Hydraulic Fracturing EPA Public Informational Meeting

Binghamton, New York

September 15, 2010 – Evening Session

Summary of Public Comments

While EPA has made every effort to ensure the accuracy of the discussion in this document, this is not a transcript of the meeting. The "Summary of Public Comments" section does not represent the views or opinions of EPA. The statements and claims in these comments have not been verified or endorsed by EPA.

Meeting Format

US EPA (hereafter referred to as EPA) held four public informational meetings in Binghamton, New York, on September 13 and 15, 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 following meeting summary details the public verbal comments given during the first of the four meetings held on September 15, 2010, from 6:00 to 10:00 p.m.

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 300 individuals attended the meeting and EPA received verbal comments from 114 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

Judith Enck, Regional Administrator, EPA Region 2

- EPA Region 2 serves New York, New Jersey, US Virgin Islands, Puerto Rico, and the tribal nations located therein.
- 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.
- 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.
- It is EPA's understanding that the New York Department of Environmental Conservation (DEC) will not review or take action on the 60 permit applications they have received until the after the release of the final Supplemental Generic Environmental Impact Statement (SGEIS). DEC has received approximately 14,000 public comments on the draft SGEIS

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. If the study identifies issues that require urgent attention, EPA will act quickly to take the necessary steps.

What Will the Study Include?

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

- EPA is very impressed with the depth of knowledge of New York's citizens on this topic. The comments and suggestions received at these public meetings will be very helpful to EPA.
- 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).
    - 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.
- Types of data and information needed include:
    - Pre- and post-drilling site characteristics and water quality.
    - Chemical data, including information on HF 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. Additional comments will be accepted until September 28, 2010.
- 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 is the foundation for a scientifically sound 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?

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 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 2 and the Marcellus Shale area, recommendations for the HF study, regulation of HF, and other comments.

Hydraulic Fracturing in Region 2 and the Marcellus Shale Area

Many commenters described New York's rural nature and the importance of agriculture to the region; they noted that other places where HF has taken place may not have these qualities. These commenters expressed concern that HF would negatively impact agriculture, tourism, wineries, and other regional industries that depend on clean water and the rural landscape. A number of speakers described their experiences as local residents and landowners and expressed concern that their property, health, and lifestyle will be put at risk by HF. Other speakers commented on the jobs and income that HF could bring to the region and noted that this is especially important in the current economic crisis. A number of speakers mentioned the draft SGEIS; some of these commenters approved of DEC's study and current regulation of HF while others described shortcomings in the draft SGEIS and called for it to be withdrawn.

EPA's Hydraulic Fracturing Study

Scope

Comments on the study scope fell into two main categories. Commenters in favor of HF asked that EPA not stray from the Congressional mandate, limiting the study to the moment of fracturing and its impact on drinking water. Commenters opposed to HF called for the scope of the study to be expanded to include other aspects of the drilling process and the entire lifecycle of HF. Some of those opposed to HF asked EPA to perform a cumulative impact study that addresses topics such as air impacts, greenhouse gas emissions, and effects on children. Commenters also requested that EPA quantify the risks of HF, including the risks of chemicals, and asked EPA how long-term effects would be addressed in the future. Some commenters asked EPA to include economic impacts in the study, while others asked EPA to only include environmental and health impacts. A number of commenters from all perspectives asked EPA to conduct a transparent study based on science and facts, and free from political, industry, and emotional influence.

Knowledge Gaps

The knowledge gap that attracted the most comments concerned the chemicals used in HF. Commenters were concerned not only with the identities of the specific chemicals used, but also the quality and quantity of information available for each chemical and the impacts of the chemicals when used in combination. Commenters asked EPA about "green" alternatives to the chemicals and noted that some substances, such as endocrine disruptors, lead to health effects at

very low concentrations. Other knowledge gaps included seismic activity, the fate of injectate that does not return to the surface, waste disposal, and the impacts of HF waste when it enters the food chain. This section also includes specific information provided to EPA to address the gaps in knowledge.

Case Studies

Many commenters suggested that EPA conduct case studies in New York and Pennsylvania, especially Dimock and Bradford, Pennsylvania. Commenters also suggested sites in other parts of the country, including Pavilion, Wyoming, the Barnett Shale, and the Bakken Shale. Commenters also asked EPA to determine if there have been any cases of contamination due to HF and to concentrate on areas with high well densities. Finally, commenters asked that EPA not rely on industry reports and suggested that EPA look at trends over time.

Regulating Hydraulic Fracturing

Many commenters discussed the regulation of HF, but were divided on whether federal oversight was necessary. A majority of commenters called for federal oversight of HF and the removal of exemptions from federal statutes. Commenters asked EPA for a national moratorium on HF and requested that disclosure of chemicals be mandatory. Commenters also suggested that since pollution does not stop at state borders, federal regulations are necessary to ensure equal protection. However, other commenters felt that the states are effectively regulating HF and that waiting for federal regulations would cause an unnecessary delay to an industry that is creating economic benefits. Some cited DEC's regulations as the strictest in the country and suggested EPA learn from and work with DEC.

General Comments

Many commenters expressed their general support of or opposition to HF, as well as the importance of water to the region and the country. Commenters also discussed the potential positive and negative economic impacts of HF, including impacts that could occur before drilling begins. Some commenters argued that natural gas could reduce the nation's dependence on foreign oil. Other commenters discussed whether or not natural gas should be considered a "green" fuel and the positive or negative impact of widespread use of HF/natural gas on greenhouse gas emissions and global warming. Several commenters noted specific risks of HF and the risk of contamination from surface spills and accidents.

Detailed Public Comments

Public comments have been grouped by common theme: impacts specific to EPA Region 2, recommendations for the hydraulic fracturing study (scope, knowledge gaps, and case studies), regulation, and general comments.

Hydraulic Fracturing in Region 2 and the Marcellus Shale Area

Comments on HF in Region 2 and the Marcellus Shale area were as follows:

- New York State is sitting on top of several of the world's largest shale formations. There are nine gas-producing formations under the ground. This should mean economic strength.

- A local medical society endorsed imposing a moratorium until 120 days after EPA findings are announced.

- A commenter who lives in the region loves her spring water and knows many people who also love their well and spring water.

- A local homeowner found out last month that his insurance agency could not find a company to write a policy against the decline in value of his home based on the risk of contamination of the house's water well due to the possibility of HF.

- EPA should identify all the wells and cisterns in New York and determine if they offer pathways for wastewater to go into water supplies.

- Upstate New York is unimaginable without farms, which are a backbone of the economy.

- A speaker's neighbor raises grass-fed beef cattle. He said no to drilling; he had a hunch that it would be destructive to farms and families. He wants to leave his grandchildren good land and a love of farming.

- EPA should look at the effects of HF on outdoor recreation and tourism, like skiing, biking, hunting, etc. This provides significant revenue in upstate New York. Access to the outdoors improves quality of life, retention of young professionals, and boosts the economy and real estate. HF will ruin the safety of our natural playgrounds.

- EPA should ignore the emotion and stick to the facts, and look at what is being done here in New York.

- EPA should give emphasis in the targets to not only humans but farm animals and crops. There are not so many milk cows and grapes in Texas; that's one area that is a big economic factor in our area.

- Two organic farming organizations support banning withdrawals for HF from aquifers; if water is used, it should be from surface water reservoirs only. In the Catskills, aquifers are very shallow, and if neighbors have HF there is no reasonable expectation that a pump or spring-fed pond nearby would continue to flow. Water from aquifers cannot be used for HF: this is a commons issue.

- Gas is valuable but we have foreign gas companies looking at New York State like it is the goose with the golden egg.

