

Croton Watershed Clean Water Coalition, Inc.
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Re: Comments on the Scoping Materials for Initial Design of EPA Research Study on Potential Relationships Between Hydraulic Fracturing and Drinking Water Resources

U.S. Environmental Protection Agency
Office of Research and Development
September 25th, 2010

Attention:

Jill Dean

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Mail Code 4606M

Washington, DC 20460

or

email comments to hydraulic.fracturing@epa.gov

The Croton Watershed Clean Water Coalition, Inc. (CWCWC) is a not-for-profit coalition of community, housing, environmental and religious groups throughout NYC, Westchester and Putnam Counties, whose purpose is to protect and enhance source water quality throughout the Croton Watershed.

CWCWC is also concerned with water quality in the Catskill/Delaware watershed since it supplies most of the water needs of NYC and Westchester County. However, CWCWC understands that confining its concerns to only one section of the 17-county NYS Marcellus Fairway, of which the Catskill/Delaware is a component, is unrealistic - the underlying shale and many of the aquifers are interconnected and do not recognize artificial political boundaries. Therefore, our comments will address the whole NYS portion of the Marcellus where hydrofracturing ("fracking") is currently being proposed. In so doing, however, we shall seek examples from the far more extensive fracking experience in the Pennsylvania portion of the Marcellus Shale.

Our concerns about fracking are echoed by none other than a leading oil/gas drilling company in Pennsylvania - Range Resources. In a May 2006 prospectus, Range Resources explained the potential risks to investors: "Our business is subject to operating hazards and environmental regulations that could result in substantial losses or liabilities. Oil and natural gas operations are subject to many risks, including well blowouts,

craterings, explosions, uncontrollable flows of oil, natural gas or well fluids, fires, formations with abnormal pressures, pipeline ruptures or spills, pollution, release of toxic natural gas and other environmental hazards and risks....As we begin drilling to deeper horizons and in more geologically complex areas, we could experience a greater increase in operating and financial risks due to inherent higher reservoir pressures and unknown downhole risk exposures."

Indeed, "...fracking has created a national controversy."ⁱ The reasons are not hard to find.

For example, according to a recent article in the Pittsburgh Post Gazetteⁱⁱ:

"In just the Monongahela River's watershed, between 612,000 and 2 million gallons per day of waste fracking fluid is discharged by 13 public and commercial water treatment facilities after limited treatment. At the lower treatment amount, Dr. Volz said, the water daily discharges contain 824,825 pounds of total dissolved solids, 15,000 pounds of barium, 16,737 pounds of strontium and 486,812 pounds of chloride.

Also, Friday, the state Department of Environmental Protection announced that 41 of 74 companies drilling in the Marcellus Shale formation missed the state deadline to report production levels of their wells."

We note that in addition to the EPA document referred to in the title of this analysis, EPA has included two more documents that explain more specifically the type of information that EPA is seeking from stakeholders. These are:

(a) Opportunity for Stakeholder Input on Criteria for Selecting Case Studies for Consideration in EPA's Hydraulic Fracturing Research Study

"EPA is developing a research study to examine the potential relationships between HF and drinking water...The purpose of this document is to (*sic*) background information on the role of case studies in EPA's HF study and to introduce a proposed process to identify, nominate and select case studies...EPA is seeking stakeholder input on proposed criteria for selecting case study locations and appropriate research questions to be answered using case studies."

In terms of case studies being performed, given the extent of fracking throughout the US, the extraordinarily diversified venues where fracking is practiced, the amount of time required to perform a thorough, meaningful case study, and the pitifully limited resources allotted to EPA for this study, it seems obvious that only a few case studies can be performed within the 2-year time frame, and that areas that should be studied will be left out. For example, the outstanding study by Dr. Geoffrey Thyne (Science Based Solutions) in Garfield County, COⁱⁱⁱ demonstrates the care and thoroughness that are needed to reach conclusions that can be regarded as valid. Clearly, such studies are time-consuming.

Given this reality, each well unit should be evaluated on an individual basis. NYS should require a State Environmental Quality Review (SEQR) prior to any drilling.

(b) Opportunity for Stakeholder Input on Conceptual Model of Potential Impacts to Drinking Water Resources from Hydraulic Fracturing.

