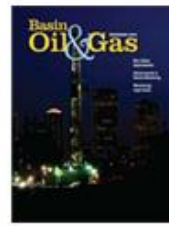
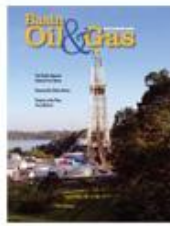
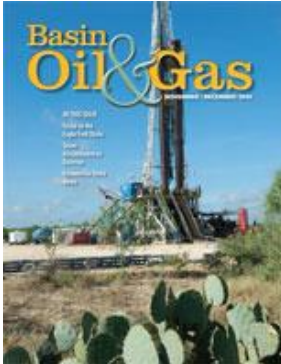


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## Current Issue



Issue No. 34  
January 2011



## Pennsylvania's Regulatory Structure Plays Key Role in Managing Marcellus Shale Development

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The potential of the Marcellus Shale play has captured the country's attention -- perhaps even the world's. Indeed, not since Edwin Drake drilled North America's first commercial oil well in 1859 have so many people and companies focused their attention on Pennsylvania as an opportunity for oil and gas development. While interest in the economic possibilities of the Marcellus is high, so, too, is concern for protecting Pennsylvania's environment from the potential impacts of well drilling.

The Pennsylvania Department of Environmental Protection ([www.depweb.state.pa.us](http://www.depweb.state.pa.us)) has a successful history of overseeing the environmentally protective development of the commonwealth's oil and gas resources. By applying our existing regulatory structure and adapting to the new challenges that the Marcellus presents, I am confident that this track record will continue.

Nothing being done to produce the Marcellus is new to Pennsylvania. It certainly isn't the deepest formation to be developed (we have more than 11,000 wells producing gas from deeper formations). It isn't the first formation to require horizontal drilling to unlock a previously ignored resource --

coalbed methane wells were around for years before the Marcellus made headlines. And, despite popular opinion, it certainly isn't the first formation that needed to be hydraulically fractured to stimulate production. Fracing has been standard operating procedure for virtually every well drilled in Pennsylvania for decades.

What *is* different about the Marcellus is the sheer size of the development. From the total acreage of the play, to the



lease payments and royalty checks, to the size of the well sites, to the amount of water used and produced, everything about the Marcellus is bigger than what Pennsylvania is accustomed to seeing. The increased size of the operation has resulted in some new field practices and an adaptation of DEP's current regulatory structure to appropriately protect the commonwealth's important water resources.

Pennsylvania regulates oil and gas well operations under several statutes, including the Oil and Gas Act, the Clean Streams Law, the Dam Safety and Encroachments Act and the Solid Waste Management Act. This network of laws and their associated regulations provides DEP with the tools it needs to comprehensively regulate everything from locating the well site, site preparation, drilling the well, fresh water withdrawals and water storage, wastewater management, and site restoration. With a focus on protecting water quality, I'll walk you through Pennsylvania's regulatory structure.

## Well Site Location

The Oil and Gas Act is the primary law governing well drilling in Pennsylvania. With the exception of wells drilled through workable coal seams, there are no spacing requirements for Marcellus wells. Although spacing restrictions do not generally apply, well sites may not be located within 100 feet of streams or wetlands larger than one acre and the site may not be located within 200 feet of buildings or water wells. These restrictions can be waived, but additional protections will be added to the well permit.

## Site Development

Stormwater runoff is the leading cause of stream impairment in Pennsylvania. To address this problem, DEP has developed a comprehensive stormwater management program. For oil and gas operations, this means that well operators must develop an erosion and sediment control plan and install "best management practices" like silt fences and roadside culverts to control erosion and manage stormwater. If development of the well site, access roads and other related facilities will disturb five or more acres, the operator must get an erosion and

sediment control permit before the site may be developed.

This is not a federal National Pollutant Discharge Elimination System (NPDES) permit, but instead a state permit authorized under Pennsylvania's Clean Streams Law. This permit was developed with the fluid nature of oil and gas operations in mind. If the permit application and erosion and sediment control plans are developed by an appropriately licensed engineer, geologist, surveyor or landscape architect who has attended DEP stormwater training, DEP can authorize permit coverage in just 14 days. Because of the size of the well site, most Marcellus wells need this permit.

## Well Drilling

Drilling any well – even a water well – has the potential to impact fresh groundwater. While this potential may exist, both DEP and well drillers recognize that such an impact is not

acceptable. Protecting groundwater supplies is of utmost importance, and the Oil and Gas Act is particularly strict in this regard. If a well operator impacts a water supply (by pollution or diminution), the operator *must* restore or replace it and pay for any increased costs of maintaining or operating the replacement supply.

