pennsylvania environmental council

Marcellus Shale Development in Pennsylvania

Testimony of

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Introduction

The Marcellus Shale is one of the largest unconventional on-shore gas deposits in the world. Estimated at between 250-500 trillion cubic feet of gas deep underground, the Marcellus Shale represents a natural gas supply that could meet America's energy needs for the next 50-80 years or more.

It is widely considered that the Marcellus Shale play offers an abundant fuel to help bridge the gap between today's energy portfolio and a future supply that reflects both a reduced carbon footprint and reduced dependence on foreign sources of energy.

There is both a national security interest as well as a private sector interest in this extraordinary resource, setting the stage for a truly unique opportunity for economic development, energy security, private sector profitability and public revenue generation.

The promise of this new industry comes at a critical time in our history, when bridge fuels to the future are desperately needed to help reduce our dependence on foreign sources of oil. At the same time, the recession has created a state budget in need of new sources of revenue. Additionally the prospect of new job creation from natural gas development and new industries attracted to Pennsylvania by a reliable natural gas supply comes at a critical time in our Commonwealth, as the unemployment rate in one-quarter of Pennsylvania remains at over ten percent.

Without question, the Marcellus Shale is a once-in-a-lifetime situation, and one that is already underway. The size and potential of the Marcellus has set off a "Pennsylvania Gas Rush," analogous to the California Gold Rush, the Texas oil boom and the discovery of oil on Alaska's North Slope.

But for all the excitement and promise of new economic opportunity, there are striking similarities to other energy resource development booms in Pennsylvania's history. Indeed, Pennsylvania has paid a very heavy price for the development of timber, coal and other extracted resources. That price has even yet to be fully paid and is evidenced by over 5,000 miles of polluted waterways, thousands of abandoned mines and oil and gas wells, decaying infrastructure, and economic devastation caused by poor planning and a short-sighted thirst for growth decades ago.

We need to learn from the mistakes of the past, apply them to the development of the Marcellus Shale, and make sure that we do everything possible to create a sustainable, thriving, and successful Pennsylvania Marcellus Shale economy that does not leave an environmental burden to future generations.

There is widespread agreement that "business as usual" in Marcellus Shale natural gas operations, as well as its current regulatory oversight, is not equal to the scale and scope of this development, and that simply applying conventional solutions to these significant challenges will result in adverse consequences to all stakeholders in the process.

The Pennsylvania Environmental Council (PEC) has taken the lead in bringing together representatives of communities, the natural gas development industry, government and environmental interest organizations in the spirit of finding a strategy that all sides can agree will accomplish three fundamental goals:

1. Enable the gas industry to prosper in the successful development of the Marcellus Shale and other deep shale gas plays in Pennsylvania;
2. Ensure that Pennsylvania benefits from the success of this industry, while preventing long-term costs; and
3. Protect people and the environment from adverse effects that result from the expansion of drilling operations.

To begin this dialogue, PEC held the Pennsylvania Marcellus Shale Policy Conference in Pittsburgh on May 3-4, 2010. The goal of this forum was to identify the key issues, challenges and opportunities in the effective and sustainable development of a Marcellus Shale gas industry in Pennsylvania.

From this conference, PEC produced a detailed report, "Developing the Marcellus Shale: Environmental Policy and Planning Recommendations for the Development of the Marcellus Shale Play in Pennsylvania" in July 2010.[1] This report represents PEC's

[1] Available at http://www.pecpa.org/marcellus

findings and conclusions from that public dialogue, allowing for further research and analysis.

The policy recommendations in the report were offered to serve as the basis for new legislation and regulation designed to identify a framework whereby this vast natural resource can be developed for the benefit of America's energy portfolio, the private sector, and key stakeholders, while at the same time safeguarding the future prosperity of communities and the natural environment in Pennsylvania for current and future generations to come.

