

Gas Rush: The Current State and Future Development of Natural Gas Production  
ABA, Real Property, Trust and Estate Law Section, 22<sup>nd</sup> Annual Spring Symposia  
April 28, 2011

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As the program title suggests, natural gas development in the United States is experiencing change. Improvements in well stimulation techniques have made unconventional targets, such as the Marcellus Shale, a focus of industry investment and changes in the industry have fueled a debate over how to manage the environmental impacts of this new level of activity. The debate over how to regulate horizontal drilling and high volume hydraulic fracturing (“HVHF”) is raging in New York as much as it is across the rest of the country. New York has a long history with oil and natural gas production and Department of Environmental Conservation staff have a strong knowledge base of all aspects of gas well drilling including well construction and hydraulic fracturing. This history has informed the Department’s environmental study of the potential impacts which may result from the use of HVHF and ways to mitigate those impacts. What follows is a thumbnail outline of the *who*, *what*, and *how* of gas well regulation (not necessarily in that order), with a focus on New York’s regulatory program. At the end of the outline are some points of interest for real property and trust and estates practitioners.

#### WHAT ARE THE ISSUES?

I. The central controversy is about natural gas drilling using HVHF and horizontal drilling while targeting low permeability reservoirs. Both horizontal drilling and hydraulic fracturing has been used for some time in New York. What’s different about HVHF is the *scale* of the activity. Hydraulic fracturing is defined in the *Manual of Oil and Gas Terms* as “a mechanical method of increasing the permeability of rock, and thus increasing the amount of oil or gas produced from it. The method employs hydraulic pressure to fracture the rock.” *Manual of Oil and Gas Terms*, Williams and Meyers, 13<sup>th</sup> Edition, 2006. A concise summary of horizontal drilling and hydraulic fracturing is available on the Department’s website at: <http://www.dec.ny.gov/energy/46288.html#horizontal>.

A. History of Oil and Gas Activity in NY – Hydraulic fracturing is not a new activity.

- First natural gas well drilled for production was in NY in 1821. Natural gas was discovered earlier, in 1806, in West Virginia and some resources indicate that natural gas was observed in the 1600s by early American settlers.
- According to “Hydraulic Fracturing, History of an Enduring Technology”, by Carl T. Montgomery and Michael B. Smith, hydraulic fracturing began in earnest in the 1930s with some experimentation with the practice beginning earlier in the 1860s. See: <http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf>

- Since the 1820s there have been an estimated 75,000 wells drilled in NY and approximately 6,995 natural gas wells were producing in 2009. Source: [http://www.eia.doe.gov/pub/oil\\_gas/petrosystem/ny\\_table.html](http://www.eia.doe.gov/pub/oil_gas/petrosystem/ny_table.html). As of March 2011, New York's online database showed 6,331 active gas production wells.

#### B. Environmental Impacts of Standard Gas Well.

- NY evaluated environmental impacts of a gas well drilling and well stimulation in a Generic Environmental Impact Statement finalized in 1992. The impacts from a typical gas well are known and can be mitigated. Topics areas addressed in the 1992 GEIS included: potential impacts from well pad construction, access road construction, impacts to primary and principal aquifers, oil and gas drilling in agricultural districts, impacts to water supply wells.
- Well stimulation, or hydraulic fracturing, was reviewed in 1992. At the time, the average volume of fluid used in the process was around 80,000 gallons.
- Findings issued in 1992 concluded that issuance of permit for standard natural gas was is insignificant for activities consistent with the GEIS. Standard permit conditions address casing and cementing of well, setbacks, fluid handling, well control (blow out prevention), and notifications to municipalities, among other considerations.
- The 1992 GEIS can be viewed at: <http://www.dec.ny.gov/energy/45912.html>.