In this document, EPA is seeking stakeholder input. "In particular, we would appreciate responses to these questions related to the conceptual model presented here:

1. Can you suggest additional pathways of exposure that could impact drinking water resources from the hydraulic fracturing process?
2. In your experience what are the most important processes and pathways of exposure that would adversely impact drinking water resources?
3. What current practices in your region do you think pose the most threat to drinking water resources from hydraulic fracturing?
4. Can you provide data, studies, reports, or other information to help us assess the relative importance of these potential impacts?"

Please note that CWCWC has already submitted comments on March 10, 2010. The following comments are based on the previous ones with additional input. Since we are a NYS organization, we shall direct our remarks mainly to those 17 NYS counties that lie within the present Marcellus Shale Fairway.

Additional Pathways of Exposure

I. REVEAL ALL CHEMICALS

Prior to any drilling being permitted, EPA must demand that the drilling company reveal all chemicals, as well as their composition and structure that are used in the processes. The many loopholes and exemptions presently enjoyed by oil and gas companies should be withdrawn. These include: the Resource Conservation and Recovery Act; the Emergency Planning and Community Right to Know Act; the Safe Drinking Water Act; the Clean Water Act; the Clean Air Act; the Comprehensive Environmental Response, Compensation, and Liability Act; the National Environmental Policy Act.

Without these loopholes and exemptions being rescinded (in particular, the Safe Drinking Water Act in the case of gas drilling), it will be impossible to track the pathways of the various chemicals associated with the fracking process, and possibly polluting drinking water supplies.

II. TEST ALL NEARBY WELLS AND WATERBODIES

It should be mandatory that prior to any work being done on a proposed well, all nearby wells (e.g., within 1.5 miles of the drill rig), and all aquifers, streams, reservoirs, lakes, ponds and wetlands be tested by a recognized professional company for all potentially hazardous ingredients in the fracking fluid, in order to establish a baseline. Should any such water-body be subsequently found to contain any fracking ingredients that were not previously in the waterbody, then the burden of proof that the contaminant did not originate from the fracking process shall be on the drilling company. Under present conditions, the burden of proof is on the public. It should be on the drilling company.

III. REMEDIATE ABANDONED WELLS

In NYS, there are several thousand abandoned oil and gas wells many of which may have been left unplugged or are deteriorating and allowing leakage. Some may be in proximity to proposed fracking sites. Toxic fracking fluids could then be forced into and up these wells by underground pressure, and into the aquifers and other sources of drinking water. These wells should be inspected by trained personnel and remediated in appropriate fashion, as soon as possible.

IV. DISPOSAL OF FLOWBACK/PRODUCED WATER

Fracking requires anywhere from 2 million gallons per day to 9 million gallons per day of water, mixed with unknown chemicals - roughly a day's supply for a town of 40,000 people (average use in the U.S. is from 80 to 100 gallons per day).

The disposal of vast quantities of flowback/produced waters is a major problem since no waste-water treatment plants in NYS are equipped to treat such waters laced with unreported chemicals and drilling muds, in addition to the unknown ingredients in the produced water picked up in the underlying shale during the fracking process. These waters (brine) are heavily polluted with salts from ancient oceans and may also contain naturally occurring radioactive materials (NORMS), which occur at higher levels in NY than in PA. As explained by John Dizard, "The Marcellus Shale is considered to have elevated levels of NORMs. NORMs that have been concentrated or exposed to the accessible environment as a result of human activities, such as mineral extraction, are defined by the EPA as technologically enhanced NORM (TENORM). TENORM may be concentrated because of (1) temperature and pressure changes during oil and gas production, (2) ^{226}Ra and ^{228}Ra in produced waters reacting with barium sulfate (BaSO_4) to form scale in well tubulars and surface equipment, (3) ^{226}Ra and ^{228}Ra occurring in sludge that accumulates in pits and tanks, and (4) NORMs occurring as radon (Rn) in the natural gas stream."^{iv}

These TENORMS' ubiquity during and after extraction pose a threat to water quality, as well as a health threat to the staff working at the site. Flowback/produced water containing NORMs and TENORMs is stored, at least temporarily, in open, plastic-lined ponds at the site. There have been occurrences of leakages due to ripped plastic, and overflows onto neighboring land, and into streams, wetlands and ponds during storm events. This dispersal of radioactive materials into sources that could be part of the

drinking water supply, or onto lands that are likely to be used for human activity (e.g. dairy farming) poses a serious health threat to the neighboring population.

