Hydraulic Fracturing EPA Public Informational Meeting

Canonsburg, Pennsylvania

July 22, 2010

Summary of Public Comments

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Meeting Format

US EPA (hereafter referred to as EPA) held a public informational meeting in Canonsburg, Pennsylvania, on July 22, 2010, to discuss proposed design and scope of a research study on the potential relationship between hydraulic fracturing used in natural gas extraction and drinking water. The meeting began with brief presentations by EPA staff on the need for the study, proposed scope and design of the study, and public participation opportunities during study development. Over 950 individuals attended the meetings and EPA received verbal comments from 94 citizens following the EPA presentations. Both the EPA presentations and public comments are summarized in this document.

Summary of EPA Presentations

EPA made brief presentations on the need for a study, the proposed study design, and the stakeholder process used for the planning stages of the study.

Introductory Remarks

Shawn Garvin, Regional Administrator, EPA Region 3

- EPA Region 3 serves Pennsylvania, Maryland, Virginia, West Virginia, Delaware, and Washington, DC.
- Natural gas is a key element of the nation's energy future. However, the public has expressed serious questions on the safety of hydraulic fracturing (HF) and EPA takes these questions seriously.
- EPA Region 3's "Eyes on Drilling" citizen tip line allows the public to leave anonymous messages relating to topics including noise, traffic, and releases to air and surface water. Region 3 also has an internal task force, which is reaching out to regulatory authorities and other groups.
- Many have expressed concern over the safety of HF and its potential impact on drinking water supplies. To address these concerns, EPA will conduct a study investigating the potential impacts of HF on public health and the environment, particularly drinking water.
- The study will be transparent and peer-reviewed, and will emphasize stakeholder input. At today's meeting, EPA asks for public comment on the study's design, scope, and focus. EPA wants to hear the public's experiences and ideas.
- EPA places a high priority on this study and hopes that the public's concerns will be addressed and answered through this study.

Why Are We Studying Hydraulic Fracturing?

Fred Hauchman, Director, Office of Science Policy, EPA Office of Research and Development

- Natural gas is an important part of our energy future, and it is a resource we value for a variety of reasons, but the public has raised concerns about the impacts of HF. EPA takes

these concerns seriously and wants to ensure that public health and the environment are protected.

- Congress directed EPA to conduct a study focused on HF's possible impacts on drinking water.
- The study will proceed as quickly as possible while respecting the scientific process and involving experts and stakeholders. EPA insists on conducting a credible, transparent, scientific study, which takes time.
- The study will use the best available science, independent sources of information, and a transparent, peer-reviewed process. EPA will consult with other groups, including non-governmental organizations (NGOs), industry, states, and federal partners.
- EPA is also in the process of putting together a robust panel of experts with a wide range of experience. The panel will provide a critical review of the study plan.
- The study itself will be led by EPA scientists and headed by Dr. Bob Puls. EPA's Science Advisory Board (SAB) reviewed an initial scoping study plan in April 2010. The SAB recommended that the study focus on water resources (including quality and quantity), use a case study approach, and include input from stakeholders.
- The expected study timeline is as follows:
    - October 2010: peer review of study plan.
    - Early 2011: begin study.
    - Late 2012: initial results.
- EPA expects that work will continue into the future. This is a complicated issue to study, but EPA will make every effort to complete the study as expeditiously as possible.

What Will the Study Include?

Dr. Robert Puls, Director of Research, EPA Ground Water and Ecosystems Restoration Division

- We need to find a balance between moving forward with natural gas exploration and extraction and protecting our natural resources.
- Here are the primary questions we hope to address with the study:
    - What HF scenarios might cause impacts on drinking water resources?
    - What approaches are effective for protecting drinking water?
- The major elements of the study are data and information (both quantitative and qualitative), chemical fate and transport (including the identification of chemicals that are used), and case studies (located in areas where issues have already arisen and/or on the site of new HF projects).
- The study could also include regional data collected by other entities, such as the Bureau of Land Management (BLM), the U.S. Geological Survey (USGS), and the Army Corps of Engineers.
- In a typical HF operation, there is a production well that is fairly deep, and there are several geologic strata between the fractures and the drinking water resources. However, there are cases where HF is shallower, and, in the past, there have been cases where HF has taken place within a geologic unit that is classified as an underground source of drinking water (USDW) by the Safe Drinking Water Act.

    - There can be 10 to 20 wells located on one well pad. Five million gallons of water can be required to fracture a single well.
    - Fractures in the geologic formations are created by HF, or they exist naturally in the formation. There can be interconnections between natural and induced fractures.
    - The distance between drinking water sources and HF provides one level of protection. Additional protection is provided by the casing and cementing of the well itself.
    - When wells are fractured, water, fracturing chemicals, and a proppant (such as sand) are injected under high pressure. This creates and props open fractures. When the pressure is released, the fluid returns to the surface.
    - In the West, wastewater is often disposed of through permanent underground injection wells. However, there are fewer of those wells in the East, which adds an additional challenge to disposal and wastewater management.
- Types of data and information needed include:
    - Pre- and post-drilling site characteristics and water quality.
    - Chemical data, including information on hydraulic fracturing fluids.
    - Water use data, such as sources and amounts.
    - Well construction and well integrity information.
    - Information on operation and management practices, especially with respect to produced water.
- Sources of data and information include:
    - Existing sources, such as published reports and materials submitted by stakeholders. EPA is already in the process of collecting this information. EPA is interested in collecting any qualitative or quantitative data that participants might have.
    - New sources. The study itself will generate more data, as will other ongoing studies. Data from these other investigations will be incorporated into the study as much as possible.
- Fate and transport includes characterizing fracturing fluids and their degradation products, determining HF's potential to mobilize chemicals from geologic formations, and identifying and refining methods for chemical analysis.
- Case studies provide opportunities for focused field investigations. The SAB recommended the case study approach, and participants in tonight's meeting can help by suggesting possible locations.
- Case studies will also allow EPA to evaluate HF in different parts of the country, in terms of geologic factors, water resource management practices, and water quality/quantity variations.
- Potential sites for case studies include areas where HF is planned, is in progress, or has occurred in the past.
- EPA will identify and prioritize case study locations based on stakeholder input, the vulnerability of water resources (including the proximity of other wells or exposure pathways), the extent of HF activity in an area, geologic conditions, and geographic variations.
- Next steps in developing the study plan include:
    - Collecting stakeholder input throughout the summer of 2010.

- A transparent peer review process by experts in appropriate fields during the fall of 2010.
- Collecting public comment on the study plan during the fall of 2010.

How Can Stakeholders Be Involved?

Ann Codrington, Acting Director, Drinking Water Protection Division, EPA Office of Ground Water and Drinking Water

- The most important part of this meeting is the public comment.
- EPA held four sector-specific webinars and is currently conducting public meetings. Later, EPA will hold technical workshops to collect input from experts in the field.
- The study design is extremely important: a good study design will lead to a good study.
- There are several ways to provide comments to EPA on the study design:
  - Speaking at public meetings.
  - Submitting written comments at public meetings.
  - Submitting written comments by e-mail or postal mail.
- Key questions EPA would like input on include:
  - What should be our highest priorities?
  - What are the gaps in current knowledge?
  - Are there data and information we should know about?
  - Where do you recommend we conduct our case studies?

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Summary of Public Comments

EPA requested comment on the proposed scope of the study plan and criteria to be used for case study locations. Public verbal comments described regional impacts to public health, the environment, and economics and provided recommendations on regulations and subjects or methods of study. Public comments have been grouped by common theme: impacts specific to EPA Region 3 and the Marcellus Shale area, recommendations for the HF study, regulation of HF, and other comments.

Hydraulic Fracturing in Region 3 and the Marcellus Shale Area

Economic and environmental impacts were the subjects of public concerns specific to EPA Region 3 and the Marcellus Shale. The positive economic benefits of hydraulic fracturing were promoted by commenters for providing opportunities for job creation and economic growth, and for energy independence for the United States as a whole. While some commenters noted that hydraulic fracturing has been practiced across the country for decades and has been proven to be

safe, other commenters noted that the particular type of HF in use in Pennsylvania is relatively new (less than 10 years). Many commenters voiced concern that hydraulic fracturing will and has contaminated underground sources of drinking water in Pennsylvania and beyond; calls for further investigation of reported cases of contamination were made by several individuals. Several commenters noted that Pennsylvania is already suffering from the environmental and public impacts of earlier contamination incidents, from chemicals and industries that were thought to be safe. Commenters also described specific instances of contamination and impacts on local farmland, properties, and drinking water sources, and expressed concern as to where and how wastewater disposal would occur.

EPA's Hydraulic Fracturing Study

Suggestions for study scope were, in large part, broadly focused – examine HF from water use to drilling and construction to management of wastewater, and impacts to both surface and groundwater. Impacts to air, land, and cumulative effects on public health and the environment were also requested. Other areas commenters suggested for research include chemical disclosure, development of analytical methods, and studies of chemical mixtures; HF wastewater treatment and management of storage areas for wastewater; and fluid migration of brines and fracturing fluids into aquifers. Case study locations were recommended in Pennsylvania and West Virginia. State data on HF and natural gas production was proposed as a source of information to determine case study locations as well.

Regulating Hydraulic Fracturing

Appropriate regulatory oversight for hydraulic fracturing was a common theme in verbal comments. Existing state regulations and state oversight were deemed adequate by some individuals. Fear of overregulation and stifling economic growth was expressed should federal oversight occur. Those who advocated for federal regulations felt protection of health and resources was denied to them by states and local governments. Exemptions for natural gas production and hydraulic fracturing in federal regulations were considered by some to be evidence that industry practices are harmful. Multiple commenters asked that EPA lift Clean Water Act and SDWA exemptions on federal HF regulation. Several commenters suggested a moratorium on HF. Repeated calls for policy and research based on facts rather than emotional reactions were voiced. Commenters also urged EPA not to allow political and economic considerations to interfere with the study or with potential federal regulations.

General Comments

Some commenters reiterated that there has been no documented evidence of drinking water contamination as a result of fracturing activities. Other commenters stated that any economic gains from HF would come at considerable cost to public health and natural resources. Some commenters stated that hydraulic fracturing will be a valuable and important source of energy, and noted that many of the stated concerns about the practice are exacerbated by media reports, or exaggerated claims not based on fact or the industry's track record. Commenters expressed concern that the states and EPA do not have enough funding to properly monitor and regulate the industry. Others expressed concern for public health, in particular for children's health, as a result of drilling, and associated trucking, waste removal, and waste disposal activities.