#### C. Environmental Impact of Gas Well Using HVHF.

- In last five years, industry started moving away from conventionally targeted formations and started focusing on unconventional sources made possible by improvements to well stimulation technology. Using horizontal drilling, well operators could site several wells on the same well pad, rather than distributing individual wells across a larger surface area.
- The volume of fluid used during fracturing operations also differs from the standard well reviewed in 1992. Larger volumes of water coupled with the longer duration of drilling activity at a multi-well pad gave rise to need to supplement 1992 GEIS.
- The draft Supplemental Generic Environmental Impact Statement (dSGEIS), released in September 2009 is a comprehensive analysis of the potential environmental impacts from horizontal drilling and HVHF. Some of the topics issues addressed in the dSGEIS are:

- Water Withdrawals - Typical fluid volume is 2-4 million gallons for HVHF well.
- Wastewater Handling and Transport
- Wastewater Treatment and Disposal
- Naturally Occurring Radioactive Material/ Drill Cuttings Disposal
- Identity of Chemicals used in Well Stimulation
- Air quality Impacts
- Visual/Traffic/Noise Impacts
- Community/Socioeconomic Impacts

D. The environmental impacts addressed in the draft Supplemental GEIS should not be confused with the perceived impacts as reported by the media. Concerns about gas migration (the ability of in-situ gas to travel to potable water supplies) and fracturing fluid migration (the ability of injected fluid to travel to potable water supplies) are often confused and mis-reported. Gas migration was addressed in the 1992 GEIS and is addressed by proper well construction requirements. Concerning fracturing fluid migration, a literature review done to support the dSGEIS showed that “. . . hydraulic fracturing does not present a reasonably foreseeable risk of significant adverse environmental impacts to potential freshwater aquifers.” ICF International, Appendix 11 of the dSGEIS.

## WHO IS RESPONSIBLE FOR ADDRESSING THE IMPACTS OF DRILLING USING HVHF?

II. The public often turns to government first with questions about who is responsible for managing the impacts of gas well drilling. However, individual well operators and the industry as a whole, are primarily responsible for addressing environmental impacts. The American Petroleum Institute, a national trade organization, develops and publishes standards for the oil and natural gas industry that cover every aspect of drilling operations. Changes in the field are also driven by state and federal regulation, as conservation agencies fulfill their obligation to conserve and protect the state’s natural resources. Regulation of oil and gas well drilling and waste disposal from oil and gas operations are regulated under a mix of state and federal environmental programs. Drilling of the well itself and the production of natural gas in NY is regulated pursuant to Environmental Conservation Law (ECL) Article 23 but waste disposal is addressed by other programs. Following is a breakdown of oil and gas regulation in New York:

### A. State Government

1. The Oil, Gas and Solution Mining Law (ECL) Article 23, entrusts regulation of oil and gas well regulation to the NYS Department of Environmental Conservation. DEC issued regulations at 6 NYCRR §550-559.

- statute conveys authority to regulate oil, gas, solution mining, underground gas storage, stratigraphic and geothermal wells.
- contains requirements for financial security, permitting, well spacing, compulsory integration & state land leasing.
- grants the Department to power to “Require drilling, casing, operation, plugging and replugging of wells and reclamation of surrounding land in accordance with rules and regulations of the Department in such manner as to prevent or remedy the following, including but not limited to: the escape of oil, gas, brine or water out of one stratum into another; the intrusion of water into oil or gas strata other than during enhanced recovery operations; the pollution of fresh water supplies by oil, gas, salt water or other contaminants; and blowouts, cavings, seepages and fires.” ECL 23-0305(8)(d).

2. It's typical for state environmental or conservation agencies to regulate the drilling and production of oil and natural gas. Proper well siting and construction prevents waste of the natural resource.

- Ohio Oil Co. v. Indiana, 177 U.S. 190 (1900).

“The local and peculiar character of natural gas makes it almost impossible that it should be the subject of general national regulation. . . . Upon this point we affirm that natural gas is characteristically and peculiarly a local product; that its production is confined to a limited territory; that because of its local characteristics and peculiarities it is a proper subject for state legislation, and cannot, so far as regards local protection, be made the subject of general legislation by Congress.” Ohio Oil, citing Jamieson v. Indiana Natural Gas & Oil Co., 128 Ind. 555, 12 L. R. A. 652, 28 N. E. 76.