A recent article^v in Scientific American comments as follows:

"As New York gears up for a massive expansion of gas drilling in the Marcellus Shale, state officials have made a potentially troubling discovery about the wastewater created by the process: It's radioactive. And they have yet to say how they'll deal with it.

The information from New York State's Department of Environmental Conservation (NYSDEC), which analyzed 13 samples of wastewater brought thousands of feet to the surface from drilling and found that they contain levels of radium 226, a derivative of uranium, as high as 267 times the limit safe for discharge into the environment *and thousands of times the limit safe for people to drink (emphasis added)*.

Geologists say radioactivity levels can vary across the Marcellus, but tests taken so far suggest the *amount of radioactive material measured in New York is far higher than in many other places (emphasis added)*."

NYSDEC disclosed these high levels of radioactivity in an appendix in its September 30, 2009 dSGEIS on gas drilling in the Marcellus Shale.

Although the NYSDEC has not yet published a response to this problem, the US Environmental Protection Agency (USEPA) has expressed concern. "The problem of TENORM contamination is now known to be widespread, occurring in oil and gas production facilities throughout the world. It has become a subject of attention in the United States and in other countries. In response to this concern, facilities in the U.S. and Europe have been characterizing the nature and extent of TENORM in oil and gas pipe scale, evaluating the potential for exposure to workers and the public, and developing methods for properly managing these low specific-activity wastes."^{vi}

In the same publication as above, USEPA expresses concern about the risks of exposure: "Risks analyzed for the general population within a 50-mile radius of the disposal site include exposures from the downwind transport of the re-suspended particulates and radon, and exposures arising from ingestion of river water contaminated via the groundwater pathway and surface runoff. Downwind exposures include inhalation of re-suspended particulates, ingestion of food contaminated by deposition of re-suspended particulates, and inhalation of radon gas."

Although both USEPA and NYSDEC express concern about radioactive exposure to the on-site workers and the population at large, they neglect to give special consideration to the most vulnerable portion of the population, namely, expectant mothers, infants and adolescents. Radiation doses for these should be much lower than for the general population.

According to the American Academy of Pediatrics (AAP)^{vii}: "Among long-term injuries to children, carcinogenesis is most important. Studies suggest that radiation exposure during childhood is associated with a greater risk of cancer than is exposure at other ages." Of further concern, if the drilling takes place in an area of dairy farms, is the contamination

of cow's milk. Again, according to the AIP: "Cow milk, a staple in the diet of most children, can also be quickly contaminated if radioactive material settles onto grazing areas."^{viii}

In order to bypass the disposal problem, some companies propose storing the majority of flowback/produced water underground. The unanswered question is: What happens to this water over a period of time, e.g., a 5 to 10-year period? Will it be forced up by the weight of the overlying rock layers through the vertical fissures that have been enlarged by the fracking process? Given time, will it become a source of aquifer contamination? There is no known method to reuse this water and restore it to potable levels. It is forever lost to our finite and diminishing supply of fresh water in the US and in the world.

Some companies are now experimenting with leaving as much as 80% of the flowback/produced waters, drilling muds and fluids underground, and recycling most of the remainder. But this only exacerbates the new problem of predicting the flow patterns of what would become a vast underground reservoir of polluted water and gas that can leak into aquifers connected to it through enlarged fissures in the fractured rock.

Above-ground disposal problems of frack waste, that are threatening some of Pennsylvania's waterways, should serve as a warning to NYS. Even the Pennsylvania press is becoming concerned as attested in a recent article dated 8/28/10 in the Pennsylvania Gazette^{ix}:

"About 1,400 gas wells have been drilled into the state's 450 million-year-old Marcellus Shale since 2005. And state and industry officials say another 35,000 to 50,000 wells could be drilled by 2030. Each Marcellus Shale deep well uses between 2 million and 8 million gallons of water treated with toxic chemicals for drilling and to hydraulically fracture the shale rock to release the gas.

In just the Monongahela River's watershed, between 612,000 and 2 million gallons per day of waste fracking fluid is discharged by 13 public and commercial water treatment facilities after limited treatment. At the lower treatment amount, Dr. Volz said, the water daily discharges contain 824,825 pounds of total dissolved solids, 15,000 pounds of barium, 16,737 pounds of strontium and 486,812 pounds of chloride....