Detailed Public Comments

Public comments have been grouped by common theme: impacts specific to EPA Region 3, recommendations for the hydraulic fracturing study, regulation, and general comments.

Hydraulic Fracturing in Region 3 and the Marcellus Shale Area

Comments on HF in Region 3 and the Marcellus Shale area were as follows:

- The highly variable and unpredictable nature of the HF process can lead to contamination of ground water and drinking water. This is a great concern. Incidents of drinking water contamination where HF is considered as a suspected cause have not been sufficiently investigated. Every day Pennsylvanians worry about their future access to safe drinking water. The protection of underground water sources is especially important to Pennsylvania because we have the second highest number of private drinking water wells in the nation; three million Pennsylvanians are dependent on private wells to provide safe drinking water to their homes.

- Natural gas drilling in the Marcellus Shale region is a major issue for many towns and communities throughout Pennsylvania. If done in the proper way, natural gas development has the potential to create jobs, strengthen the state's economy, and reduce the nation's dependence on foreign energy. However, despite its potential benefits, natural gas drilling presents a concern for the people living near these drilling sites.

- This is an exciting time for this area because of new job creation and economic growth. It is crucial for citizens of southwestern Pennsylvania to have this forum on the Marcellus Shale and natural gas drilling and exploration so that they can express their views on this issue in person. Hearing these concerns will help EPA ensure that this region's resources are protected.

- Increasing natural gas production and use has potential benefits, especially thousands of new local jobs. Natural gas can provide the base load fuel we need for continued economic development while reducing our dependence on foreign oil. The Marcellus Shale will have a tremendous impact on the local economy; it can provide 211,000 new jobs and $18 billion in Pennsylvania.

- The 5th District of Pennsylvania represents a quarter of the land mass in Pennsylvania. It has the Marcellus Shale on the east end and the oldest oil well in the country, the Drake well, on the west end. The District has 150 years experience with drilling. The Marcellus Shale may be the largest natural gas field in years. It could provide over 200,000 jobs in the next ten years, and increase tax revenue by $1 billion per year.

- HF is a process with a significant history. It has been done for 60 years or more, and one million wells have been safely fracked. When performed correctly and safely, this presents an enormous opportunity for Pennsylvania. Thirty to forty percent of domestic oil and gas is produced with HF. Sixty to eighty percent of wells drilled in the future will require HF to remain viable after one decade. There are enormous opportunities in some

of our most rural and poorest areas: jobs, new wealth, and the chance to provide clean natural gas to the northeast with existing infrastructure.

- A stakeholder's family has been fighting for this state for 235 years. Pennsylvania is a special place, and it has been and remains worth fighting for. This boom is similar to other extractive industry booms in Pennsylvania. The arrival of a big industry with air and water pollution issues is a familiar story here. The arguments have already been laid out. This affects residents' lives and the lives of their children. Residents of this state keep making the same mistakes, contaminating their own drinking water and poisoning the state they love. Pennsylvania is worth dying for, but not because of a glass of water.

- This style of HF technology is only 5 years old in this area. Tap water in Pittsburgh from the Monongahela River is already contaminated with acrylonitrile levels 11 times the level allowed in streams. There have been two fish kills and dead cattle. This is similar to Agent Orange—people were ignored when they got sick, because when it was used it was said to be safe enough to drink. Twenty years later, there were health studies and it turned out those men were right to think Agent Orange was dangerous. Many had died in their fifties.

- A stakeholder from Hickory, Pennsylvania lives in a house surrounded by four natural gas wells, some very close to the well cap for a drinking water well. The family relied on that well, and there is no other industry around except for natural gas. In June 2009, the well water was contaminated. Since then, there have been 12 tests, and the well and a nearby creek have been shown to contain numerous volatile organics. Nearby homes also have problems with the same chemicals. The burden of paying for this testing falls on the residents. Pennsylvania Department of Environmental Protection (PDEP) is not capable of testing for acrylonitrile. The well was the only source of water for the family, and two children were exposed to the water. The family now pays for water hauled into a 1,500-gallon tank in the garage. Daily life has drastically changed since they found out about the contamination. They still use the well for some things, but it is not safe for the children to play with the water in the sprinkler. They have daily fears about the effect on the children. They feel they are ground zero here in the "Marcellus plague" and people need help before they are in the same situation.

- The gas industry says that Marcellus Shale drilling will rescue Pennsylvania's economy, create jobs, give people wealth, and unlock "clean-burning" natural gas, that it's safe, and the objections are the fear mongering of environmental groups. These claims should be examined. Many of the Marcellus Shale jobs have gone to Texans and other out-of-staters so far. Drilling jobs are short-lived. The study that identified 200,000 jobs was funded by the natural gas industry. As for wealth and health, see *Gasland*. It's hard to feel wealthy when your land is fouled. Some people leased their land and saw their property values drop due to pollution. Some have seen their families get sick. Also, there were health problems like neuropathy or cancer. Others have seen their animals weakened and their hair fall out.

- Frack pits leak and are never properly sealed. Cattle and deer have access to them. While cattle have been quarantined in Pennsylvania, deer cannot be quarantined. People hunt white-tailed deer for venison. What happens when hunters and their families eat these

deer? How many hunters and their families will suffer? The Marcellus shale may be akin to the oil below Saudi Arabia, but if we are not vigilant we may also end up as dry as the Arabian Peninsula. Action must be taken now.

- A resident of Hickory, Pennsylvania has lived there for 37 years. In 2005, there was drilling on his neighbor's property. The water turned oily brown. He called the drilling company, described what happened, and was asked to prove it. He called his state representative, and they asked if he had called the drilling company. He called PDEP. After PDEP took a water sample, they said the water was safe. He was surrounded by gas wells; the closest 907 feet away. Five of his goats died, and he had no idea of how bad the water was. Only after a call from Washington, D.C. did he know the extent the situation. Manganese levels were 140 times higher than the limit and iron was 243 times the allowable limit. The test showed that there were lots of other chemicals too.

- We don't know the effect of HF on water. Pennsylvania has another rich resource: its rural nature and agriculture. EPA was designed to protect the environment, not protect jobs. In the paper, we see that EPA says this will bring jobs. But EPA was established under a conservative Republican president to protect the environment. Remember the "three threes"—you can survive three weeks without food, three days without water, and three minutes without air. But you can go without natural gas for a lifetime. Do not allow industry to pillage our resources and go home with the money like the coal industry did.

- In the summer of 2007, the casing in a gas well drilled 800 feet from a citizen's house blew out when the well was fracked. There was a bad taste and smell in the water, and the family experienced health problems. They filed complaints to every group they could think of. The drilling company supplied the family with water for two months. The well water was discolored, but PDEP claimed it was safe to drink. The family has been paying for water after the initial two months because they still see effects: the family has dry skin and there is still a bad odor. Pre- and post-drilling testing did not include tests for HF chemicals.

- A citizen's well is contaminated with cyanide, benzene, toluene, and other chemicals—these are deadly chemicals. This dangerous practice needs to be stopped to protect lives and natural resources. An economic war is being waged against the United States. The rights of landowners and citizens are being violated by the fracking companies. West Virginia failed to test drinking water. In 2009, a volunteer program took up this responsibility and tested for VOCs and the results were shocking and frightening. Corporations are allowed to poison land and water and put drilling waste on roads and in rivers. Highways and roads leading to these sites are damaged and destroyed. Drugs and prostitution follow the rigs and workers are dying of cancer, tuberculosis, and silicosis. Canonsburg is a historic site of nuclear contamination. EPA should make this meeting an historic victory for human rights.

- There are gas wells one mile from a resident's house, a processing plant within one mile, and a compressor station within one mile. She is concerned about waste, human health, the environment, and the health of Chartiers Creek.

- Gas well drilling is a dirty business, any way you cut it. From the middle of March to late April of this year, a citizen kept a log of the activities drilling companies did quickly in order to avoid getting caught. The environment is being affected in Washington County. The sights of day and night operations are quite alarming and overwhelming. This is from his log: Called the PDEP and asked if they would take a tour. Did not receive a call back. No action was taken by PDEP. March 29, flare stacks blowing in Hopewell Township 20-30 feet high. Huge flare stacks blowing out of proportion.

- A candidate for U.S. Senate has heard from people who no longer drink water from once-clean wells, who can't let their kids play on their farms due to the dangers from frack ponds, or who can't live on their lands. The industry statement that drillers have never been responsible for contamination and that there has never been a single proven case of contamination is foolish. In their view it is all coincidental; it's not their fault. This position is a scam.

- A citizen has city water, but lives near a 560-acre wooded park. He can imagine drilling there because the city is broke. The citizen is concerned.

- A nurse in Colorado almost died because she was exposed to fracking chemicals. The drilling company refused to disclose a list of possible chemicals so that the hospital could properly treat her. Because of incidents like this, a commenter feels surrounded by danger. The stakeholder felt as if he could call 911 every day of his life. He can't count on the PDEP. They receive so many contributions and are lobbied so heavily. The commenter noted that such a system would be called bribery in most countries but in the United States it's called lobbying.

- A citizen lives within a mile of a frack well and feels she is not exempt from any of the horror stories told at this meeting. Our own worst enemy is ourselves: we take the profit and then we get the contamination.

- In 2007, Dominion Gas asked to drill two horizontal wells on a citizen's property. He said no, but they said they would use eminent domain, and they claimed they had a lease from 1921. They said the water would be protected or restored. The commenter lost his water well, a spring, and a pond for cattle. As drilling progressed, frack water spilled into the pasture. PDEP said they dump it in fields in West Virginia and that it was safe. During 2008 and 2009, the commenter lost ten calves. They had multiple problems. He lost a two-year-old heifer too. PDEP said, "That's a farmer's luck." The commenter fenced off the pond and hasn't lost any more cows. Five water wells had to be dug before he found water. The new drinking water well is 30 feet from a manure pile that been there for 30 years. The water is salty. The PDEP says it's salty because it's not being used and that it meets federal standards. The commenter has been paying for drinking water since 2009. Industry must be held accountable. He feels he is subject to terrorism and threats on his own property and he is stuck with the problems created by the HF industry with no one to help him. This is intolerable. Dominion Gas said that PDEP signed off on all further liability.