- A commenter wants an environment that is safe enough to raise animals and grow food in, not just one that is safe enough to live in, because that is what Upstate New York is about and anything that threatens that, during or after HF, should be considered as severe risks.

- A citizen watches her neighbor's calves drink clear water. No one can produce meat or milk without toxin-free water. Cattle that have drunk contaminated water have already been quarantined or killed. The meat and milk produced here go to the rest of the state, New York City, and beyond, presumably for the long term. Healthy agriculture is our strong suit; our patrons will avoid the products of contaminated soil.

- An organic farmer thought that there were many jobs and opportunities in the shale gas region relating to renewable, but HF will kill people. How will EPA rule on how many deaths are acceptable?

- New York has had HF in vertical wells for 30 years with no gas migration incidents. The danger is from spilled chemicals and fluid storage.

- The DEC study added further stringent guides to those already in place from EPA and the states. DEC did find that in 60 years, HF has not caused a single documented case of ground water contamination.

- The draft SGEIS is inadequate because it does not consider the cumulative impacts. It also ignores the impact of pipes and compressor stations.

- DEC has been proactive in evaluating potential risks before issuing permits. This should minimize those risks, unlike Pennsylvania's reactive approach, issuing permits and then addressing problems as they arise. Look at New York State's history; we have been fracking vertical wells for years with no water sources contaminated.

- DEC created the strictest regulations on the planet. All of the objections of the past few days will be addressed soon by the new SGEIS.

- DEC dismissed water wells negatively affected by methane after vertical drilling on nearby land as natural contamination.

- EPA should begin their evaluation of risks from HF with a thorough review and analysis of DEC's SGEIS. DEC spent two and a half years, thousands of man-hours, and millions of taxpayer dollars to perform a thorough evaluation of the HF process. The draft was available for the scrutiny of all. DEC then solicited input from all concerned parties and is addressing them prior to completing and issuing the final version. It contains requirements for safe horizontal fracking. It would be fiscally irresponsible of EPA not to start with a review of the SGEIS.

- The DEC's draft SGEIS drew heavy criticism. More than 10,000 signatures were collected on a coalition letter requesting that Governor Paterson withdraw DEC's

proposal in order to rectify its fundamental shortcomings. Many of the concerns expressed in the letter are echoed in a landmark 12/30/09 EPA letter to DEC. Issues involving water supply, water quality, wastewater treatment operations, local and regional air quality, management of naturally occurring radioactive materials disturbed during drilling, and cumulative environmental impacts have to be addressed. It is essential that EPA take action to prevent HF hazards from developing until its study is complete. EPA should require DEC to withdraw the SGEIS to address the shortcomings described in this letter.

- A local couple who traveled to Wyalusing, Towanda, and the Wyalusing Rocks was shocked at the dirty, dusty air and the trucks with which they competed for space on the roads. It was an industrial site that they will not visit again. They are proud to live in a state that is being proactive with regulations rather than a state that is unregulated.

- EPA should remember that there are people here out of jobs, about to lose their homes and unable to put food on the table. People here do not like to depend on other people or need public assistance to survive. It's a sad thing, but a lot of people have had to turn to that. People who own their land can support themselves if they need to. People need to be independent.

- New Yorkers want things to stay the way they are with no HF.

- People will wrest control of upstate homelands for Downstate interest.

- Seventy-five percent of the land overlying the Marcellus Shale involves major sources for public water supplies. If ground water and surface water are polluted, drinking water for 8 million New Yorkers will be irreparably harmed.

- A commenter expressed concern over industrialization of the landscape, which has occurred in the West. With its rolling hills, farms, lakes, and rivers, upstate New York has the best scenery in the country.

- There should be no fracking allowed without adequate wastewater treatment plants to treat the fluids and the materials released from the shales. Pennsylvania was assured by industry that the fluids are safe, but the state does not have one plant sufficient to treat them.

- Broome County's geology and population are not similar to Texas. Those arid properties in the West don't compare to our flora here.

- An important energy resource is food: we need clean water for clean food. New York State has got it and should protect it.

- A commenter who has visited Pennsylvania, West Virginia, and Ohio has talked many people whose lives had been negatively impacted by HF.

- The New York State Senate passed a resolution to suspend fracking in New York State until May 15, 2011. It is waiting to pass the State Assembly.

- Just over the border in Pennsylvania, the results of real damage can be seen, and many states are far worse.

- Who loses by New York, the fourth largest user of natural gas, not producing its own natural gas?

- A landowner supports responsible horizontal drilling in New York State.

- New York is calling and we need an immediate moratorium on HF across the United States.

- Putting a movie together and calling it a documentary is very misleading. Lighting faucets on fire is common in this area but people who are not from the area wouldn't know that.

EPA's Hydraulic Fracturing Study: Scope

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

- The study should include climate change, especially emissions and the full lifecycle. Detractors say EPA lacks the authority for lifecycle testing but EPA gets their authority from Congress and Congress gets their authority from the people here today.

- The focus should be on water. If the hope is that wastewater will be treated enough to become drinking water again, then the whole water cycle should be considered.

- Industry claims that problems are caused other parts of the natural gas extraction process, not HF. EPA should examine all activities, not just the most narrow definitions used by public officials, geologists, universities, and individuals.

- The scope should be as comprehensive as possible. Drinking water is valuable but water is also important for the ecosystem. Lots of other creatures use water too.

- Any time water is contaminated and bought to the surface, especially in ponds, it impacts air quality. EPA is not mandated to cover that, but if things really stand out as possible air quality issues, they should be flagged for a follow-up study.

- The scope should be comprehensive. People say it should be narrow, but all factors interplay with one another.

- Consider all aspects of drilling and cumulative effects on ground water, surface water, and air.

- EPA was asked to use a narrow approach and the best available science, have a transparent peer review, and consult other agencies. The government committee that specified a clear peer review process also requested that EPA study endocrine disruptors, etc. This does not rule out lifecycle analysis. A literal interpretation could be to just sample drinking water. But if health problems relate to air problems coming from evaporation of methane-contaminated water, a contextual approach would be better than water snapshots. Environmental justice issues are cumulative questions. Take a cumulative approach, including indoor effects, regional effects, and global greenhouse gases. EPA working on all three of those linked together can actually save EPA time and money.

- Include cumulative impacts, including economic issues, in the EPA study.

- We support a full assessment of the cumulative impact on the environment and health, as well as a practical plan for the disposal of all wastewater.

- EPA should conduct a complete cradle to grave analysis and beyond—there are areas that require study that are not even on the horizon. Use science that is impartial, not funded by industry like MIT's Clean Skies study. EPA needs full disclosure. As for human health, professionals face the dilemma of storage and transportation, not just for families but for workers. How can we diagnose patients if there is no listing of toxic chemicals? There are growing numbers of residents in Wyoming, Pennsylvania, Texas, West Virginia, and Louisiana with health issues, like a loss of taste and smell, breathing problems, migraines, skin rashes, extreme neuropathy. What about endocrine disruptors? Look at the air quality in several regions in order to understand it.

- EPA should try not to let outside political or non-political forces sway judgments one way or another.

- HF generates massive amounts of wastewater; EPA should pay attention to the way it's stored, because plastic tarps leak and rain causes pits to overflow. The evaporation pits add to air pollution because contaminants come down as rain into drinking water. Evaporation and air issues are part of EPA's mandate to protect drinking water. Look at the proposed uses of post-production frack water. What's on the roads ultimately goes into the water. Please remember that drinking water comes from an interconnected cycle and take account of this.

- EPA should include in this study that people affected don't have a choice. People with the bottled water trucked in don't have a choice. Please include the water cycle in the scope—that the water cycle is in continuous circulation, from the water to the air to the ground and back. Once it's contaminated with fracking fluids, EPA said it's difficult if not impossible to change that water. What happens in ten years when the amount of fracking water is depleted from the ground?

