



CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

Environmental Impacts of Marcellus Natural Gas Drilling in the Chesapeake Bay Watershed

Comments of Harry Campbell
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to the House Majority Policy Committee

April 13, 2010

Chairman Sturla, Representative Mirabito, and other distinguished members of the House Majority Policy Committee, my name is Harry Campbell and I am the Senior Scientist of the Pennsylvania Office of the Chesapeake Bay Foundation (CBF). I would like to thank you for the opportunity to discuss the environmental impacts on the Chesapeake Bay watershed of drilling for natural gas in the Marcellus Shale formation.

CBF is the largest non-profit organization dedicated to the protection and restoration of the Chesapeake Bay, its tributaries, and its resources. With the support of over 240,000 members, our staff of scientists, attorneys, educators, and policy experts work to ensure that policy, regulation, and legislation are protective of the quality of the Chesapeake Bay and its watershed, the largest tributary of which is the Susquehanna River.

Today, this Committee seeks to garner a greater understanding of the potential impacts Marcellus Shale-related drilling may have on the Chesapeake Bay and its watershed. Simply stated, we do not know.

Thirty-six of the 42 counties in Pennsylvania's portion of the Chesapeake Bay watershed are underlain by the Marcellus Shale formation. The current pace of permitting and drilling in the watershed is high, and the projected pace will only accelerate. In fact, the Pennsylvania Department of Environmental Protection (DEP) has projected over 5,000 drilling permits to be issued this year alone.

Yet, a comprehensive evaluation and assessment of the cumulative environmental and quality of life impacts, including on recreation, of this level of drilling has not and is not being performed by any state agency(s) or commission(s). We believe that all of the Commonwealth's resource agencies, including DEP, the Pennsylvania Department of Conservation and Natural Resources, the Pennsylvania Fish and Boat Commission, and the Pennsylvania Game Commission, should

be required to work collaboratively to fully assess the cumulative impacts of current and long term Marcellus Shale drilling on Pennsylvania's natural resources.

Such an approach is absolutely necessary because to date we have not seen the careful environmental analysis of even site-specific permits required for drilling operations that we believe is necessary to ensure that land, air, and water resources are protected. If a thoughtful analysis has not occurred at even the site level, we can not purport to begin to grasp the cumulative regional impacts.

As you know, in order to establish a natural gas drilling pad a large amount of earth disturbance is often required. To avoid eroded soils making its way into local streams and eventually the Chesapeake Bay, erosion and sedimentation control plans and permits are required for activities which will disturb 5 acres or more of land and, for roads, 25 acres. Traditionally, County Conservation Districts worked with applicants to develop a plan which maximizes resource protection while allowing use of the land. But, in March 2009, without any public notice, DEP stripped County Conservation Districts of their authority to review and approve erosion and sediment control and wetlands permits for oil and gas activities. In the same action, and again without public notice, DEP instituted an expedited erosion control and stormwater permitting process that does not allow for public participation or meaningful agency review of permit applications.

This expedited permit review process consists of simply making sure all the paperwork is in the permit application. DEP does not conduct any detailed technical environmental review of the plans that drilling companies are required to submit in order to minimize environmental impacts, so long as those plans are signed and sealed by the paid professional consultant for the drilling company. Unlike many building permits, stormwater runoff calculations necessary to assess the changes in the amount of stormwater coming off of the site as a result of the clear cutting, grading, and compacting of soil are not even required to be submitted. And permit decisions must be made by DEP within 14 days, which does not give concerned citizens and important resource agencies such as the Pennsylvania Fish and Boat Commission sufficient time to review and comment on plans for impacts to aquatic life.

In August and September 2009, CBF appealed three permits issued by DEP under its expedited permit review process. In October 2009, with our appeals pending before the Environmental Hearing Board, DEP announced that it was revoking all three permits. In letters sent to the companies revoking the permits, DEP noted numerous technical deficiencies with the plans.

While we are pleased that DEP revoked the permits, the expedited permit process remains in place and is still being used today to approve permits as quickly as possible.

We believe that DEP should abandon the expedited permit review process in favor of a more traditional environmental permit review where drilling companies are required to conduct careful site review and pre-application planning to avoid impacts to waters and minimize earth

disturbance, and one in which DEP provides meaningful agency review of the permit applications that are submitted. This process should contain the following elements:

- Involvement of the County Conservation Districts early in the permit review process.
- A requirement that the agency reviewing the permit application conduct a site visit as part of the permit review process.
- Requirements for permit applicants to submit as part of the permit application complete and accurate erosion and sediment control plans, post-construction stormwater management plans, and detailed surveys of all waters of the Commonwealth in an adjacent to the permit area.
- A requirement for the reviewing agency to conduct a full technical review of the entire permit application.
- A requirement for the reviewing agency to review and assess the probable cumulative impacts of all anticipated drilling within the same subwatershed, and require the permittee to undertake activities necessary to prevent adverse cumulative impacts.