- Frack water is being dumped in backyard creeks. People don't know who to call. There is no one to call. By the time somebody comes, the people dumping the water are gone.

These trucks have been seen driving without license plates so they can't be identified. No one can call the police because the trucks have no license plates.

- Wastewater from HF contains endocrine disruptors, which affect fetuses. This explains why local calves are born with severe deformities. People laughed at a commenter who talked about prostitution and drugs, but that is a fact. Just read the press releases of the local police departments. An independent study in Colorado said there was a rise in the crime rate and sexually-transmitted diseases – that is a fact. It is important to be educated about these consequences and it is EPA's responsibility to protect people who cannot educate themselves.

- Almost a year ago, forty-three miles of vibrant Dunkard Creek in Green County were poisoned and thousands of aquatic organisms died in an environmental disaster. Dunkard Creek has survived, barely, with the help of watershed groups and volunteers. It has endured until the 21st century. Nine years of toxic byproducts from mining nearly destroyed it. But now it has been destroyed by the natural gas industry. There will be repercussions for generations to come. CBM and Marcellus waste poisoned it.

- What are we willing to sacrifice for energy: our children, our elderly? The dead fish in Dunkard Creek are a testament to the lack of enforcement. How many times do the citizens of Pennsylvania have to be disrespected or violated before they demand from the local, state, and federal government that they protect their quality of life? State agencies have refused to act properly. The citizens of Pennsylvania have waited for and welcome the U.S. EPA.

- A citizen has been directly affected. The commenter threw up fluorescent fluid and has scars on her body. Her father was also affected. He was on a catheter from a stroke and needed one liter of fluid per day. He was given well water that was contaminated with frack fluid. It had 1.8 mg/L of methane and approximately 30 mg/L of chloride. The people up above with Atlas Energy did not tell them the water was poisoned. The water was contaminated by Atlas Energy. The commenter felt her father was embalmed alive from the chemicals in the water—his body would not even burn when he was cremated. Her mother has pounds of ashes sitting in her hallway. She can't take a shower or turn on her water. At the meeting, she sat next to someone who laughed at the comments.

- In Hopewell Township, an energy company built a well—a "Mount Marcellus"—across the street from a citizen's house. The well is surrounded by a tent city; it does not look like the beautiful pictures of wells the industry prints. There are such awful vibrations from the well that they almost rattled the house right off the foundations. It is a mess. EPA can come out and see it anytime they want. The citizen didn't sign a lease. He has no public water. They should have to put in public water and fixed the roads first. Hopewell Township used to be known as the place near where *Night of the Living Dead* was filmed – maybe they will film the next sequel here as well.

- We should consider the potential economic benefits to Pennsylvania and the United States. Unemployment in Pennsylvania doubled in the past two years, and there have been layoffs of state employees. Natural gas could create 211,000 new jobs and add $18 billion to Pennsylvania's economy – a significant boost. A citizen has personally

struggled with unemployment recently and understands the toll it can take on a person. It's in our interest to continue to process natural gas in a manner that protects the health of the community and supports the economy.

- Natural gas could provide Pennsylvania with 200,000 jobs and $18 billion for better roads, better schools, and better-paying jobs. Let's make sure we are making the right choices as we come back from the economic slump.

- A resident of Lincoln Place, near Pittsburgh, has been personally affected by an under-regulated and irresponsible industry. More than 80 of her neighbors leased gas rights. Other than the horrendous stories, the commenter wants to remind EPA of the hidden dangers of what is already there. Here are the facts: the Marcellus is a black shale, which contains uranium, pyrite, and other hazards. Pyrite reacts in the atmosphere to form sulfate, which causes acid mine drainage. It is also an emission source when struck by the drillhead. Uranium has radioactive decay and it is a source rock for radon gas. EPA says that radon is the second-highest cause of lung cancer, after smoking. How are these materials being handled and disposed of? They're in impoundment ponds. This has to stop.

- A Caterpillar equipment dealer has seen a positive impact from Marcellus Shale development. In April 2008, the business employed 1,515 people. In the second half of 2008, they had to reduce by 463 people. At the end of 2009, they had 1,052. So far in 2010, they've increased by 59 people, mostly due to demand from the natural gas industry. They will add 50 more in the near future due to increased business from natural gas. This is important when Pennsylvania unemployment has doubled in the past five years. These are real numbers with a direct effect on the lives of the people of Pennsylvania. Growth comes from reduced costs and increased revenues—this business has had increased revenues, and they expect the growth to continue as long as the HF industry continues to grow. Continued and sustained growth and additional investments grow the local economy.

- Nurses are concerned about the health of the patients they serve in the present and in the future. What will patients have to deal with because of the HF in the Marcellus Shale? Fracking chemicals, some of which are very familiar to nurses as carcinogens, many may affect water and fish. Also, drilling emits volatile chemicals into the air we breathe. Seventy percent of the fluid remains in the ground and it is not biodegradable.

- There could be widespread benefit to the Commonwealth, with jobs, local energy, and the production of clean-burning fuel. The Pennsylvania Council of Professional Geologist's Marcellus Shale policy statement is available at http://pcpg.org.

- Technology today is more advanced and sophisticated than in the past. Here in Pennsylvania, HF has happened for over 50 years and is tightly regulated by the state. Plus, there is the commitment of industry to protect the environment—there has been no single incident drinking water contamination on account of these existing tight regulations. This is recognized by groups including the Ground Water Protection Council (GWPC). The Marcellus Shale Coalition does not resist regulations. It is working every day on how to regulate to protect drinking water, health, and Pennsylvania.

- The Marcellus Shale provides the nation with an opportunity to completely rid itself of its dependence on foreign oil. Pennsylvania will be able to export natural gas in three to five years, and it could support the entire country's total demand for natural gas for 20 years. Added to other shales, it could last many more years, maybe up to 100.

- HF is a vital technology for domestic energy production and has been for 60 years. Range Resources is not a stranger to Pennsylvania. Employees and their families live here. Safety and transparency are the core values of a growing base of 400 Pennsylvania employees and subcontractors. EPA is working with a host of stakeholders and experts and several decades of data. The commenter has seen hundreds of wells safely use HF. HF has been performed more than a million times, and it has been and can continue to be safe and in balance with the environment. EPA should work with other groups to responsibility develop the nation's clean-burning supply of natural gas.

- There was an explosion in Clearfield where 30,000 gallons HF fluid escaped containment and nothing was done. EPA said it was a "serious incident."

- "First, do no harm" is an oath that reminds doctors and nurses that they have an obligation to weigh the consequences of their actions. Landowners have a responsibility to do no harm to the habitat they call home. A seismic testing center approached the commenter and told her that they would be entering her property without her consent. They said they were doing research. Now she has a constant pit in her stomach – she feels helpless and at the mercy of big business. The PDEP advised her to cooperate with the drillers and not go against their demands. The responses are all the same: "There's nothing you can do about it." "That's the way the laws are in Pennsylvania."

- Is having our drinking water tainted for weeks without our knowledge okay? Is having a Water Buffalo for your water supply an acceptable way of living? Is it okay to have your land devalued? Is the phrase "prove it" an acceptable response? Are millions of gallons of chemicals put into the earth acceptable to future generations who will have to deal with the results?

- A father, businessman, geologist, and fisherman is proud of working for the natural gas industry. His company supplies cutting edge technology to the clients that can meet and exceed the best environmental management practices and very strict regulations in Pennsylvania. Natural gas will flourish in an environmentally sound manner.

- A natural gas company, their partners, and others have all opened additional offices and hired more employees. Before hydraulic fracturing in the Marcellus, the industry in Pennsylvania was facing layoffs and closures.

- There is a high level of industry scrutiny and oversight in Pennsylvania. There are best management practices developed specifically for natural gas in the Marcellus Shale that have pushed this industry to the forefront of sustainable development. Children should be able to enjoy the natural resources in Pennsylvania. The gas industry is helping to provide the sustainable energy our nation deserves. Drilling practices are protective of human health and the environment while providing clean energy for our nation.

- A citizen presented two documents to the EPA. One is from February 28, 1989, signed by the EPA Administrator. It recognizes the fact that abandoned wells can act as conduits for the upward migration of toxic substances. The Marcellus Shale is not a solid monolithic layer of shale with no variations. Second, there is an 1888 newspaper article that says "Every man has an oil well in his backyard." It is an exaggeration, but it shows the drilling activities of the past. The citizen challenged the EPA to try and find a map that identifies these locations so our surface water and drinking water can be protected from HF.

- A citizen expressed concern about HF, water and air pollution, and highways. There are illegal signs on the highways saying "Roadwork ahead." There are laws in Pennsylvania governing signs on construction sites. These roads need to be put in right. The commenter would like to meet with the Pennsylvania Department of Transportation (PennDOT) and other industries concerned. Drilling companies don't answer their phones.

- A citizen was looking for steady work and recently found a good-paying job with a drilling company due to the growth of the Marcellus Shale natural gas industry. She's concerned too but knows her company always does the right thing. If you endanger jobs, other people won't have the same opportunity. Natural gas can provide 200,000 jobs—industry is helping people get back to work. For every $1 into the state from the Marcellus Shale, $1.90 in economic output is generated.

- The first natural gas well in West Virginia was surveyed in 1760, by George Washington. Fracturing has been used in West Virginia for over 60 years. EPA's 2004 CBM study and GWPC's 2008 study in the Marcellus Shale concluded that there is no problem or contamination from HF. In 2007, the West Virginia DEP conducted a 2-year study on HF for CBM in horizontal wells. All the water wells within 1,000 feet of a leg were tested for baseline and after fracking. Results found high levels of contamination from fecal coliform before and after fracking. A large amount of money has been spent to prove that industry does not cause any ground water contamination.

- Here is a list of incidents. July 2008: A site in Wyoming had benzene 1,500 times the limit. 2009: 8,000 gallons of fluids spilled from a Cabot site near Dimock, Pennsylvania, seeped into a creek, and killed fish. 2010: The Tioga County, Pennsylvania Department of Agriculture enforced a cattle quarantine after the cattle had contact with drilling wastewater. 2010: Cabot was ordered to close an earthen pit with tears and holes. February, 2008: There was a leak from a waste pit in Parachute, Colorado, and 1.6 million gallons of used fracturing fluid were able to reach the Colorado River. 2007: A Utah storage pit leaked 1,200 gallons of fluid. Eight days later, there were foaming agents in the Green River. 2008: In Susquehanna County, West Virginia, 800 gallons of diesel fuel powering a natural gas rig leaked 350 feet from a wetland. 2010: A blowout in a Clearfield County, Pennsylvania well lasted for 16 hours. The well operator cut corners and caused this blowout, shooting fluids into the air. 2010: A Texas natural gas line erupted after utility workers accidentally hit it while digging. There are many more incidents like these, and EPA should look into them.

