Hydraulic Fracturing EPA Public Informational Meeting

Binghamton, New York

September 15, 2010 – Afternoon Session

Summary of Public Comments

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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 12:00 to 4:00 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 410 individuals attended the meeting and EPA received verbal comments from 124 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 (NYNYDEC) 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).

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?

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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 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

Public concerns for economy were divided. Many commenters stated that HF presents an opportunity to turn around the struggling economy of the region and thought that economic impacts should be included in the study. Other commenters, however, noted that development of the gas industry could jeopardize other industries in the region, which is heavily agricultural and also is a second home market. They felt the agricultural and real estate market options were more viable as long-term solutions for the New York State economy than the short-term gains that would come from natural gas development.

Environmental concerns were also a focus of verbal comments. Many commenters felt that the NYDEC had failed to adequately oversee HF and that the draft SGEIS should be withdrawn because it does not include cumulative impacts or because a generic approach to HF in New York State is not appropriate. A smaller number of commenters suggested that EPA and NYDEC should work together and that NYDEC's work could be a valuable resource for EPA. Many commenters also discussed the regional economy. Several commenters were also concerned about compulsory integration and the effects that drilling could have on adjoining properties or watersheds. The large number of residents relying on private wells, springs, or surface water was also addressed. Finally, several commenters argued that the same standards must apply to the entire state; the New York City watershed should not receive special protection not afforded to the rest of the state.

EPA's Hydraulic Fracturing Study

Scope

Many commenters expressed opinions on the scope of the study. The majority of these commenters are in favor of a cumulative, "cradle-to-grave" lifecycle analysis that addresses all aspects of HF and related activities. Commenters suggested a number of topics for EPA to study, including effects on agriculture and food supplies, exposure through bathing, land values, road quality, truck traffic, methane leakage, radioactivity, air quality, landscape values, health and diversity of flora and fauna, watershed impacts, and potential for pipeline leakage. Some commenters felt that EPA should take as much time as necessary and that $2 million may not be adequate to complete the study.

Another group of commenters felt that EPA should keep their focus narrow. Most of these commenters argued that EPA should strictly adhere to the Congressional mandate, though a few also noted that a narrow scope would allow the study to be completed more quickly. In general, these commenters also suggested relying on past EPA HF studies. Nearly all of the commenters asked EPA for a science-based, transparent, and peer-reviewed study. Many commenters warned against relying on fear, emotions, and misinformation.

Knowledge Gaps

Most commenters addressed the knowledge gap on chemicals used in HF. Commenters were concerned with the identity of the chemicals used and with the quality and quantity of information available (including risk assessments) for each chemical and the effects that chemicals have in combination. Many speakers mentioned the potential for "green" additives. Comments on treatment of wastewater and flowback generally centered on the availability of treatment facilities and processes. Several commenters also remarked that knowledge of the subsurface and its fractures in the region is incomplete. Commenters also provided specific information to help fill these knowledge gaps.

Case Studies

The majority of commenters who discussed case studies asked EPA to study Dimock, Pennsylvania regardless of the individual's position on HF. Other commenters asked EPA to make unannounced visits and not work with industry, so that EPA could observe drilling operations in practice and not experience only ideal sites. Other commenters requested that EPA focus on all contamination and pollution problems at sites, including surface spills, and not just the subsurface operations. Many commenters noted that not a single case of drinking water contamination from HF has been confirmed, but other commenters suggested that contamination problems were probably chronically underreported as a result of non-disclosure agreements and/or fear that revenue-producing wells would be shut down.

Regulating Hydraulic Fracturing

Commenters were divided on whether federal oversight is necessary. Some commenters felt that the states are effectively regulating HF and that waiting for federal regulations would cause an unnecessary delay for an industry that is creating economic benefits. Other commenters argued that states are unable to adequately oversee HF due to budget and staffing constraints and other issues. Several commenters suggested that since pollution does not stop at state borders, federal regulations are necessary to ensure equal protection. A number of commenters specifically supported requiring the disclosure of chemicals.

General Comments

A number of commenters discussed whether the United Sates should pursue natural gas extraction as part of its energy policy. These commenters generally argued that natural gas development should be limited due to the nature of extractive industries and the long-term cleanup costs. Other commenters discussed whether 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 felt that allowing HF prolongs America's dependence on fossil fuels at the expense of increased government investment in renewable energy. Another group of commenters focused on the economic benefits of the natural gas industry, especially in the current economic climate, and the potential for energy independence that HF could provide.

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:

- Unconventional gas production via HF should be prohibited in the northeastern United States, including New York State. EPA will reach the same conclusion. EPA should support the prohibition of this dangerous and costly practice and recommend the same to New York State. EPA should call for New York State to withdraw its deeply flawed draft SGEIS in favor of an independent cumulative study.

- EPA and NYDEC are watchdogs for safeguarding our environment. Professional rivalry should not prevent EPA from working with NYDEC on this very important issue and EPA/ NYDEC should not waste time duplicating each other's efforts. NYDEC issued a preliminary 800 page SGEIS report and collected almost 10,000 comments from the public and they are in the final stages of issuing a final SGEIS that address the comments. Surely this effort is not contrary to the EPA effort.

- NYDEC has failed us with an inaccurate draft SGEIS. It should be withdrawn.

- One in seven families are considered poor in this part of the country. These wells in Pennsylvania have helped poor people.

- A significant number of the households in Tompkins County depend on individual wells and have no alternative sources of drinking water. Others depend on rivers and lakes.

- In the past 10 years, there has been no greater regional environmental threat than HF in the Marcellus Shale.

- Five percent of Cortland County residents are leasing 50% of the land mass and state has leased another 10% of state forest land for gas drilling. How did we get to this place? Industry development with this process during the last decade turned fracking from a low impact process into a high impact process.

- Pennsylvania is drilling and they have all of the same structure. The drilling trucks come and dump the waste in New York and take fresh water back to Pennsylvania. Fracturing is also done in Black River Formation which is 12,000 feet deep.

- A local Chamber of Commerce collaborated with government, industry, landowners, and scientists to gather an accurate understanding of gas drilling. Development of Marcellus Shale will offer tremendous opportunities for the southern tier.

- New York State has been though a two-year process. People from outside and from within the industry have reviewed and commented on NYDEC's draft SGEIS. People's concerns regarding water will be reflected. EPA should produce a peer reviewed document. EPA should not shut down HF over fear. Industry should be able to drill safely, drill responsibly, and drill now.

- EPA should require NYDEC to withdraw its draft SGEIS in order to address the shortcomings specified in its 12/30/09 letter to NYDEC about Marcellus Shale hydrofracking in New York. EPA should enforce its "grave reservations" expressed in the 12/30/09 letter. EPA should also take action to prevent HF hazards from developing until its study is complete. NYDEC's draft SGEIS has received withering criticism. More than 10,000 citizens, elected officials, business leaders, and environmental groups have signed a coalition letter requesting Governor Paterson to withdraw NYDEC's proposal in order to rectify its fundamental shortcomings.

- Fracking is unbelievably boring. The only effect is the creeping influx of prosperity into the region, including new homes and new siding. People are proud of being home owners in this region again. All of this is due to gas wells. Can this spark of recovery survive more stalling?

- In Damascus, Pennsylvania the school districts are considering allowing gas drilling on their properties. Are our children going to be listening to trucks as they are adding up their numbers? This is unconscionable; the school districts are acting without considering the effects of drilling on their student's health.

- Imagine a typical rural neighborhood in the Catskills, with lots of five to nine acres. If one neighbor starts drilling it may cause noise problems, loss of ponds or wells, fish kills, death to white pines, and methane bubbles in swamps on the neighboring properties. Neighbors might get sick and it may lead to birth defects. The neighbors would have no recourse to stop the drilling. In fact, since technology allows for multiple wells per acres, one neighbor in a typical neighborhood could drill up to 16. In this case, the best the neighbors can hope for is a buyout at $3,000 an acre, but that will only allow them to live in a double-wide trailer. The only reason this would be allowed to happen, and is happening, is because natural gas is involved.