- Comments on the draft SGEIS said that one unaddressed issue is cumulative impacts from dotting the landscape with gas wells. Case studies are important and welcome, but also include cumulative impacts.

- In order to have a cumulative impact study, EPA should examine an area of ongoing activity. Let facts and science dictate the answer.

- Remember the mandate from Congress to study the effect of HF on drinking water. Keep a narrow focus and do it in a timely manner.

- EPA was charged to investigate drinking water and HF. Safety is paramount; by all means, continue this study. EPA should keep its study narrow and work as quickly as possible to set safe standards so that we can develop natural gas. Other areas can be handled at the state and local levels. Landowners can control the placement of wells relative to their homes, water sources, and businesses through their leases.

- People can twist the meaning of words if the final report contains phrases like “unlikely” or “rare”— make every effort to quantify. Say “one in a million” and compare that to other industries. That’s a key component here.

- Whether or not we develop gas should be based on sound science not on excessive use of the precautionary principle.

- Make sure the examination is based on science, not emotions.

- EPA should look at how HF affects water and consider the need to protect all people and beings on Mother Earth from the damage and contamination that may occur. There is spoiled water in pools, can it be cleaned? Think about how this will affect the seventh generation. We cannot have putrid water lying around filled with chemicals that can hurt humans and all other beings.

- Science, not emotion, should be the sole consideration—profit and financial considerations are also outside the appropriate scope.

- EPA’s purpose is examining the potential impacts of HF on drinking water. All other concerns, like noise and waste, are important but should remain at the local and state levels.

- EPA should do a comparative study of the health and wellness in HF areas versus those without HF. Find out what chemicals are used and test the soil, water, and air for the most dangerous chemicals, especially carcinogens and VOCs. Consider long-term effects of perpetuating the status quo. Show up unannounced anywhere EPA investigates. Compare natural gas drilling with solar, wind, and other renewables.

- Assuming the maximum number of wells, what would the impact be of consumptive water use from the water cycle? It’s not evaporating and turning to rain, it’s removed.

Apply the study to the entire process and all actions associated with horizontal high-volume HF (including the impact of diesel truck traffic). Do not allow the fact that other energy sources pollute or the big corporations to affect the study.

- The priorities of this study should be compared to another source of pollution over 100 years. For example, at least 90% of the land is not served by public sewer systems; homeowners hope that septic tanks contain the worst of it, and that the effluent is sufficiently purified before it reaches water wells less than 100 feet away.

- EPA should focus on the pathways to the water supply, spills, dumping, migration, short and long time scales, natural joints in rocks—the Marcellus Shale has a lot of joints —as well as leaks in the casing and the well bore. Assess the jobs done nationwide. Also, focus on subterranean methane migration and potential impacts, like explosions and blowouts.

- A priority should be the economy of global markets and global pollution. There is a numerical value placed on everything. There could be tariffs on natural gas from areas where there are no regulations. Our domestic product can compete with imported products. Life is full of tradeoffs.

- A priority should be long term effects. Twenty or 30 years down the line, will the benefits balance with the caveats of having land polka-dotted with drill pads? Take water samples and look at aquifer replenishment. Some of the confined aquifers take hundreds or thousands of years to replenish; the effects might come later. Study the methodology used. For the methods, case studies can be too results-oriented. Take core samples, test porosity and permeability. Gas companies do these tests but they don't test for water permeability and ground water. Look at the exact percentage of fluid replaced. EPA should go through patents to see if they have any information on the chemicals used. Also, second order effects: the water table can drop, creating sinkholes, which has happened in other parts of the world, and vegetation.

- The study should focus on children. There are many stories out of Pennsylvania about children living near drill pads who suffer from headaches, dizziness, and nosebleeds, who are frequently sick. Are the chemicals inside their bodies, in their blood, urine, and exhaled breath? Children are more vulnerable than adults. My children use asthma nebulizers already and struggle with learning disabilities. The land near schools is already leased for fracking and that fracking fluid and flowback water contain solvents and heavy metals, like arsenic.

- The majority of the HF workforce is hired locally. Since HF requires human beings the study should include human beings—it should include the qualifications of those working the fields and evaluate the potential for error, and alcohol and drug use, which was well understood to be the cause of the Exxon Valdez disaster.

- When all the data is collected, give emphasis to risk analysis. What does it mean? Probability times impact. It's the precautionary principle mixed with Murphy's Law.

- EPA's priorities should be accessibility and transparency. Look at current research, its constraints and limitations, and employ the findings.

- Please protect children and the natural wonders we grew up in. Learn and teach these facts that are out there. Lead, inspire, and protect us, please.

- Presumably, the risk is larger in areas with more wells. There are areas in Tompkins County where over 60% of the land is leased. It's important to analyze risk based on geography at the county and town level, and the amount of land leased. How many five-acre impoundments are acceptable in a given area? Do they affect the risk? Figure out how "intensive" gas drilling can be on water drops for different watersheds.

- The environment should not have to be at odds with economic development, but it must fit within the context of ecosystems sustainability. Besides a strict scientific study, EPA must include an ecologic and economic assessment to ensure that natural resources are protected while pursuing sustainable development.

- Review best practices, what standards already exist—more work may be redundant and unlikely to reveal new hazards compared to the Material Safety Data Sheets (MSDSs). Water is the proper area to study. Review well cementing and consider a review of well walls. Take a sampling of successful wells and accident sites. Maybe there are other areas to address, such as fault interactions like at Rocky Mountain Arsenal in Colorado. There are wastewater remediation processes already being developed, like Salt Water Solutions, who plans to build a processing plant for safe disposal of fracking water. Be truthful and unbiased.

- Two years is not enough. Best practices are continuing to improve, and EPA should keep abreast of the current events.

- Look at the nearly half million natural gas wells in production in the United States. Less than a fraction of one percent are suspected of water pollution. It's like airlines, which have thousands of flights every day, and one crash gets everyone's attention.

- I suggest that EPA study the water, sewer, gas, and electric industries that have used slurry and directional drilling to do accurate horizontal drilling for utility lines.

- In the scope of the investigation, include the fate of drilling muds (including salts, polymers, and minerals) and plugs. Where do they end up? In ponds next to cattle? Please be sure to evaluate the available wastewater treatment techniques. No municipal or community plants today can handle the salts and organics that are present in frack water. However, there are evaporation and pyrolosis techniques that treat water so it is cleaner than the water it came from. Industry says it's too expensive, but maybe it is not.

- Consider water contamination over the long term. Looking at pathways and projecting into the future, where might the chemicals and spills end up? Won't they continue to move? Will they percolate through soil and eventually into ponds and streams and water?

When and where will the effects be seen? Whose grandchildren will have birth defects or untraceable illnesses?

- EPA should not overlook other risks, such as spills and leaks from casing and cementing. Casing must be done to a depth and cemented to a thickness sufficient to protect ground water. EPA should look into the process for cementing and estimate the correlation between contamination and cement, and by whom.

- EPA should assess the threat of chemicals relative to household chemicals that are already discharged by sewage. One of EPA's objectives should be to compare water quality in rural areas pre- and post-drilling. Perform a scientific risk assessment and disregard emotional arguments. Weigh the risks versus the benefits: more money for schools, reducing the dependence on foreign oil, reducing the pollution from coal.

- Look at the long-term effects of hundreds of chemicals.

- Opponents to HF are conflating rare incidents and what people are saying into systemic incidents. EPA needs to put it in the proper context and distinguish the plausible from the rare.

- There are regional differences in hydrology that must be taken into account.

