

**Testimony of
John Hanger, Acting Secretary
Department of Environmental Protection
before the
Senate Majority Policy Committee
Tuesday, November 18, 2008**

Chairman Corman, Senator Baker and members of the committee, thank you for the opportunity to appear before you today to discuss the opportunities and issues concerning natural gas exploration and drilling in the Marcellus Shale formation.

The Marcellus Shale is a rock formation that underlies much of Pennsylvania and portions of New York and West Virginia at a depth of 5,000 to 8,000 feet. Recently, a leading Pennsylvania State University geoscientist increased his initial estimates from 150 trillion cubic feet to nearly 363 trillion cubic feet of natural gas could be recovered over the next few decades from the 31-million-acre core area of the Marcellus region. To put this number in perspective, the United States consumes 23 trillion cubic feet of natural gas a year.

While it has long been considered prohibitively expensive to access the natural gas contained within the Marcellus Shale, recent advances in drilling technology and rising natural gas prices have attracted new interest in this previously untapped formation. Developing these resources not only will build on our continuing efforts to develop more homegrown energy resources that are cleaner and better for the environment, but also could lead to billions of dollars in new economic investment for Pennsylvania's communities, as well as tens of thousands of new jobs.

As an example of what may be in store for the commonwealth, I offer the case of the Barnett Shale in Texas. Since development of that formation began in 2001, nearly 84,000 new jobs have been created and the annual output of the region's economy increased by \$8.2 billion.

Here in Pennsylvania, The Pennsylvania State University estimates the economic value of the Marcellus Shale formation at \$1 trillion and that for every \$1 billion in royalty income paid to Pennsylvania residents, nearly 8,000 new jobs will be created each year over the next three years. If we apply the mandated minimum royalty percentage of 12.5 percent to the estimated value of the natural gas the formation contains, Pennsylvania's landowners could receive as much as \$125 billion in royalty payments. That creates the potential for tens of thousands of new jobs.

The economic potential contained in the Marcellus Shale could be a boon to Pennsylvania communities, particularly regions in the northcentral and northeastern parts of the state that have not traditionally seen much gas well drilling development. The department has issued 328 drilling permits for exploration in the Marcellus Shale in 2008 and another 137 are currently under review.

As more developers converge on Pennsylvania and discussions over leasing and purchasing mineral rights become more common, there has been considerable interest from the media and the general public. The Department of Environmental Protection has fielded many calls over the past year with questions from landowners, farmers, local governments, environmental

organizations and sportsmen's groups. The questions have ranged from how we intend to facilitate the tremendous economic opportunities before us to how to handle land leases to how the department plans to protect our natural resources.

Each drilling operation in the Marcellus Shale will require substantial volumes of water, much more than conventional drilling operations. Ensuring that water withdrawals do not threaten Pennsylvania's environment or ecosystems is one of the department's primary concerns. With increased interest and activity in oil and gas drilling throughout the state, Pennsylvania will indeed experience a boost to its local economies, but we want to make sure that our environment and natural resources are not sacrificed in the process.

While the department is committed to providing the industry with prompt reviews and timely decisions on all permit applications that meet our regulations, we are mindful of the consequences these operations could have on the state's natural resources and are working to ensure that gas can be produced and water protected.

Below, I will address some of the more often-asked questions and issues surrounding this activity in greater detail.

Drilling for Oil and Natural Gas in Pennsylvania

More than 350,000 oil and gas wells have been drilled in Pennsylvania since the first commercial oil well was developed in 1859. The commonwealth first began regulating drilling in 1956.

Oil and gas exploration and production is regulated under all or part of the state oil and gas laws (Oil and Gas Act, Coal and Gas Resource Coordination Act and Oil and Gas Conservation Law), and the environmental protection laws that include the Clean Streams Law, the Dam Safety and Encroachments Act, the Solid Waste Management Act, and the Water Resources Planning Act. In addition, the Pennsylvania Department of Labor and Industry regulates certain aspects of drilling under a portion of the state Worker and Community Right to Know Act.