- Sylvania Corp. v. Kilborne, 28 N.Y.2d 427 (1971).

“ ‘maximum recovery of hydrocarbons from any given [gas] pool can be had only where the wells are placed at proper intervals. When unregulated, producers often allow the profit motive to interfere with their [duty] to conserve. The [state conservation] department may regulate the spacing of new wells if it finds such spacing is necessary to the most efficient development of a field.’ (Mowbray, Regulation of Oil and Gas Producers, 32 Albany L. Rev. 387, 399.)” 28 N.Y.2d 427, fn3.

3. Two principal waste streams from oil and gas sites are drill cuttings and water-based drilling fluid that returns to the surface following fracturing operations. Off-site disposal of drilling cuttings is subject to state solid waste management regulations, including 6 NYCRR Part 364, concerned with waste transport. Water-based drilling fluids, or flowback, for HVHF wells will not be flowed back into lined pits, but will be required to flow back into steel tanks, according to the dSGEIS. At standard oil and gas wells, flow back into pits is an option and is subject to a performance standard. Ultimate disposal of flowback at a waste water treatment plant is possible, provided that WWTP completes a headworks analysis to demonstrate ability to meet conditions of State Pollution Discharge Elimination System permit.

4. Other state environmental programs may come into play, depending on location of well pad. State freshwater wetlands and endangered species are two examples.

5. Gathering pipelines and compressor stations are approved by New York State Public Service Commission pursuant to N.Y. Public Service Law Article VII.

## B. Federal Government

1. Interstate pipelines are approved by the Federal Energy Regulatory Commission pursuant to the Natural Gas Act.

2. Oil and gas drilling not subject to EPA oversight, unless flowback is handled via disposal well. This would require approval under the Underground Injection Control Program.

C. Local Government

ECL 23-0303(2) preempts all local laws or ordinances relating to the regulation of the oil, gas and solution mining industries. Jurisdiction over local roads and rights under the real property law are the exception to preemption.

D. Mineral Rights Owners/Lessors

In addition to payment terms, mineral rights owners can negotiate surface conditions, such as reclamation requirements and location of access roads and pipeline rights of way.

E. Regional/Multi-State entities

Susquehanna River Basin Commission (SRBC) and Delaware River Basin Commission (DRBC) are regional compact commissions authorized to develop plans and policies for the development and use of water resources. SRBC signatories are PA, MD and NY; DRBC signatories are DE, NJ, NY, PA and the federal government.

## WHAT IS THE APPROPRIATE RESPONSE?

III. Mitigation of environmental impacts is a result of constantly evolving industry practices and is also a function of state and federal regulations. From the perspective of industry, sound environmental practice saves money at the well pad and saves regulatory compliance costs. From the perspective of state conservation agencies, the goal of state environmental policy is to conserve and protect our natural resources and to enhance the health, safety and welfare of the people. NY's statutory objectives also, however, require the agency to "foster, promote, create and maintain conditions under which man and nature can thrive in harmony with each other, and achieve social, economic and technological progress for present and future generations. . ." ECL 1-0101(3).

A. A good generic assessment of oil and gas well drilling, production, and impact mitigation (aside from the GEIS) is the *Adverse Impact Reduction Handbook*, published by Interstate Oil & Gas Compact Commission. This publication goes through the life cycle of a drilling operation and addresses impact review for federal land leasing. <http://iogcc.publishpath.com/Websites/iogcc/pdfs/2008-LINGO-Handbook-lowres.pdf>.

B. NY state generic review - for standard oil and gas well, mitigation measures were documented in the 1992 GEIS to address: setbacks from surface waters; primary and principal aquifers; well casing and cementing practices; and plugging and abandonment of oil and gas wells.

1. 1992 GEIS contains well and access road restrictions when well site is proposed within a coastal zone or watershed
2. GEIS also requires a more detailed review for projects within 1000 feet of a municipal water supply well.
3. for well sites located in an agricultural district, special permit conditions may be included that limit total disturbance area to one acre, or well may be relocated to reduce interference with agricultural operations.

