamble in describing the results of testing his department recently performed at well sites throughout Ohio County. "The concerns of the public are validated," he added.” (17)

# Emerging Research

- Low birth weight
  - “...researchers Janet Currie of Princeton University, Katherine Meckel of Columbia University, and John Deutch and Michael Greenstone of the Massachusetts Institute of Technology -- looked at Pennsylvania birth records from 2004 to 2011 to assess the health of infants born within a 2.5-kilometer radius of natural-gas fracking sites. They found that proximity to fracking increased the likelihood of low birth weight by more than half, from about 5.6 percent to more than 9 percent. The chances of a low Apgar score, a summary measure of the health of newborn children, roughly doubled, to more than 5 percent.” (18)
- Endocrine Disruption
  - “Twelve chemicals used in hydraulic fracturing, or "fracking," operations to extract natural gas all showed endocrine-disrupting chemical (EDC) activity in laboratory cell studies, researchers report. Moreover, surface and groundwater samples from sites near spills at controversial drilling operations contained higher levels of the 12 EDCs than samples from control sites.” (19)

# Sources

- (1) Outdoor Air - Industry, Business, and Home: Oil and Natural Gas Production - Additional Information- US EPA
- (2) Particulate Matter Health Effects- US EPA
- (3) Acrylonitrile
- (4) Health Effects of Ozone in the General Population
- (5) American Lung Association Silicosis
- (6) Worker Exposure to Silica During Hydraulic Fracturing-OSHA
- (7) EPA Needs to Improve Air Emissions Data for the Oil and Natural Gas Production Sector
- (8) Oil and gas federal exemptions with statutory citations
- (9) Fracking and "Green Completion": Still Incomplete

# Sources continued

(10) US EPA Green Completions

(11) "Colorado Governor Proposes Strict Limits on Greenhouse Gas Leaks From Drilling"

(12) "Don't Mess with Dallas"

(13) Presentation: "Air, Noise, and Light Study Results" Michael McCawley PhD West Virginia University

(14) Colorado School of Public Health "Assessment of Air Quality in Battlement Mesa"

(15) "Study Shows Air Emissions Near Fracking Sites May Pose Health Risk" University of Colorado-Denver

(16) "Reckless Endangerment While Fracking the Eagle Ford Shale"

(17) "Health Dept. Concerned About Benzene Emissions Near Local Gas Drilling Sites"

(18) Study Shows Fracking is Bad for Babies"

(19) "Fracking Chemicals May Disrupt Hormonal Activity"

# Thank You!

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