

**NYC Council Committee on Environmental Protection
October 23, 2009**

**COMMENTS RE HYDROFRACTURING IN THE NYC
WATERSHED PORTION OF THE MARCELLUS SHALE**

Croton Watershed Clean Water Coalition, Inc.

Federated Conservationists of Westchester County, Inc.

As not-for-profit organizations among whose concerns is the protection and preservation of NYC's high quality drinking water that serves 9 million people, we are deeply concerned that the proposal to extract natural gas in the underlying Marcellus Shale through hydrofracturing will lead to the contamination and pollution of NYC's unsurpassed source of water.

NYC is the largest city in the world that is blessed with high quality drinking water that still only requires minimal treatment prior to reaching its consumers. NYC's 75% forested, still largely undeveloped watershed is the provider of this high quality water. Because of the DEP's strenuous efforts to protect its watershed and maintain the high quality of water in its reservoirs, the EPA has granted a Filtration Avoidance Determination (FAD) for its Catskill/Delaware (Cat/Del) watershed that lies mainly West of Hudson (WOH) entirely in the Marcellus Shale area. NYC's Croton Watershed that lies East of Hudson (EOH) was not so fortunate. Due to development pressures in the Croton watershed, EPA was not willing to grant it a FAD. As a consequence, NYC is in the process of building a chemical filtration plant for the Croton. The plant was originally estimated at \$800 million. That cost has now risen to \$3.2 billion, accompanied by skyrocketing rises for NYC ratepayers. The Cat/Del can supply at least ten times as much water to NYC as the Croton. If Cat/Del water were contaminated because of drilling for natural gas in the Marcellus Shale, or some other cause, the accompanying costs for a filtration plant would be astronomical. Neither NYC nor NYS residents who receive NYC water should have to be burdened with such a cost.

DEC's presentation of the possibilities of drilling in the NYC Watershed comes at a time of severe economic stress, when Governor Paterson is trying, by any means possible, to close NYS's \$3 billion budget gap. Estimates for the revenue from drilling for natural gas in the Marcellus Shale are in the \$1 billion figure.

The Governor has been trying to streamline the approval process for developments in NYS by issuing Executive Order #25. As stated in our 8/14/09 letter to the Governor, "... the Regulatory Review and Reform Program, purportedly for the purpose to ' evaluate, reform, or repeal, where necessary, rules and paperwork requirements...' would merely streamline the processes through which developers, oil and gas companies and others could obtain permits, and make it more difficult, if not impossible, for the average citizen to have a voice in preventing environmental degradation."

DEC has now published its 10/5/09 DSGEIS report - Well Permit Issuance for Horizontal Drilling And High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas reservoirs - (available at OGDSEIS at the DEC website).

In keeping with the streamlining process, the Governor is pushing for early hearings and the rapid acceptance of the DSGEIS. The public has only till November 30th to respond with written comments, a ridiculously short time for having to comment on over 800 pages laden with a heavy technical content.

In addition, the document appears not to be available in some of the NYC public libraries, listed by DEC as repositories for the report. This contravenes 6 NYCRR Part 617.12(b)(3): "All SEQR documents and notices, including but not limited to, EAF, negative declarations, positive declarations, scopes, notices of completion of an EIS, EISs, notices of hearings and findings must be maintained in files that are readily accessible to the public and made available on request" and (5) "If sufficient copies of the EIS are not available to meet the public interest, the lead agency must provide an additional copy of the documents to the local library."

The fact that DEC started the review process prior to having the document available in the local libraries, appears to contravene the above SEQR law. The clock should start when all documentation needed for comments is available to the public. Because of the size of the document and the fact that it was not available to members of the public, the written comment period should be extended to January 31st, 2010.

Besides the DSGEIS, there is the Draft NYS Energy Plan that also calls for natural gas drilling in the Marcellus Shale. CWCWC and FCWC consider the Energy Plan's insistence on extraction of natural gas within the NYC watershed to be a dire threat, indeed an unacceptable threat, to the integrity of the drinking water supply for over 9 million NYS residents, and has expressed that view at the 8/21/09 Public Hearing held at Hunter College.