- The amount of water used sounds large, but is small in context versus any regulated source. As for what comes out, flowback brines do indeed look like deep formation brines considered in the Northeast for deicing. Put all issues in context and look at reasonable receptors, not just drinking water standards. Ask people to explain how gas can migrate up through thousands of feet of rock and how dense brine can move up. Focus on how HF is done now, not the rare incidents and the past practices executed with technology poorer than today's.

- Ensure that the study is based on science and facts.

- Please look only at the facts that can be substantiated by accurate data. EPA must rule, not the politicians.

- Focus on prevention, not treatment after failure.

- Take a deep breath and look at the risk versus the reward of natural gas. Consider the risk of natural gas extraction versus the reward of a source of energy.

EPA's Hydraulic Fracturing Study: Knowledge Gaps

Comments from the public regarding knowledge gaps on the subject of hydraulic fracturing are as follows:

- Does EPA know what chemicals are being used? EPA cannot evaluate chemicals without identifying them. What about the chemicals in the earth that will be brought up, like radon, volatile organic compounds, and methane gas? Look at government and politics and consider the two aspects of the whole process.

- We need a complete and accurate knowledge of the different chemicals, bonds, and interactions. Look at all the chemicals in the frack substances. Analyze them for toxicity and safety. Do that first before they are allowed to be put into the ground. Also look at the safety of produced water and have guidelines for disposal and containment. Produced water in tanks beside wells perpetually emits gases—they may be the most potent greenhouse gas to date. The content of the produced water gases should be published before a single additional well is dug.

- The chemicals used in HF are so potent that they defy risk assessments to keep them safe, so precaution is better. There is not yet science and engineering to keep us safe enough.

- The data sheets for horizontal high-volume HF chemicals are very incomplete. Pennsylvania is representative of the problem—the data sheet lists 85 items, ignoring proprietary mixtures. At least six of them are classes of chemicals which represent hundreds of individual compounds. They share the same functional groups and general behaviors, but this means that there are hundreds of individual chemicals not listed, and that there are hundreds of chemicals being used, not just 85. Chemical behavior cannot be generalized based on chemical class, no prediction about specific behavior or toxicity can be made. Without the chemical structure, this knowledge is worthless. If the specific compound isn't known, toxicity cannot be assessed. Take two alcohols: methanol and ethanol. There is a single CH_2 difference between them. Ethanol is found in alcoholic beverages, but methanol has a high toxicity in humans. Two teaspoons can cause permanent blindness and one cup is fatal. Benzene was found in Sublette County, Wyoming and is also identified as a suspected contaminant of ground water in Pennsylvania. How is it getting there? It's not on the DEP list. If it's not in HF fluid, we need to consider the possibility that HF is responsible for the release of underground benzene into the environment.

- Here are authorities with integrity and research: James Northrup, Walter Hang, Professor Anthony Ingraffea, and Theo Colborn in Colorado.

- The cocktail of chemicals may cause cancer and birth defects. Sixty-five chemicals are classified as hazardous waste, but because of the exemptions, none are treated as hazardous.

- EPA needs all the information on all the specific chemicals used at each drill site.

- There are few significant well-conducted epidemiologic studies on the health effects of natural gas drilling. The natural gas industry does not disclose the CAS numbers for chemicals added to the fluids, so EPA cannot conduct any study evaluating potential health impacts. Endocrine disrupting chemicals are active at much lower concentrations

than other chemicals, and can still have ill effects decades after exposure. The absence of evidence is not the absence of harm. The precautionary principle is derived from "do no harm" and should be applied. There are few high-quality epidemiological studies on this, that should be are introduced. EPA should notice in its own literature review a lack of these papers on the toxicity of chemicals and the risk to the human population. Remember that endocrine disrupting agents are effective in parts per trillion and hence the use of toxicological evidence, where the dose makes the poison, is not applicable in this case. Ensure that even the most minor spill or contamination does not happen.

- Gaps include identifying specific chemicals so that epidemiologic studies can proceed — without this information, they will not be valid or useful.

- New York State is not on a major fault but what happens when wells one mile on the center, like in Dish, Texas, are fractured, shattering the whole strata of shale for a very large area, like is happening in Pennsylvania? What will happen when seismic activity does occur? It might be 100 years from now, but it could be a major problem.

- Because injected fluids are not all coming back out of the ground they will continue to leak and permeate and cause seismic activity.

- Gaps include the well failure rate and variations based on the local geology, as well as the effects of wells on areas with high-rainfall climates.

- There seems to be a large knowledge gap in casing and grouting—this is what will contain the gas over the lifespan of the well, not just when it is first developed. EPA should examine grouting as a part of the HF process, not as something distant to it.

- There is concern that there is no system in place to prevent blowouts. There is unsettling news from Halliburton's "Gas Migration Update," which describes the problem of gas entry into a cemented casing/borehole annulus and numerous pathways for gas migration.

- If 30% of the flowback water is reused, what happens to that? Is that compounding the toxicity? Where does the flowback water go that they finally drain out? Who's watching that and where it's going? What happens to it? What happens when the well is shut in, what happens when there's 5,000 pounds per square inch down there with the little molecules slipping around? Are they going up fractures into ground water? Who knows? And the production casing, maybe there are leaks coming out of the coil production casing—it's something to look at.

- Look at landfills accepting Marcellus Shale cuttings, including drilling mud, such as the Chemung landfill and others in southern New York. What happens to the 30% of the concrete that does not return to the surface when injected up around the annulus? That figure was testimony from an employee of Chesapeake. Look at the figures that say water is 99.97% pure after they try to remove the chemicals

- HF is all about brittle fracturing, which is by nature unpredictable. It happens at the speed of sound, so something 3,000 feet below the surface could be at the surface in three seconds, but all it has to do is intersect an aquifer. When fractures extend beyond the target zone in an instant, the damage will lead to hundreds of years of repercussions. EPA must examine the failure rate, and assume it will be there, because nobody's perfect.

- Who maintains storage tanks? Who's responsible for wells when 25 or 50 years later as wells and pipes deteriorate and leak into the ground? EPA also needs to know about radioactivity. Who knew radioactives were in there?

- EPA needs to study closed-loop systems, have unannounced visits, require pre- and post-drilling samples for all water and air tested, require control of methane emissions and mandate full disclosure of everything.

- A problem is methane intrusion. This is not a clear, exact problem, there have been many local reports, but present research should be focused around methane intrusions and focused around waste disposal. Where are they getting rid of the wastewater and how? These are things we don't have answers to.

- State and local agencies need enough inspectors to know what we're working with, what they're doing, and how. EPA needs to know whether the costs of the petroleum energy are equal to the gain of the natural gas itself. EPA needs to know how to clean the chemicals and the water before we even think of putting that stuff into a place it won't come out of. Remediation using fungi might be possible.

- Fifty years and over $1 billion later, Onondaga Lake is still the most polluted lake in the country. We are on the verge of a catastrophe of even greater magnitude—even taking the remote possibility that there won't be a disaster, what will be left behind when the gas is gone? Thirty thousand holes in the earth, filled with toxic waste, and 30,000 miles of connecting line.

- The study should include the introduction of fracking waste into the food chain. In Armenia Mountain, Pennsylvania two weeks ago there were cows grazing yards from an active well site, partially-contained slurry was on the ground, and the cows downhill could easily drink the water. Ducks and geese land on open wastewater pits where frack water is stored. This chain needs to be studied. Cattle have been poisoned already in Pennsylvania and Louisiana.