- Ithaca has always been an industrial town and is still dealing with industries that provided jobs and then left. The Ithaca Gun Company is now paying for the lead that was left behind in the soil. The same is true of the coal gasification industry as well. We are now trying to remediate all of the damage these industries caused. What will be the legacy of this industry?

- There are over 450,000 active wells in the United States and 12,000 active wells in New York. In New York State 20% of our energy comes from natural gas, and 90% of this comes from wells that have been hydraulically fractured.

- There was recently an earthquake near Toronto. Earthquakes are rare in this area because no new geologic energy is added to the mix. But the subsurface underground does have a lot of stored energy. There is a static equilibrium right now, but if we upset the equilibrium there will be new earthquakes in the future. The structural integrity of the Marcellus is being compromised. HF breaks and shatters the once solid rock. Its ability to withstand the subsurface pressures is greatly reduced. Introduction of large qualities of slickwater further reduced the resistance to geologic pressure. If the Marcellus Shale is made weak enough by HF, then earthquakes will result. The geology is complex and unique.

- Many people in areas of the state are reliant on very shallow individual well or spring water with no alternative sources or municipal water. Should gas drilling or gas production contaminate water as in Dimock they would have no useable water. The commenter doesn't have the money to relocate and can't think of how to manage to live without our water.

- Since New York State has such a large agriculture industry, EPA should slow down and conduct a thorough and unbiased study that considered air quality and effects to farm animals, wildlife, and children. EPA should talk to people near drilling sites to see how animals have already been affected and look at effects on products like cheese, hay, milk, eggs, etc. Environmental damage is irreversible if we move in haste.

- Dimock, Pennsylvania is surrounded by an uncontrollable industry that now dominates the landscape and discharges poisonous chemicals into air and rock formations every second of the day. Those chemicals are subsequently appearing in wells, streams, and wetlands. How will we ever be able to clean up what will become a superfund site that covers the entire Marcellus Shale geology across Pennsylvania, New York, West Virginia, and beyond?

- EPA should hopefully be able to get scientific data from New York State.

- Unemployment is reaching 10% nationally and 20% in New York State. People need jobs. The fear mongering of special interest groups should not be allowed to prevail.

- Leases and contracts are not designed to protect our water, and now Pennsylvania cannot either. Cabot says that Pennsylvania cannot guarantee the safety and integrity of its aquifers in the face of this industrial development. This is a rogue industry. This activity is in conflict with the state's own constitution, which states that clean water is a right for all citizens.

- Keuka Lake is rated by the New York State Department of Health (DOH) as an AA drinking water source. Half of the residents pump it and drink it right from lake. EPA is here to protect the entire United States of America. There have been over 1,400 complaints in Pennsylvania alone, from less than 1,000 active HF wells. This indicates that there is a problem with HF and environmental health.

- The Binghamton area is one of the most flood prone regions in the country. Are surface impoundments a real option for this region? What are the options for disposing of fracking fluid?

- There isn't one permit for horizontal fracking in this state, so there is no record of accidents in New York. Let all of the people who want this to happen say that they are fully responsible and they will pay for all damages and the other things that may occur. The Cabot Company has been shut down in the whole state of Pennsylvania for irresponsible drilling.

- The current study design is inadequate to address the dangers of HF on the eastern seaboard. This region of the country has four times the population of the west. The east is prone to heavy rains and hurricanes, which raises the chance of widespread spills. New York State is the sixth largest food producer in the nation, and water is used to raise all of this food. Water in New York State is not a single use commodity as it is in the West. People living in a drilling area are suffering from liver failure, cancer, emphysema, and more. Why? Air pollutants can travel as much as 200 miles from drill sites. Airborne pollution must be included in the study deign. Let's do it right with an independent study.

- It is impossible to assess effects without looking at the social economic factors in Ulysses: 37% of the town is leased, but these lands were sold by less than 6% of the town. Thus 94% percent will lose tourism, education, land values, etc.

- This study needs time to learn from science and from our neighbors in Pennsylvania and for calm, careful, deliberate, reasoned legislation informed by science and the land and people of New York. That is EPA's responsibility as our protection agency.

- The Finger Lakes are the most beautiful place in the world and may be destroyed by HF. Nowhere in any of the leases does it list the chemicals that are in going to be injected, because Dick Cheney slipped the non-disclosure clause into the 2005 National Energy Policy. The mission of EPA is to protect human health and to safeguard the air, water, and land upon which life depends. EPA to do this study and not to side with corporate greed.

- A New York State resident found that it's hard for us to bring water to our house when our well runs dry because our water hauler is currently taking New York State water into Pennsylvania to sell to well drillers for their camps.

- Sullivan County is less than 90 miles from New York City and we depend on tourism and our position as a second home market. New York State estimates that for every $1 directly generated in tourism, $7 are indirectly generated. The SGEIS says for $1 directly generated from gas drilling $1.40 is indirectly generated by the gas industry. In 1969 Woodstock was held outside Bethel, New York. In 2009 Bethel Wood was ranked 39 in the top 100 worldwide amphitheater venues. It employs more than 36 full time employees. Bethel Woods is cultural and economic driver for the region but its success

all depends on tourism. Without clean water and clear rivers, there will be no reason for people to come.

- Approximately 75% of the land area overlying New York's Marcellus Shale involves major sources of public water supply. If those ground and surface waters become polluted by HF, the drinking water for more than 8 million New Yorkers could be irreparably harmed.

- Scenic views will become industrial lands because, while only 6 and a half percent of the residents near Keuka Lake have signed leases, this leased land covers over half of the area around the lake. How about a wine tour where people can look at all of the industrial wells along the way? Goodbye farms and organic farms. Hundreds of thousands of trees, goodbye. What about the gas leases signed near the lakes? What's going to happen then these two come together? The Finger Lakes deserve the same protections afforded to the watershed of New York City and Syracuse.

- A large garbage truck crashed into the community school in Ithaca not too long ago. How will the brine tankers and trunks navigate the steep hills and icy winter roads?

- Educators may have misled people as to what is in the subsurface, and in thinking that the subsurface is regular and predictable. That is a serious distortion of the highly fractured and variable hydrology that lies above and below the Marcellus and Utica Shales. Few things are known for certain and we don't know what we don't know.

- EPA should study the air quality impacts of HF, as air affects every person in a community and beyond. New York State DOH has reported at one of its test wells that the levels of radon tested in the air were 500 times the allowable level, while those in the water were 200 times the allowable level. Due to known high radon levels in the Marcellus, carcinogenic exposure through our air should be included in the study. The National Weather Bureau has 30 years of records, indicating that upstate New York prevailing wind patterns are from out of the north/west, going south/east, exactly in the direction of the New York City water reservoir from upstate. These winds will carry toxins in the air for a distance up to 200 miles, to the New York City reservoir to settle in its water. New York City cannot be safe without protecting upstate New York's air. Contaminants will be carried there through the air.

- NYDEC's SGEIS is not adequate; not expecting residual or cumulative effects to the ground water is ludicrous.

- A commenter stated that he owns and operates 370 power units and employs 530 people. Since April of this past year, the workforce has increased by 130 jobs. If this process is approved in New York, this increase will be replicated in Pennsylvania, where $3.8 has been paid out to landowners. It is an interesting area to examine: these jobs are not Wall Street jobs, they are blue collar. These are Main Street jobs that could provide work to an additional 200 people tomorrow if HF were approved. While the science is critical, the issue is that we need jobs. Twenty percent of the Southern Tier is unemployed. Economics should be weighed equally with the science.

- The town of Oneonta owns half of the 4,300 acre watershed, but the other half is privately owned. According to New York State law, the town has no control over drilling activities in the privately owned half. New EPA guidelines should protect all municipal watersheds. By prohibiting drilling in any municipal watershed, the major concerns will be solved.