In the following comments, CWCWC and FCWC will present an overview of the many hazards to water quality that are inevitable consequences of fracking. Most of these hazards are described in detail in Hazen and Sawyer's 9/2009 Rapid Impact Assessment Report (RIAR), commissioned by DEP. DEP will have a complete report ready by mid-December.

We shall also challenge the contention in the 10/5/09 DSGEIS report that drilling in the NYC Watershed area of the Marcellus Shale can be done safely, if the proper precautions are taken.

In a situation where the unfiltered drinking water of 9 million people is at stake, absolute safety is required - a clearly impossible goal. Therefore, this is a classical example that calls for the exercise of the Precautionary Principle.

A Brief Introduction to "Fracking"

From the DEP Report, page ES-2: "The area of land assigned to a well is called a spacing unit, and the number of wells that may be drilled in an area is based on NYSDEC spacing unit regulations. A minimum spacing unit of 40 acres is required for a single well, and a 640 acre spacing unit is required for multiple wells drilled from a common wellpad. Once the site is prepared and the wellpad is completed, operators begin drilling the well. One or more wells may be drilled from a single wellpad. In the NYC watershed area, the well would likely consist of a 3,000 to 7,000 feet deep vertical section that extends out laterally for an additional 2,000 to 6,000 feet....Construction of gas wells in the Marcellus Shale will require drilling through shallow aquifers and penetrating formations that may contain high level of total dissolved solids, hydrocarbons, heavy metals, radionuclides or other potential contaminants. The wellbore creates a conduit for fluid flow between these previously isolated geologic formations." A mixture of water, sand, and chemicals is then injected into the well at high pressure to create fractures in the shale and release the gas. "An average fracturing operation may require on the order of from three to nine million gallons of water, 1% to 2% of which reportedly consists of various products and chemicals designed to control fluid properties and facilitate fracturing."

Although 1% to 2% of chemicals might appear to be too small to be harmful, we must remember that, in many cases, harmful concentrations are measured in parts per million.

Moreover, the names of the chemicals that are injected into the shale and that could contaminate their drinking water are shamefully kept secret from the public. From Earthworks: "Despite the widespread use of the practice, and the risks hydraulic fracturing poses to human health and safe drinking water supplies, the U.S. Environmental Protection Agency ("EPA") does not regulate the injection of fracturing fluids under the Safe Drinking Water Act. The oil and gas industry is the only industry in America that is allowed by EPA to inject known hazardous materials -- unchecked -- directly into or adjacent to underground drinking water supplies."

The three to nine million gallons of water have to be obtained from the most convenient source available. If there is no nearby source available, the millions of gallons have to be trucked in. Otherwise they are sucked out of the local sources. This presents a danger of depleting aquifers, the base-flow for streams, drying up wetlands, and lowering the depth of local lakes, ponds, and reservoirs.

The risks of private wells being contaminated by the fracking process are very real, as we show in the next section. The reasons are not hard to find. Millions of gallons of fluid are injected into the shale under intensely high pressure that opens up the fissures in the shale and releases the gas. From the RIAR, page 18: "Upward vertical migration through extensive, open fractures or an improperly sealed gas well can allow for the cross-formational migration of groundwater between flow regimes (i.e., short-circuiting). Such a migration can allow for the discharge of high salinity and gas enriched groundwater directly to the ground surface or into shallower (local or intermediate) flow regimes.

Under these conditions, the discharged groundwater could occur at a considerable distance from the corresponding source area and formation."

It is easily seen that, in many cases, the upward migration of fracking fluid mixed with highly saline fluids that are present at the depth of the shale can contaminate the well waters of local residents. A 40-acre wellpad, the minimum allowed per wellhead, would allow a neighboring wellhead as close as 750 feet. Assuming the neighboring well goes down to 500 feet, that the fracking well goes to a depth of 3,000 feet and then horizontally about 2,000 feet, the fracking material released from the horizontal portion could be as close as 1,500 feet - not a great distance for fluid under high pressure to travel.

Incidents of Private Wells Being Contaminated and Burden of Proof

Having read through the extensive documentation pertaining to hydrofracturing or "fracking" in the Marcellus Shale, we can only come to one conclusion - fracking should be banned in the NYC watershed. The risks of contaminating the watershed's groundwater, streams, wetlands and reservoirs are diverse and, in many cases, unforeseeable and therefore uncontrollable. It is inevitable that over time, contamination will occur.