C. For wells where HVHF will be utilized, NY's dSGEIS proposes a suite of other mitigation measures to be employed at the well site. Appendix 10 of the dSGEIS contains proposed permit conditions. Appendix 10 and the entire dSGEIS can be viewed at: <http://www.dec.ny.gov/energy/58440.html>. There are 48 additional permit conditions that may be placed on well permits to address impacts from HVHF. These draft conditions address all stages of the operations, from site preparation, drilling, stimulation, flowback and site reclamation. For ex:

1. Draft conditions will require well operators to test residential water wells within 1,000 feet of the well pad and provide the results to the property owner.
2. Draft permit conditions also require flowback (injected hydraulic fracturing fluid that returns to the surface) into steel tanks.
3. Draft permit conditions will also require all topsoil to be stripped and retained for reclamation, and will require a closed loop drilling system to be used in floodplain locations.

D. Local reaction/Municipal action. Some upstate NY communities, including the City of Buffalo, have passed resolutions condemning or prohibiting hydraulic fracturing. Few, if any, localities have discerned between the type/scale of hydraulic fracturing that has been going on in the state for decades and the type/scale of hydraulic fracturing expected at a multilateral well using HVHF.

E. Policy question.

Are there certain places where shale gas development shouldn't take place due to likely adverse impacts on other important resources, environments and communities? From a legal standpoint, only areas where oil and gas development could not occur is on state forest preserve lands, which are constitutionally protected. NYSDEC also, per ECL Article 23, does not have the ability to lease state parklands. It would be up to state parks agency to determine whether leasing of mineral rights is consistent with state park policy. On other state owned land, NYSDEC screens locations to determine which areas are not suitable for development and which areas are more appropriate for the siting of well pads and access roads. In those cases, the location of steep slopes and environmentally sensitive resources are taken into consideration, as well as any management plan which may apply to nominated lands. On privately held lands, question of what areas should be "off limits" to development should be subject of site specific and fact specific technical inquiry.

F. Concluding thoughts: Mitigation of environmental impacts by regulatory agencies should be the product of an objective technical analysis of the industry. Oil and gas drilling is an industrial activity that will have impacts, both temporary or long-term, on both the environment and socioeconomic characteristics of a community. These impacts are known but they can be mitigated.

## **Points of Interest to Real Estate, Trust & Estates Practitioners:**

1. Leasing. Leasing of mineral rights is not a regulated activity in NY, but the Department does have a Landowner's Guide to Leasing at: <http://www.dec.ny.gov/energy/1553.html>. Note too that the General Obligations Law (GOL) 15-304, contains provisions for forfeiture and cancellation of oil gas or mineral land leases and GOL 5-333 provides a three day cooling off period for execution of lease.

2. Split Estates. Mineral estate is dominant and mineral rights owner can occupy as much of surface as is reasonable to access minerals. More in more in NY, mineral and surface estates are being split so that mineral rights can be exercised while attempting to limit liability of surface owner. Reserved or outstanding mineral rights issues also crop up in cases where state became owner of surface lands for conservation purposes.

Belden & Blake Corp'n v. Dept. of Conserv. and Natural Resources., 600 Pa. 559 (Supreme Ct. PA, 2009) - Court held that state, as surface owner, could not unilaterally impose conditions limiting access to mineral rights. Status of surface owner as government agency did not change fundamental principle that subsurface estate is dominant.

3. Is SEQRA or NEPA applicable to state agency or municipality that, as a surface owner, processes approvals for drilling plans (as opposed to leasing such lands)?

Minard Run Oil Co., et. al. v. U.S. Forest Service, 2009 U.S. Dist. LEXIS 116520; 40 ELR 20288 (Dec. 15, 2009) – U.S. District Court decision granting preliminary injunction against Forest Service's application of NEPA to processing of well drilling plans in Allegheny National Forest. Court found that processing of drilling plans by Forest Service, as surface owner of lands within park, was not a major action under NEPA.