The Department of Environmental Protection is responsible for reviewing and issuing well permits, inspecting drilling operations and responding to complaints related to water supplies and other water quality problems. Thirty-six DEP inspectors and water quality specialists conduct routine and unannounced inspections of drilling sites and wells statewide.

Other agencies directly involved in monitoring the effects of drilling on water quality and aquatic life include the Pennsylvania Fish and Boat Commission, the Susquehanna and Delaware river basin commissions, the U.S. Fish and Wildlife Service and Pennsylvania's county conservation districts.

Permitting staff from DEP's regional offices have met one-on-one with each drilling company that had received permits to explore the Marcellus Shale to review development plans and appropriate regulations. We have also worked with the industry and the Susquehanna and Delaware river basin commissions to develop an amended permitting process that creates

consistent rules for water usage and disposal in all areas of the state to ensure that water quality is not threatened by drilling operations.

Permitting and Production

The commonwealth has witnessed consistent growth in oil and gas production each year since 2001 due to increased drilling activity in Pennsylvania's traditional fields. The amount of natural gas produced in the state has increase by more than 35 billion cubic feet from 145 billion cubic feet of gas in 2001 to 181 billion cubic feet in 2006. The number of producing wells has increased during that time period from 50,158 to 63,566.

Although development of the Marcellus Shale is still in the beginning stages, and there are no production statistics available, it is believed that statewide production will increase substantially as these new wells come online.

The department has seen a steady increase in oil and gas exploration permits over the past several years as well. In 1999, the department issued 2017 oil and gas permits. This year the department has issued 6,860 oil and gas drilling permits to date and estimates that it is on target to issue a record number of permits this year, exceeding 8,000 permits statewide.

Of the permits issued to date, 566 permits have been issued to drill exclusively in the Marcellus Shale formation since development of the formation began in 2005. Since new water management plan requirements were instituted at the end of August, 108 permits have been approved.

Drilling activities, including road and site preparation, have taken place at 341 Marcellus Shale well sites since 2005. A small percentage of these wells are in production, but at most locations, the drilling companies are still performing geologic studies and building the infrastructure to collect and transport gas from these wells. We expect that if natural gas is found in the anticipated quantities, and once the collection and distribution infrastructure is in place, the pace of exploration and permitting will increase dramatically.

Water Withdrawals and Waste Water Treatment

Extracting natural gas from the Marcellus Shale formation requires horizontal drilling and a process known as 'hydraulic fracturing' that uses far greater amounts of water than traditional natural gas exploration. Drillers pump large amounts of water—sometimes on the magnitude of a few million gallons—mixed with sand and other chemical additives into the shale formation under high pressure to fracture the shale around the well, which allows the natural gas to flow freely. Once the hydraulic fracturing process is completed, the used water, often referred to as "frac fluid," must be treated to remove chemicals and minerals. During the fracing operation, these fluids must be contained in impermeable tanks or impoundments and disposed of at an approved treatment facility.

Drilling companies must identify where they plan to obtain and store the water used in their drilling operations and where the used frac water is to be stored and treated as part of the drilling permit application process. When applying for a permit, drillers must specify the sources and

location of fresh water and the anticipated impacts of water withdrawals on water resources, and obtain approval from the appropriate river basin commission.

DEP worked with the river basin commissions and the oil and gas industry to create a consistent statewide application process for Marcellus Shale drilling permits that requires gas well operators to better protect water resources. Operators must provide additional information as part of the permitting process including the sources and locations of water to be used in the drilling process, anticipated impacts of drilling on water resources, and the locations of facilities where drilling fluids will be taken for treatment and disposal.

The application addendum was created and designed to assist applicants in completing a water management plan associated with the development of Marcellus Shale Gas Wells. Under the new application process, gas well operators seeking to extract resources from the Marcellus Shale formation must provide the following information to DEP when applying for a permit to drill a gas well:

- Type of well with proposed location plotted on a U.S. Geological Survey topographical map showing property lines and horizontal bores;
- Acreage to be disturbed by drilling and operations;
- Sources and locations of water to be used in the drilling process, the impacts of drilling on water resources, and proof that the water withdrawals have been approved by the appropriate river basin commission;
- Location(s) of treatment facilities where drilling and fracturing fluids will be taken for treatment and disposal; and
- Size and locations of proposed dams and water impoundments.