- An employee of the Pennsylvania gas industry is from Tennessee, but he spends his paycheck in Pennsylvania. His family lives here as well, and they keep their money in Pennsylvania too. A great effort has been made to expand the workforce in Pennsylvania. Five miles from here is a training location, which trained over 100 students this year. They all have jobs in the Marcellus Shale right now making $60,000 per year. This money is not going back down south.

- A local business owner works with drilling companies. Most of the advisory/tech-side people he sees are from Texas because they know the business and have more experience, but 60% of the rig crew are from the tri-state area. However, local people deliver ice and water and provide other services. The opportunities are there from an economic standpoint. He supports the study and wants benchmark data.

- EPA should look avoid many of the lies that surround hydraulic fracturing. In Western New York State, a school in Chautauqua County has had gas wells on their properties for years. In towns, villages, and cities, many wells have been fracked safely and productively. Concerns about water withdrawals are very good. But where is the concern about the 35 million gallons that leaks from the New York City water system every day, without that problem being solved?

- We have heard and seen much about lighting water on fire. Methane migration has occurred from drilling, but it also occurs in nature—maybe if the Pilgrims and the Native Americans had possessed lighters, they could have lit their water on fire too. China has just passed the United States as the number one consumer of energy. Where would the United States be without the Marcellus Shale and other sources of energy?

- We have heard a lot about industry best practices. A gas company bought an abandoned pond on a citizen's neighbor's land. PDEP approved it, but drilling waste would have ended up in public water unless the commenter had alerted them to leakage. This case does not attest to strong regulation from the PDEP. This is in the second best watershed in Pennsylvania. PDEP also gave waivers to a drilling company to move a drilling pad closer to within 30 feet of a surface water source for no other reason besides convenience. This is hard to reconcile with the "best practices" or "well regulated" image the industry tries to project.

- A citizen living in a residential area was shocked to learn that that Atlas Chemical was drilling on her land. The area has clean air and no water problems. For the gas companies, it's all about money. Residents don't want pollution in the air, and they don't want the water affected. They don't want animals dying. Citizens should have some rights, not just the drilling companies. They don't want this in their backyards.

- A citizen, who has been a petroleum engineer since 1965 and who is also an environmentalist, doesn't understand why drilling concerns and environmental protection can't coexist. The shale is terrific and has a 300-year supply of natural gas that could make the country energy independent, but it has to be done right. The jobs are needed and the shale can provide the jobs. The citizen wants to see people return home and raise families in Pennsylvania. The citizen is also a representative of the Lakota community and a Sundancer.

- A citizen has been reading in the paper what his town council members are doing, but when people attend meetings there is silence on the issue. The problem is secrecy. Drilling locations are not disclosed because they're on private property. No one can find out what is going on in the industry.

- Natural gas drilling in the Marcellus Shale gives citizens a sense of urgency. Everyone has a stake since everyone drinks water.

- EPA should proceed with the precautionary principle and not let short-term economic motives be the driving factor when citizens will be paying more in the long run. Ultimately HF could cost a lot more, and cause more suffering, than the benefits drilling brings to Pennsylvania.

- HF is a time-tested method across Pennsylvania and the world. In Pennsylvania alone, fracking of wells has been standard for over 50 years and 10,000 wells.

- Whatever comes out of this study needs to be based on fact, not emotion. The local economy has grown with drilling. Businesses grow, local restaurants hire new waitresses, and hotels hire staff too. The natural gas industry is responsible for the creation of thousands of jobs locally and 2.4 million jobs in support services nationwide. A temporary halt would result in significant job loss. A 2009 study determined that if HF is prohibited for 3 years, 1.8 million jobs would be lost. EPA should consider all information before moving forward.

EPA's Hydraulic Fracturing Study

Comments from the public regarding the scope and content of EPA's study are as follows:

- The reasons for supporting the Congressional request for this study are many. Recent incidents in the state raise the question of whether the necessary steps have been taken to protect Pennsylvania families and communities against the detrimental side effects of drilling.

- A key approach for the study must be to characterize the constituents that are used. PDEP's Bureau of Oil and Gas Management released a list of chemicals that are used in the hydraulic fracturing process. Since it was posted labs have received calls to test for these chemicals. From a technical standpoint, however, many of the chemicals have no approved analytical method. Significant method development is needed in order for testing results to be legally defensible. Also, there are no risk criteria for the chemicals with which to compare the resulting data. EPA should create a subset list of chemicals (for example, indicator compounds only present in ground water compromised by HF or flowback water). These indicator chemicals would ideally have risk data associated with them. EPA should involve commercial labs in the process of developing a list of indicator chemicals.

- The Center for Healthy Environments and Communities is doing research into public health impacts of natural gas operations in the Marcellus Shale. Research includes a

literature review and compiling the experiences of citizens to examine both quality of life and health issues.

- There is a need for additional study of the movement of dense brine and the fracking fluids and chemicals through porous underground formations. Industry says HF has been done for 60 years. But not in the Marcellus Shale. Scientific evidence says that fluids left after hydraulic fracturing can move through subsurface layers into underground sources of drinking water and surface water. This poses a public health hazard for water wells, especially private water wells which are currently unregulated water sources in Pennsylvania.

- The Marcellus Shale is linked to an increase in radon gas in homes above the shale. Does increased disturbance from drilling provide more opportunity for radon migration into homes?

- Another item of concern is the integrity of well casings over a period of time.

- A great concern is the chemicals used in HF. They are highly toxic and cancer causing. Many are known, but some are proprietary.

- A greater concern is the movement of fluid into groundwater. The fluids go into the aquifer and poison the water. In EPA's 2004 study, migration was shown to be unpredictable and occur over greater distances than expected. Many health problems such as heart, kidney, brain, and blood damage arise through prolonged or repeated exposure. Chemicals are injected in the ground, they are transported, and frack water is stored in open pits. If what is injected is alarming, these pits have dangerous amounts of contaminants.

- ABS Materials has won prizes and grants for their work in environmental remediation. They have developed a nano-glass water treatment system. This year, they have a trailer-mounted system and are working with Clinton Formation produced waters in Ohio. The system can treat up to 100 gallons per minute. The system captures greater than 99% of volatile organic compounds (VOCs), including agents added to produced water from stimulation operations. In the study, EPA should consider emerging technologies such as this for recycling produced water and fracking fluids.

- EPA should not lose sight of the major amount of withdrawals from the headwater streams that the residents of south Upshur County, West Virginia rely on daily. Residents adapt when the streams flow low, but when withdrawals take away the water residents rely on, there is a direct impact on how they can live without a public water supply. The headwaters are especially fragile and last summer they were pumped dry. There are stream gauges in West Virginia, but the gauges for this water source are in another watershed in a larger portion of the river. So even if industry was attuned to recommendations, they could be seeing that they could take water according to the gauges downstream. EPA should not overlook the withdrawal volume as an impact of HF.

- All the chemicals used in fracking should be included in pre- and post-drilling testing.

- EPA should also look into casing standards and the air effects of open ponds. Containment ponds are allowing leaks.

- Wastewater treatment and disposal is another concern. Total dissolved solids (TDS) levels are high and plants are unable to treat this. Wastewater treatment plants cannot deal with fracking chemicals. Families' health and safety are at risk.

- Millions of gallons of water are used at each well, and thousands of wells are being drilled. This means billions of gallons are removed from the surface water budget to drill these wells, and half a percent of a billion gallons is still a very large volume of chemicals that are subject to accidental release and ultimate inclusion in ground water. Much of the produced water is going to storage ponds that leak and overflow. The contents flow to ground water. EPA should look at what happens to that water. Accidents should be expected and EPA should look for them.

- Problems have been encountered. We still know very little about the hydraulic fracturing process. We need to understand the whole process from start to finish.

- EPA should keep the study properly focused on the Congressional mandate: the relationship between HF and drinking water. EPA has a better chance of completing the study if it is properly focused. EPA should not waste time and resources on topics that are outside the scope. The technical workshops that will be held this fall will provide an appropriate scientific grounding. The surface management of fluid could be an expert workshop topic.

- The subsurface is alive with microorganisms. The 2004 EPA study on coalbed methane (CBM) and a 1983 study at Allegheny College identified 11 possible sources of contamination from HF, including: slush pits, surface discharge during fracturing or servicing, road application of brine, natural fractures, faulty bottom seals, movement from strata producing brines or natural gas, lateral or upward movement through permeable strata, movement directly into shallow aquifers where a surface casing is of insufficient depth, and through leaks in surface casing.

- Roadside application of brine is going on in this state and is a possible source of contamination. Considering that five million gallons of water are needed for each well, it's not surprising that landowners have reported contamination and a lack of water pressure. Future concerns include the water stress of withdrawals, residual microbe activities, and high TDS released to surface water after "treatment."

- There is substantial public concern about HF. A comprehensive review will confirm that sound application of this technology, following risk-based decision-making principles, will confirm that there is no risk to public health or the environment. The American Petroleum Institute (API) has guidance documents with a written framework, developed with a comprehensive risk-based approach. They are available at http://api.org.

- For priorities, the study should not be focused too narrowly on one part of the water cycle. The study should be expanded to include all aspects of the water cycle. It also needs to include the impact on air, the land, and biodiversity. As for gaps, in

Westmoreland County, there are stories of neighbor against neighbor and community against community. In the cast of Pittsburgh, the city council supported a moratorium. Allegheny County is considering the same, like New York State. We're now seeing city, county, and statewide concerns cut across all aspects of the Marcellus Shale. EPA should leverage their position as a national arbiter of environmental concerns. For data: EPA has heard plenty of people here tonight. A fifth question is: what should EPA be doing now?

- Study criteria should include the management of wastewater and residuals (with regard to Table 1 in the feedback document regarding stakeholder input that EPA distributed). There are no UIC wells in Pennsylvania, so that is not an option for storage here. Will it be possible to dilute the wastewater to a safe concentration?

- EPA should look at the effect of recycling on frack water —since there are more chemicals added each time, does the water get more concentrated as more chemicals are added with each cycle? Also, what is the effect on pH?