Also Friday, the state Department of Environmental Protection announced that 41 of the 74 companies drilling in the Marcellus Shale formation missed the state deadline to report the production levels of their wells.

Drilling companies were required to report production totals by Aug. 15 for the period from July 1, 2009 through June 30, 2010. The next well production reporting deadline is Feb. 15."

V. CUMULATIVE IMPACTS OF FRACKING

Fracking with horizontal drilling, on the scale being intended for the Marcellus Shale, requires millions of gallons of water per frack, and billions of gallons on a cumulative

scale. Productive wells may be fracked several times. The cumulative effects of these multiple frackings over multiple wells must be a fundamental component of the EPA study. Local aquifers and surface waters could be stressed to the point of not having sufficient capacity to provide base-flow for local streams, with subsequent degradation of stream water quality and loss of stream biodiversity, or sufficient supply for agriculture and the human population.

In addition, a depleted aquifer will be far more vulnerable to intrusion by pollutants seeping into it from surrounding areas, including vertical fissures enlarged by fracking, than a full aquifer whose water pressure will prevent pollutants from entering.

In such cases, water would have to be brought onto the well site by hundreds of large, heavy, diesel-spewing trucks.

Air pollution due to these and other causes such as methane release from the wellhead, condensate tanks, compressors and pipelines - is an on-going, serious health problem that must be fully addressed. The vented gas, along with other noxious substances that evaporate from waste ponds, travel downwind and contaminate surface waters and farmland. This must be taken into account. It is not sufficient for the EPA to examine only water pollution problems since air pollution also affects human health. In addition, as this vented gas mingles with rain and falls back to earth, it contaminates streams, ponds, lakes, wetlands, and reservoirs. "Fracking" is extremely air polluting, as pointed out in NYSDEC's dSGEIS. The effect of air pollution on rainfall and subsequently on pollution in streams, lakes, ponds, wetlands and reservoirs should be modeled and analyzed.

Air pollution from fracking is a clear pathway to water pollution. It must be included in the study. In states such as Texas, air pollution is the primary issue - even ahead of water pollution

Most Important Processes and Pathways of Exposure

I. IMPOSSIBILITY OF PREDICTING EFFECTS OF HIGH-VOLUME FRACKING

The high volume, horizontal drilling process that will be used in the Marcellus Shale requires millions of gallons of water (anywhere from 3 million to 9 million per well) and intensive blasting that shatters the shale rock in ways that cannot be predicted. Shale rock is much harder than even sandstone that has been the conventional source of natural gas. Gas flows in sandstone are measured in millidarcies. In shale, flows are of the order of microdarcies or nanodarcies - thousands to millions of times slower than in sandstone. The need for intensive blasting as described in the next section is, therefore, mandatory.

Explosions of the magnitudes that are being proposed are, by their very nature, unpredictable in their effects. How will existing faults be affected, particularly following

multiple explosions? Will fractures be lengthened vertically and become conduits for contaminated flowback/produced waters to access nearby aquifers? Case studies may provide guidance, but it would be foolhardy to rely on them to predict the safety of an individual "frack". Even slight differences in initial conditions, and/or slight differences in geologic formations can produce vastly differing results.

The following description of high-volume fracking with horizontal drilling is quoted from a memo to the Otsego County Board^x. It describes the destructive power of fracking, as proposed in the Marcellus Shale, and how the detonations used in fracking would create new and unpredictable pathways for the release of the gas into nearby and more distant aquifers.

"The existing DEC well regulations are grossly inadequate to regulate a horizontal hydrofracked well in shale gas. They are a prescription for disaster for New York's drinking water. Horizontal hydrofracking of shale gas formations is essentially a hydrobaric underground explosion, i.e. a bomb. A very powerful, very dirty bomb. A bomb's explosive power is a function of the pressure wave it generates and the mass of air it displaces. An "air bomb" used in Afghanistan as an anti-personnel device has a pressure wave of about 500 lbs per square inch (psi). It can be heard up to 100 miles away. A horizontal hydrofrack inside shale can have pressures approaching 15,000 psi, or 30 times that of an air bomb. That is equivalent to the water pressure 6 miles deep in the ocean.... The fracking fluid contains chemicals that would be illegal to use under the Geneva Convention banning chemical weapons. This adds up to a massive explosion of a "dirty bomb" underground. Since the chemicals in most fracking fluids are hydrocarbons (oil-based), they separate from the frack water, meaning they rise to the top of the fractures within a matter of days. So, while they represent a small fraction of the total fracking fluid, they are disproportionate at the top of the formation - which is why they are found in relative abundance in adjacent water wells, when such wells are polluted by shale gas drilling. When a shale gas well is hydrofracked, the explosive power of the frack breaks up the rock indiscriminately for a considerable distance - far enough to break into nearby aquifers - particularly if the frack hits a vertical fault, that may cause the gas bearing formation to "communicate" with other strata. This can release natural gas - which consists of methane, butane, propane, and benzene, etc. - into drinking water, along with the toxic chemicals in the fluid. Once introduced, there is no way to remove the gas or the chemicals in the drinking water."