- Drilling puts a huge quantity of chemicals, toxins, carcinogens, and endocrine disruptors into the ground. Industry claims that the chemicals are safe, that they are found in household cleaners, but most of these chemicals are banned in Europe. The amounts in cleaners are minute. Even at 1%, if it takes five million gallons for one well, there are 200 tons of chemicals. Flowback also contains salt several times higher than seawater and other contaminants like arsenic. Industry claims drilling is safe, accidents won't happen, and HF can't contaminate the water supply. We know that contamination has happened

elsewhere. Why is vegetation dying, and why do Dimock residents need bottled water? They said an accident wouldn't happen in the Gulf, but it did.

- Another gap is the downstream effects of waste byproducts that will continue to pollute our communities. Economic development is critical to this agricultural state. However, the growth should take us upstream and use smart criteria.

- Five or six years ago the Red Cross identified toxins in umbilical cords.

- Dramatic rises in lung cancer, autism, and asthma from air pollution should be a great concern.

- If this industry has toxic problems but less so than other industries, don't punish them for that. The salt issue is becoming most significant. In a lawyer's opinion, salt should be disposed of in the Atlantic Ocean, or put it in dumps, but the states won't allow it.

- EPA should contact Salt Water Solutions; they dealt with the saline contamination of drinking water in the aquifer from the salt mine collapse.

- Can regulations be developed and enforced related to preventing and mitigating failed well casings? Drilling and water safety might be mutually exclusive.

- The industry has repeatedly stated that horizontal high-volume HF technology has been going on safely for decades. But there has never been any horizontal high-volume HF in New York, ever. Drilling horizontal wells in sandstones, and fracturing vertical wells in shale have been co-mingled as if they added up to horizontal high-volume HF. The Herkimer sandstone is a porous stone that originally contained no methane but has absorbed it over time from underlying shales. These horizontally-drilled wells require no fracking, use no poison fluid, and produce no flowback. Vertical wells in the Marcellus Shale encounter only about 150 feet of shale available for fracking, and are legally limited to using 80,000 gallons of fracking fluid per well.

- Faulty casings and abandoned wells like in Salt Springs State Park, as well as rock fractures (new or natural) through the bedrock, allow the flow of contaminants into aquifers. This contamination will affect fisheries such as the brook trout in the Susquehanna River Basin for years to come.

- EPA should at least use its 2004 study along with the new DEC SGEIS and the MIT study to reduce the redundancy and cost involved.

- Fracking in low-permeability shales must be repeated two or three times. Repeated fracking means that area ground water and aquifers are more vulnerable to the natural gas and toxic chemicals. The cumulative effects of thousands of well pads and millions of wells increase the chances of serious accidents.

- The baseline contamination of ground water and aquifers should be obtained prior to drilling. Studies by ProPublica show more than 1,000 cases where aspects of the HF cycle affected water, including spills of HF liquids, cracking of cements, and methane migration through faults and fractures. A baseline test would hold the companies responsible. There should also be an option for landowners to hire their own experts.

- The only safety factor is the well casings, and they will crack. They are steel and concrete exposed to salty water in the fluid, and they will fail. Whether it is 15, 30, or 100 years from now, water will seep in and fill and mix, creating a ticking time bomb.

- As demonstrated by the 2004 study, the actual reach of HF is minimal and it's virtually impossible for the transmission of fluids from the injection zone into aquifers to occur. The transmission site is at the wellbore, and the greatest danger is at the surface from spills. Best practices should be the only practice, for casing including requiring multiple casings, cementing, protection and lining, and no open pits. Horizontal drilling with HF has the least impact (in terms of total footprint). HF and horizontal drilling make sense in this area.

- Fresh water is a scarce resource but there is technology to purify water.

- As for the excessive consumption of water ,a study of 79 counties showed that of the 3.6 trillion gallons used per year, 72% was used in power generation, 12% for public use, and 16.2% for industry and mining. Of that, only a fraction of a percent was used by the natural gas industry. This is insignificant compared to other industries like coal. It takes 4.5 million gallons to frack a typical shale gas well, but in New York City five million gallons leak every seven minutes. A 1,000 MW coal fired power plant would use that amount in 12 hours. A golf course would use it in 25 days.

- The amount of water allowed to these companies is a disgrace. There may be irreversible damage to the watershed that is so precious to millions. If each frack takes five million gallons, that's 1,000 trips in 40-ton trucks. If it takes five or six fracks in a 30-year period, that's a lot of road damage.

- EPA's projections and modeling should assume the maximum permitted well density.

- The representative from the New York City water system says that there is 35 million gallons in leaks daily. A 2010 *National Geographic* issue was dedicated to water. The leaks in New York City have been going on for more than a decade. Thirty-five million gallons times 365 days is 1.2 billion gallons per year. Over ten years, that is 12.7 billion gallons leaked. As for questions on the water quantity used for HF, why hasn't EPA looked at the leaks in New York City? One day of 35 million gallons could support the HF of seven natural gas wells, and 1.2 billion in a year could support HF for 2,550 natural gas wells. Over ten years, 12.7 billion gallons could support HF for 25,550 natural gas wells. The representatives from New York City also told us about the $10 billion annual cost to filter water. This is treated as an environmental issue—is it really, or is it an economic issue?

- There's a distinction between spilled water and polluted water: 35 million gallons of spilled water goes into the aquifer and can be reused. But 35 million gallons of frack water is poisoned forever.

EPA's Hydraulic Fracturing Study: Case Studies

Comments from the public regarding case studies to be conducted during the study are as follows:

- An elected official commented that he had been told of contaminated water wells from Ohio, Colorado, and New York but when he checked with officials from these states and other states with HF, he learned there has not been one water well contaminated from the process of HF, though there have been impacts from spills and dumping into surface water. Even the issues in Pennsylvania are not a result of fracking, but from storage of fracking fluids and spills. Potentially poor inspection processes are also a problem. States are in the process of updating surface water controls to address these deficiencies.

- A citizen offered their land for a case study. It is close to the Susquehanna River, which may be of interest.

- The New York/Pennsylvania border region is an ideal region to study. Look at trace geochemical processes under subsurface pressure and temperature conditions and the changes that happen after transport to the surface. Effective heat and additives, as well as the chemistry of source rocks, should be fully assessed for guidelines for waste disposal and recycling. Trace water/rock/vapor partitioning processes. Aquifer drill cuttings and time sequence samples are needed from industry, as well as isotope analysis to characterize and track pollutant movement. The case study design should include scientists who live and work in the impacted regions. For example, involve Pennsylvania and New York watershed groups. United States Geological Survey scientists can also provide experience and perspective.

- EPA could conduct a case study in Pike County, Pennsylvania. In July, it was approved that Dominion could withdraw 700,000 gallons per day. The river represents the ecosystem, a natural state of being, and HF is going to be a threat to that. The cost outweighs the benefits.

- Case studies could include future projected case studies, scenarios that haven't happened yet, for example New York.

- Go to the state park in Ithaca and look at some shale and see if it's stable.

- Dimock gets a lot of publicity but Bradford has had just as many cases since drilling began. EPA should come down and see six or eight places where the water is contaminated.

- EPA should study Dimock, Hickory, or Pavilion. The contamination of drinking water in Dimock is a criminal act. Why is there not a forensic investigation?

- Finish the Pavilion study first, and then do the study in an area that has had ongoing drilling.

- Baseline information is essential to understanding a trend. How, a commenter worried that requiring a full baseline could introduce a bias into the study, like the bias introduced into the 2004 study by limiting the study sample to only CBM wells.

- How would the subsurface aquifer be affected in the peripheries of Broome Country by HF in nearby counties, and how would the Susquehanna and the Chesapeake Rivers be contaminated from drilling? A comprehensive case study is needed, and mineral rights should not be arbitrarily assigned to companies without addressing public and general property rights. This is a basic constitutional issue.