Since that time, PEC has been actively engaged in meetings with the members of the gas industry, state regulators, local governments and other environmental organizations aimed at bringing consensus to this debate around PEC's fundamental objectives. We were selected to serve as one of four environmental interest organizations on Pennsylvania Gov. Corbett's Marcellus Shale Commission in recognition of the leadership role PEC has played in seeking to bring about effective legislation and regulatory changes that give state government the resources and authority to effectively safeguard the people and environment of Pennsylvania with laws that are relevant to the modern industry.

Our fundamental position is that development of the Marcellus Shale need not produce winners and losers. If done right, the industry, the people of Pennsylvania, and the environment can all benefit from the combined effects of government regulation that is equal to the task at hand and the enforcement of best management practices in an industry that has already demonstrated its capabilities in this regard. It is our hope and belief that Pennsylvania can be a model to the nation in sustainable energy development, and preserve the historic landscape of Pennsylvania's environment for future generations.

Impacts of Development in Pennsylvania

Over the past five years, the development of the Marcellus Shale gas formation in Pennsylvania has increased at an ever-quickening pace. It has transformed the stagnant natural gas industry in Pennsylvania and has significant implications in the energy market at both the national and perhaps the international scale. It has also affected local communities, particularly communities not accustomed to industrial scale activity, in both positive and negative ways.

Last year 3,314 permits were issued by the Department of Environmental Protection, and 1,446 wells were drilled for the Marcellus Shale formation. Permit approvals for 2011 are already outpacing last year's numbers. Some analysts estimate that over the

next 10 years annual Marcellus Shale formation well drilling activity will steadily increase from 2,500 wells per year to over 3,500 wells per year.[2]

The projected development of the Marcellus Shale formation and the anticipated development of the Utica Shale and perhaps other shale formations in Pennsylvania means that we are in the formative years of an industry that will be a prominent part of the Pennsylvania landscape for multiple generations to come.

One of the challenges of unconventional gas development in Pennsylvania is the density of well development activities. Thus far, well development activities have been concentrated primarily in a handful of counties in the northern tier and in the southwest corner of the Commonwealth. With very limited exception,[3] this concentrated activity is occurring without gathering information that is needed to identify and assess the impacts of this activity. PEC believes that as the natural gas exploration, production and delivery infrastructure is developed in the rest of the Marcellus Shale play and in other shale gas formations in Pennsylvania, it is vitally important to systematically collect and compile a data base of relevant information that is publicly accessible. Such information is necessary to assess the impacts of the past activity as well as ongoing activity, and to establish adaptable requirements that are designed to mitigate impacts to the greatest extent possible both in the near term and the long term.

There are a number of studies being undertaken by organizations such as the Environmental Protection Agency, the Department of Energy National Energy Technology Laboratory and the Interstate Oil & Gas Compact Commission to identify impacts of shale gas development. In addition, we are aware that:

- The U.S. Environmental Protection Agency is conducting a study plan on the potential environmental and human health implications of hydraulic fracturing, with special emphasis on the relationship between hydraulic fracturing and drinking water resources;
- President Obama has asked the Department of Energy's Advisory Board to produce a report offering recommendations on how to assure that shale gas development does not adversely affect water quality; and

[2] See Timothy J. Considine, et al, The Economics of the Pennsylvania Marcellus Shale Natural Gas Play: An Update, at 16, (The Pennsylvania State University, College of Earth and Mineral Sciences, Department of Energy and Mineral Engineering, May 24, 2010).

[3] In November 2010 the Pennsylvania Chapter of The Nature Conservancy published its first in a series of analyses on energy development impacts to Pennsylvania. This first report included an analysis of potential impacts from Marcellus Shale development.
The report is available at: http://www.nature.org/media/pa/pa_energy_assessment_report.pdf

- Last week the Chesapeake Bay Foundation petitioned the Council on Environmental Quality to conduct a multi-state Programmatic Environmental Impact Study examining the potential risks and possible cumulative impacts of natural gas development throughout the Marcellus Shale formation.

We are also aware that the state of New York has been engaged in a general environmental impact statement process relating specifically to unconventional wells developed by high volume hydraulic fracturing.