4. Compulsory integration/Force pooling. Force pooling is the administrative process where state conservation agency addresses unleased mineral rights in a drilling unit or spacing unit. Need to consult relevant state programs because they are not all alike. Some oil and gas producing states do not have a clearly defined process. NY's statute was greatly improved in 2005 and is laid out at ECL 23-0901. The process provides each uncontrolled owner with an opportunity to make an election to become a participating owner in a well, a non-participating owner, or a royalty owner. If no election is made, the unleased owner is integrated as a royalty owner and receives the lowest royalty in an existing lease in the same unit but no less than one-eighth or 12.5%.

The final order of integration is filed in the county clerk's office and is binding on all heirs, successors and assigns. However, ECL 23-0901(13) provides that any person taking title by operation of law to any oil and gas interests pooled by the Department is subject to all liability and benefits associated with those interests unless they notify the well operator within 60 days of the taking of such interest of their intention to be integrated as a royalty owner. This provision may come into play in foreclosure proceedings or in the handling of an estate.

## 5. Ongoing Litigation.

### Cases to watch:

Berish v. Southwestern Energy Prod. Co., 2011 U.S. Dist. LEXIS 10626 (Feb.3, 2011). Pa. decision denying motion to dismiss claim that hydraulic fracturing is subject to strict liability, but dismissing claims of emotional distress when physical injury not pled.

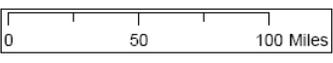
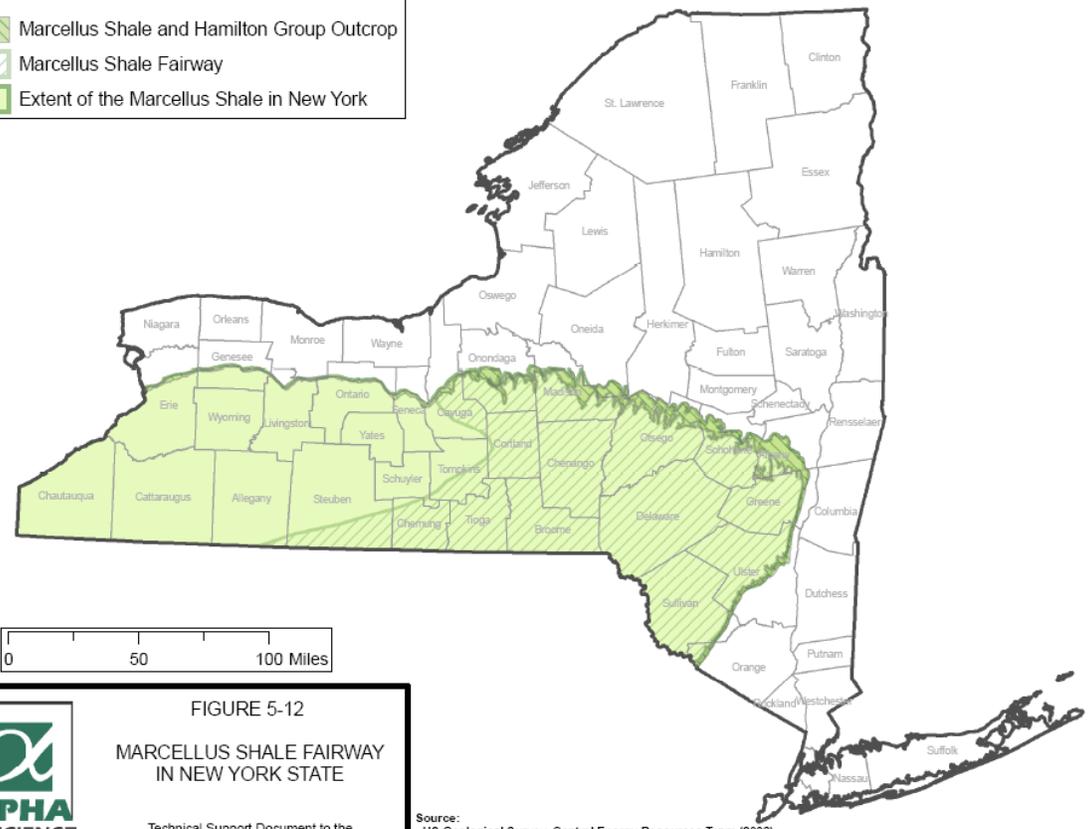
Baker, Brewster, et. al. v. Anschutz Exploration Corp., et. al. – case filed in Chemung County State Supreme Court but moved to Western District. Plaintiffs claim hydraulic fracturing of Dow 1 and 2 wells contaminated water supply; causes of action include negligence, negligence per se, and the fear of developing cancer.