We also believe that Pennsylvania's Oil and Gas Act should be amended to prohibit any hydraulic fracturing activities within 100 feet of *all* waters of the Commonwealth (not just those depicted on topographic maps) and the waterbody's 100-year floodplain. Given the ability of such drilling activities to extend horizontally for great lengths, there is no need to disturb riparian land and store hazardous chemicals so close to our water resources.

Adopting the following revisions to DEP's permitting approach would, we believe, start to ameliorate some of the site-specific concerns we have with natural gas drilling activities. Albeit, we believe such revisions would only begin to address the large-scale cumulative impacts to our resources.

For instance, we are quite concerned about the cumulative impacts of Marcellus Shale development in the northern tier of Pennsylvania. Much of the Marcellus Shale region is thickly forested. Forest cover is the single biggest indicator of high water quality in local watersheds and the Chesapeake Bay. These forested areas provide cool, clean water vital to recreational economies, public drinking water intakes, and aquatic life all down the Susquehanna River and into the Chesapeake Bay. The multitude of well pads, access roads, pipelines, compressor stations, and other infrastructure associated with the Marcellus Shale development can add up to significant cumulative loss of forest cover. Yet, by looking at each site myopically in isolation, the cumulative effect on our forests and our watersheds is not considered.

The handling and safe disposal of wastewater from the hydrofracking process is another serious water quality challenge presented by Marcellus Shale development. Wastewater from Marcellus Shale development is a highly contaminated waste stream that presents significant threats to

water quality of receiving streams. It is typically several times (and can be up to ten times) saltier than sea water; in some cases approaching saturation. It can be up to one-third total dissolved solids (TDS). The dominant ion by far is chloride, which is known to be toxic to aquatic life. It can contain high levels of barium and strontium, heavy metals that can be toxic to aquatic life. Biocides, surfactants, and various toxic organic compounds, including BTEX (benzene, toluene, ethylene, xylene), that are used as additives in the hydrofracking process are present in the wastewater. If not handled carefully and bled through the system at proper amounts, these compounds can impair or kill the microbes in biological treatment systems many municipal wastewater treatment operations are installing to meet Chesapeake Bay requirements. And if not fully or improperly treated, these compounds can profound toxicological impacts on aquatic resources under the current conditions.

Even with increased recycling and reuse of this wastewater by the industry, the high amount of drilling for Marcellus shale contemplated in the Commonwealth of Pennsylvania over the next several years and decades will mean that large volumes of this highly unusual and highly contaminated wastewater will have to be properly disposed.

The Clean Water Act contemplates that, for such waste streams, technology-based limits employing the best available technology economically achievable be established for the industry to achieve specific end-of-pipe effluent limits on parameters of concern set forth in NPDES permits.¹ Recently, the Pennsylvania Environmental Quality Board (EQB) proposed changes to Title 25, Chapter 95 of the Pennsylvania Code that would require strong effluent limits for the treatment of wastewater associated with Marcellus Shale development. We believe that the information gathered by DEP through an open stakeholder process and through the EQB public comment period supports establishment of the proposed effluent limits.

The treatment technologies available to treat this volume and type of wastewater are either all or nothing—that is, limit of technology using some method of evaporation/distillation (all) or dilution of the concentration of the waste stream to avoid treatment (nothing). Dilution is not an appropriate treatment technology, particularly with industrial waste streams this contaminated, and merits no serious consideration.² We believe the environmental and health risks of relying upon dilution to address these serious industrial wastewater concerns are too great and place our rivers and streams at tremendous risk. This is particularly true now that *Pyrmnesium parvum* (golden algae) has been found in Pennsylvania surface waters. This saltwater algae produces a toxin deadly to fish, mussels, and salamanders and thrives and outcompetes freshwater algae in high TDS waters. It has been responsible for a massive fish kill on Dunkard Creek in

¹ 33 U.S.C. § 1311.

² See EPA Effluent Limitation Guidelines for Centralized Wastewater Treatment (CWT) Industry Final Rule, 65 Fed. Reg. 247 pp. 81241-81313 (December 22, 2000), Chapter 8 p. 8-3 (“EPA does not consider the use of equalization tanks for dilution as a legitimate use. In this context, EPA defines dilution as the mixing of more concentrated wastes with greater volumes of less concentrated wastes to a level that enables the facility to avoid treatment of the pollutant.”).

southwestern Pennsylvania. EPA's preliminary report on the Dunkard Creek fish kill concludes that "control of TDS on Dunkard Creek and other watersheds is the best solution to control *P. parvum* blooms."³

While we support DEP's proposed TDS standard, we believe that the proposed revisions to Chapter 95 should be strengthened by requiring whole effluent toxicity (WET) testing for all discharges of wastewater, requiring recycling and reuse of flowback water, and establishing strong environmental performance standards for recycling and reuse that are protective of our surface and groundwater.