In fact, there have been numerous incidents of contamination in other watersheds. For example the Texas Groundwater Protection Committee has reported an average of 6,000 alleges groundwater contamination cases per year, since 1990, with 5,267 cases being currently investigated for 2007. Apparently, these have not deterred natural gas drilling. However, the situation in NYS is radically different. It would take only a small fraction of those occurrences for EPA to withdraw its FAD for the Cat/Del, an action that would place a near intolerable burden on NYC finances and as well as on many of its residents.

ProPublica (August 4, 2009) reported that "The incident is the latest in a string of more than 50 similar cases related to gas drilling in the state...", the incident being a natural gas well leak near the town of Roaring Brook, PA. Further reports by ProPublica refer to four homes in Lycoming County, PA that have lost their drinking water to pollution, due to gas drilling, and 18 other homes where the water is being tested.

Earthworks, in an August 14, 2009 Press Release, describes how citizens in Pavillion, WY call for a fracking moratorium. They found that "11 of 39 tested wells were contaminated. Among the contaminants are toxics used in oil and gas production."

In several cases, local residents whose wells have been adversely affected have considerable trouble being reimbursed for the damages they suffered. The drilling company will argue that the chemicals found in a well are the same as those used as lawn pesticides, for example. The burden of proof is thus cleverly shifted to the victim.

We recommend that all wells, within a reasonable range, be carefully tested for the quality and quantity of chemicals that they may happen to contain. If any new chemicals are discovered subsequently to the start of operations, then the burden of proof must be clearly on the drilling company to prove that they are not responsible.

Given the cutback in manpower at DEC for the sake of so-called "streamlining", we fear that adequate monitoring of wells is not possible and that local residents who have lost their potable water will be left with little recourse.

Fracking Chemicals

A database developed by the Endocrine Disruption Exchange (RIAR, p. 36) identifies 435 products composed of over 340 individual chemical components used in fracking. However, the drilling companies have been reluctant to divulge which chemicals they use in the fracking process, claiming the privilege of trade secrets. In particular, they do not reveal how these various chemicals are combined to make products that are used in fracking. We liken this to being told that carbon, nitrogen, oxygen, and hydrogen are harmless, and not being told that, if combined in the correct proportions and configuration, they can produce TNT. The drilling companies have not been forthcoming in informing the public as to what is being injected into their aquifers. Although CWCWC hopes that permits will never be issued in the NYC watershed, should such an unhappy event occur, however, no permits should be allowed until the drilling companies provide full, complete lists of all the components and combinations they use in their drilling activities.

To do otherwise would be a dereliction of NYS's duty to protect public health and safety.

Storage of Hazardous Waste

There are various estimates on how much of the injected, chemically-laden water, flows back to the surface. Estimates vary between 40% and 70%, possibly depending on whether already existing water within the shale layer, is included. This flow-back water is laden with contaminants such as cobalt, chromium, salts and lead, among others. An additional concern is the surfacing of materials containing Naturally Occurring Radioactive Material or NORM. According to the River Reporter (see <http://www.riverreporter.com/issues/09-01-08/news-backflow.html>), "NORM consists of Radium 226 and Radium 228, which are bone seekers that result in lung cancer and bone cancer." This wastewater has an unusually high brine water content, as well as Total Dissolved Solids (TDS), radionuclides and chemicals, all of which must be disposed of safely. Bromides are a concern since their disinfection byproducts are as dangerous, or even more so, than the haloacetic acids and trihalomethanes normally found to some extent in NYC water. Disinfection byproducts due to bromides could cause NYC water to be out of compliance with Stage 2 Disinfection Byproduct Rule.

It is shocking to see pictures of the hazardous waste water that is retrieved from the drilling process "stored" in open pits, merely lined with plastic. There appear to be no precautions against the effects of a heavy storm that could easily wash the hazardous mix into neighboring streams, lakes, and wetlands with disastrous effects on local fish and wildlife.

The usual procedure, if on-site storage is only temporary, is to transport the hazardous waste to a sewage treatment plant (STP) that is supposedly capable of cleaning it. This can present a multitude of problems.