- New York State is two years ahead of EPA. EPA should tell the state, "Don't wait for us to release your recommendations."

EPA's Hydraulic Fracturing Study: Scope

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

- EPA should conduct a cradle-to-grave study. Pretest all wells no matter how far from drilling sites, because water runs fast and far. Come back and test again. Give us facts.

- A comprehensive study is needed because water is ingested in numerous pathways, including indirectly through food and bathing. To limit EPA to anything less than a comprehensive study of all sources misses the point of human safety.

- Let science guide policy. The gas is going to be there. Everyone is going to make their money eventually. EPA should take their time, do it right, and get it right. As long as EPA is studying HF, EPA should include air pollution. One concern is the large number of truck trips and methane leaks. The research into this topic is very important. EPA should not rely on industry-funded studies such as the MIT or Penn State studies.

- EPA should stick to the request of Congress to study HF and not digress to other areas.

- In the Marcellus Shale play there are big rewards and big risks. Because the risks are so high, EPA has a responsibility to do the most complete study it possibly can.

- Congress did not ask for a political opinion poll, they asked for a study between the relationship between HF and drinking water with the best available science and peer review. EPA should use the 2004 study as a baseline and then gather newer data. EPA should reach out to Schlumberger and the Society of Petroleum Engineers (SPE) for data to supplement the prior study. This should be the only basis for the study. EPA should not expand beyond the Congressional mandate. Covering water resources other than drinking

water resources as well as potential impacts is an expansion of EPA's mandate and is wrong.

- If EPA insists on expanding their Congressional mandate they must also include economic impacts at the micro and macro level, looking at farms and families facing foreclose. Losing a farm also has an impact on human health, not to mention the impact of foreign wars to secure energy resources.

- A commenter asked EPA to investigate the drill cuttings and flowback waters.

- Extractable volume, inter-basin transfer, protection of downstream users and public-drinking water supplies or fishery habitats should be examined.

- A major goal for the driller is to hit a sweet spot, which, among other things means more extensive fractures resulting in the quick and continuous release of gas. The more extensive the fracturing, the higher the probability of fractures intersecting with water bearing formations or faults leading to such formations. EPA may mandate careful study of strata before drilling to reduce this probability, but it will not reduce it to zero. EPA must mandate a probability of gas-water contact.

- Citizens that own and live on the land often raise crops and livestock. The land does not belong to the federal government or special interest groups. Owners are stewards and the last people who want to see it harmed. EPA should conduct a technical, scientific study.

- Do not limit the study but be as broad and comprehensive as possible. We rely on EPA to have a broad study of the full economic impact.

- Please stick to the science and geology. Based on mines drilled in Colorado, EPA said that in order for HF fluid to migrate, the reality of physics would need to change.

- EPA should adopt the holistic view of fracking, including all the consequences in the lifecycle of HF, which is the view used in anthropological studies. It assumes that everything is interconnected. This study must also encompass cumulative impacts overtime and across terrains. Anthropology focuses on humankind. This study must put humans in the center.

- EPA should study metabolic and endocrine disrupters that evaporate and are leaked and spilled into the air we breathe. Twenty-five percent of people living over the Barnett Shale develop asthma as opposed to 7% in the rest of Texas.

- The study should include municipal water system polygons within 0.5 miles of a water source. EPA already regulates municipal water quality and already monitors at many of these sites. Using these sites could minimize new construction and cost of new monitoring infrastructure.

- EPA has said this study will be about the potential adverse impact that HF may have on drinking water. If there must be a study, then it should be focused on this issue alone. Since HF is so critical to the energy supplies of the United States, an expedited schedule should be established, and the work should be completed as soon as possible. Convincing proof and arguments need to follow the scientific method. This study should focus on potential risks to drinking water and nothing more. The study should be conducted in pieces and narrow the focus from to be more specific, with decision points along the way to determine if the findings warrant more investigation in future phases. EPA has a well-documented peer review policy. Both EPA and the Office of Management and Budget have said it is important to perform peer review for influential scientific information and assessments. Since this HF project is of such great national importance, EPA should incorporate its peer review process using the strictest requirements, including external peer review.

- EPA should evaluate both the benefits and the potential cost to the American people should this technology be restricted, further regulated, or removed from use. Should restrictions be put on this process, EPA should look at other potentially under-regulated processes. There have been many other environmental processes that do not receive this about of review, for example, leakage from septic systems. EPA should expedite this process and focus on drinking water supplies.

- An environmental group quoted EPA's December 2009 comments on the draft SGEIS to support a cumulative and indirect impact assessment and a more in depth look at water quality, wastewater treatment, air quality, radioactive materials, human health, and cumulative environmental effects. They presented materials documenting the heightened risks posed by fracturing to aquifers and ground water in the porous, faulted, and seismically active geology of the northeastern United States.

- EPA should study the significant negative and largely overlooked economic and social impacts, including effects on property rights, property values, the tax base, employment, and local industries. These are indispensable to any complete assessment.

- Watersheds are invaluable resources for habitat and open space too. Significant revenue is derived from this sector of the economy, and it is linked to forest protection. Other benefits include pollution treatment and removal, erosion control, water purification by settling out of silt and organic matter, the slowing down of water surges, providing training and resources for scientific research, and providing sources of nutrients to foster forest growth. Watersheds also provide outdoor laboratories, sources of nutrients and nurseries for wildlife. HF threatens these forests with clear cutting for drilling pads and fragmentation from access roads and pipelines as well as air pollution from machinery and condenser tanks. Also, HF fluid spills and methane leaks could further compromise these watersheds. HF could also allow for the introduction of invasive species. If the natural benefits of these watersheds were lost, water filtration plants would cost 10 times the current expenses maintaining these watersheds and are less effective.

- EPA was charged by Congress to conduct a study on the relationship between HF and drinking water quality. Do that study, not another one. Study the overwhelming success of HF. There have been isolated events, magnified by the media and special interest groups.

- It has been 32 years since the Department of Energy first began investigating this technology and 20 years since Schlumberger began using HF. State regulators and Schlumberger should be able to give EPA the needed information on the state of this technology.

- This study was prompted by political purposes, not by new scientific findings on the process of HF. EPA must review the experts: the state regulators who have been doing this for decades. Congress asked EPA to answer a simple question, so cut to the chase and do not waste time and money. Answer the question Congress asked.

- Public health should be the number one effort in this study. Protection of our ground water resources is paramount; any problems should be handled immediately. EPA should work with states and industry. An interconnected approach will create a study that can put the public's mind at ease and ensure that their drinking water is being protected.

- The focus should be on whether HF poses a safety risk to public health. High volume, high pressure HF has a poor high cost/benefit ratio. EPA should look at human ecology results for both urban and rural communities.

- Do not allow anyone who stands to benefit financially in the short or long term from any aspect of gas extraction to be part of EPA's scientific study. Simply put, do not have the fox deciding how we understand the safety of the henhouse anymore. Those days must end to make this study credible.

- EPA should make its investigation consistent with Congress's legislation, which directed the Agency to clearly determine the historic relationship of HF shale formations to facilitate natural gas recovery and the effects, if any, upon aquifers and surface water including wells. Further, to determine the risks, assess benefit/cost ratios and promulgate regulatory guidance for the states to implement. Recognizing that all projects will always take all of the time allotted to complete and, that, according to Pareto's principle, 80% of the effects will come from 20% of the causes and that the law of diminishing returns will apply, the Agency should keep its scope of effort limited to the historic and most likely effects on environmental water and to fix a near term date certain to complete its work and to stick to it.

- EPA should have as its highest priority that gas and liquid follow the path of least resistance. Methane can exit the subsurface through either immensely long torturous pathways or by the three inch pipe supplied by the gas drilling company, which lead directly to the surface. Please hold real science as the highest priority and ignore the emotional hysteria.