We note again that a single well may be fracked many times and that the cumulative impacts of all these procedures on water quality must be taken into account.

II. EFFECTS OF FRACKING ON CONTIGUOUS LAND

A serious gap in the proposed analysis is the omission of the effects of fracking on the land contiguous to the operations. Hydraulic fracturing will undoubtedly have a profoundly negative effect on the land itself and its surroundings. For example, the NYS Marcellus Shale Fairway is mostly forest and/or farmland (e.g., the NYC watershed is 75% forested). The intricate network of roads and pipes, and the heavy, intensive use of the spacing units will fragment the forests and increase their vulnerability to invasive

species and disease, rendering them no longer viable. It is a well-established, scientific fact that forests are among the best producers of clean, potable water^{xi}. Loss of forest will undoubtedly result in degraded, polluted water.^{xii} This will have serious economic consequences since treating polluted water is far more expensive than protecting clean water at the source. Even if the fracking could be accomplished without a single spill or pollution of any water-body, the loss of forest would be sufficient to guarantee the loss of water quality.

A report from the Office of the NYS Comptroller, Thomas P. DiNapoli^{xiii} states that "A 2002 survey of 27 water suppliers found that for every 10 percent increase in forest cover in a municipal water system's watershed, costs of water treatment decreased by 20 percent."^{xiv} This quantitative, dry tribute to the forests' ability to provide clean water should be a warning that they are too valuable to be impacted and eventually destroyed by gas drilling enterprises.

Loss of forests, loss of their CO₂-absorbing capacity and their contribution to global cooling should be included in the study. After the wells have been closed, the study should also analyze the crucial issue of whether or not the land can recover its former uses (forestry, farming), its effects on water quality, and how long recovery would take.

Current Practices Posing the Most Threat

I. CONFLICT OF INTEREST

NYSDEC personnel who issue the licenses should be separate from those who carry out the inspections. Otherwise, a clear conflict of interest exists, to the likely detriment of water quality. The recent catastrophe in the Gulf of Mexico is a prime example of how the lack of government oversight allowed BP to skirt safety for profit. Furthermore, due to the complexity of the drilling process and its many unforeseeable consequences, each inspector should be assigned to no more than one well pad. There must be a 24/7 presence to monitor all aspects of the drilling practice.

II. NEED FOR SIGNIFICANT INCREASE IN DEC PERSONNEL

There is a dire need for more NYSDEC personnel to oversee fracking. Personnel has been severely cut in recent years, and only a few positions are being reinstated to oversee fracking if and when it starts in NYS. The present NYS administration is anxious to promote fracking in the hope of a quick financial return that will help alleviate the State's present large deficit. For this purpose, the Governor has issued Executive Order #25 that would streamline the State Environmental Quality Review Act (SEQRA) and facilitate obtaining a permit to drill.

Although fracking with horizontal drilling has not yet occurred in NYS (the NYSDEC has still not responded to the over 13,000 comments on its dSGEIS pertaining to fracking

with horizontal drilling), there have been numerous examples of drilling in Pennsylvania's portion of the Marcellus Shale. The results are not encouraging. For example, there have been 565 violations pertaining to 1,458 wells drilled since 2008, a close to 40% violations.

A recent article in the Pittsburgh Post Gazette states:

"A new report by the Pennsylvania Land Trust Association said the state has identified 1,435 violations by 43 Marcellus Shale drilling companies since January 2008, prompting environmental groups to call for quick legislative action to protect water and land resources.

According to Monday's report, 952 of the violations were identified as having or likely to have an impact on the environment. Those included 100 violations of the state Clean Stream Law, 268 for improper construction of waste water impoundments; 277 for poor erosion and sedimentation plans during well pad, road and piping construction; 16 for improper blowout prevention; and 154 for discharging industrial waste, including drilling waste water containing toxic chemicals, onto the ground or into streams.