In proposing the Chapter 95 discharge standards for all sources of high TDS wastewater, DEP has captured many industries (including publicly owned treatment works) for which the cost of meeting these limits may be particularly burdensome. Yet we believe these standards are absolutely necessary to deal with the new industrial waste source that is being produced in Pennsylvania from hydrofracking operations in the Marcellus shale. The need for addressing this industrial waste source will only be greater as drilling increases over the next several years. One approach DEP should consider is setting technology based limits for the oil and gas industry now, and continuing to evaluate the need for such technology based standards for other industries in the future.

Finally, while the proposed Chapter 95 discharge standards is absolutely necessary to deal with the immediate need to protect water quality of our rivers and streams from discharges of treated flowback wastewater, given the amount of wastewater expected to be generated over the next several decades of Marcellus shale development in Pennsylvania, we are concerned that surface water discharges of flowback wastewater may not be an adequate long term solution. While permit limits set under these proposed standards would be stringent (and would be even more protective with required WET testing and reuse and recycling requirements and accompanying environmental protection standards), any violation of permit limits could potentially discharge highly contaminated and toxic wastewater into waters of the Commonwealth, where aquatic life, including economically valuable game species, and downstream drinking water intakes could be contaminated.

We believe that DEP should immediately begin analyzing the need for a permanent prohibition of surface water discharges of flowback wastewater and the development of adequate and protective nondischarge disposal alternatives, such as onsite deep well injection. Such an injection program would need to be robust and protective of surface and groundwater. Given the lack of primacy for the deep well injection program, DEP should seek to engage the U.S. Environmental Protection Agency (EPA) in this analysis, and should engage all relevant stakeholders as it undertakes this analysis.

³ Reynold, Louis. USEPA. Update on Dunkard Creek (Online). November 23, 2009. Available: <http://www.epa.gov/region03/dunkard.pdf>. [February, 12, 2010].

Strong recycling and reuse standards coupled with onsite or local deep well injection disposal requirements may ultimately be the best long term solution to some of the difficult water and other environmental issues with which Pennsylvania is currently grappling. If, after thorough investigation involving stakeholder input, DEP believes that prohibiting surface water discharges and requiring onsite or local injection is the most appropriate long term option, DEP should propose additional regulations to implement these requirements.

Beyond the above environmental impacts with Marcellus Shale drilling activities, air pollution from heavy truck traffic and compressor stations is a concern. With development of the Marcellus Shale includes nitrogen oxide (NO_x) emissions from drilling operations, depending on drilling depths. According to the National Park Service, on a site-by-site basis emissions may not be significant but on a regional basis may prove significant as states and parks deal with regional ozone transport. Currently, many rural counties are in attainment for the ozone standard. However, with expanded Marcellus Shale development, this activity may push several new counties (and parks) into nonattainment, particularly since the U.S. Environmental Protection Agency (EPA) has recently tightened the ozone standard. In the rural areas of the East, natural gas operations would add to the rural NO_x, which could make rural NO_x more of an issue than urban NO_x. This would be a fairly significant change for the East, in forming regional ozone episodes. It is possible that impacts to visitor health and ecological impacts to plants may occur since the Mid-Atlantic region has many plant species that are classified as ozone sensitive. The estimated 320 to 1,365 truckloads of equipment necessary to bring a well into production will only add to the NO_x pollution concern⁴.

NO_x-laden air pollution is a significant source of nitrogen pollution to the Chesapeake Bay. The NO_x in the air tends to deposit onto directly into the rivers and streams which feed into or directly to the Bay. NO_x can also land on impervious surfaces such as roads and parking lots where it can runoff into the nearest waterbody. And when deposited on grass, forests, or farm fields it can leach into the groundwater or enter into runoff, both of which flow to local streams and the Bay.

Cumulatively, the impacts noted above may have a profound impact local water quality and threaten to make Pennsylvania's ability to meet the federal Clean Water Act requirements to reduce pollution to the Chesapeake Bay all that more difficult and costly. It is vitally important Pennsylvania undertake a comprehensive cumulative analysis of the environmental impacts and quality of life impacts to Pennsylvania.

Again, thank you for the opportunity to share our views.

⁴ Potential Development of the Natural Gas Resources in the Marcellus Shale New York, Pennsylvania, West Virginia, and Ohio. December 2008. National Park Service, Geologic Resources Division, Denver. CO. Available at: http://www.eesi.psu.edu/news_events/EarthTalks/2009Spring/materials2009spr/NatParkService-GRD-M-Shale_12-11-2008_view.pdf