- The EPA study should be comprehensive, independent, and unbiased, and should take advantage of local knowledge in the data collection process. The study should encompass the entire lifecycle of the HF process, from the geology of the formations, treatment and management of produced water, through abandonment of the well and the fluids left behind. In addition to the HF stage itself, EPA should look at both surface and ground water contamination (which is linked) caused by development of any well that is hydraulically fractured, including by spills, leaks, other accidents, inadequate casing and cementing, and poor wastewater management. Unlike the fatally flawed SGEIS, EPA must consider the cumulative impacts of many wells across the landscape, which NYDEC sidestepped entirely. Unlike its 2004 study, it is critical that this EPA study should be independent, unbiased, and performed without influence by those with financial interests in HF or the natural gas industry. EPA cannot rely on public relations materials and claims in conducting this study, but must consider the actual day-to-day practices of the industry and the regulators. This means acknowledging that drillers don't always follow the rules and regulators are stretched thin. Thus, study methods must include unannounced site visits. The study should involve people with expertise and local knowledge in the regions studied. Scientists from out of town may be very competent in their fields, but local scientists and lay people with intimate knowledge of the history and characteristics of the areas studied are invaluable to an accurate outcome.

- EPA has heard from many emotional people who will not learn the science of drilling and who will believe what they are told. EPA should investigate HF and how it relates to drinking water resources following its Congressional mandate.

- Two weeks ago the State Department met with eleven other countries to offer our experience of HF. Also, the Department of Energy has not been allowed to publish the DOE Road Map to Water Use report because the report shows a head-on collision between water use in energy generation and public water supply. If the report shows that HF is bad, EPA will not be able to release the report. EPA, as protectors of our environment, must take charge and stop the industry from destroying us. Issue a moratorium now. Do not limit the study to a narrow process, but consider everything from microscopic organisms to adult humans. We are all connected. Evaluate this from both an individual case study basis and a cumulative synergistic basis.

- Two million dollars is not enough. Request funds to look at the lifecycle emissions studies that now indicate this kind of drilling will increase carbon and methane emissions, speed climate change, and thereby affect ground water for generations to come.

- Two million dollars over two years is grossly inadequate. EPA needs more time.

- A political representative felt that the comments at this meeting are indicative of EPA's and the public's need to produce an objective comprehensive scientific study that fills the gaps in our knowledge. He expects this study to be a full analysis of the risks to water and air posed by the industrial processes involved in HF.

- Successful environmental policy is a goal primarily achieved by facts, not politics or fear, and on a singular basis as proposed by Congress.

- Economics cannot be separated from the impact analysis. EPA should address the effect on rural communities, especially the effect on wastewater facilities. The commenter's group works in capacity development and believes infrastructure impact is an important effect because the delivery of drinking water can't be separated from the water itself. The integrity of water treatment plants is critical to allowing these people to live. Impacts on other built environments besides these plants as well as natural environment should also be examined. Include infrastructure in rural areas as a section on impacts of wastewater utilities, in particular, the kind of technical assistance these rural areas would need.

- EPA should look at the cumulative impact of so many wells; there would be an estimated 4,000 wells in Broome County alone. The probability of contamination becomes very high with this number of wells. It is good that EPA plans to study the lifecycle of these wells. EPA is our EPA. Gas migration and leakage are also big concerns. Also, EPA should require industry to develop new technology that will not require the use of such vast quantities of water.

- Because there are 320 truck trips for a 2 million gallon frack and the 1,440 trips for 9 million gallons of fracturing fluid, people can already see what is happening to the roads.

- Threats to air and water are a concern, particularly for shallow well water supplies.EPA should recognize that many rural Americans have shallow wells for water that are easily compromised by surface spills of HF fluid or leaks from inevitable truck accidents. In light of the BP disaster, any model that EPA uses should operate under the assumption that companies will skirt the regulations as much as they can. Any leaks in the commenter's area would run downhill to the well. EPA should have an external review process so that people can participate.

- EPA must take a long term view that puts the health of the environment first. EPA must look at the cumulative impacts of HF. EPA needs to address effects on all water supplies —surface and subsurface, municipal, artesian, and even unconfined aquifers.

- EPA must study and regulate the full lifecycle of fracking on all natural resources which include using up our finite fresh water under increased demand from population increase and climate change, fragmenting the health and benefits of forests when every tree is need for carbon sequestration. Include cumulative impacts to air: methane is 72 times more potent as a greenhouse gas than CO_2. The disposal of radioactive produced water will have a negative impact on community health by obliterating the housing market. Tourism and farming—the food that keeps us alive—will also suffer.

- The FDA would not allow development of drugs to be accomplished in this manner: over real lakes, real people, and under uncontrolled circumstances. The study design should go back one step and not make the assumption the high-volume slickwater HF is a given. Let's determine if the process itself is warranted. How many people will sicken or die

from accidents, what it will cost to remediate the thousands of potential drilling pad superfund sites that will dot the countryside? Can these sites ever get a diverse, healthy economy on the surface once the gas is gone? Determine the cost of subsidies and exemptions

- It is within EPA's power to protect the air, the water, the land and people's lives and EPA should not take this charge lightly or with regard for anything other than their safety and the safety of our planet. The financial gains—no matter how large—are nothing compared with the future health of everyone and everything dependent on our environment.

- The future of our communities is at stake, and the precautionary principle demands proof of safety prior to proceeding. EPA should be guided in its study by this philosophy.

- EPA should study the process. EPA should go somewhere else and see if they can make it better and fix it. It's something that many corporations do. Get the facts, make a summary, and it's done. EPA's timeframe is a little long.

- There continues to be misinformation stating that drilling may contaminate our drinking water, that it will affect our live with seismic testing and regional earthquakes and cancer. All of these statements are based on accidents distorted by people who want to delay drilling and ban drilling in the United States.

- EPA should keep in mind the singleness of purpose in the Congressional mandate. EPA should act on only science and act with experience. Many illusions have been presented as facts. Emotion has directed the discourse. Facts are as follows. HF has been employed in 26 states of the union. There has not been a single documented case of pollution. Each state has a strong regulatory apparatus in place. What has really important this study? Fear or facts? Twice this agency, under two different administrations, has been directed to perform an investigation into HF and only one conclusion has been drawn—HF is a safe practice. Failure would result in the cumulative impacts of another sort: jobs, revenues, and individual properly rights stand to be lost.

- EPA needs to study air quality as well as water. Air quality in Dallas-Fort Worth now rivals Beijing on hot sunny days.

- EPA must go beyond the relationship between HF and drinking water.

- Congress has asked EPA to conduct this study about the relationship between hydraulic HF and drinking water. But we already have 60 years of research saying this is safe. This study is a waste of taxpayer money.

- EPA should study the impact of the entire natural gas lifecycle. Exploring the results of individual case studies is essential, but the study the cumulative impacts too. The NYDEC draft SGEIS does not consider cumulative impacts and is therefore. EPA should focus on private wells as well as public water sources. Sustenance of flora and fauna also

need to be considered. EPA must mandate that states and locations develop inventories of their water resources. Comprehensive inventories and planning for all water resources is critical. Consider air pollution as well. Finally, the study needs to consider that for many states, coping with fiscal deficits has resulted in a reduced ability to regulate and adequately handle wastewater and other pollutants. New York State has lost 450 positions since 2007.

- The inevitable leakage from pipelines, like those in San Francisco, offers another reason for this investigation.

- EPA should observe the entire process, read all of the labels on every chemical used, require drillers to use noise abatement and dust abatement, require companies to pay to maintain the roads in our communities, ban drilling on weekends or religious holidays, and mandate that the gas recovered from these wells be sold only in United States. In *Silent Spring*, Rachel Carson said to be vigilant for the environment. The commenter hopes that EPA is vigilant and was also shocked to see a faucet being set on fire in a movie.

- EPA should think of the survival of the seventh generation. EPA must bear in mind the responsibility to the future now and always. This is not being accomplished. EPA should secure adequate funding and take the time they need. The gas is going nowhere. EPA should study the effects of natural gas drilling cradle to grave.

