

How is Human Health Addressed in Shale Gas Drilling?

Presented by:
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Outline of Comments

- What are the public's concerns regarding shale gas drilling and health?
- How are these concerns being addressed?
- What are options to improve upon the way shale gas drilling is currently developing?

What Are the Public's Concerns?

E.g., Washington, PA public meeting with Natural Gas Subcommittee of the Secretary of Energy Advisory Board, September 2011, N=59

Reason	Percent (%)
Environmental Concerns	78.0%
General Health Concerns	62.7%
Health Problem in Family member attributed to drilling	20.3%
Personal legal rights have been infringed upon by companies	13.6%
Concern about safety and/or regulation of industry	69.5%
Bias, conflict of interest, or lack of expertise in desired subject area by members of the committee	23.7%
Export of domestic natural gas resources	10.2%
Depreciation in property values	6.8%

Legitimate Concerns that Exposure to Some of the Known Contaminants Involved in Shale Gas Production Can Cause:

- Asthma
- Cancer
- Heart disease
- Diabetes
- Damage to nervous system and reproductive organs
- Mental health problems

Note: The actual risk to any individual or community is not known.

Source: Rona Kobell, "Marcellus Shale: Pipe Dreams in Pennsylvania?,"
Chesapeake Bay Journal, December 2009 @
<http://www.bayjournal.com/article.cfm?article=3715>

Language of the Executive Orders Creating Unconventional Natural Gas Drilling Advisory Committees

"...task the Secretary of Energy Advisory Board (SEAB) with establishing a subcommittee...to develop, within six months, consensus recommended advice to the agencies on practices for shale extraction **to ensure the protection of public health** and the environment" (emphasis added)

-President Barak Obama in
Blueprint for a Secure Energy Future (March 2011)

The Marcellus Shale Safe Drilling Initiative will assist State policymakers and regulators in determining how gas production from the Marcellus shale in Maryland can be accomplished **without unacceptable risks of adverse impacts to public health, safety,** the environment and natural resources" (emphasis added)

-Maryland Governor Martin O'Malley in
Executive Order 01.01.2011.11: The Marcellus Shale Safe Drilling Initiative (June 2011)

"WHEREAS, the Commonwealth takes seriously its responsibility to ensure the development of natural gas in a manner that protects the environment and **safeguards the health and welfare of its citizens**" (emphasis added)

-Pennsylvania Governor Tom Corbett in
Executive Order 2011-011: Creation of Governor's Marcellus Shale Advisory Commission (March 2011)

So who was on the PA Advisory Commission?

- Mike Krancer, Acting Secretary of Environmental Protection, Harrisburg
- George Greig, Acting Secretary of Agriculture, Harrisburg
- C. Alan Walker, Acting Secretary of Community and Economic Development, Harrisburg
- Richard J. Allan, Acting Secretary of Conservation and Natural Resources, Harrisburg
- Barry Schoch, Acting Secretary of Transportation, Harrisburg
- Patrick Henderson, the Governor's Energy Executive, Harrisburg
- Robert Powelson, Chairman of the Pennsylvania Public Utility Commission, Harrisburg
- Glenn Cannon, Director of Pennsylvania Emergency Management Agency, Harrisburg
- James W. Felmlee, President of the PA State Association of Boroughs, Harrisburg
- Clifford "Kip" Allen, President of the PA League of Cities and Municipalities, Harrisburg
- Gene Barr, Vice President, Government & Public Affairs, Pennsylvania Chamber of Business and Industry, Harrisburg
- Terry R. Bossert, Vice President, Government & Regulatory Affairs, Chief Oil & Gas, Harrisburg
- Jeff Wheeland, Lycoming County Commissioner, Williamsport
- Vincent J. Matteo, president Williamsport-Lycoming Chamber of Commerce, Williamsport
- Terry Engelder, Professor of Geosciences, Penn State University, Department of Geosciences, University Pa
- Matthew J. Ehrhart, Executive Director of the Chesapeake Bay Foundation's Pennsylvania Office, Harrisburg
- Ronald L. Ramsey, Senior Policy Advisor, the Nature Conservancy, Pennsylvania Chapter, Harrisburg
- David Porges, Chief Executive Officer, EQT, Pittsburgh
- Christopher J. Masciantonio, General Manager, State Government Affairs, U.S. Steel, Pittsburgh
- Cynthia Carrow, Vice President of Government & Community Relations, Western Pennsylvania Conservancy, Pittsburgh
- David Sanko, Executive Director of the PA State Association of Township Supervisors, Enola
- Dave Spigelmyer, Vice President, Government Relations, Chesapeake Energy, Canonsburg
- Randy Smith, U.S. Government Affairs Manager, Exxon Mobil, Fairfax, VA
- Ray Walker, Chairman, Marcellus Shale Coalition, Canonsburg
- Chris Helms, NiSource Gas Transmission and Storage, Houston, TX
- Terry Pegula, Delray Beach, FL
- Jeff Kupfer, Chevron, Washington, D.C.
- Gary Slagel, Chairman, PA Independent Oil & Gas Association, Wexford
- Anthony S. Bartolomeo, Chairman, Pennsylvania Environmental Council, Philadelphia
- Nicholas S. Haden, Vice President, Reserved Environmental Services, Mt. Pleasant