About 500 of the violations were administrative or safety violations and identified as not likely to degrade the environment."^{xv}

Although violations, per se, do not necessarily lead to water pollution, the fact that they are so common is indicative of the careless manner in which wells are dug and fracking is carried out, leading to the increased probability of an accident. In fact, a recent incident occurred on June 3rd, 2010, when a well blew up in Pennsylvania's Moshannon State Forest in the Marcellus Shale region. According to the newspaper report,^{xvi} "Critics of the shale gas industry remain concerned about the probability of such accidents occurring in Pennsylvania's Marcellus Shale gas region and with it, long term concerns regarding watersheds which supply drinking water to the greater Philadelphia and Delaware Valley regions."

III. COMPULSORY INTEGRATION AND CUMULATIVE EFFECTS OF MANY WELLS

Under present NYS law ("Compulsory Integration"), a landowner has to give up the right to prevent gas from being extracted from under his/her property if the gas company, or a combination of gas companies, control leases on as little as 60% of the land inside the spacing unit - the area permitted by NYSDEC for drilling. Compulsory integration gives the drilling companies an unparalleled opportunity to control large areas of contiguous lands where fracking can occur. Indeed, aerial photographs show landscapes covered with vast networks of spacing units interlaced with access roads.

The cumulative effect of such networks on water quality together with the cumulative effects of drilling many wells on a spacing unit should be evaluated. In the Marcellus Shale, for example, there can be 8 to 10 wells drilled horizontally on a well pad and 16

well pads per a square-mile spacing unit. There could, therefore, be up to 160 wells in a square-mile. And, each well may be fracked several times.

IV. WORST CASE SCENARIOS

Companies that propose to drill in the Marcellus Shale must submit worst-case scenarios with proposals on how to deal with such situations. This should require the approval of the permitting agency, or agencies.

Data, Studies and Reports

These have been provided along with the foregoing discussions. Again, we cannot over-emphasize the critical role that forests play in providing clean, potable water. Since a large portion of the Marcellus Shale Fairway is forested, fracking would lead to fragmentation and to the eventual demise of these forests. If this were to result, there could not be a more devastating impact on water quality.

CONCLUSIONS

It is unparadoxically short-sighted that such a small sum of money is being allocated to this EPA project so that only water pollution can be studied. There are many more issues that are of great importance such as air pollution, economic sustainability, effects on land-use and biodiversity, quality of life.

Unfortunately, EPA is forced to carry out this study with its "hands tied." Water is, admittedly, vitally important but there is a myriad of other issues that might be harder for the "fracking" companies to dismiss than water pollution. Indeed, these companies claim that there has never been a proven case of water being polluted due to fracking. How could there be since there is no requirement for them to do any pre-drilling testing of surrounding wells, streams or other water-bodies? The burden of proof must be shifted from the home-owner or the community to the drilling company.

Despite these drawbacks, and despite the 2005 law that exempted fracking from EPA regulatory authority under the Safe Water Drinking Act, we are hopeful that these comments, and others, will help EPA use its enforcement authority to the maximum extent possible. In particular, under the Clean Water Act, EPA still has regulatory authority over surface discharges of wastewater from drilling operations - including fracking.

Our comments are the result of extensive reading and study, including the NYS Department of Environmental Conservation's (NYSDEC) 2009 dSGEIS, and our comments delivered at various public hearings and panels, including Senator Antoine

Thompson's Round Table on hydrofracturing, We can reach only one conclusion: there should be a ban on all hydrofracturing in NYS, specifically a ban on high-volume hydraulic fracturing with horizontal drilling in the Marcellus Shale and other low-permeability gas reservoirs such as the Utica Shale.

We are appalled that the US government is still thinking long-term of promoting development of fossil fuels to meet our energy needs. Although this country cannot immediately forego fuels based on hydrocarbons, it is shamefully long overdue in seriously subsidizing, researching, producing and marketing renewable energy sources such as wind, solar and others.

The ultimate irony is that we don't even need these extra fossil-fuel resources as touted by the gas companies and some environmentalists. Indeed, a recent agreement between EnCana Oil and Gas, USA and China^{xvii} is, in fact, for export of natural gas to China. Natural gas is not a transition fuel until we reach renewables, as we are being led to believe. If hydrofracking is allowed to establish itself further, it will be a source of immense revenue for the companies, but wholesale water, air, forest and land destruction where the drilling occurs.