EPA's Hydraulic Fracturing Study: Knowledge Gaps

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

- The toxic and radioactive naturally residing compounds in the earth should be of equal or greater concern than the introduced chemicals. Leaks and spills are front door avenues for contamination, but faults and fractures are back door concerns that could be harder to contain and fix. It is the gas industry mantra that what is injected is so far down can't possibly reach drinking water, but numerous studies suggest otherwise. EPA needs to understand these processes of migration. The HF process supports migration of gas as well as everything else. Fractures goes along the path of least resistance, so it naturally extends cracks and factures that already exist. EPA needs an inventory of these features where they are present.

- EPA must understand the scientific basis of this contamination and require remediation. Does this contamination come from the lack of integrity of the well bore or the lack of confinement of the HF fluid in the shale layer? EPA must also test the ground water prior to the wells being drilled, during, and after to understand really what is there. EPA should also require identification of the specific chemicals being used. EPA must also require treatment of produced or flowback waste in a manner that is safe for surface discharges. Only then does EPA fulfill its name of "protection."

- Biocides are the most serious of the potential contaminants to drinking water from frack fluid. At this time there is little knowledge of the biocides that could be used in anyone well as the use of these chemicals vary with the well's subsurface conditions, the components of specific fracking fluids used, the firm undertaking the fracking process, and other variables. These compounds are severely toxic to fish and other aquatic organisms and can be dangerous at very low levels (just a few molecules). They are probably long-lived and able to migrate underground with fracking fluids when such migrations occur.

- EPA should conduct a controlled study of the biocides in use, the ability of these chemicals to migrate from one area to another as underground contaminants and the short and long term effects of all of the biocides in use on the ecosystems in which fracking might be undertaken.

- The engineering firms working on "green" fracking fluids have a problem getting rid of the toxic biocides. Fracking fluids will probably always be toxic and hazardous mixtures due to the biocides in use.

- Please investigate the seismic implications of widespread HF in the Marcellus Shale. Please examine the unintended consequences. The buildings and infrastructure are poorly prepared for even a medium earthquake. Do not bring us closer to this disaster. One earthquake can really ruin your day.

- Industry claims that injecting at high pressure without full knowledge of the subsurface geology of New York State and recovering some of those fluids and shipping them across the surface is an unsafe process. Fracturing will cause conditions that make transport of contaminants from the shale to surface aquifers possible, even if transport may take decades or centuries. Zone of preferential flow may allow for faster transport. A commenter recalled a location where a well drilled into the shale later had dynamite dropped into it.

- EPA needs to go out and look at the geology.

- A life-long Catskills resident draws water from a spring and is deeply distressed about the possibly of high-volume slickwater HF. It is dangerous process that can only lead to more harm than good. They are alarmed by the falsehoods that the gas industry is spreading. The ground below us is not solid and the reality is that we don't know what lies beneath us with any certainty.

- Where are the gaps in current public knowledge? We need natural gas to be a bridge fuel while we develop a green energy future. The "secret formulas" of the drilling fluids are all available on Halliburton's Web site. It's proportionally all of the chemicals in the fracking fluid.

- The issue of radioactivity has not been addressed. Drill cuttings cannot be put in municipal landfills in Pennsylvania but they can be in New York State. They are spread

on field and leachate ends up in wastewater treatment plants that can't handle them. The highest priority for EPA should be to examine human and natural life and protect wells in rural and suburban areas. There should be no acceptable risk level. Do we poison someone a little or all at once? What an insane calculus.

- EPA's handout was biased in favor of natural gas extraction, as evidenced by the phrase: "Natural Gas plays a key role in our nation's clean energy future, and HF is one way of accessing this vital resource." Natural gas is not clean energy. Nowhere is it asked if—with current technology—extraction can proceed in a low-impact, environmentally friendly matter. Such records are difficult to find. The assumptions are serious flaws. The NYDEC does not compile a record of drilling problems encountered. The result is a dearth of official documentation because the state is too friendly with the industry. This study must examine case studies and look at record keeping policies.

- The worst threats are deep underground and include naturally occurring chemicals and radioactive elements. They have been underground for hundreds of millions of years. Radium-226 decays into radon. Radium-226 is a carcinogen that can cause leukemia. New York State NYDEC says frack fluids have levels of radium-226 that are thousands of times the limit that is safe for people to drink. It is very unsafe for children, but this threat is never addressed adequately. Radiation exposure in children has a greater risk than exposure later in life. Look at aerial photos that show well pads interspersed with homes.

- There is risk of the contamination of essential life systems such as water, air, and soil and causing harm to wildlife and humans through exposure to dangerous chemicals. The Endocrine Disruption Exchange (TEDX) is currently conducting studies to explore health effects. EPA must ascertain the health effects of chemicals used in HF. Many are considered hazardous waste. The commenter provided a list of 944 chemicals used in HF and noted that 43% of the chemicals on the list have absolutely nothing known about them. No one knows how much stays underground or how much is coming back to the surface. Additionally, the geology underground is not fully understood. What people don't realize is that gas does not come out of the ground dry, it comes up wet. Many of these chemicals are endocrine disrupters.

- It only takes a while for drilling to start before reports of contained well water surface. Sometimes it is one or two people speaking up but usually the true tale is told in another way: the story is told by a growing number of water buffalos. The big leaseholders don't complain because they are afraid their wells will be shut down. Others can't complain because the replacement water has come at a price because of a non-disclosure language. How can there ever be a proven case of contamination if the enforceable requirement for remediation is a non-disclosure agreement?

- This is just the beginning of all of the information we need to know about this process.

- The commenter has a gas lease but opposes shale gas mining as it is currently done; their main concern is water. Open pit fluid is more than a possible pathway, it is a sure thing

for contamination. All ponds overflow in this climate. Since green additives will probably be discovered for fracking, it is ridiculous to add 1,000 gallons of toxic additives a few years early instead of waiting.

- Citizens have concerns about wastewater and fluid disposal.

- Radium and other radionuclides in the backflow water might be a cause for concern because injection in the subsurface at high pressure liberates particles down to the molecular level. Radium, a decay product of uranium, is often present in the rock and in backflow water in concentrations that are sometimes high relative to EPA limits for drinking water. The concentrations are also higher than those in water normally treated at wastewater treatment plants. EPA should be aware of new technology that sequesters radioactive elements in the walls of the drilling pipe. The pipe remains below ground and thus the radioactive component is never released to the surface making treatment of the waste water simpler and reducing the chance of extraction of radionuclides from surface which can present health risks or security risks. The radionuclide matrix in the pipe can be removed mechanically at a convenient time.

- High volume, high pressure horizontal HF is in no way comparable to the vertical kinds of fracturing used for decades.

- EPA should also look at surface water as well as ground water. While it isn't any longer recommended, many people in this area still use surface water as their main source for drinking and household use.

- A national group opposed to HF was further concerned by the oil drilling disaster in the Gulf of Mexico because it demonstrated how worst case scenarios can and do happen. They are worried about the possible loss of our useable water. Permanent damage that might be done, the production phase that may last for decades, the active underground slickwater high-volume HF may not give one incident like the Gulf, but the cumulative impact can be bigger.

- EPA should consider flowback water disposal and that there is no guarantee that the methane won't enter drinking water. Also, do not ignore serious issues of air pollution. Evaluate all environmental impacts under regular cases and under failure. This is a very new process, not the one that is 50 years old that some people have been discussing.

- EPA should look at Salt Solutions. They process frack wastewater in Livingston County and do pretreatment of frack water.

- The main technique used here is horizontal high-volume slickwater HF, which has been practiced for less than a decade. The difference between these two technologies, to borrow from an earlier speaker, is like the difference between a chicken coop and a factory egg facility.

- EPA needs to understand that some of the issues surrounding HF include high salt content and water resources, and that as new technologies developed, these technologies can be adopted to show how natural gas extraction can be an important green energy resource.

- If allowed to speak freely, industry workers could constitute a valuable source of information and shed light on the work culture that often rushes to get wells producing. Industry has also ready procured their desired results from their studies. They have already had their input. As the Onondaga remind us, people can't drink gas.