No one with a medical or public health background

Marcellus Shale Advisory Commission's Health Recommendations for Department of Health Activity:

- **Collection and evaluation of clinical data** provided by health care providers
- Routine **evaluation and assessment of Marcellus Shale-related environmental data**, such as air, water, solid waste, and fish and other food samples
- Creation of a **population-based health registry** with the purpose of characterizing and following over time individuals who live in close proximity to gas drilling and production sites

Also....

- Establishment of a system to provide timely and thorough **investigation of and response to concerns/complaints** raised by citizens, health care providers or public officials.
- **Education of health care providers on the presentation and assessment of human illness** that may be caused by material in drilling constituents.
- **Establishment of public education programs** regarding the constituents used in the drilling process, potential pathways to humans, and at what level, if any, they have the potential to cause human illness.

These recommendations are
not part of the new law in PA.

Why not?

“In fact, the recommendations directly related to the Department of Health do not require legislation. They can be advanced through the agency’s traditional policy implementations – indeed, **many already reflect what the department does day in and day out.**”

-Patrick Henderson

Energy Executive, Office of the Governor
Pittsburgh Post Gazette, 3/14/12

**New legislation (Act 13)
language that addresses health issues
(with similar language for emergency response):**

§ 3222.1. Hydraulic fracturing chemical disclosure requirements.

(10) A vendor, service company or operator shall identify the specific identity and amount of any chemicals claimed to be a trade secret or confidential proprietary information to **any health professional who requests the information in writing** if the health professional executes a **confidentiality agreement** and provides a **written statement** of need for the information indicating all of the following:

- (i) The information is **needed for the purpose of diagnosis or treatment** of an individual.
- (ii) The individual being diagnosed or treated **may have been exposed to a hazardous chemical**.
- (iii) Knowledge of information will **assist in the diagnosis or treatment of an individual**.

Our interpretation of these new chemical disclosure provisions (copied almost verbatim from a controversial Colorado law and currently being challenged in PA court):

A physician may receive information about proprietary chemicals, but must agree not to reveal this information to the public, even if it is likely that the same chemicals that made her/his patient sick are likely to impact the health of others.

“It is a breach of a physician’s responsibilities not to report a public health threat, as well as a contradiction of established public health practice and law.”

Drs. Bernard Goldstein & Jill Kriesky
University of Pittsburgh GSPH
Pittsburgh Post Gazette, 3/12/12

Also on the issue of companies responsibility to report on chemicals, the legislation says:

Section 3332.1(c)3: Notwithstanding any other provision of this chapter, a vendor, service provider or operator **shall not be required to** do any of the following:

...

(3) Disclose chemicals that occur incidentally or are otherwise unintentionally present in trace amounts, may be the incidental result of a chemical reaction or chemical process or may be constituents of naturally occurring materials that become part of a stimulation fluid.

...

Whether or not intentional, our reading of this language leads us to conclude that a company can withhold information about chemicals that drilling brings up from underground, including the natural gas constituents which themselves can be toxic, and naturally occurring toxic agents such as arsenic, barium, brine components and radioactive compounds dissolved in the flowback water.

How can we improve on current responses to shale gas drilling impacts on health?

The Southwest PA Environmental Health Project:

- a nonprofit environmental health organization created to assist and support Washington County residents who believe their health has been, or could be, impacted by natural gas drilling activities.
- a team of public health professionals who know that the perception in the community of environmental dangers, along with plausible sources of hazardous substances, are reason enough to provide a public health response.

The Southwest PA Environmental Health Project:

www.environmentalhealthproject.org

- an **onsite nurse practitioner** available by appointment to people who think their health may be compromised by nearby gas drilling activities. She offers home or office visits, exams, consultations, referrals, help with navigating the health care system, and consultations with environmental health specialists about residents' medical conditions.
- a **resource center** for information on the **potential routes of exposure** from hazardous substances, as well as strategies for limiting the risk of health effects.
- **Supporters of epidemiologic research** on the health effects of living near natural gas drilling activities **who recognize** that this type of research takes a long time to conduct while **people need information and help now**.

Also, continue to ask for more . . .

- **Studies of potential impacts** in advance of drilling (start epidemiological study now in future drilling sites);
- Implementation of **air and water monitoring regulations** at fracking sites;
- Support for **strong chemical disclosure regulations**;
- Establishment of a **health registry and public health education programs**; and
- **Responses** designed to address issues **in your community**.