- The case studies should include areas with underground coal mines, which are especially sensitive.

- Environmental laws are human health laws foremost and utmost. EPA needs a conceptual site model that includes all potential vectors for chemicals in and out. There are already cattle, deer, and fish advisories due to pollution. EPA needs to consider every way for human health to be affected, through inhalation, etc. Also, consider developing causal models that people can use to protect themselves. Currently, in Pennsylvania, if you are more than 1,000 feet from a wellhead it is up to you to prove that the wellhead was the cause of harm. It is unacceptable for people to be on their own to prove contamination.

- EPA should study Pennsylvania because it has a high rural population and more drinking water wells than almost any other state. EPA needs to be here and help Pennsylvanians fight what is happening in these communities.

- There is already 150 years of oil, gas, and coal extraction in this state—how might these underground activities affect newer activities? This is a knowledge gap. EPA should consider well casing, and the toxicity of mixtures, not just individual compounds. Also, seasonal variations in flow.

- EPA should do as thorough a job as possible. As for the scope, don't act too narrowly, don't just look at the fracturing moment. Look at the whole process of extraction from these deep gas shales. If there is a problem with cementing or casing, that would have environmental or public health impacts. If there is a problem with the frack pit, that will also have impacts. And the wastewater that is generated, that will have impacts.

- As for potential case studies, there have been a lot of options presented at the meeting tonight. But there are not just individual cases, there are also PDEP records. The 2010 records show that one in seven wells drilled into the Marcellus Shale had violations, like improper casing or cementing, disposal, or frack pit violations such as leakage or improper construction. There are over 150 examples of leaking frack pits or otherwise compromised frack pits. These need to be investigated by EPA.

- For a case study – there are one million wells nationwide, and a huge data source in the records of state agencies. EPA should review those files and any related complaints, and how the state investigated them. EPA should look at surface or leakage complaints too and compare surface complaints to impacts on surface sources. Many of these complaints address different sources of contamination like traffic accidents, industrial discharges, or household releases.

- It is good that EPA is considering the entire hydraulic fracturing lifecycle. The study must include identifying the makeup of the frack fluids, so they can be tested for. Look at a variety of frack jobs, the storage of chemicals before and after use, migration to water sources, seasonal ground water differences and the impact on migration, timelines on how chemicals may move, where fracking fluids and other wastes are disposed, impacts of disposal decisions, transportation of frack water offsite, well casing failures, recycling opportunities, and worst case scenarios.

- People have multiple sources of drinking water, so it is good that EPA plans to examine sources of drinking water for rural and urban uses. EPA should also study cumulative impacts. There are thousands of permits in the Marcellus Shale. The study needs to go on for a number of years.

- There is considerable information available to EPA on the League of Women Voters Web site. Here are some questions to extend the scope of the study: What is the cumulative impact of withdrawals? Will there be specific standards and oversight of casing and storage pits? How will wastewater be comprehensively tested and treatment implemented? What regulations must be established to address abandoned and orphaned wells? The EPA presence on this issue is encouraging. HF is an unnecessary waste of other irreplaceable resources. Timely answers are expected.

- Industry should be required to maintain a desalination facility onsite—portable systems are available—because when water leaves the site, salinity is a big issue. Industry should be subject to additional transparency. House Resolution 3534 would require disclosure. EPA should also address frack water on the surface.

- Stakeholders on all fronts—urban, suburban, and rural—are all affected by HF because they are interconnected. EPA needs to consider the effect on all environments and look beyond the ideal case. Maybe there are no negative consequences in the ideal case, but in the real world the ideal case is never the case. What if something like Clearville happens again? What will happen when people get cancer from poisoned water? This study should be executed with respect to the scientific process. EPA should remember the study's aim is to protect people, not just trees and wallets. EPA should do the study clean, do it well, and put a moratorium in place until the study is done, if not permanently.

- The chemicals used in HF need to be identified in order to determine if ground water or surface water has been impacted. Whether MSDSs are supplied should not be the focus. Analytical methods do not exist for many of these chemicals. Also, combinations of chemicals with variations in concentrations complicate things. Quartz and cristobalite are red herrings. Instead, EPA should focus on identifying a narrow series of identifying markers to assure the cleanliness of drinking water sources and identify contamination.

EPA could develop an analyte list for substances with indicators that are ubiquitous indicators of the HF process, that are detectible at the parts per million (ppm) or parts per billion (ppb) level, and are able to be transported over long distances.

- The study must be extensive to include all aspects of deep well gas extraction and guide regulatory efforts to ensure drinking water is safe. EPA should not just focus on the action of HF, but the larger process of natural gas extraction and development. Risk of ground and surface water contamination occurs not just at the moment of fracturing but during the whole process. EPA should expand the scope of the study to include the entire lifecycle. Track all potential pollution pathways: flowback, casings, and impoundments. Produced and flowback water should also be looked at. There are examples here in Pennsylvania: for example, PDEP ordered a halt to drilling in Dimock.

- The study should include cumulative impacts, including consumption, disposal, air, waste management, and roads and development in residential areas. One company spilled 8,000 gallons of drilling fluids. Cumulative impacts need to be examined. New roads and well pads will be needed for gas extraction, some in high-density residential areas. Any drilling must protect public health, drinking water sources, and our rich natural heritage. If the natural gas industry won't do this of their own accord, the responsibility falls to the local, state, and federal government and the study should respect this sentiment.

- This study is akin to investigating the flammability of Rome while it burns. The impacts are real, and the process is not safe. However, the question asked is, "Will Rome burn?" Some people are content with the obvious answer, but others need a detailed peer-reviewed study of all the combustion processes in the wood. The conceptual model is good, but results should be available now, not in 2012. EPA should take one month to summarize the available evidence. The risks to public health are unacceptably high. We need a moratorium until it's proven that it HF is done safely. Then EPA can carry out the detailed work they are planning – it looks great. EPA should expand the study beyond drinking water to include food security, wildlife, and air quality, since most used compounds are volatile.

- The study should involve all stakeholders, including industry and state regulators.

- EPA should truthfully, honestly, and objectively assess the failures and successes of HF in the United States over the last 50 years. EPA has databases of successful projects. A company has actually used HF to solve environmental problems. They were essentially ordered to frack a contaminated aquifer to facilitate its remediation. The success of this project is described on EPA's Web site. One HF well pad permits the elimination of 35 conventionally-installed wells.

- A citizen expressed concern about karst. EPA studies have identified karst aquifers as sensitive, high risk aquifers that don't lend themselves to standard risk assessments Contamination happens fast and spreads far, and it's very difficult to remedy. Marcellus Shale drilling in karst presents special, immediate, long-lasting dangers. It's hard to respond to contain damage or alert people. Town commissions have little to no authority to put standards in place. EPA should consider karst and other highly sensitive aquifers, for example in Monroe County, West Virginia.

- This is not mentioned in the study scope: Who's going to investigate the financial shenanigans, like when a shell company is the owner of a rig and when something goes wrong, there are no assets, and they can't pay for the damage?

- The research process itself might unintentionally subject communities to impacts. There needs to be continuous monitoring throughout the research process.

- An objective, peer-reviewed, and science-based study from EPA will reach the conclusion reached by other studies, including the 2004 Clinton-era EPA report. It found no evidence of a threat to drinking water, even though that study examined shallow CBM fracking. That type of fracturing occurs closer to the water table.

- EPA should look at the drilling program in Dallas/Fort Worth; it's more mature than in this area. Look for any systemic issues with HF or risk to people. EPA should be objective – it's important for the study that EPA has the credibility of objectivity and fairness.

- The study must be a transparent, comprehensive assessment and include public health issues, air and water, social and economic costs, deforestation, land clearing, traffic, processing, pipelines, and associated infrastructure. The effects of a pipeline should also be examined as part of the necessary gas infrastructure. EPA should weigh this against a net energy gain instead of the current oil and gas speculation that is masquerading as scientific research.

- In the 2004 study, EPA said the process was safe and didn't warrant further study because there was no risk. Today, EPA started this meeting saying, "We want answers from you," but doesn't the American public pay you to tell us what to do?

- There needs to be a method to acoustically confirm that the casing integrity is okay. And the chemicals – let's do some forensics on the chemicals. Many are already common in southeastern Pennsylvania.

- The study needs to examine all the risks and benefits from a wide perspective. EPA should find a way to identify water resources contaminated by frack water versus other contaminants, such as acid mine drainage. Also, EPA should look into the feasibility of using acid mine drainage for fracking, and the toxicity and dose levels of chemicals.

- EPA should look at the containment ponds on the surface and their effect on surface water pollution. EPA should look at the overall cumulative effects on water resources: a cradle-to-grave scenario, water source to produced wastewater.

- An ounce of prevention is worth a pound of cure. PDEP is permitting drilling on a three-story construction demolition landfill that is 15 years old. It has methane-producing tree stumps, all sorts of nasty road debris, concrete, and rebar. Citizens are concerned because even PDEP made a comment about the stability of the well site, but it got permitted anyway. Over the long term with these wells, they use millions of gallons of water. EPA should do the math.

- The study must be balanced, using facts and scientific analysis. West Virginia DEP and other states will also tell you that there is no incidence of cross-contamination.

- The results of the study need to be based on fact, not emotion. The Science Advisory Board should make sure that it is objective and takes into account the positive impact of industry on the economy. The study needs to have participation from industry and states with experience, including state-level regulators that have been involved with developing and implementing state regulations for years.

- In areas where a company is currently drilling, the Marcellus Shale is 6,000 to 8,000 feet below the surface. Most drinking water sources are at 500 feet or less. In this area, microseismic testing was done on eight wells. Microseismic lets you look at the zone of impact and provides a 3D picture of it. It revealed no zones of impact shallower than 5,300 feet, certainly deeper than drinking water. The public will welcome all studies based on fact and science. EPA should consider studies like this one that uses microseismic techniques to confirm there is no impact.

- EPA should identify other sources of TDS, as well as address contamination from pharmaceutical byproducts that are not a result of drilling.

- Currently, EPA tests for HF chemicals individually despite the evidence that the greatest danger is in combinations of chemicals. EPA needs to study the long term, synergistic effects of fracking chemicals (it takes 15 to 20 years to develop cancer) and evaluate them on the basis of peer-reviewed, independent research.