- How will HF impact our society now and in the future? What kind of legacy are we leaving to future generations? Will they question the motives of our government? Why did people cave into cooperate power and government in place of their health? Young women and children are more susceptible to environmental pollutants. Our country seems to be forgetting that it is made up of citizen with the unalienable right to good health, clean air, and clean water.

- The industry insists that there is no proof that gas drilling has contaminated water, but surfactants have been detected in residential tap water. Independent labs verified that. Only one case is needed to show that contamination can happen. We need data and more studies.

- A national conservation organization has two concerns. First, EPA should look as hard as they can at the long term effect of the industry on the long term state of water quality. Look 100 years down the road. Given what the previous speakers have mentioned about earthquakes, leakage, and the breakage of these famous concrete casings, this is important. Second, what is the surface effect of natural gas drilling, particularly with regard to natural habitats? What is this going to do to the water quality for other animals and plants? On the surface there will be pipelines, noise, etc. There is quite a lot of wildlife that won't migrate across roads. There are also edge effects that allow predators and invasive species to get in. Consider what species may become endangered.

- The Marcellus Shale has an inadequate scientific knowledge basis. A group representing over a million American scientists tentatively concluded that shale gas is not a clean fuel, although there is much uncertainty in the analysis. The carbon footprint for shale gas approaches or may exceed that of coal when all factors are taken into account. The analysis of these numbers is driven by methane leakage, which is difficult to estimate. EPA has a great opportunity in this study to remedy this knowledge gap and other gaps. The most uncertainty is associated with the risk of contamination of ground water, which is very difficult to find.

- Look at how the leases are structured and if people are being pressured and threatened to sign. In the commenter's experience, every question she asked of the drilling company was answered with a lie.

- A gap is an uninformed public. That we don't know what we don't know is a gap. Nobody wants a devastating output.

- EPA should look at the new process of fracking. It is new, not decades old. Also, investigate eastern rock strata, which are unique and in which fractures are naturally occurring. These rock strata present multiple pathways naturally occurring, and poisons rise. EPA should also take advantage of research scientists. New toxic effects are not reversible. Medicine offers little relief.

- What is the cumulative effect of large ground water withdrawals? What is in the millions of gallons of HF fluids? The Marcellus Shale is a very dry formation. It is reasonable to assume that chemicals can migrate into our drinking water by fracture or spills. For the wastewater that does come back to the surface we do not have treatment plants and shipping it to state with less stringent guidelines for disposal, which is happening, is not an answer.

- A green space preservation group is very concerned about this process because a state forest is subject to logging or mining, or even natural gas extraction. They are in full support of all other groups that oppose HF in New York State and elsewhere. EPA should study the water supplies before and after drilling and look if industry has kept record. Look at them and see how they compare with direct observations. EPA should also study alteration of the surface landscape, including clearing of vegetation and how this affects local water supplies. Finally, EPA should look at the impact of truck traffic. Industry always takes a gamble with imperfect technology and avoids dealing with consequences; do not allow more of that.

- EPA should look at the impact of using deep injection wells because we have a dearth of treatment plants and also look at the geological formations, our many salt mines and limestone dissolution pathways.

- What will the state of well casings be 75-100 years from now, when our grandchildren are adults? The potential failure of steel and cement casing is a great source of anxiety. It is likely that hairline fractures will occur due to the high pressure used during injection, and will come to light over time. These fractures may be overlooked at the time of the drilling, but they must be evaluated. No one knows what the pressure will be that causes such failures until a very long time from now because this scale of HF is so new.

- Environmental consultants and engineers have the most up-to-date knowledge and industry experience.

- A commenter lives next to a wetland that is home to wildlife and rare salamanders. Should the water become polluted, this wildlife would die. The high pressure, high volume HF in Texas, Wyoming, Colorado, Ohio, and Pennsylvania has been associated with water problems and methane percolation. Because of the problems that develop in areas of HF, high pressure, high-volume HF is unsafe. Please include rural areas and vulnerable wetlands in the study.

- There is significant concern about the impact of HF on human health and the environment including water supply, water quality, wastewater treatment operations, local and regional air quality, management of naturally occurring radioactive materials disturbed during drilling, cumulative environmental impacts, and the New York City watershed.

- EPA should conduct a cumulative impact analysis of wastewater treatment plant discharge on water sources. WWTP plants along the Monongahela River claimed to be in compliance individually but the total impact endangered the drinking water for Pittsburgh. Industry claims it is moving toward 100% recycling of injected and produced fluids. This should allow EPA to reassert itself and stop the abuse of public water.

EPA's Hydraulic Fracturing Study: Case Studies

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

- We hope that EPA scientists will study the hundreds of already documented cases of water contamination by the gas industry that are on file in the Pennsylvania DEP's Offices; that EPA will read through the hundreds of newspaper and journal articles on gas drilling that will alert EPA to other pollution problems that have still not been resolved; and that EPA will make on-site visits to Dimock and other townships where drilling has occurred to independently test our wells. Contact Mr. Craig Lobins, Regional Manager of DEP's Northwest Office in Meadville for Oil and Gas Drilling, whose office is responsible for issuing the gas drilling permits and violations for the entire northern half of Pennsylvania.

- Regarding the case studies, it's not just Atlas, Chesapeake, Fortune, Talisman, etc. that EPA needs to look at.

- EPA should talk to NYDEC in Avon to determine whether there have been complaints in the Binghamton area.

- The fact that there have been no cases of documented contamination gets overlooked. Cases of reported contamination have been cause by other processes in the drilling. EPA should make this clear distinction.

- EPA should look at Dimock, Pavilion, Durango, and other unannounced sites. Please consider property values and insurance issues.

- The air, water, the scenery is threatened. Go down to the tip of Watkins Glen. There is continuous dumping. Who is dumping? Pennsylvania has laws that don't allow people to dump, so trucks are coming up to New York and dumping here. EPA should look at the salt industry that Watkins has allowed. Who is going to check that salt? If we have

radiation and chemicals pumped in and they come up, what about them getting into our salt supply and coming into contact with us?

- Go investigate Dimock, Pennsylvania and see if there is a problem. The landowners will want to know.

- Some of the most significant issues are to find a comparable area to study that has the same population density and density of HF wells. There isn't one in the country.

- Dimock water contamination has been incompletely reported. Many wells in Dimock have had gas in water from the upper formation; this has no bearing on Marcellus.

- There is no known water well in New York State that has been contaminated from HF. A speaker from Independence Township, in Allegany County, has four neighbors who have lost their drinking water. Only one of them is going to say anything publicly for various reasons. One made a YouTube video about how his well was contaminated from vertical fracturing.

- Since the anti-drilling groups are against the SGEIS, it is clear there is not a scientific study not supporting their predetermined idea they will ever accept. Go down to Dimock and study the water.

- The northeastern mid-Atlantic states have very dense network of surface water supplies. The primary water supply for Syracuse is Skaneateles Lake, which has 150 tributaries on 38 miles of shoreline. 48% of that land is used for agriculture. It is apparent that the topography could provide pathways for spilled fluid to enter surface water supplies. EPA should have a case study in this region. Also look at total suspended solids from the greater volume of traffic that would be need to service these surface well pads. Our rural roads are not of the greatest construction. They have very little shoulder and they will be very much impacted by repeated truck traffic.

- A landowner has property among potential gas drilling sites that includes a stream fed by marsh that empties into the Susquehanna River. The slopes are filled with natural springs, from which they get water. Most of his neighbors have wells. EPA is welcome to use this site for a case study.

- A landowner's group investigated Dimock, Pennsylvania and heard from the residents there that the problems in Dimock have had nothing to do the process of HF. EPA should go there and tell the world the same thing. The complications there represent less than one percent of total drilling. Drilling does not have to be perfect to move forward.