Wiser, Wiser, et. al. v. Enervest Operating, LLC., Belden & Blake Corp. & Chesapeake Appalachia, LLC. - Case 3:10-cv-00794-DEP, Northern District of NY – decision issued March 22, 2011 declared leases null and void for failure to pay delay rentals. Defendant lessees claimed that executive order issued by then-Governor Paterson was a de facto moratorium on high volume hydraulic fracturing which constituted force majeure event.

Also noteworthy is an administrative hearing held in January 2011 before the Texas Railroad Commission to determine whether hydraulic fracturing was the cause of gas present in water wells. The caption of that case is: Re: Commission Called Hearing to Consider Whether Operation of the Range Production Company Butler Unit, Well No. 1H (RRC No. 253732) and the Teal Unit, Well No. 1H, (RRC No. 253729) in the Newark, E. (Barnett Shale) Field, Hood County, Texas Are Causing or Contributing to Contamination of Certain Domestic Water Wells in Parker County, Texas, Docket No. 7B-0268629.

**Legend**

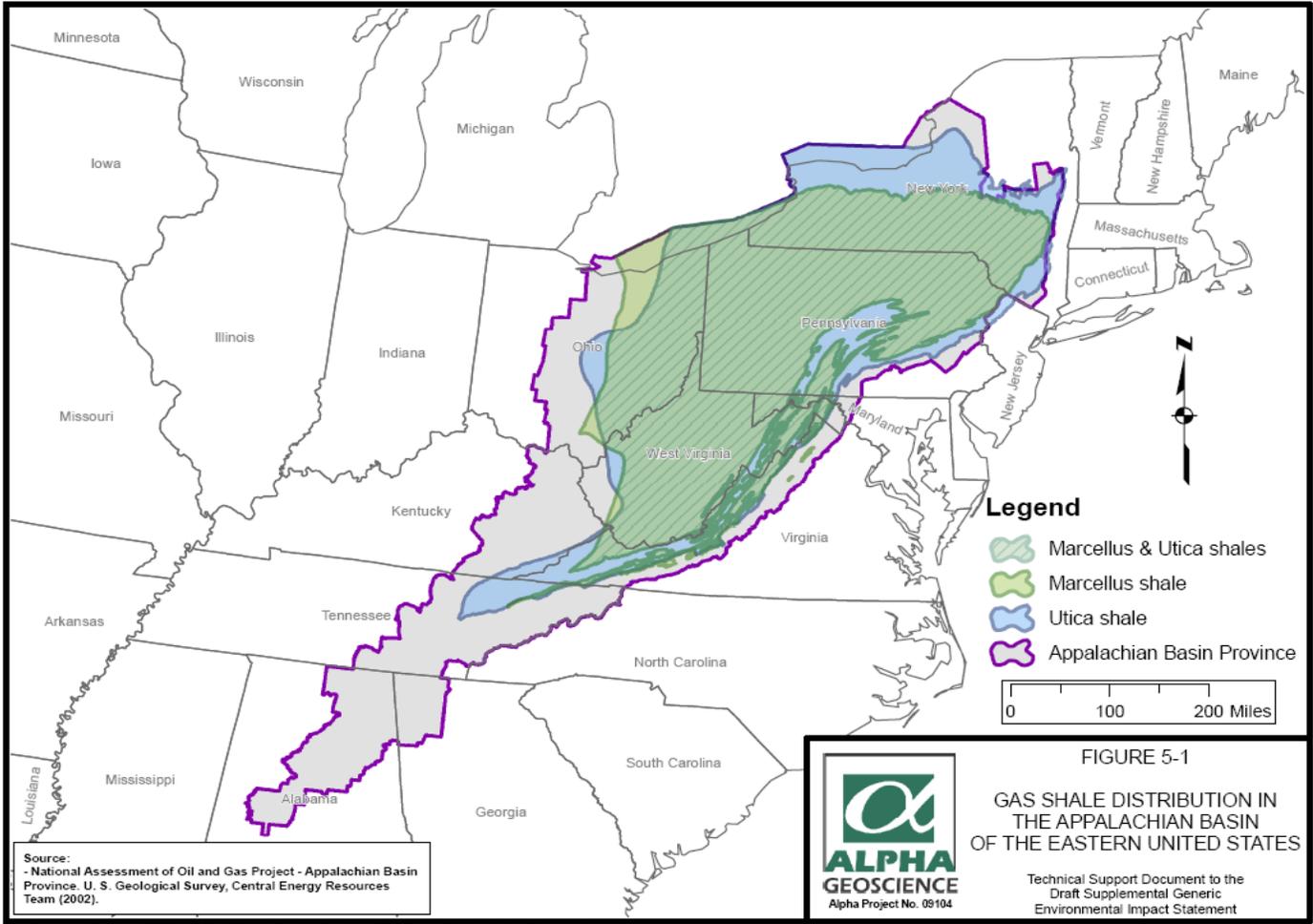
-  Marcellus Shale and Hamilton Group Outcrop
-  Marcellus Shale Fairway
-  Extent of the Marcellus Shale in New York