PEC's focus since the publication of our report has been the design of a model state-level regulatory and management process that operates on proactive, comprehensive information gathering and assessment prior to individual site development and well operation. In short, information gathering and assessment should be an integral part of the regulatory and permitting process. This basis then allows for adaptive management as greater understanding of this complex and dispersed activity – and its impacts – is developed.

Regulatory Challenges in Pennsylvania

Pennsylvania's regulatory framework as it existed five years ago was designed for shallow vertical wells that were far less complicated than horizontal shale gas wells. The production of natural gas from what are termed "unconventional" resources such as the Marcellus Shale formation is a much more complex set of operations. The nature of these operations, which include the use of high volume hydraulic fracturing, as well as greater associated infrastructure, equipment and transportation demands, significantly increase the potential for adverse impacts to terrestrial and aquatic resources. What's more, any industrial process is subject to failures of technology and human judgment.

Given the rapidly increasing deployment of Marcellus Shale activity, often occurring in either close proximity to communities or sensitive natural resources or both, the need to reform Pennsylvania's management program has been great. In response, the Department of Environmental Protection has effected critical changes to its oil and gas management program and successfully proposed new regulations for promulgation by the Pennsylvania Environmental Quality Board.

On the regulatory front, DEP formulated and directed two major regulations through the Environmental Quality Board rulemaking process in the past two years:

- Regulatory amendments made to 25 Pa. Code Chapter 78[4] that significantly strengthen well casing and cementing standards to better ensure well integrity and protect against the migration of methane and hydraulic fracturing fluids. Insufficient well casing and completion has already proven to cause adverse impacts to private and public water supplies in Pennsylvania.

[4] Pennsylvania Bulletin August 21, 2010 (40 Pa.B. 4835)

- Regulatory amendments made to 25 Pa. Code Chapter 95[5] that place stringent total dissolved solids (TDS) limits for the disposal of wastewater generated through unconventional shale gas development. These amendments have created strong economic incentive for the reuse of flowback fluids, helping to offset a still-significant water management challenge for Pennsylvania.

These vital changes will greatly contribute to better management of the industry and the avoidance of detrimental impacts.

But there remains much to be done, and we must acknowledge that the implementation of best management practices within the industry – beyond the point of regulation – are equally important to ensuring that unconventional shale gas development can provide economic growth and energy production without undue and long-term costs to the environment and people of Pennsylvania. At a minimum, this work must include:

- Ensuring that sufficient financial assurance is in place to address impacts if and when they arise. Currently Pennsylvania's bonding program is woefully inadequate in relation to the size and extent of unconventional shale gas operations.
- Enacting additional amendments to Pennsylvania's Oil & Gas Act to provide the Department of Environmental Protection with more precise authority to protect public and natural resources in the permitting and enforcement process.
- Enhancing Pennsylvania's Natural Heritage Program to better accommodate more regional or comprehensive planning by state resource agencies and the industry; as opposed to segmented, site-by-site analysis.
- Ensuring that sufficient funding is consistently provided to Pennsylvania's resource protection agencies so they may adequately perform their statutorily-mandated responsibilities. During the last several years, our state resource agencies have experienced the greatest burden of budget cuts and staffing reductions.[6]
- Ensuring better and more consistent management of water use in unconventional shale gas operations across Pennsylvania, including more comprehensive accounting and analysis of potential aquatic resource impacts.
- A restructuring of the overall permitting process which provides more robust and effective informational collection and assessment prior to the commencement of individual well operations.

We sincerely believe these objectives can be accomplished in a manner that is equally protective of the environment and public as it is supportive of the industry. We would

[5] Pennsylvania Bulletin February 5, 2011 (41 Pa.B. 805)

[6] One notable exception has been the Department of Environmental Protection's concerted effort in adding Oil and Gas Bureau field staff to monitor Marcellus Shale activity over the past several years. However, imposed budget cuts continue to significantly affect other Department Bureaus and Programs, many of which have a role to play in overall management of this escalating activity.

like to address the latter two items in a bit more detail to highlight the nature of this challenge as well as how the objectives of PEC's work can better inform management efforts.