Depending upon various site considerations and timing issues, applicants may propose to obtain the water for the fracturing operations from a public water supplier or propose a direct withdrawal from a stream or groundwater well. The Application Addendum has been designed to accommodate either option.

The overall intent of this addendum is to utilize a consistent framework commonwealth-wide when evaluating water usage. This effort will help to protect water resources in the Ohio and Potomac and Great Lakes Basins where no federal-interstate compact commission exists. This will also help in the Delaware Basin where the policy is less protective than the SRBC's.

Erosion and Sediment Control Plans

Erosion and sediment control requirements under state law apply to any earth disturbance activity including construction of oil and gas well sites (Pa Code Chapter 102). If construction activities at oil and gas well sites disturb less than five acres, an erosion and sediment control plan must be kept on site and best management practices implemented to minimize point source

discharges to surface waters, preserve the integrity of stream channels, and protect the physical, biological and chemical qualities of the receiving waterway.

For oil and gas earth disturbance activities that disturb five or more acres at one time or over the life of the project, a notice of intent authorization for the erosion and sediment control general permit must be completed. The erosion and sediment control plan and the notice of intent must be submitted to DEP or an authorized county conservation district for review and approval.

The oil and gas industry has questioned the legality of this state permit, and has complained that the process is difficult to work with.

The Energy Policy Act of 2005 exempted oil and gas activities from the requirements of the NPDES Stormwater Construction Permit. However, EPA acknowledged that this does not prohibit individual states from regulating oil and gas earth disturbance activities under state authority. In response to EPA's decision, DEP has used its authority under the Clean Streams Law and Pennsylvania's Oil and Gas Act to regulate erosion, sediment and stormwater runoff associated with oil and gas activities.

Additionally, over the past summer, staff from DEP's Bureau of Oil and Gas Management has conducted 19 training sessions on the use of Best Management Practices and state permits for industry, county conservation districts and DEP regional office staff. Three more training sessions are scheduled for before the end of the year.

Storing Fracing Chemicals at Drilling Sites

Drilling companies involved with natural gas wells in the Marcellus Shale must disclose the names of all chemicals to be stored and used at a drilling site in the pollution prevention and contingency plan, as well as response plans in case of an accidental release. These plans contain copies of material safety data sheets along with emergency contact information and training protocol for employees. This information is on file with DEP and is available to landowners, local governments and emergency responders.

Protection of Drinking Water Supplies

Pennsylvania law requires drillers to install steel casing and cement the casing through all fresh water aquifers before drilling through deeper zones known to contain oil or gas. This casing protects groundwater by isolating the borehole from the groundwater system. It further keeps water from the surface and other geologic strata from mixing with and contaminating groundwater.

Disrupting water quality or flow in water wells from drilling activities does occur in some cases and this disruption is often temporary. However, if problems persist, state law requires drilling operators to replace or restore water supplies affected by drilling. Landowners should contact the drilling company if problems with water wells develop. Landowners who are not satisfied with the drilling company's response should contact the nearest DEP regional office. DEP will investigate complaints within 10 days and issue orders as necessary to replace or restore water supplies.

Oil and Gas Wells Permit Fees

The department will propose to the Environmental Quality Board later this year, a regulatory fee increase to support the costs of permitting and inspecting Marcellus Shale well permits. The Department has reviewed with the Oil and Gas Technical Advisory Board, a proposal to set a Marcellus Shale base fee of \$900 with an additional \$100 per 500 feet of well bore drilled past 1,500 feet. This rulemaking increases the current \$100 permit fee, which is nearly 25 years old, in order to assure adequate funding to cover program expenses for the review and inspections for permit applications within the Marcellus Shale formation.