First, only a few STPs are capable of dealing with an unusual mix of chemicals, some of which are not required to be revealed under the Trade Secret Law. Since tens of millions of gallons of water are used in fracking, and these have to be treated by the STPs, the result is that an individual STP likely will not be able to deal thoroughly with the volume, resulting in improperly treated effluent - not only the fracking water but also the sewage waste that the STP is originally designed for.

In NYS there are no specialized STPs for this kind of waste. Therefore, an alternative might be to store the waste via deep underground injection wells. However, disposal sites are limited due to the volume and the hazardous nature of the material. According to the RIAR, "Overall, waste management failures were responsible for the majority of documented water contamination incidents related to natural gas development." In addition, costs could be exorbitant. Even if suitable waste disposal sites were found, their use would still be problematical since the Underground Injection Control (UIC) program does not regulate materials that are not being injected under the waste disposal programs. In other words, there would be little supervision or control.

Thus, the problems associated with storing hazardous waste could, of themselves, be sufficient to ban gas drilling in the NYC Watershed.

The transport of these hazardous wastes is also a problem. Most will be transported in NYS approved trucks, some having a capacity of up to 9,000 gallons. A fracking operation can use up to 3 million gallons (mg) of water. Unless these 3mg are sucked out of the ground locally, they will have to be transported to the site by truck. That would require 600 trips of the largest trucks to bring the fracking water to the site, and a near equivalent number to haul the wastewater away, depending on how much is retrieved.

Accidents are unavoidable, and some trucks filled with hazardous waste will inevitably spill their contents into the NYC watershed.

Additional Concerns

We have touched on what we deem to be the main threats to the integrity of NYC water in the Cat/Del watershed. In our opinion those threats are so dangerous that they warrant the prohibition of drilling in the NYC watershed.

There are other threats, each has a lesser impact, yet taken together could do irreparable damage to the watershed.

Destruction of Land and Forests

The Cat/Del watershed is heavily forested and relatively undeveloped. Fracking involves laying bare anywhere from 40 to 640 acres (1 square mile) of mostly forested land in order to provide the area for the machinery. If drilling were to become more prevalent, the landscape would change from forest to one pockmarked with bare spots. In addition, roads will have to be cut through the forests in order to haul the heavy equipment to the pads. The effects will be devastating to wildlife and any endangered and threatened species in the vicinity, whose habitat will be destroyed. Furthermore, fragmenting and destroying the forest will have a deleterious effect on water quality since forests are supreme in their ability to provide the best quality water.

Laying of Pipes

Gas transmission pipelines may lie above ground or up to 6 feet below ground. Constructing the pipeline creates disturbance and can severely impact sensitive wildlife habitat as well as neighboring streams, wetlands and reservoirs, if improperly installed. Herbicides and other 'cides should be used sparingly. According to the RIAR, page 44, "Gas treatment at compressor stations and/or refineries may require chemicals and create liquid wastes that if handled improperly could lead to surface water or groundwater contamination."

Seismic Testing

Testing for the location of shale deposits is accomplished through the use of "Thumper Trucks". By detonating explosives below ground, they generate energy in the form of waves. The various paths taken by the waves give an indication of below-ground conditions. There is concern that these explosions that generate waves with an energy of up to 100,000 pound-foot could promote earthquakes which would further weaken the fissures promoted by fracking, and release the deep-lying toxic water, through the intervening layers and into the groundwater.

In conclusion, we would like to reiterate that the Catskill/Delaware Watershed is a unique area in the world that supplies high quality water, with a minimum of treatment, to over 9 million people. Unlike areas that are less sensitive because they do not have comparable water resources, although they may have other resources such as oil and gas, the Cat/Del cannot tolerate any impacts that would pose a threat to its hard-won Filtration Avoidance Determination. The result would be an unacceptable financial burden on NYC residents and all those who use Cat/Del water, to pay \$20 to \$30 billion for a filtration plant, not counting inevitable inflation.

The NYC watersheds not only supply superb water. They also supply some of the most beautiful landscape in the world - that graces the Hudson River and its valley with its mountains, rivers and forests. There is nothing like it.

If contamination should occur, no one really knows for how long it may last and whether it could ever be remediated, let alone what illness could result to humans, wildlife and vegetation. The potential astronomical cost aside, how could we ever replace this excellent, world-renowned water? If we cannot use the reservoir system, what do we do for water?