- The highest priorities for this study should relate to the preservation of human health and the environment, and the elimination of either direct or indirect environmental exposure of these contaminants through food.

- A gap is the chemicals in the fracking process. There are something like 596 or 597 chemicals, and industry has only released the names of 39. Many of these chemicals could be carcinogens or hormone disruptors. It is essential to know their identities, their effects, and their offspring and combinants. EPA must describe multiple routes of exposure. EPA must consider them in combination as well as alone. Exposure without consent would be considered criminal. No evidence of ill effect is not the same as evidence of no effect.

- For case studies, how can people in the suburbs help EPA? If there is a project going on in a township, people would not know about it unless they saw the equipment. EPA should develop a database so citizens can access the locations of HF projects. Citizens should be able to enter their addresses and see the projects within a certain radius of their water supply, which companies are responsible, and how air quality might be affected.

- EPA should consider Columbia University's study on Hancock, New York.

- Every case of suspected contamination should be investigated. There should be a panel to investigate every bad situation. HF started in 1948, in Wyoming, and there weren't any problems there. Industry has replaced the old method of using acidation.

- There are many impacts of climate change already in the northeastern part of the United States. EPA should take that into account, including the variability of the weather on the hydrologic cycle, and how flooding and drought might change the probability of contamination. It's a difficult aspect of the science – the effects of climate change include extremely variable weather patterns. The quantity and redistribution of water in ecosystems and the effect of contamination on the hydrologic system should also be considered. Right now, there is one technology. Maybe more safe and effective methods can be developed.

- EPA needs to get companies to open up on the fracking chemicals. This might help researchers figure out what is going on, including the long-term effects due to things like endocrine disruptors. However, what is injected into the well is not the same as what comes back up. EPA might consider comparing the two fluids. Companies have been holding back, but there might be some important discovery or reaction here.

- Science is not done in the absence of emotion. Emotion involves insight and intuition, and that's very important. It propels people and what they work on, and what they discover – cold, hard facts are not all there is.

- From the perspective of environmental risk assessments, there are a few areas lacking in the study. There are three components of risk analysis. Exposure assessment is key—that's a gap. EPA should look at the chemicals separately as well as the mixtures, the chemical cocktails. They have different effects. For risk assessments, EPA should not only look at the chemicals or fracking fluids but at the whole process of fracturing. Risk management has the most influence and makes the biggest difference. EPA should consider alternative practices and technologies. There is the possibility to develop the economy here, as a secondary industry. EPA should also consider local capacity initiatives, establishing baselines, pre- and post-drilling testing, and the creation of facilities for produced water so it is not pumped back into drinking water sources. Risk communication is the most neglected aspect. There needs to be better communication between industry, citizens, and EPA. Nobody in the Washington, D.C. area was aware of this event.

- EPA should do the study in the Pittsburg area. Partially treated wastewater is being dumped in drinking water.

- What about the people and families who are not aware of the contamination? Are the cement well casings staying in place? Can the casings withstand the pressure of fracturing? Is porous cement allowing transport? PDEP should help families inform themselves.

- A broad, comprehensive, rigorous study is clearly needed given the changes in industry practices and scope in recent years. Another reason is the vast number of exemptions industry enjoys from seven major federal environmental laws. The Congressional mandate is broad, and EPA should consider many aspects including the availability, usage, and effectiveness of non-toxic chemicals; the full lifecycle of chemicals; airborne contamination effects; spills, leakage, and loss of containment; and a comprehensive analysis of all of the chemicals utilized. EPA should consider looking at southwestern

Pennsylvania, the rest of the state, and Ohio and West Virginia. Impacts of HF are already evident. These impacts can be seen in watersheds that supply water for millions of people, and have vital agricultural and forest land.

- There is a vast amount of citizen-gathered information from people who have HF in their backyards. This must be part of the study. HF is decades old, but horizontal wells are a new approach. They must also be studied. The Web site http://www.earthworksaction.org has more information.

- People need to know about the chemicals, the drilling process, the fracking process, and also about the millions of gallons that are pushed through the shale with chemicals.

- For historical reference, EPA should visit sites with successful HF operations. Impacts do not occur from responsible fracking operations. Some gas wells from 30 years ago are still in production and they provide viable resources for the community.

- Brine water is being deposited at a wastewater treatment plant. Operators are not aware of all of the chemicals used and produced in drilling processes before the water is released back for human consumption. How safe is the water released back for consumer use? People don't know what chemicals to test for.

- EPA should ensure fair practice: results must be based on facts, not emotions.

- HF is extremely dangerous to people and the environment and has been allowed with little or no public health notification or awareness of the hazards. EPA should complete this study in a quick and effective way.

- EPA asked for case studies: EPA should investigate the historically fracked wells, which are shallower than the ones in the Marcellus Shale. EPA could see if there are any water impacts associated with those wells.

- A former water supervisor of a community in New York spent four years researching the potential impacts of drilling on Chautauqua Creek and the community water supply. Specifically, he evaluated soil erosion, the use and disposal of fracking fluids, contaminant flow pathways, the identification of surficial bedrock fractures, and the ability of treatment to remove high TDS and chloride. He developed a source water protection plan for the community.

- Why did EPA choose Southpointe in Canonsburg with Range Resources down the hill, the mansions and golf courses, and all of the corporate headquarters? The industry representatives were snickering at the people who came here. They have contributed millions of dollars to lobby officials, and the Governor runs the PDEP. He calls himself the best ally of the industry.

- Why isn't this a closed system? If industry is going to use water, they should recycle the water, and use it again. If they are going to have frack ponds, people enclose tennis courts, so why can't industry enclose the ponds and tanks? A closed system should be used.

- When water is returned to the surface, how is it dealt with? Once water leaves the wellhead it is extremely difficult to regulate and oversee, especially when industry has contracted to other sources.

- PDEP published a list of 83 chemicals in June. There are cancer-causing agents on this list, and most of the levels they are found at are ppm or ppb. A ppb is one inch in 16,000 miles – and the limit for most of these chemicals is 1 ppb. How much is a gallon going to pollute? All citizens are entitled to life, liberty, and property. The government has not done due diligence in researching the effects. If a person is knowingly poisoning the environment, a citizen has the right to address that issue and the government should stand behind them.

Regulating Hydraulic Fracturing

Comments from the public regarding regulation of hydraulic fracturing activities are as follows:

- Pennsylvanians already bear the burden of some environmental legacies, created in previous generations when federal regulations that promoted responsible development did not exist. It is important to protect the health and safety of Pennsylvanians as we further develop the Marcellus Shale. The Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 1215, would require that HF be regulated under the Safe Drinking Water Act (SDWA). HF involves the use of sometimes toxic chemicals that are injected underground, often in close proximity to underground sources of drinking water.

- The federal government must not be allowed to over-regulate the industry to the point where regulations would kill jobs in southwestern Pennsylvania.

- PDEP has done a good job regulating up to this point.

- Pennsylvania needs stronger regulations, probably a moratorium like in New York State.

- HF is dangerous to public health and property values. If this is safe or acceptable, why did Congress and the federal government and EPA accept that this industry is exempt from the Clean Air Act (CAA) and SDWA?

- We lack regulation because the local and state government lacks knowledge. There should be a moratorium until an objective study is performed.

- EPA should be instrumental in lifting the exemptions from CAA and Clean Water Act (CWA).

- Financial wealth overrides health and the environment concerns, and pollution does not recognize boundaries. Even if the industry is correct in telling concerned citizens that there is no hazard and all chemicals have MSDSs, very few of the chemicals have Chemical Abstracts Service (CAS) registry numbers listed. This should be required. Manufacturers have too much power because they can determine what is revealed, and often do not reveal much, they state that the chemicals are proprietary. They claim the HF chemical mixture is salt, and that they use it to melt snow. Millions of gallons are used – complete records are needed for each well with the exact and complete formulations of

all stages and disposal methods. Pennsylvania is happy to collect money for permits with little more than company assurance of safety. There needs to be federal regulation and accountability. EPA should be concerned for the generations to come.

- EPA must indeed scrutinize and regulate this whole process to a greater extent. Umberto Eco wrote about the "believing game" and the "doubting game." Industry argues that there are no documented cases of HF directly contaminating ground water. Pennsylvanians' experience suggests this can't possibly be true. The doubting game is easy: commenters tonight have described how they lost their water supply or how their supply was contaminated. Spills have killed aquatic life. Towns and local governments are powerless to control or influence the extraction of natural gas. People cannot depend on the industry to choose protection of the environment over profits. Corporations have no conscience. EPA must give them that conscience.

- The chemicals need to be disclosed and the Halliburton Loophole needs to be closed. The safety of Pennsylvania's water supply should not have to rely on the luck or public relations talents of the oil and gas companies.

- Natural gas extracted from Marcellus Shale is a finite, carbon-based, energy resource and its production significantly affects the environment and the economy of the Commonwealth. Government policies should promote an environment beneficial to life through the protection and wise management of natural resources in the public interest. Pennsylvania needs an equitable and flexible revenue system for funding state and local government services. In concert with the Pennsylvania Constitution, Article 1, Section 27, "The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."

- No one has mentioned the devastation of archeological and historical sites: they are under attack. The greatest threat is development. Oil and gas companies are putting these sites at risk. Section 106 of the National Historic Preservation Act takes into consideration the effect of development. These sites are no different from wetlands or other resources. These are the most human of all the resources the Commonwealth possesses. Industry is not following the laws. Sites have been damaged or destroyed. There are laws protecting these sites in Pennsylvania—federal laws and state laws. Federal laws are also being broken regarding the protection of Indian burial lands and other sites. If these laws are being broken, who has been held accountable?

- What kind of a government oversight body, the U.S. Congress or EPA, that would even consider proposals from industry that require exemptions from CWA, CAA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – more commonly known as Superfund, the Resource Conservation and Recovery Act (RCRA), and SDWA? In addition, industry is exempt from the public's right to know. Companies can withhold information. Having a list of HF chemicals in the water is not the same as knowing the volumes, concentrations, amounts, and risks that these chemicals bring to millions of gallons of frack fluid. No amount of tweaking regulations

can reconcile the immediate and long-term danger to health and the environment. HF should be banned. Pennsylvania needs to move forward with wind, solar, geothermal, and other truly clean renewable technologies, as well as serious energy conservation. There are thousands of green energy jobs for Pennsylvania if we are serious about a green energy future. We should not be moving environmentally backwards and creating further environmental disasters for our children.