Resources for Future Action:

- Me, at jkriesky@pitt.edu or 412-624-9379
- SW PA Environmental Health Project (Raina Rippel)
www.environmentalhealthproject.org
- FracTracker:
www.fractracker.org
- Pipeline:
<http://shale.sites.post-gazette.com>

Multiple pathways to adverse health impacts exist

- Worker health and safety
- Air pollution
- Water pollution
- Soil pollution
- Noise pollution
- Community safety: traffic, explosions, fires; crimes
- Psychosocial disruption
- Sustainability
- Global climate change

Air Quality Issues

- Currently only a limited number of stations monitoring gas industry operations, including compressors, relief valve emissions from separators, and produced water tanks
- Fugitive natural gas emissions from separators and produced water tanks may contain many contaminants:
 - Methane and other hydrocarbons (ethane, propane, butane) and water vapor are of relatively low human toxicity.
 - Others such as hydrogen sulfide (H₂S) are of more significant toxicity.
 - Some natural gas wells produce a condensate which can contain complex hydrocarbons and aromatic hydrocarbons such as benzene, toluene, ethyl benzene and xylene (BTEX). These substances are important human toxics with multiple non-cancer and cancer endpoints.

A 3-year air monitoring study from Colorado just in...

([McKenzie, Lisa M.](#); [Witter, Roxana Z.](#); [Newman, Lee S.](#); [Adgate, John L.](#)

Human health risk assessment of air emissions from development of unconventional natural gas resources
[Sci. Total Environ.](#), 2012, 424, 0, 79-87)

- Residents living $\leq \frac{1}{2}$ mile from wells are at greater risk for health effects from UGD than are residents living $> \frac{1}{2}$ mile from wells.
- **Subchronic exposures primarily to trimethylbenzenes, xylenes, and aliphatic hydrocarbons** during well completion activities present the greatest potential for non-cancer health effects for residents $\leq \frac{1}{2}$ mile from wells.
- **Cumulative cancer risks were 10 in a million and 6 in a million for residents living $\leq \frac{1}{2}$ mile and $> \frac{1}{2}$ mile from wells, respectively, with benzene as the major contributor to the risk.**

WATER ISSUES: Additives for Fracking (0.5% of fluid)

Additive	Example Chemical	Purpose
Acid	Hydrochloric acid or muriatic acid	Helps dissolve minerals and initiate cracks in the rock
Antibacterial agent	Glutaraldehyde	Eliminates bacteria in the water that produces corrosive by-products
Iron control	Citric acid	Prevents precipitation of metal oxides
Breaker	Ammonium persulfate	Allows a delayed break down of the frac gel
Corrosion inhibitor	n,n-dimethyl formamide	Prevents corrosion of pipe
Crosslinker	Borate salts	Maintains fluid viscosity
Surfactant	Isopropanol	Increases viscosity of the frac fluid
Friction reducer	Petroleum distillate	Minimizes friction
Gel Guar gum	Hydroxyethyl cellulose	Helps suspend the sand in water
Clay stabilizer	Potassium chloride	Brine carrier fluid
pH adjusting agent	Sodium or potassium carbonate	Adjusts and controls pH of the fluid
Scale Inhibitor	Ethylene glycol	Reduces scale deposits in pipe

Sources: Earthworks. (2011). *Hydraulic Fracturing 101*. Retrieved Jan 11, 2012, from http://www.earthworksaction.org/issues/detail/hydraulic_fracturing_101#CHEMICALS;

EnergyIndustryPhotos. (2008). *What is Hydraulic Fracturing and What is it Used for?* Retrieved Jan 11, 2012, from http://www.energyindustryphotos.com/what_is_hydraulic_fracturing.htm

Fluid Disposal Issues

- Disposal of flow back and produced water are of significant concern. These fluids are high in:
 - Salinity -- 5-10 times that of saltwater
 - Total dissolved solids (TDS)
 - Hydrocarbons which are volatile organics such as benzene, ethylene, toluene, and xylene (BETX)
 - Heavy metals such as arsenic and mercury
 - Radionuclides

Beyond Chemical Releases and Their Potential Health Impacts

- **Community impacts that can**
 - Create stress that directly impacts individuals' health
 - Create change in the physical and social environments that indirectly contribute to health problems

Some sources of stress on residents:

- Noise
- Potential loss in property value
- Potential loss of farm income
- Increased disagreements with neighbors
- Housing costs



Sources of stress on the community:

- Loss of “small town way of life” in rural areas
- Negative impacts on non-drilling industries (especially various types of tourism)
- Increased use of government services including police, EMS, and social services*
- Need for increased road maintenance*

*This may be partially alleviated by Act 13