- EPA should conduct a long-term cumulative effects assessment that took into account horizontal drilling, extensive fracturing, the proposed large number of wells, and the probability of permanent contamination of water. The EPA case studies should not study these aspects in isolation but as a whole.

- Complex responsibilities, competing goals, and decision making by multiple players in a high tech culture is not failsafe as shown by the Gulf spill and the Challenger explosion. The EPA case studies should include this issue of decision making and should devise a way to keep our water safe in such a culture.

- Agencies that regulate and inspect must be separate from those that issue permits and the site visits must be surprise visits. Visitors are being directed to the best sites, not to the significant number that have problems. People didn't fly here on an airline with a two percent failure rate because that isn't permitted. EPA has the same responsibility to our environment.

- If EPA picks sites for case studies that are already suspected of being contaminated due to HF, the companies will just deny it was their fault.

Regulating Hydraulic Fracturing

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

- NYDEC has rubber-stamped 90% of wastewater permit applications instead of conducting a substantive review. Municipal wastewater treatment facilities should not be allowed to take wastewater. They are not designed to take briny solution; they merely dilute and discharge into waterways. The NYDEC does not have staff or funding to administer a pretreatment program for gas and oil wastes, and the public does not have confidence in them. There is no guarantee that rules will be followed or enforced.

- Without regulations avoidable pollution will kill innocent people. A Ph.D. in economics isn't needed to see that we need regulatory oversight. The NYDEC cannot provide that level of oversight. New York State suffers from lawlessness and unseemly legislative haste.

- EPA should work closely with NYDEC officials. EPA should look at the use of closed loop systems. Guidelines for enforcement should be clear and only companies with good drilling records should be permitted to drill in New York State.

- A local legislature passed a resolution to ask Governor Paterson to ban HF pending future investigations.

- We are all worried about different types of pollution. Nothing can be taken out of the Great Lakes. The legislators in charge of the Finger Lakes should enact a similar rule.

- Water turns into toxic waste, toxic air pollution, and radioactive pips. All of these do not stop at state borders. For this reason, it must be considered as an interstate matter to be regulated by EPA.

- Beyond the study, EPA must provide vigorous oversight on this inherently interstate process. Aquifers and river basins such as the Susquehanna do not stop at state

boundaries. The existing patchwork of state and regional regulatory schemes varies according to politics, not science, and state regulators have proven unequal to the task of protecting our health, safety and environment from a risky industrial process.

- EPA should order the immediate suspension of high-volume slickwater HF until the study is complete. There are methane leaks going on and although there is an EPA rule requiring reporting of such leaks there is not a rule that they have to be controlled. They should be controlled, and tightly. If gas industry has to be sent back to the drawing board, then send them back.

- EPA does not need to regulate or permit HF; the states are already doing that, and they are doing a good job.

- While the Pennsylvania DEP is making progress trying to regulate this industry, many of our elected officials are being bought off and are helping the gas industry get the laws they want. The commenter stated that their local gas company has arrogantly flaunted DEP's regulations and orders unless they are delivered repeatedly. Therefore, just as the Army Corps of Engineers provides tighter regulations than most of the States to protect wetlands, we need EPA to provide strong federal oversight that will back up and go beyond the states' regulations, containing significant penalties to violators

- EPA should ban all of the drilling not covered by environmental laws, for the safety of the American people, until this study comes out. After HF is proven hazardous, do not allow the gas industry to come back with a so-called green technology. They've already proven they can't be trusted. The time to switch to a renewable energy source is long overdue. Germany is 20% solar. They learned that genocide is not the answer, have we? We cannot live without food.

- Without proper oversight, this extraction will destroy our air, water, soil, and our rising property values: that's already happening in other states. Please help—our lives depend on it.

- High-volume HF is the most important issue that EPA and all other agencies concerned with our air, water, and land will ever examine. The commenter stated that their experience with natural gas drilling is a perfect paradigm that proves that even with all the regulations in place, the appropriate agencies and personnel on duty and the best procedures carefully delineated, a single individual can easily wreck havoc despite the rules, regulations, and safeguards. The commenter lives on a rural property, and had a neighbor who drilled an unproductive gas well that was declared "temporarily abandoned" and soon dismantled. However, the site was used to dump brine and frack wastewater because the trucker found out the permitted site he normally used was closed for the weekend. The commenter sold their home because they did not want to risk having well water that might be polluted with a chemical cocktail (undermining the home's equity).

- New gas wells and all water wells must be tested before or after drilling. Vertical fracturing is taking place now and has taken place with negligible effects. NYDEC's SGEIS is as nearly complete. No new action should be considered until the results are released.

- A moratorium or delay will be devastating to us all. We must consider our security as a nation. The exploration of natural gas from shale is global, and our regulations are the best in the world. The regulations in New York State are the strictest in the country and NYDEC is working on strengthening them further.

- The commenter does not know a single person who is in favor of contaminated ground water. The real issue is whether the matter be handled by the state or turned over to EPA. The NYDEC is well poised to regulate. The result of surrender would be nothing short of disastrous to this economy. The passage of the FRAC Act would do more than close the loophole, it would add years for us to move forward. New York State is bleeding jobs and economic ruin is a constant threat. These resources stand to bring thousands of high paying jobs to the southern tier. This raises the question of whether we are serious about our national security and safety. This issue is best left in the hands of the people of New York.

- There should be one standard for the entire state. EPA should step in with federal regulation because these are interstate water sources.

- Gas companies say HF is safe, but they are quick to blame the cement casing when something does go wrong. It is never the actual fracking itself that causes the problem. Fracking should not be allowed by our government unless it can be proven safe beyond a shadow of a doubt.

- Fracking is an interstate matter.

- Look at the ways water withdrawal and dispersal regulations differ from one watershed to another, with not much coordination and uneven enforcement. An elected official noted that 75% of the residents in her district are in an international water basin that has different protections than the 25% of residents in the domestic water basin.

- It has become very apparent that Pennsylvania cannot protect its water.

- A commenter begged EPA for oversight to protect water.

- A political party has concerns over the health and safety of our members and friends and the local workers hired to work in this industry. Wells will be located next to schools, churches, farms, and ponds. It has become increasingly apparent that the industry is not policing itself and that states are learning at hard way that they are underprepared to regulate this industry.

- Given the interstate nature of unconventional shale gas drilling, EPA's involvement is essential to any adequate assessment.

- The best way to accomplish safe, responsible gas drilling (which the commenter supports) is to have all regulatory industries fully engaged with industry held accountable and not allowed exemptions. EPA should call for tough uniform regulations at the top, not a state-by-state race to the bottom.

- Bolivia proposed in the United Nations—and it passed—a resolution to make clean water a worldwide human right. Would the great State of New York want anything less?

- New York State has failed to adequately address environmental impacts in NYDEC's draft SGEIS. EPA intervention is critical.

- Since EPA is a federal agency, any negative findings from this study may shut down all of the oil and gas operators across the United States.

- A commenter expressed support for the FRAC Act, which requires full disclosure of chemicals.

- The industry must be forced to use green fracking fluids so that the taxpayers are not forced to clean up after them years later.

- It is appalling that drilling companies do not have to tell us what chemicals they are putting us into the ground.

- We need the complete list of what is in frack fluid. EPA should test to identify these chemicals, singularly and combination, along with substances that are naturally in the ground already. Everything has to be looked at without the limitation of the energy exemptions. Otherwise, our hands are tied, and there is not much EPA can do to help.

- An escrow fund should be collected now while the money available and placed in a strongbox until needed to fix broken casings.

Hydraulic Fracturing – General Comments

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

- Gas production constitutes the single greatest threat to abundant clean air and land. It is a threat, not a boon, to the renaissance of our green energy future.

- We know that the chemicals used are active in the parts per million or billon range and are not removed by wastewater treatment plants or drinking water treatment plants. Given these dangers, there is no safe way to proceed with HF.