Leasing of Mineral Rights in Pennsylvania

A mineral lease is a private contractual agreement between the owner of the minerals and the producer (i.e. a drilling or mining company). County courts hear suits for property damage or disputed lease matters. The commonwealth does not regulate mineral leases, audit payments or read or calibrate meters. DEP recommends that landowners who are contacted by companies wanting to purchase or lease mineral rights consult an attorney who is familiar with oil and gas law before signing any documents. Contact the local bar association for assistance finding an attorney in your area.

Eminent Domain and Gas Collection Pipelines

Under Pennsylvania law, there is no eminent domain granted for natural gas collection pipelines associated with the well. Drilling companies must negotiate with landowners for the rights to build gas lines on their property. This right may be included as part of a lease agreement.

Interstate transmission pipelines are regulated by the Federal Energy Regulatory Commission. DEP issues permits for earth disturbances and to protect wetlands and streams, but does not have the authority to control the route or location of these lines.

Comparative Air Emissions

According to the U.S. EPA, at power plants, the burning of natural gas produces nitrogen oxides and carbon dioxide, but in lower quantities than burning coal or oil. Methane, a primary component of natural gas and a greenhouse gas, can also be emitted into the air when natural gas is not burned completely. Similarly, methane can be emitted as the result of leaks and losses during transportation. Emissions of sulfur dioxide and mercury compounds from burning natural gas are negligible.

The average emissions rates in the United States from natural gas-fired generation are: 1135 lbs/MWh of carbon dioxide, 0.1 lbs/MWh of sulfur dioxide, and 1.7 lbs/MWh of nitrogen oxides. Compared to the average air emissions from coal-fired generation, natural gas produces half as much carbon dioxide, less than a third as much nitrogen oxides, and one percent as much sulfur oxides at the power plant.

Well Locations Relating to Houses or Streams

Gas wells cannot be drilled within 200 feet of structures, or in or within 100 feet of streams and wetlands. The locations of wells, access roads and related drilling operations are usually negotiated as part of the lease agreement. If the proposed location of a pipeline or access road

must cross a stream or wetland, an encroachment permit must be obtained from the department, which includes U.S. Army Corp of Engineers' approval.

Well Plugging and Land Restoration

Drilling operators must restore the land once drilling activities are completed. Once a well is no longer producing, the operator must plug the well and then restore the site within nine months.

Bonding of Roads

A permit applicant may propose to construct a fresh water impoundment to store this water or may propose to store the water in many individual 22,000 gallon tanks for the drilling process. Whether the source of water is from a public water supplier, a large river or a small stream, there may be considerable truck traffic between the source of water and the gas well site.

Maintenance and repair of municipal or state roads is an important concern in rural areas. In many cases, these local municipal roads will need to be repaired after they are used to access well sites. The Pennsylvania Department of Transportation has a process to assist municipalities to survey and evaluate roads and establish mitigation procedures.

Notice of Well Permit Applications

Many landowners and municipalities are interested in receiving notice of well permit applications. DEP has a no-cost subscription service called ENotice that notifies landowners or municipalities with an email when a well permit application is received. ENotice enables landowners and municipalities to receive notice of a permit application at the same time that the department receives an application. ENotice can be accessed through DEP's Web site: www.depweb.state.pa.us.

Conclusion

There is no question that the Marcellus Shale holds tremendous potential for Pennsylvania's citizens, communities and economy if managed properly.

Governor Rendell recognizes this potential and has made facilitating this development in a manner that is environmentally sound one of his top priorities. Given that direction, the Department of Environmental Protection is working diligently to review permits expeditiously and render a decision in a timely fashion once it has been thoroughly evaluated.

As I mentioned earlier, although the vast majority of activity surrounding the Marcellus Shale to date has involved the purchase or leasing of mineral rights, drilling activity has begun and some wells are entering production. If the drilling companies find natural gas in the anticipated quantities, we can expect exploration and drilling activity to increase dramatically. I believe the department, along with its partner agencies, is prepared to meet the challenge.

Chairman Corman, Senator Baker and members of the committee, I thank you for your time and attention. I am happy to answer any questions you may have at this time.

###