Water Management

Current estimates place water demands for hydraulic fracturing at three to five million gallons per well. While the demands of unconventional shale gas development may be less than those of other industrial or energy producing activities, the fact remains that unconventional shale gas development is more likely to occur in remote locations where water withdrawals from smaller or high quality streams can quickly have significant cumulative impacts. Thus, the need for consistent and effective management across Pennsylvania is critical.

Yet management of water use for Marcellus Shale operations in Pennsylvania is a matter of geography. If a proposed water withdrawal is made in the Susquehanna or Delaware River Basins, it will be subject to the respective regulatory programs of the Susquehanna or Delaware River Basin Commissions. While the Susquehanna River Basin Commission has a robust water management program for Marcellus Shale operations, the Delaware River Basin Commission has imposed a moratorium while it works to update its regulations in response to growth of the industry.

In the Ohio River Basin, which does not have a corresponding Commission in place with water quantity authority, the Department of Environmental Protection has developed a Water Management Plan component as part of the well operation permitting process. The Department requires this submission through extension of existing authority via the Pennsylvania Clean Streams Law.[7]

The division of water management responsibility is unavoidable given that the River Basin Commissions are rightly acting pursuant to interstate compacts. The challenge is now before the Department and River Basin Commissions to work together to determine how water quantity issues can be best addressed, and to establish exemplary and consistent protocols and best management practices throughout Pennsylvania.[8]

[7] Pa. Stat. Ann. Tit. 35, §691.1 et seq. The Clean Streams Law does not directly provide for regulation of water withdrawals. Rather its focus is on activities that cause or may cause "pollution" (broadly defined to include physical, chemical or biological alteration) to waters of the Commonwealth. *See generally* R. Timothy Weston, *Water and Wastewater Issues*, Prepared for the 2011 Penn State Marcellus Shale Law and Policy Symposium (February 10, 2011). One of the recommendations of PEC's report is to provide clear statutory authority for the Department to manage large scale water withdrawals.

[8] The program established by the Susquehanna River Basin Commission is frequently cited as a model for how effective management with strong informational reporting can be performed without unduly affecting the industry.

Permitting

As indicated previously, Pennsylvania's regulatory framework for natural gas exploration and production, as it existed at the onset of the Marcellus Shale boom in 2005, did not contemplate the scale and intensity of horizontal unconventional well development activities. It was designed for conventional reservoir formation vertical wells which required limited, if any stimulation by hydraulic fracturing.

The Department of Environmental Protection has responded to some of the identified deficiencies in the conventional permitting framework through administrative alterations to the application process; the development of proposed amendments to oil and gas regulations and water quality standards which were promulgated by the Pennsylvania Environmental Quality Board; and other actions to increase the capacity to review applications and monitor well development activities. However, PEC believes that a more fundamental change in the permitting process is required because the existing process does not provide for the acquisition of sufficient information to make well-informed well pad siting decisions.

Based on discussions with unconventional gas exploration and development companies, we have the sense that some of the companies voluntarily implement sophisticated well pad siting processes that go beyond the minimum requirements in the current application process, involve meaningful engagement with surface property owners and the community, and are intended to mitigate potential impacts to the greatest extent reasonably possible. However, we also have the sense that the attitude and effort level of the sector as a whole varies widely.

Later this month PEC will present a package of proposed amendments to the Pennsylvania Oil and Gas Act, which will include a section that will fundamentally alter the existing permit application process. The revised application process is designed to gather more information on site conditions and focus more attention on the siting of well pads and associated infrastructure. Generally speaking, we will advocate that the permit application process for unconventional wells involving development by high volume hydraulic fracturing be split into two distinct phases. The first phase will be limited to the identification and assessment of site conditions for the purpose of determining whether a well pad should be authorized and, if so, the siting conditions that must be taken into account for selecting the precise location of the well pad and ancillary infrastructure. The second phase will focus on construction authorization of the well pad and the drilling, casing and development of the wells.