In fact, if an oil or gas well is drilled within 1,000 feet of a water supply and the water supply becomes polluted within six months of drilling, the operator is *presumed* to have caused the pollution unless the operator took a water sample that demonstrates the pollution was present before the oil or gas well was drilled. Needless to say, taking a pre-drilling water sample from all supplies within 1,000 feet of a gas well should be a standard business practice.

Of course, the goal is to avoid groundwater impacts in the first place. To that end, DEP has proposed new regulations to strengthen our current well construction standards. Under the proposed rules, operators must develop a casing and cementing plan that shows how the well will be drilled and completed. Centralizers will be required at prescribed locations to ensure that cement is evenly distributed between the casing and the well bore. Documentation of the cement quality and practices used at the well must be available for inspection. Other provisions, including casing pressure testing requirements, gas migration response and new requirements for existing wells are also part of the proposal, which should be finalized through the normal comment/response rulemaking process this summer.

## **Water Withdrawal**

The volume of water needed to frac a Marcellus well is an order of magnitude greater than the amount required to frac traditional vertical wells in Pennsylvania. Withdrawing up to 5 million gallons per well from the headwaters of the commonwealth's most pristine streams has the potential to impair water quality through diminished stream flows. As the development of the play progresses, even Pennsylvania's larger streams could be impacted. To prevent impacts from occurring, Marcellus operators must get an approved water management plan.

Three entities are charged with protecting water quality by managing water withdrawals in Pennsylvania -- DEP, the Susquehanna River Basin Commission and the Delaware River Basin Commission. The two river basin commissions were formed by a compact between the federal government, Pennsylvania and neighboring states within the respective watersheds. If a Marcellus well is drilled within the Susquehanna or Delaware River watersheds, DEP and commission approval of the operator's water management plan must be obtained before construction of the well site can begin. If the well is located outside those two river basins, only DEP approval is necessary.

The water management plan is based on low flow conditions and describes where water will be withdrawn, how much water will be needed and the amount of water that will be

taken at any one time. Once approved, the plan is valid for each location for five years. Although the commonwealth has ample water resources, operators will need to cooperate to make sure that access to water is available as more and more plans are submitted for headwater streams.

## **Water and Wastewater Storage**

Once an operator gets the water needed to frac a well, the question becomes where to put it? Even more importantly, where to put the frac flowback? A new development with Marcellus wells is the advent of centralized impoundments. Unlike pits located immediately adjacent to the well, centralized impoundments use dam-like structures to hold enough water to service multiple wells over an extended period of time. These impoundments can store fresh water, and more increasingly, flowback from a frac job.

Under DEP's dam safety regulations, small freshwater impoundments – similar to a farmer's pond - do not need a permit. However, Marcellus impoundments can hold more than 15 million gallons and, if they store wastewater, must be permitted and constructed according to DEP standards. Key standards include an impervious 30 millimeter liner and groundwater monitoring around the impoundment. Impoundments located where a breach could threaten public safety must undergo a much more stringent engineering review.

## **Wastewater Management**

The most significant issue facing Marcellus operators today is wastewater treatment and disposal. Flowback from Marcellus frac jobs contains, among other things, high levels of dissolved salts. The best solution for disposing of high "TDS," or total dissolved solids, wastewater is deep well injection. Unfortunately, the best geology in Pennsylvania for this method of waste disposal is being used for natural gas storage. Exploration for new injection sites is ongoing, but not yet commercially available.

Therefore, the current preference for flowback water disposal is through existing DEP approved wastewater treatment plants. These plants typically do not have the technology necessary to remove TDS from the effluent. Instead, the high TDS flowback is blended with the municipal wastewater stream to dilute it prior to discharging the effluent to the stream. As greater and greater volumes of Marcellus flowback are taken to these facilities, dilution will no longer be an option.

The commonwealth's receiving streams are approaching their TDS assimilative capacity. Recent high profile cases such as TDS loads to the Monongahela River and the associated impacts to industrial processes and drinking water supplies exhibit the need to be proactive. DEP is currently pursuing a TDS strategy that would impose discharge limits of 500 parts per million of TDS (250 chlorides, 250 sulphates) on all new or increased discharges of TDS. The purpose of this strategy is to get ahead of any potential water quality impairment and a federal apportionment of TDS discharge limits among point and nonpoint source dischargers.

Fortunately, an increasing number of operators are able

to reuse their flowback for the next frac job. Increased recycling of flowback is a top priority for operators and DEP. DEP is also seeing an increasing number of vendors who offer wastewater treatment technologies that remove TDS. While the disposal of the sludge from these technologies remains an issue, the number of companies vying for this business is encouraging.

The Marcellus Shale play, along with other domestic unconventional resources, can transform world energy markets. This potential will only be realized by avoiding the mistakes of the past. I believe that Pennsylvania will prove that the balance between environmental protection and the development of this world class resource is possible.

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