- There are no known beneficial impacts of HF, only adverse impacts. Everything EPA needs to know was taught in kindergarten. Oil gas water do not mix. The only safe policy is to keep them away from each other. Toxic chemicals cannot be separated from an industry witch's brew. Fracking fluid is indelibly infused with cancer-causing substances like benzene. Even if fluids contained only sterilized sand and distilled water, the volatile organic compounds that are components of natural gas will still contaminate the fracking waste water.

- It is not a level playing field if competing economic development has to ensure clean emissions but not the gas industry. Solar, wind, geothermal, helicopter plants, and the dairy industry—why should some have to play clean and not others? It is a false choice between this kind of development and none at all, when some get exemptions from regulation and benefit of tax credits and some don't.

- Overcome industry influence to conduct an unbiased and through study. Save us. The responsibility is EPA's to save us from HF so that we can lead the whole world back to sanity, sustainability, and survival.

- The HF of the Marcellus Shale poses unacceptable risks and is being developed before we have the knowledge needed to ensure it can be safely done. The situation is comparable to the Deepwater Horizon, the PCBs in the Hudson River, and Endicott.

- The gas and oil companies used to have to contribute to a Superfund. They haven't since 1995. Now when something goes wrong it is up to individuals or the government to pay for it. It is difficult to get compensation from the industry, and this is unfair. Consider the one million dollars needed for road improvements in tiny Croton, New York for the construction of the Millennium Pipeline. They got $50,000 from the drilling companies and were told to sue for the rest. If the industry must cover the full cost of each drilling activity, then the industry would be much more careful. A fund should be created that gas drilling companies have to pay into. An ombudsman should be appointed to tap into this fund on behalf of the citizens. Make industry contribute to the superfund.

- Domestic natural gas is a good way to reduce the nation's dependence on foreign oil. EPA should help lead this country out of energy gridlock so this United States can be stronger than it is today.

- The natural gas industry has a long history of explosions, spills, contaminations, and accidents in Pennsylvania and other areas of unconventional gas production, refuting industry claims of "safe" operations.

- Gas will be sold on the international market and will not benefit the United States. Since the drilling company brings their own crews, local jobs aren't created. Does anyone really benefit?

- There are several reasons to support responsible gas recovery in the U.S. First, national economic and strategic defense. Consider that China, a nation of 1.3 billion people has

just become the world's largest market for automobiles. It follows that China, not the United States, will soon be the world's largest consumer of hydrocarbon energy. Foreign producers will have a new and expanding market for oil and natural gas. What are the implications for the United States? Second, economic improvement locally and nationally. Can anyone deny that our youth are leaving because of economic necessity?

- Drilling on your property is like shooting at the horizon. You can't shoot at the horizon because you don't know what's beyond it. Then when your property or hunting rights end, that's when you can hurt someone else. This does have to do with the economy. There are other ways to make a living. Property owners are struggling, and the oil and gas companies are the largest subsidized industry in the United States. But there are other ways. There is money even in a recession. There is money to incentivize property owners to make a living without drilling.

- A commenter expressed fear that his lifelong investment is about to be destroyed. A half million signing bonus is not worth living in an industrial zone. He didn't want to become rich at the expense of my neighbors, but he will likely be forced to lease due to compulsory integration. He was happy with his decision because he thought he was protected by well-informed government oversight, but he feels he is not protected and is scared stiff.

- It is clear that the success of the current economic recovery may depend on fulfilling our energy needs domestically. Access to our own energy resources was critical to transform our nation's energy future and to maintain economic competitiveness and keep jobs.

- We drink same water the dinosaurs drank and there is only a finite amount. How can we pollute billions of gallons forever just to extract more carbon fuel from the earth? Then we will turn to the sun and wind but it will be too late.

- Now we know that heat trapping gases are warming the globe and that extracting more gas is going to do nothing but exacerbate that.

- Don't put the fox in charge of the chickens. The people of the gas industry are not from here, but they have unlimited resources. They are the foxes and are not in the business of protecting us.

- The moment is now to subsidize and switch to renewables.

- A speaker would never want her family raised near gas wells because of the risks.

- Natural gas is transition fuel that must be harvested now. Switching to natural gas can cut emissions by 17%.

- It is hard for the public to find credible information on HF. Web sites are filled with misinformation. The EPA Web site is the only place with good information. Since this

decision would be important to many landowners, everyone should take the time to learn about HF and learn from the geologists.

- Drilling and jobs and the accompanying economic benefit offer a chance to reverse the downward economic trend. Keep in mind the benefits of a cheap and clean energy source. We should be concerned about how we are spending billions on foreign oil. We need to utilize our own natural resources here.

- This whole debate is a quite a contrast to many other places where the industry has come in and simply established themselves for better or for worse.

- Why are people so fearful of this process? There are chemicals everywhere; in clothes, in packaging, in telephones, in automobiles, shoes, furniture, eyeglasses, money, pencils, inks, and pretty much everything. If something doesn't have chemicals in it, chemicals were used to transport it. To enroll a child in school in New York State, they need vaccinations, which are chemicals. Why are people afraid of the chemicals in this process? Please get over the foolishness and fears and use this opportunity to improve people's lives.

- As expenses of gas drilling are shifted to the drilling companies themselves, renewables would become more competitive. Currently, gas companies get 20% of government subsidies. Americans could build, use, and export green technologies. This is America, and we can do this.

- Natural gas has great environmental benefits in terms of protection. If coal was replaced with natural gas, the United States could easily exceed the goals set by President Obama at Copenhagen.

- We took away this country from the Indians and we were expecting to have a good country but now it's threatened.

- Out West, there is extensive evidence of environmental impact of hydrocarbon extraction. Many wells have been drilled in Western states with terrible environmental impacts. Federal environmental protection laws did not protect citizens because these activities are exempted.

- This study might be a delay tactic. Congress has created this study process to study something against which there is already a great deal of evidence. In addition to an environmental problem, we have a political problem. Representatives are not protecting citizens from the impacts of oil and gas drilling. Everyone needs to keep this firmly in mind during the next election.

- We are Americans. We are innovative, and we can do this without destroying our environment.

- Senior citizens should be involved. We do not want to be the next Love Canal.

- We should be developing our shale and natural gas supplies. We have a great opportunity to reduce global warming, cut the deficit, and put people back to work.

- At a Binghamton meeting sponsored by the NYDEC on horizontally fractured wells, a woman complained about the fracturing process, worrying that her children would have three eyes. This is unreasonable—there are not many three-eyed Texans.

- Don't think for a minute that the industry will stop spying on people trying to stop drilling. A commenter related a story about a small meeting being observed by a dark minivan parked across the street, which drove away as soon as anyone approached it.

- EPA is not the jobs board.

- It is important to draw a distinction between green terrorists, patriots, and activists.

- A local coalition works with geologists and scientists and developed a comprehensive lease to get safety for farms and homes. They feel they are the original environmentalists and resent being characterized otherwise. They want to clear up all of the information pollution. They feel pro-drillers are not being represented in the media because they do not have taglines or chants and are not dealing in emotion or sensationalism. This should be a fact-based study, not a crafted media circus.

- The following statements are lies that should be dispelled: gas companies are overregulated, gas is economically marketable and clean, fracking has created lots of high-paying jobs, fracking uses nothing more dangerous than household chemicals, fracking has been done for ages, everyone gets gas money, no wells are ever ruined, and no radioactive drill cuttings are being dumped in landfills.

- The professional left has politicized this issue, and has driven energy to unsafe places such as the Gulf of Mexico. They want to stop all oil imports from the Middle East in 10 years. If we stop importing oil, we will want to live in Mexico because their standard of living will be higher than ours. Then the Mexicans will build a fence on their side of the border to keep us out. Having a green industry will not be possible without reducing the standard of living. Green technologies are not price competitive. If the price is driven up so that it is competitive, then we will really have unemployment. Even the solar cells are made in China. The fact remains that our economy depends on trains and 18 wheelers. To maintain and increase our high standard of living we need clean energy from natural gas.

- There have been many emotional statements made at the meeting.

- We need clean energy; gas is not it.