**FIGURE 5-12**  
**MARCELLUS SHALE FAIRWAY**  
**IN NEW YORK STATE**

Technical Support Document to the  
 Draft Supplemental Generic  
 Environmental Impact Statement

Source:  
 - US Geological Survey, Central Energy Resources Team (2002)  
 - New York State Museum - Reservoir Characterization Group  
 - Nyahay et al. (2007)



## REGULATION OF UNCONVENTIONAL NATURAL GAS DEVELOPMENT IN THE NORTHEAST: What, Where, Who

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Development of unconventional natural gas “plays” like the Marcellus Shale has induced a substantial amount of new activity. The Marcellus Shale, at least, is located in relatively rural areas of New York, Pennsylvania, West Virginia, Ohio, and Maryland that have not recently seen industrial development activity at the current scale. Often in this region, the natural gas resource exists in the same places as other important natural resources: timberlands, forests at the tops of watersheds, high quality streams with natural resource and recreational value, and so forth. This panel explores **what** aspects of natural gas development are regulated, or should be regulated; **where** natural gas development should proceed or not proceed; and **who** should regulate the activity.

We have seen a great deal of interest in the environmental consequences of natural gas development in the general press. *See, e.g.,* Urbina, *Drilling Down: Regulation Lax as Gas Wells’ Tainted Water Hits Rivers*, New York Times at A1 (Feb. 27, 2011); *see also complete series posted at* [http://topics.nytimes.com/top/news/us/series/drilling\\_down/index.html](http://topics.nytimes.com/top/news/us/series/drilling_down/index.html).

The Environmental Protection Agency has commenced a two-year study of hydraulic fracturing. *See* EPA ORD, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, EPA/600/D-11/001 (Feb. 7, 2011), *posted at* [http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft\\_SAB\\_020711.pdf](http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft_SAB_020711.pdf). On March 7, 2011, EPA Regional Administrator Shawn Garvin wrote to

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\* These materials support a continuing legal education program. They are intended to provoke debate, or perhaps to offer amusement. They should not be cited against the author, or anyone else, in any context, including, without limitation, real life.

Acting Pennsylvania Secretary of Environmental Protection Michael Krancer demanding additional scrutiny of wastewater discharges from natural gas operations and suggesting a forthcoming broader EPA role in regulation. Senator Casey has reintroduced his proposed Fracturing Responsibility and Awareness of Chemicals (“FRAC”) Act, S. Bill No. 587, 112<sup>th</sup> Cong., 1<sup>st</sup> Sess. (Mar. 15, 2011).