- The FRAC act in Congress brought forth by Senator Casey—some state legislators don't want that to go through, doesn't want EPA to oversee what PDEP is doing. PDEP is a failure in Pennsylvania.

- EPA should get local oversight in there. In addition to the Halliburton Loophole, industry is also exempt from the 1974 SDWA. Why should it be? It shouldn't be. EPA should get rid of the exemptions and get us back to the United States we love and would like to live in instead of dying from poisons in.

- People have lost water and cattle. Who is to blame? It's simple: follow the money. PDEP hasn't done their job. Federal regulations are needed to police HF from cradle to grave. Did we have problems before HF? Companies are dumping advanced waste up in New Castle in Beaver County. TDS levels are very high because of the dumping, so people added chlorine, and then chloramines. They sent letters out about the chloramines, warning people on dialysis to consult their doctors, and telling people not to put the water in fish tanks. This isn't the type of gas wells that are usually drilled – these are high pressure triples. Everything here is big, with intermingling and connecting layers. It's very easy to find out what needs to be done: follow the money. Why isn't PDEP, the Governor, or the Attorney General coming to talk to these folks? We need EPA's federal regulation.

- It is the mission of EPA to protect human health and safeguard the natural environment—air, water, and land. Current practices in the HF process are affecting our air, land, and especially water. Southwestern Pennsylvania is a water-rich area but it cannot sustain the volume of water withdrawals needed from frack wells for very long. The state and local governments are not properly regulating or enforcing current regulations. They often cite the economic upside as justification. EPA needs to stay true to its mission and evaluate the environmental effects regardless of economics. The environment must be protected through regulations as industry will not self-regulate properly and they will always put economics first. There can be no economic justification for the environment. HF needs to be regulated, including issuing a moratorium until proper safeguards are in place. To allow the process to continue unchecked during the research can only result in a failure of your mission, our environment, and our future. The economics of that situation are clearly unaffordable.

- EPA must oversee HF. Industry claims there have been 60 years of HF with no contamination.

- EPA should be examining if HF needs federal oversight.

- The highest priority of EPA should be an economic impact study on consumers of more regulations. It's unfair for EPA to sponsor and propose regulations without an economic impact study, increasing the cost of products from over-regulation. It's unfair to send jobs overseas by over-regulation, which benefits big corporations and foreign corporations, increasing the cost to drill and deliver products. EPA needs to justify more regulations. The Commonwealth already has the PDEP. Regulations kill jobs and tax the poorest among us with higher prices. Over-regulation is unfair to consumers – why did the so-called servants of the people speak first tonight? Regulations are political, not necessary safeguards. Why is Pennsylvania begging for more federal regulation, when the people should be begging PDEP to do its job instead?

- PDEP states that if operators in the Marcellus Shale follow the rather strict rules, there is no danger to water. It would seem that there are enough regulations already. The existing regulations need to be more strictly enforced.

- The federal government must take full responsibility for the problems of the Marcellus Shale in Pennsylvania. It was the federal government, with Bush and Cheney supporting the Halliburton Loophole that allowed exemptions to CWA, SDWA, CAA, Superfund, RCRA, and the Right to Know Act. The atmosphere in Pennsylvania is like what the Wild West was like: there is no enforcement agency able to control the bandits, or in this case, the industry. The industry is donating money to politicians to prevent further regulations. The people of Pennsylvania are suffering physically, mentally, and socially. EPA should enforce a 5-year moratorium until studies are completed and regulations are in place, there are frack water treatment plants, and technology catches up to industry to make this safe for the people of Pennsylvania.

- Drilling fluids are not solely the responsibility of EPA; Pennsylvania can still make whatever laws it wants.

- For the United States to destroy its resource base of clean water and land for a finite resource is an act of extreme desperation. This speculative Marcellus Shale gas play is a finite gas play. Shale gas is not clean, green, nor sustainable. The United States failed to develop an energy policy. Where has EPA been? EPA has allowed an arrogant oil and gas industry to destroy our water. HF has been ongoing for 6 years in the Marcellus Shale basin and other areas. EPA allowed industry to extract water, pollute it, and dispose of untreated water – there is no treatment solution – into waterways. An immediate moratorium is necessary.

- The country needs an energy policy that has a comprehensive solution to our energy needs. EPA's study should be based on fact, not emotion. Industry is so important to the regional economy and should not be burdened with unnecessary regulations not based on fact. HF should be regulated and held to an extremely high standard so that industry feels that no contamination is acceptable.

- HF should be regulated as strictly as private septic systems. A citizen lives 1,000 feet from a drill site, with a stream in between. This drill site has no obvious runoff controls; it just flows into the creek. There is runoff from hillsides into creeks. There have been changes in the stream plants and animals. People have already fought this battle with

longwall mining. Human are part of the ecosystem and need to keep it in mind. Water is a nonrenewable resource. The quantity is constant, but the quality is not.

- Are the frack ponds scrutinized as much as private septic systems? Does industry need building permits to build the ponds? Is wildlife protected? People aren't. Why does industry do so much work at night if they aren't hiding something?

- We should not let economics decide our environment. This is a large problem the state will deal with for years, and no one knows what's going to happen. Environmental resources are not going anywhere. Policies that fairly treat our resources are necessary.

- HF should be and is well regulated by existing state regulations.

- No one in this commonwealth has given permission to allow EPA and the gas companies to destroy the health and welfare of this state. People have an inalienable right to water sources in their communities. Citizens will not allow regulation that documents destruction and only requires minimal cosmetic remediation on a much more serious problem. Natural gas is not a component of a clean energy future, this is industry propaganda and EPA should be ashamed to repeat it. EPA should work with citizens to secure a moratorium.

- Five million gallons of Pennsylvania's fresh water are used for each well—those numbers are on the low side—and there are no facilities in Pennsylvania that can remove the pollutants. PDEP file reviews show that inadequately treated water was dumped into the Monongahela and Allegheny Rivers, which are home to endangered mussels and other aquatic life. A new study is not necessary. EPA's and PDEP's failure to seek a moratorium is a failure that is putting our lives at risk.

- There is a famous Native American saying that humankind is just one thread in the web of life. The rapid expansion of the natural gas industry is in danger of destroying the air, the water, and the land that supports life. Chemicals are being evaluated after widespread use to see if they are safe, unlike a medical researcher who must demonstrate that a process is safe before it is used. For the chemical companies, the burden of proof is on those who are harmed. EPA should right this iniquity. There needs to be a legal obligation to demonstrate the process and substances are safe for widespread public exposure.

- There is a real and present danger of water contamination. Water protection, not remediation, is of the utmost importance. People who depend on private water supplies must be protected now and in the future. Stringent regulation must be formed in order to address the toxic nature of the fluids and the flowback and fluid disposal.

- All regulatory agencies should make informed, logical decisions based on fact, not rumor, HBO movies, or speculation. EPA should focus on their priorities. Unrelated matters such as the Gulf of Mexico have no bearing on the matters at hand. Rural areas require massive capital investments, but the Marcellus Shale is poised to offer abundant energy where it is needed without lots of long-distance shipping. Energy is not often found where it is needed. This is an evolving industry – a moratorium will stop the

evolution and nothing will be gained. People are afraid that that development will tear across the countryside destroying everything in its path. Nothing is further from the truth. Every industry has a vested interest in protecting the environment. Everyone drinks the water, and people want to continue to work where they live. Companies will protect the environment to avoid undue regulations. Allow this industry to evolve and employment opportunities will abound.

- HF needs thoughtful policies in place. However, there are jobs and the local economy at stake. This is potentially the first good thing to happen to western Pennsylvania since the steel industry left. EPA should keep in mind that jobs and the economy are at stake.

- Key economic and industrial decisions are about to be made, with long-lasting effects. This moment is parallel to the time of Gettysburg, when President Lincoln noted that "the world may little note what we say here today, but not what we do here today." The industry should not be allowed to police itself, especially what happened in the Gulf. More and more documentation is coming forth on the chemical hazards of HF. Water is our most valuable resource, absolutely necessary for the survival of mankind. With HF, there will not be a chance to fix mistakes. Regulations should be strict with no allowances for contamination.

- HF is like driving a car. Some people accomplish it better than others, so we need to set standards.

- EPA's 2004 report described how toxic HF is, but EPA still gave it the stamp of approval. EPA needs to prove people can trust it to look out for their health. EPA should watch the tap water burning. A nearby town had a burning river and people do not want their towns to have that reputation. The corporations do not live in Pennsylvania, they do not have to drink the water or sell their homes here. Polluted ground water will destroy the value of our land. Companies want to be profitable, that makes sense, but everyone drinks water and breathes air. Owners of corporations don't have to try and sell a house or drink the water, so they don't care. The government relies on promises made by corporations when they should be relying on science. It is hard to trust EPA – look at the track record. EPA declared the air safe at the World Trade Center in 2001, and then heroic rescue workers got sick and died. Then EPA didn't know if the dispersant used in the Gulf was toxic, when the package said it was. EPA should regulate this industry.

- There are 526 chemicals put down the well—companies ought to be required to build their own wastewater treatment plants.

- EPA must correct the hydraulic fracturing exemption from SDWA. EPA needs to reach a conclusion that reassures the public, and the Halliburton Loophole must be corrected.

- It is concerning that industry moves forward, exempt from regulations, without the completion of a study. No industry should be exempt from regulations.

- A moratorium is needed until a new, safe method is in place.

- Most workers try to do their job well. But sometimes people don't pay attention to equipment warning signs, and sometimes people get tired or leave repairs for the next shift. Productivity always trumps maintenance. Supervisors are told to run the equipment and defer maintenance—production before maintenance. The workers on the rigs and the pumps are no different. Mistakes and accidents happen. Everyone occasionally drives over the speed limit, we all need rules, and the gas drilling workers need regulations.

- Natural gas in the Marcellus Shale has been there for thousands or millions of years. It can wait a little longer. We need a moratorium until the research is done.

Hydraulic Fracturing – General Comments

General comments from the public regarding hydraulic fracturing are as follows:

- EPA is welcome to come and see the proof of HF contamination in Clearville. Pre-tests showed no contamination, and now there is pollution. There is no camera here like the live camera in the Gulf. The illustration EPA uses does not show the drill bit spewing toxic chemicals. A citizen's pond and streams and a neighbor's water filled with suds after drilling. The industry lies at the expense of the human and environmental health. Livestock and pets died. It was hard for people to know what was going on; the Internet was not available before 1995. People can sign a lease, but when they can't feel their left arms or their lips are twitching—when their water is contaminated, is it worth it? This is at the expense of health, water, and wildlife. Is it worth the cost of drilling?