- HF isn't new; there is a history of actual relationships between HF and drinking water in Texas. There are ongoing plays like the Barnett Shale, Fayetteville Shale, Bakken Shale, and the Marcellus Shale. EPA should consider these four plays for case studies. Consider those plays as regional retrospective case histories and look at them from inception to the present. Look at the actual relationships and the number of minor and major incidents, including impacts of surface withdrawals, natural fractures, abandoned wells, and surface spills. Look at the incident rate, the incident rate by year, the causes (such as human error, well failures, and weather), the incident rate by company, and vertical versus horizontal wells. These data will allow EPA to compare and predict. Regressions would allow EPA to see how cases compare, to see what the trends are over time, and to forecast the number of incidents based on trend scenarios. EPA should see how rates and impacts compare to other industries like oil, coal, forestry, and dairy. In conclusion, these comparisons and predictions can be based on known past incidents, accepted statistics, and give industry and the regulatory community a common foundation of objective fact from which they can make informed decisions.

- Methods should include case studies in the areas with the highest well densities and population densities. Consider worst case scenarios.

- Case studies should not rely on any industry reports because all of these reports are horribly, terribly indifferent and inaccurate.

- EPA should be wary of industry obfuscation of truth and seek out the individuals who have been silenced by money, trucked-in water, and non-disclosure agreements. Seek out stories of how lives have become focused on what most of us take for granted.

- I would like to see EPA study gas migration in new wells and look at older wells as well.

Regulating Hydraulic Fracturing

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

- DEC is updating its regulations and many of the changes deal with inspections, disclosure of chemicals, and the pre-testing of water wells. The commenter has full faith and confidence in the diligence of DEC.

- Require companies to use safe chemicals, biodegradable chemicals, so that they don't poison the land.

- In New York State, ironically, gas is protected but not water.

- State regulations have strict safety standards and the safety record remains strong. Regulators have expertise in these areas and are part of the local community. They have significant expertise and knowledge about the geology, economy, and population—information necessary to properly regulate the industry. State regulators are equally concerned about drinking water quality.

- A consumer's group believes that states are best equipped to regulate HF. They support EPA in its effort, and urge EPA to carefully examine the impact of federal regulations on the safety of natural gas production. HF has been successfully regulated by the states for 60 years, and the states have valuable experience that the federal government does not. They urge EPA to consider the history of HF and consult the Interstate Oil and Gas Compact Commission (IOGCC).

- A landowner's group believes HF should be handled at the state, not the federal, level.

- A lot of states have done studies and enacted regulations, especially the New York State DEC. There should a statement out soon about that, maybe these will be the strictest regulations in the United States.

- The gas industry and these other large industries don't have to keep up to the same standards as smaller industries like housepainters. Industry is allowed to dump mercury, lead, toluene, and many other chemicals. DEC is incapable of monitoring this due to conflicts of interest. EPA needs to be involved.

- EPA made scathing comments on the SGEIS. EPA is bound to oversee enforcement, with the New York Department of Health. EPA should claim that right. Make those comments not suggestions, but mandates. When drilling waste is trucked to Pennsylvania—and *Scientific American* said it was likely radioactive—that's interstate commerce, which deserves federal oversight.

- New York State needs a federal presence and a state presence because air, water, and soil move across state lines.

- State regulation should continue without delay and the EPA study should be done in parallel.

- A commenter was concerned about the radium in the shale. Uranium is not soluble, so it ends up in a landfill, and it's not a water issue. But radium is soluble, so wherever the water goes, radium goes with it. If it's trucked across state lines this is an interstate federal issue. It's a federal mandate to look at this on a larger level.

- It's up to the federal government to step in now.

- Compulsory integration means if 60% of the people do it, everyone has to—well, 60% of the states have HF now, so the federal government should step in.

- There needs to be a national moratorium on this.

- EPA has heard very serious testimony. How could EPA not respond to a grown man who fought tears, saying "…[leasing] was the worst decision I ever made. My goats are all dead, my calves are stillborn, my kids are sick, and my pets died." EPA should tell President Obama that the United States needs a moratorium.

- EPA has federal jurisdiction but EPA needs the regulatory authority to exercise oversight if EPA moves forward at all, under the Clean Water Act (if it is restored after what happened in 2005) or under a new policy measure. EPA has the ability to speak up, to meet the President and support him, to advise Congress. EPA can say, "We have the jurisdiction to do this, and we do not have the regulatory authority to exercise oversight. If we don't have that, we need a moratorium. It's our oversight or no one's, and if no one's, don't move forward. We have the expertise to make that happen."

- Corporations lie. Advertising and lobbying are the most reliable methods; they're not looking at the big picture, only competitors and pricing and money. That's capitalism, but it only works with government looking out for the common good. We need the government looking out for citizens when corporations lie about their plans. It's called oversight and that is EPA's job, otherwise chaos would reign.

- There should be an immediate national moratorium until the harmful effects are eliminated from this process. If one pond caused contamination, then all the water is affected—if there is one negative effect, we are all affected, and so on.

- We need a moratorium right now.

- Mandate that pipe compressors be powered by electricity to reduce diesel emissions in populated areas. Reduce truck traffic. Mandate a national accounting system to track chemicals, in and out. Create a special natural gas Superfund and charge gas companies a fee for toxic cleanups. Have an alarm system to alert people of leaks. Mandate that well casings go into the bedrock and require documentation of this. Seal the casing sections together. Have a tax funding safe fracking methods research and development. Ban applying fluids to roads. Develop real alternative energy solutions to create green jobs.

- Make the gas industry be responsible under the Clean Water Act. This needs to happen before anything else. EPA must request this.

- There were no exemptions granted for HF; it was just deemed that HF was not what the Safe Drinking Water Act was designed to regulate. A well-regulated HF process, with treatment and disposal of wastewater, done safely, should be sufficient to protect water.

- Two organic farming organizations voted unanimously to support the FRAC Act and a HF moratorium. Chemicals must be disclosed; this is a property rights issue, because people have no way to protect themselves unless they know what to test for.

- Practices and technology and all fluid compositions should be as transparent as possible. We are all reliant on clean, safe drinking water. The production of natural gas and the process of HF should be well regulated and held to a high standard.

- Air emissions partially enter the hydrologic cycle and negate the progress made in the Chesapeake watershed. Reduced flow affects the total maximum daily load discharged into the Chesapeake, and this will require action from the federal leadership under Executive Order 13508.

- One problem is companies not regulating themselves, so problems occur.

- Government agencies appear to be captured by an industry they've been tasked to regulate.

- What about the Skaneateles, in Cortland on the sole source aquifer, what about lake water? Humans and non-humans drink the water. Special considerations for non-filtered water sources are unjust and arbitrary.

- Landowner coalitions have taken legal steps, like requiring the use of steel-lined tanks instead of pits and encouraging the use of recycled water.

- Know this: air and the water do not respect state borders. This is a federal issue that needs federal oversight. Protect the environment as mandated. Call for an immediate moratorium.

- A commenter supports HF provided it's done correctly. Based on personal dealing, they believe DEC has some of the strictest rules in the nation and recommend EPA adopt some of their policies.

- The injection of millions of gallons of poisoned water must be stopped. A complacent government has failed to account for the risks of this process. Think about it logically: sending carcinogens and endocrine disruptors into the heart of the planet, then leaving 35 to 50% of this toxic cocktail in the earth, which provides us with food, water, and air. That alone is unthinkable.

- EPA is a regulatory agency. Any contamination is unacceptable. Create regulations that enforce that idea.

- Strengthen penalties for violations, remove exemptions, and reverse the compulsory integration regulations.

- EPA should compare and contrast the Clean Water Act with existing regulations.