Foreign companies are set to exploit the Marcellus Shale. Since the natural gas resources are finite, "fracking" is clearly not a sustainable industry such as farming, forestry, tourism, maple, wineries and others that currently exist in those areas. Also, "fracking" is extremely destructive to the areas where it is practiced. The land will be transformed from farms and forests into industrialized areas that will subsequently be abandoned. Can anyone predict whether they will recover within a reasonable time to their former usefulness, or merely remain an exhausted wasteland?

To put it bluntly - we shall be selling our natural resources to foreign countries which, having exploited them, will leave us with unproductive, contaminated, useless land. While a few may reap huge financial benefits, most will suffer from this colonial-type exploitation.

The low-hanging fruit - the fossil fuel sources that are relatively easy to exploit - have been used up. So we drill deeper and deeper, and more and more destructively to the environment to reach new sources. If we dig deep enough, using increasingly brutal methods, the supply appears limitless. But the price we pay is the irreversible damage to our planet.

If the catastrophe in the Gulf of Mexico has any benefit, it is to make us realize that there will always be human error, and limits to what we can do.

There are better, more intelligent ways of fulfilling our needs. The most immediate, least polluting way is simply through energy conservation at the individual, group, town, state and nation-wide levels.

Designing more energy-efficient homes and manufacturing more energy-efficient products can also steer us away from our dependence on fossil fuels. However, the energy required for the manufacture and disposal of such products - their total life-cycle - must also be taken into account in order to get a realistic appraisal of their total energy usage.

The final step is to take advantage, in the style of a Manhattan Project, of the tremendous talent that is available in our universities and research centers - the best in the world - and apply it to research, develop and market renewable energy in all its forms.

It can be done.

Thank you for the opportunity to submit these comments.

Marian H. Rose, Ph.D.
Director, CWCWC

ⁱ WATER POLICY REPORT - WWW.InsideEPA.com - August 30, 2010

ⁱⁱ Do Gas Wells Pose Health Risk?, by Don Hoper, Pittsburgh Post Gazette, August 28, 2010

ⁱⁱⁱ garfield-county.com/Index.aspx?page=1150 & garfield-county.com/Index.aspx?page=1149

^{iv} John Dizard, July 18, 2010: <http://www.ft.com/cms/s/0/9e6c7b40-9103-11df-b297-00144feab49a.html>

^v Natural Gas Drilling Produces Radioactive Wastewater, Abrahm Lustgarten and ProPublica, Scientific American November 9, 2009

^{vi} Oil and Gas Production Wastes, <http://www.epa.gov/rpdweb00/tenorm/oilandgas.html#whatbeingdone>

^{vii} American Institute of Pediatrics: <http://www.aip.org>

^{viii} *Ibid.*

^{ix} See <http://www.post-gazette.com/pg/10240/1083398-454.stm#ixzz0xvCeDNWU>

^x Statement by James L. Northrup, ex ARCO Planning Manager, to Otsego County Board, July 21, 2010

^{xi} **Forests, Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States** - United States Department of Agriculture Forest Service, June 2009

^{xii} News from Hudsonia, Volume 24, Number 1, Summer 2010, FORESTS: UNSUNG DEFENDERS OF OUR WATERS, pp 4-6

^{xiii} Economic Benefits of Open Space Preservation, Office of the State Comptroller, March 2010

^{xiv} Ernst Caryn, Richard Gullick and Kirk Nixon. "Protecting the Source: Conserving Forests to Protect Water." *Opflow* 30.5 (May 2004). [www.tpl.org/content/documents/landandwater opflow article.pdf](http://www.tpl.org/content/documents/landandwater%20opflow%20article.pdf)

^{xv} Report: Well drilling violations near 1,500 for Marcellus Shale, Tuesday, August 03, 2010

By Don Hopey, Pittsburgh Post-Gazette

^{xvi} See <http://www.examiner.com/energy-in-philadelphia/despite-assurances-marcellus-shale-gas-well-blowouton-pennsylvania-state-lands>

^{xvii} See <http://calgaryherald.com/entertainment/movie-guide/Terzakian+Encana+China+natural+deal+ponts+shifts+North+America/3210790/story.html>