We believe that the two phase approach will allow for more flexibility in the siting of well pads to minimize risk and reduce the surface impacts of well pads and ancillary facilities to the greatest extent possible. At the same time, because the siting of the well pad will be pre-approved in the Phase I process, the Phase II application process should be at least as time-efficient, if not more efficient, than the current process. Consequently, once a well developer has assembled a portfolio of approved sites through the Phase I authorization process, it should have the necessary flexibility in planning rig movement.

In developing our proposal, we are cognizant of the interest that the process be reasonably predictable in terms of the level of effort required by the well developer to complete applications and the amount of time required to process pending applications. We believe that the two-phase process can be structured and implemented in a manner that will not unduly interfere with efficient well development.

Beyond Pennsylvania

As you can see, the breadth of issues in Pennsylvania is daunting, and our state is only one of many experiencing shale gas development. While we have found lessons learned and actions taken in other states to be instructive to our own work on these issues, they are tempered by the fact that Pennsylvania's topography, geology and climate are very different from places like Texas, Alabama, and Colorado. For this reason we believe that efforts to improve management and oversight of the industry should be primarily directed at the state level.

But that obviously does not and should not preclude the federal government from continuing its strong oversight of any shale gas state, including Pennsylvania. In fact, for some of the same reasons addressed before in this testimony – including the very real struggles of state agencies to meet existing state and federal mandates due to budgetary constraints – we believe federal engagement is essential.

Consistent with our principle of adaptive management, as information develops and if better understanding of individual and cumulative impacts point toward the need for revision of federal statues or regulations, we would urge swift and appropriate action. As Pennsylvania has learned first hand, environmental legacies from improperly controlled resource development is extraordinarily costly and detrimental to economic vitality and public well being. Even today Pennsylvania faces abandoned mine remediation costs that well exceed one billion dollars, and must account for thousands of miles of rivers and streams which fail to meet water quality standards because of acid mine drainage.

With the ongoing growth of the unconventional shale gas activity, we don't have a moment to lose in getting it right.

Conclusion

The oil and gas regulatory structure in Pennsylvania did not contemplate horizontal drilling in combination with high volume hydraulic fracturing and is not adequate to manage the escalating development of Marcellus Shale development throughout Pennsylvania. The current regulations are not designed to obtain timely and sufficient information to make well-informed decisions concerning the siting of well pads or to build a database identifying cumulative impacts of well development activities on the scale projected by the oil and gas industry. The natural gas industry has made great strides in leading innovation, but the regulatory framework must address the complexities created by the pressure of time, scale, cost and technology.

Given the extraordinary opportunities and challenges associated with Marcellus Shale gas extraction, it is incumbent upon key stakeholders to take whatever steps are necessary to ensure the safe and reliable development of this resource in a way that does not repeat the mistakes of the past.

Throughout Pennsylvania's history, our natural resources have been exploited for industrial purposes without the benefit of careful consideration and forethought. The price paid in exchange for this rapaciousness can never be fully calculated, yet remains evident in the forests, waterways, and communities and that cost has been shouldered by generations that followed the development.

More recently, accidents at drilling rigs have captured the attention of the news media, regulators and Pennsylvania citizens. These incidents cannot and should not be ignored – they highlight the need for prompt and effective reform.

The spot market for natural gas is considered to be temporarily undervalued, with gas prices of approximately $4.25 per million cubic feet. Even at that low price, the Marcellus Shale represents a natural resource whose development can be valued at $1-2 billion in Pennsylvania. Considered in this context, PEC urges that a long-term view of development be adopted which allows all stakeholders to realize the benefits of the resource while safeguarding the health and safety of our citizens and the environment that has still not yet fully recovered from past resource development movements.

Pennsylvania has an extraordinary opportunity to enact the nation's best body of laws governing the extraction of a vast natural resource. Such action would effectively legislate the nation's best practices and make them the standard by which the Marcellus Shale is developed and provides the benefits to the Commonwealth that have been heralded as the promise of this new industry.