- We need a comprehensive model for total water use in this area, for industry and drinking water, projected for a minimum of 100 years. If there are 60,000 wells in the Southern Tier, with five to ten million gallons of water and 25,000 gallons of chemicals per well, that's a colossal and titanic use of water that needs federal oversight. Nobody is coordinating the water use of Pennsylvania, New York, Virginia, and West Virginia. The state is not capable; it has to be done centrally by the federal government

- A landowner supports the requirement that companies release the ingredients to EPA. The process should be similar to that under the Toxic Substances Control Act, where companies disclose information about new chemicals. This enables risk assessment without releasing confidential business information.

- Industry claims it's safe—several commenters have said this tonight, but industry won't disclose the chemicals. Chesapeake has withdrawn from drilling into the New York City watershed —why, if it's so safe, did they withdraw their application? We hear that the chemicals are such a small percent of the fluid, half of one percent, and it's so dilute. My ten-year-old daughter could figure this out: half of a percent of five million gallons is over 22,000 gallons. In Bradford, there are at least 4,400 wells, so that's 100 million gallons of chemicals beneath our feet. Force industry to disclose the chemicals so proper testing can be done.

- The HF techniques developed by Halliburton several years ago are much too dangerous to water and agriculture to use as an energy source. This may always be the case, but in case it is not, there should be regulations.

- Exemptions from the Clean Water Act and the Safe Drinking Water Act should be dismissed. Restore the universal federal standard that we beg EPA to step up to.

- Citizens need the government to fund and regulate police, firemen, and teachers so why is energy any different? Bring back the superfund tax.

- This exercise is nothing but a representation of the interests of the corporations that control the entrenched regulatory bodies of this country.

- The use of carcinogens in HF fluids should be banned. Carcinogens and endocrine disruptors are part of the 300 chemicals used in HF.

- Pennsylvania needs to enact legislation and make environmental inspection of Marcellus wells mandatory.

- If HF is so safe, why is it exempted from the Clean Water Act and the Clean Air Act?

- All of the science and engineering will not fix industry practices that do not have government regulations or common sense to keep them under control.

- The most important issue is the exemption from the Clean Water Act by the previous administration. The previous administration was instrumental in allowing these changes. EPA should undo it.

- Fracking is specially exempted from virtually every environmental law. Industry insists that HF is safe, but this contradicts the widespread serious contamination of water and land. If drilling is unregulated, what is the recourse? Taking on a monumental legal battle against corporations with unlimited resources? This is unacceptable and I hope EPA considers what happens to the poisoned people.

- Companies must release every chemical planned for use not only to EPA but also to state agencies and the public. They may not be exempted from the Clean Water Act, the Clean Air Act, the Safe Drinking Water Act, and Superfund.

Hydraulic Fracturing – General Comments

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

- HF can be done safely with little impact on drinking water with proper oversight, best practices, and partnership with the community.

- A citizen quoted from a newspaper that Marcellus Shale gas drillers in Pennsylvania commit an average of 1.5 regulatory violations per day. In the last two and a half years, drilling companies were cited for 1,435 violations—952 of which were considered most likely to harm the environment. Nearly half of the violations were related to improper erosion and sedimentation plans and improper construction of wastewater impoundments that contain fracking water. These impoundments were improperly lined or not structurally sound.

- EPA should to fulfill the grave obligation imbedded in the Agency's name.

- Who loses with the United States producing its own energy?

- Everyone wants this to be done right, and based on facts not fear and hysteria. Everyone should work together. No one needs exaggerated stories, grouping all spills under "gas" and believing that everything that is a natural gas issue.

- There is fear of contamination of drinking water, but HF is not new; it has been done for 60 years without a substantiated case of contamination. There are companies drilling today in Pennsylvania that use as few as six additives, all of which are found in homes today.

- EPA is doing an okay job communicating with the public. Whatever the results, they are useless if not properly communicated. Perhaps there should be a lay version and a scientific version of the study. Otherwise, this debate will continue on indefinitely. EPA needs to address concerns head-on. EPA can have a significant role if it can convince the public of its EPA concludes.

- EPA's new study on HF is nothing more than a political ploy by politicians for their own agendas at the taxpayers' expense.

- Safe, responsible fracking should be allowed with no delays.

- Don't let a few companies invade our homeland, extract our resources, and expose us to irremediable harm.

- A citizen of Tompkins County who has lived in Texas, Colorado, Wyoming, and Pennsylvania got a sick feeling when they saw aerial photos of the western United States. They felt that the West was gone. It is EPA's duty and honor to protect the whole country. EPA is supposed to protect us from energy companies.

- America has sat on their sofas and allowed the government to be purchased by greedy corporations and continue to subsidize them with taxes instead of limiting the life of fossil fuels.

- Every day waters are invaded by lawn pesticides and illegal dumping, are damaged by blasting at rock quarries and from particulates from coal burning power plants and wood furnaces that enter our lungs, lakes, and rivers. These are real environmental issues that warrant EPA's attention. People are promoting the irrational fear of water contamination to stall HF in New York State. Those people are overdramatizing the facts.

- Natural gas can be used for transportation to help make a greener economy. One is converting heavy trucks to natural gas usage. If we continue to use transportation as we know it, we will need alternatives to our dependence on foreign oil.

- HF has destroyed lives throughout the country.

- Everyone should pray to stop fracking for money—put a stop to it now, whatever the cost, even if it takes many years to not have any more pollution on the planet and to our land.

- There shouldn't be tanks all over for storing poison fluids. If toxins aren't put it in the ground, it won't come back up, and there won't need to be all these tanks all over the landscape. There are too many disasters on earth; EPA, don't be the cause of any more.

- Coal power plants are a major source of pollution and mercury emissions. The state will see 945 deaths and 75 heart attacks, and problems from coal will cost $100 billion. Natural gas is a clean-burning fuel that will help reduce power plant dependency.

- We've chosen to trash the planet with petroleum. We should make an investment for true clean energy. The government can't charge for the sun and the wind.

- A major priority should be additional funding. The funding is insufficient for the task before EPA.

- When a containment pond spills and cows are quarantined with their calves, there is obviously something dangerous to farming.

- Currently, the energy and industry policy of this country is a major government mistake. It should be reviewed for political, social, and economic reasons and changed.

- HF water and waste contains endocrine disruptors, radioactive materials, and carcinogens. It is inconceivable that anyone in their right mind would think it is safe to allow poisons near our water, air, land, and children.

- In 2007, Chesapeake drilled a dozen vertical test wells along a ridge near a commenter's house. Shortly after, the water from their well had a bad smell and taste and the drilling company provided bottled water. However, they cannot talk freely because of a non-disclosure agreement. These penalties should be waived for studies in order to uncover stories. Non-disclosure agreements should be nullified. The fact that the Marcellus, Skaneateles, and Onondaga Health Departments knew of this incident and did nothing is unacceptable.

- Widespread use of natural gas to replace oil is inevitable. The technology behind solar and wind will not fill the oil gap for many years. Natural gas is the next natural step in the energy revolution. It's cleaner and abundantly available regionally.

- The attitude of "not in my backyard" and continued foreign dependence mean we will give up the means to truly control and regulate the environmental impact of drilling. It's unlikely that Russia, Iran, and Saudi Arabia and other producers of natural gas and oil share our environmental concerns. Embrace the opportunity to be environmentally responsible while developing resources. This could provide a huge economic uplift. The fact is, further reliance on natural gas will take place. This is an opportunity to control it while gaining economic benefits. Otherwise, we could turn our backs as the future of our towns and states continue to decline.