- There are many consistencies with everybody's concerns. Recently, the Supreme Court essentially granted the luxury of personhood for corporations. Many businesses will abuse this. There are waste trucks around a citizen's home, and no one knows when they go in or out. Daily, trucks are pulling out or putting water into streams. If an individual did this, he would be fined or arrested. Roadways are suffering from traffic they were not built to handle. If an individual did that, he would be liable for repair. Companies are bonded, but it takes too much time to make pay. Repairs take time and money that small townships don't have.

- That idea that the new gas drilling industry is patriotic, job creating, and promoting energy independence, is not true. What is the cost of these jobs? Productive, good paying jobs in noninvasive, safe industries could aid in industry and energy independence. We are blessed in southwestern Pennsylvania with water of the purest kind. We cannot afford to wait for generations to realize the damage we are doing now.

- Ground water starts out as rainfall. It percolates down through soil and permeable rock until it hits some barrier, then flows slowly sideways under the influence of gravity. It may take hundreds of thousands of years to return to the surface, or it may never return naturally. Most aquifers for drinking water are only a few hundred feet deep. Ground water can get contaminated. Many people in the Northeast can no longer use ground water without treatment because of contamination from road deicing salts.

- Technology is crucial for extracting this clean-burning and domestically abundant natural gas. HF will be necessary to provide energy for generations of Americans to come. We

must produce energy in a safe way with the least possible environmental impact. Companies take their responsibility to the environment seriously.

- When HF first arrived, everyone was going to drill and own a well in their backyard, get free gas, and get rich, according to local legislators. However, the stories from Louisiana, Texas, Wyoming, and Colorado are nothing but a tragedy of people getting sick. Pennsylvania could learn from previous experience. The industry should not be trusted. Workers have had brain lesions and first responders are not protected because of proprietary information. In Durango, Colorado workers were taken to an emergency room and a nurse was overtaken with fumes. They shut the hospital down. The driller wouldn't tell the doctor about the chemicals, claiming it was proprietary information.

- HF has been widely used for 60 years. Contrary to popular misconception, this is not a new or a controversial process. The controversy is generated by the media. This idea is based on public hysteria, not science, facts, or evidence. From every state agency in the nation, there are no recorded incidents of ground water contamination from HF. EPA's Clinton-era CBM study addressed fracking that is even shallower, but even in that case, there was no indication of contamination.

- Local sacrifices have to be made for the broader benefit of the energy consumption of the country. Five thousand dollars a minute is spent importing oil from overseas. There is a staggering energy problem in our country. The current model is not working and an alternate source of energy is needed. Twenty-three thousand Americans die from coal emissions. There is tremendous mistrust of the industry and a "not in my backyard" mentality. Balance is needed.

- EPA should come down to Texas where people have been dealing with oil for 100 years. It takes a lot of work, but it can be dealt with. People are worried about exemptions from laws. The government should get more inspectors—it's simple, companies are not going to do things for the environment unless they see a bottom line difference, so the government should fine them, and they will understand that.

- If people don't want natural gas drilling, they should turn off their computers and their heat and stop driving until green energy is in.

- All drilling practices, fluid compositions, and technologies should be as transparent as possible. We are all relying on clean, safe drinking water, and natural gas extraction and HF need to be held to a high standard. Contamination is not acceptable. All problems need to be quickly and appropriately addressed. Industry must act to correct all wrongs.

- HF allows us to develop gas resources that we couldn't previously and this is tied to the price we pay for everyday items, like heat, pens, and shoes. Natural gas helps meet demand, lower carbon emissions, and provide the feedstock for U.S. manufacturing. It is also a less carbon-intensive gas.

- How much money is a life worth? Would you let one of your kids have cancer for $1 million? When fish die and people get cancer, it is obvious these chemicals are there. Water is our most valuable resource.

- HF is ruining health and the environment. The fluid consists of friction reducers, breakers, microbicides, pH adjusters, and other chemicals. An industry Web site could not even get it right—they changed the content, and it was a pretty big difference. However, what industry continues to pour down the hole hasn't changed. They say the chemicals are as harmless as soap and sand, but they won't drink it. People don't want soap and sand in their water, anyway.

- It doesn't take much to contaminate water, especially with the combination of these fracking fluids. Companies are manipulative and should not be trusted. One company announced last week that disclosure was morally and ethically correct, but why it wasn't morally and ethically correct before when there was less media pressure on the practice? This is an attempt to improve public relations and gain favor with the EPA so that new regulations would not be developed. Why are drilling companies given the right of eminent domain without having to disclose the chemicals they use? Companies are also draining private wells with their usage of fresh water.

- West Virginia doesn't have the adequate money to fund testing before, during, and after drilling. One West Virginian has almost all their neighbors using well water and surface water for livestock. Ground water contamination is irreversible. Spills of frack chemicals will happen and they quickly affect surface water and ground water. HF might be a good idea, it might be safe, but only if everything goes perfectly and no mistakes are made. All the studies will not have much value if it's not implemented correctly and we assume the best case scenario. Everyone cuts corners, and gas drillers are no different.

- The lives of children should be a priority. The playbook of the industry is apparently to say you should narrow the scope or focus on facts, not emotions. Why do families have to prove the fracking techniques caused the contamination in their water? Why isn't it the other way around? Why aren't drilling companies proving it isn't contaminated?

- Fossil fuels, including natural gas, play a critical in everyday life. They provide transport, heating, and electricity. Speakers against HF have forgotten how dependant they were on fossil fuels. The study should be based on reason, not emotions or hysteria. EPA should ignore the politics and the demonization of capitalism in favor of science. In Pennsylvania since 1960 over 40,000 wells have been hydrofracked and not one case of groundwater contamination has occurred. A rational individual would conclude that contamination is highly unlikely from this data and that the fears of environmental disasters are overblown and have little relation to the actual technology.

- Truck and bus fleets have been running on natural gas for many years. Automobiles such as the Honda Civic GX, which burns only natural gas, are also available. In New York, California, and Utah, this car is in big demand and supported by an infrastructure of natural gas refueling stations. It should be introduced in Pennsylvania and further reduce our dependence on foreign oil.

- Water is a more important part of the future than natural gas. Fifteen to 80% of fracking fluid is recovered after drilling—a pretty broad range for fluid recovery.

- Due to the dirt and noise, some people cannot open their windows. HF is akin to building an airplane while flying where everyone is being forced to take a seat.

- How could casing leakage possibly occur? There are seven layers of steel and cement protecting the aquifer. That is probably a higher standard than hazardous waste landfills. Also, how could something so deep affect the surface? There are 20 layers of rock. It is extremely unlikely that anything in the Marcellus layer can reach up here.

- The marriage of directional drilling and HF has made it so we have a very small footprint for a cluster of wells that go under a whole square mile. But apparently it's not working out.

- We should slow down and reevaluate the "drill, baby, drill" concept. Water shouldn't be sacrificed for economic development. It's possible to extract one natural resource without damaging another. The technology must operate by safe standards. Companies should not just dump water into abandoned mines. Proper wastewater management is needed, to treat the water to a state as good or better than it was when it was found. Clean air and safe water are essential. People have a right to clean air, water, and the preservation of the natural, historic, scenic environment. They are the common assets of the people. This is a common endeavor and the American way of life must not be violated by greed. These ideas should not go by the wayside for profit.

- Current HF technology began in 2004, not 60 years ago. The long-term biological effects of endocrine disruptors include neurological and developmental disorders and cancer, at very low concentrations, sometimes ppb or lower, should be investigated. People say these are already in common household products, but that does not excuse any additional exposure.

- A citizen wished to respond to other commenters who characterized the concerns over HF as media driven or factless emotion. The citizen directed these commenters to talk to the breastless women, the vomiting lymphoma patients, the patients undergoing chemotherapy, the severe asthmatics, and the parents of children with developmental or metabolic disorders.

- To vilify the people who came to the meeting in gas-powered cars when speaking on behalf of an industry that has received billions of dollars in subsidies every year is hypocritical.

- Many have talked about Native Americans. In the Native American community, one term they use to describe HF is rape, rape of Mother Earth. This is not acceptable. They worked in the petroleum industry for five years, and saw three good friends killed. The wage the workers made was not worth a life.

- There is not enough EPA staff to oversee all of the drilling. There isn't enough government staff to watch all the rigs being operated, the wells that are there or going to be there, or every truck going to and from the rig. Water trucks were used to siphon hydrochloric acid and empty it into a local stream. There were no EPA people watching

them making sure that wasn't happening. The industry claims lots of certainty, but the only guarantee in life is death.

- There are windmills on the Pennsylvania Turnpike, and they are often still. It would take seven hundred windmills to replace one Marcellus Shale well.

- Will our children and grandchildren have power and energy? Industry says HF has been done for 60 years and on hundreds of wells with no evidence of contamination. There's a reason for that. At depth, fractures become horizontal. One reason industry doesn't frack in ground water sources is because they can't. If you take into account simple engineering, and good science, there are multiple opportunities for case studies in that area.

- There are a lot of issues at hand. The biggest is the denial of the hazards HF presents. EPA should listen to the common people affected by it. The hazards for the future are large. HF has been done vertically for years, but not horizontally. When you go straight down, you have no problem. When you go down and go to the side, that's the problem. Companies say there have been no incidents, but this may not be true. Emotions are absolutely necessary. EPA should listen to the people who have been affected, and the industry workers. When the water can't be drunk and the land can't be lived on, it's a problem. Sickness is a fact. This has the potential to be a good thing, but before we get to that point there are things we should do.

- Natural gas is clean if we ignore the horrendous pollution of the water and air used to extract it and compare it only to coal—but that is a pathetically low standard. It is not fear mongering if landowners with experience build a grassroots campaign against an industry that is not prudent in their processes.

- A natural gas pipeline exploded near Route 84 due to corrosion. Now, industry is building a pipeline from Tennessee that will be used to export gas to Norway from a port in Boston. The industry has attacked the people of this country by not securing the consent of the citizens to undertake these activities. Subcontractors are risky and the regulations are useless**.**

- There has been no commitment from these companies not to export gas outside Pennsylvania or the United States, even though they keep touting the fact that it will make the Unites States energy independent.