- A commenter lives in Syracuse near Onondaga Lake, the most polluted lake in the world, and it's exactly the same as it was 40 years ago. The speaker asked EPA where they have been.

- We're spending so much time worried about fracking; we should worry about renewables. In Colorado, they get 10% of their power from wind in the last decade alone, and Denmark is close to getting 23% of their power from renewables. It can happen overnight. We're spending time wasting time on HF when we should be looking into the future.

- A commenter expressed concern about public law, private property, and competing private properties. John Locke wrote about private property but did not recommend contaminating his neighbor's property.

- Radium seeks out bone tissue when ingested, and it continues to emit radiation in our bodies. Radiation and toxic chemicals are the largest causes of cancer. One in three people here will die of cancer, and this is not good enough. This is because of chemical policies, or lack thereof, that have been in place for 40 years. No worse than the current regime is not good enough.

- The permitted withdrawal of over ninety million gallons from the Susquehanna as of September 30, 2010 for gas drilling will only increase the adverse effects on water quality and will only increase the cost of drinking water and sewage. Reduced flow will mean that wastewater treatment plants will need to have a greater reduction in their discharge to the river. Municipal water systems on surface water from the Susquehanna have to treat for increased TDS content. Accidental and willful discharges, drilling mud, flowback, and produced water will affect watersheds.

- Water is our most precious commodity; we can live without gas but not without water. Water is necessary for food. Why should we allow them to poison that which we require and does not have alternatives? Fracking and deepwater drilling are not the same, but there are similarities. It's a matter of when, not if, spills, even big spills, will occur. Spills with poison the water and do the most harm in ground water and aquifers.

- People say natural gas is a bridge fuel, but this is questionable. A Cornell professor said that a huge release of methane would be 60% more damaging to climate change than using crude oil—the impact would be similar to coal.

- A commenter wanted to let EPA know that the people who attended the hearings are just the tip of the iceberg; others are overwhelmed and just vaguely hope it won't happen. They're not social activists, they're mostly not environmentalists; they're just concerned with health and caution.

- A citizen was not against drilling for natural gas but was definitely against being poisoned

- This has been done safely for 40 years.

- It's very important to have things in as plainspoken a manner as possible. The idea of having two reports, with one for the general public, is good.

- A citizen supports the natural gas industry because they believe there is no question that safe, environmentally responsible drilling in the Marcellus Shale and other shales has benefits that outweigh the risks.

- The economy is tough, that's an enticement, it's tempting—many say it's their constitutional right to lease their land, like anything preventing a taking for which they could be compensated. But the cost to the people in the community needs to be talked about. Just being near a drilling site may cause homeowner's insurance rates to increase. If there is an explosion in your neighborhood as has happened in Dimock, PA, insurance might not pay for damages. This is not a potential taking but the theft of the single largest property asset people have. The economics are decidedly one-sided.

- The speed of drilling is fantastic. They are moving a well every 23 days. By the time the study is done in two years, 800 wells will be drilled. If there is ongoing damage, it will be great.

- Why are Swedish and Canadian companies investing in New York State gas and oil? Why should we export our jobs and our industry?

- When people say there's no contamination, a lot of that has to do with the nondisclosure agreements.

- Protocols to facilitate rapid drilling development at the least cost are compromising well integrity and construction as evidenced by the BP Deepwater tragedy.

- A commenter commended EPA for setting things right from the coal bed methane debacle.

- Rivers become creeks, wells dry up, and the pressure of drilling makes this worse.

- It's appropriate that the study will be done scientifically; however, there are limits to science. Proof of exact cause is very difficult to find, and good lawyers can argue a long time about it. We already have really good circumstantial evidence that water has been destroyed.

- This is a democracy. We are all entitled to equal protection under the law. But when the four percent of the population that owns 84% of the land makes a decision that affects the rest of us, that doesn't seem much like a democracy.

- There is wealth gained by this but it's inevitable that the short term benefit will ruin drinking water and reduce the quality of agriculture that is essential to this area.

- One mile below our feet is a good solution to energy, jobs and the economy, and tax revenues. There are always risks —this is no different, and they're not to be feared but assessed and managed. Get on with natural gas drilling and don't prolong this for years in the guise of studying it to death.

- A commenter supports natural gas drilling as long as it can be done safely. They think it is possible and ask that EPA not take too much time. Five or ten years is way too long.

- EPA should tell us what's acceptable and what's required to ensure that decisions are informed and based in reality. Areas surrounding HF and water quality are not unrelated matters.

- EPA should change the language of the study by switching the order of the priorities. Instead of starting with how natural gas is a key energy resource start with the second point, about the public's concerns: poisoned water, air, soil, infrastructure, health, the destruction of life.

- EPA should study the science, and the social science, but as paid land keepers, EPA should listen deep inside themselves where a person knows right from wrong. EPA should study with the mind, but listen with the stomach and the heart.

- This is an assault upon our land and our rights as a sovereign people.

- EPA should not forget about economic benefits or the dependence on foreign oil. Alternative fuels are quite a few years away yet, and this could help to bridge the gap.

- By safely extracting these deposits of natural gas, we advance our economy and improve our quality of life. For example, power plants can supply affordable energy to industry and SUNY Binghamton and other schools.

- Think wisely about the future. HF is most profoundly a moral issue. First do no harm. Nobody has the moral right to put so many in harm's way.

- A commenter thanked EPA for giving her a voice.

- EPA should publish all of the materials in the study, not just the study itself, to allow the public to review the data.

- A commenter believes in HF and thinks EPA will find every way to make it happen.

- The local media are only on one side, because fear sells papers.

- EPA should get out of bed with industry and start working for the American people.

- Is there any life on this planet dependent on natural gas that can exist directly or indirectly without water? Is the risk worth seven generations?

- Truth has been distorted by political agendas and it's time for EPA to sort through the noise and really study reality.

- The seven priorities set out by EPA Administrator Lisa Jackson do not allow for HF: (1) Take Action on Climate Change—look at the entire process, including greenhouse gas emissions from trucks. Methane is 72 times more potent as a greenhouse gas than CO_2, so even a small leak would have a big impact on greenhouse gas emissions and health. (2) Improving Air Quality—HF companies are exempt from the Clean Air Act. (3) Assuring the Safety of Chemicals—how is this possible when industry refuses to divulge the chemicals? They must be held accountable to the public and EPA. (4) Cleaning Up Our Communities—our roads, bridges, and water systems will be compromised because industry is not covered by laws. (5) Protecting America's Waters —visit the communities in Pennsylvania to see how the agencies failed to stop contamination. (6) Expanding the Conversation on Environmentalism and Working for Environmental Justice—putting children at risk for long-term diseases from endocrine disruptors, radioactive materials, and carcinogens is not the way to go about it.

- A commenter was first in favor of HF as a good way to increase farmers' incomes and protect farmland, which is an environmental benefit. Wind turbines, too, would give farmers revenue. But now that the commenter is aware of the unknown chemicals added by the millions of gallons, they are against HF.

- EPA should conduct unbiased and unbought research.

- The 2004 EPA study is a good one.

- The cyclotronic resonance of the earth is changing. Michael Faraday predicted a 50% higher ratio of sunspot activity at this time. That's fourfold the electromagnetism that is melting the tundra and shedding natural gas into the air right now. Is that a fair balance?

- HF is a barbarous process affecting water, air, farms, fields, forests, roads, infrastructure, and communities. All aspects of EPA's mission do not allow fracking in this nation.

- Everyone values water, but we all value energy too.

- Grouting failures like in Dimock have only happened a handful of times, and they do not destroy aquifers.

- There are a lot of people in the realty business who have been affected even before drilling started.

- Life cannot exist without water; water is our most precious resource.

- EPA will present the most complete and best possible findings.