While Pennsylvania, West Virginia, and Maryland currently allow development of the Marcellus Shale gas resource, New York has imposed a moratorium on new natural gas well permits targeting the shale as described in Jennifer Maglienti’s materials. The Delaware River Basin Commission has halted new development within the basin in New York and Pennsylvania until the Commission adopts regulations. *See Natural Gas Drilling in the Delaware River Basin*, <http://www.state.nj.us/drbc/naturalgas.htm>. The Maryland House of Delegates has passed a moratorium bill. Proposed Marcellus Shale Safe Drilling Act of 2011, Md. House Bill No. 852 (passed on third reading Mar. 23, 2011). Efforts to impose a moratorium continue in West Virginia, but none of the bills proposed in the last session of the legislature passed. *See, e.g., Nyden, Delegates Want Marcellus Shale Drilling Moratorium*, *Charleston Gazette* (Mar. 18, 2011), *posted at* <http://wvgazette.com/News/201103182921>.

Much of this activity is directed at environmental consequences that do not have a record of occurring with a high frequency. That raises the question whether the politicians and the regulators are like Yossarian, bandaging the wrong wound. Heller, *Catch-22* (1955).

This paper suggests that regulation should focus on the known big problems: groundwater contamination, wastewater handling, handling of hazardous materials, and the conventional land use issues posed by industrial activity in rural areas. It suggests that the regulators with expertise should implement the rules, and that there not be overlapping

regulators. And it suggests that natural gas development is important -- environmentally, economically, and strategically -- therefore it should proceed apace; regulation should change adaptively as experience grows. My discussion of regulation focuses on Pennsylvania, where most of the current natural gas activity is occurring in the northeast (and for other obvious reasons).

## 1. Groundwater Resources

When a natural gas well bore intercepts an aquifer, material passing up or down that well bore can contaminate groundwater. One protects the groundwater resource by cementing pipe to the walls of the well bore through the zone that bears usable water. That much has been understood by courts and lawyers for a long time. In Pennsylvania, for example, the Supreme Court more than a century ago considered a case brought by a homeowner whose well had been contaminated by development of a neighboring natural gas well. *Collins v. Chartiers Valley Gas Co.*, 18 A. 1012 (Pa. 1890), *subseq. appeal*, 21 A. 147 (Pa. 1891). In the area of the natural gas well, the drinking water aquifer from which local wells drew lay above a formation bearing salty water -- "brines" -- and under that lay a reservoir of gas. When Chartiers Valley Gas Company drilled its well, it failed to case off the aquifer, and Mrs. Collins' well was fouled by the brines. The court acknowledged that in the ordinary case, this would be an uncompenible injury. However, because oil and gas operators understood the local geology quite well, the defendant failed to exercise reasonable care when it did not case its well, and plaintiff could recover.

Lest anyone recoil in horror at the notion that water well contamination could be (to use an appropriately archaic law-Latin phrase) *damnum absque injuria*, note that statutes in

Pennsylvania have arguably imposed a strict liability standard on a natural gas well developer that causes groundwater contamination. Groundwater constitutes a “water of the Commonwealth” for purposes of the Pennsylvania Clean Streams Law, Pa. Stat. Ann. tit. 35, §§ 691.1 to .1001. *See id.*, § 691.1. Sections 316 and 401 of the Clean Streams Law impose absolute liability on the part of a person who owns or occupies land upon which exists a condition that poses a risk of pollution of waters of the Commonwealth. *Id.*, §§ 691.316, .401. That rule applies in the case of a discharge of mine drainage from coal mine works never operated by the defendant landowner. *Commonwealth v. Barnes and Tucker Co.*, 319 A.2d 871 (Pa. 1974). Similarly, it applies in the case of wood treating chemicals disposed by injection to a well. *National Wood Preservers, Inc. v. Pennsylvania Department of Environmental Resources*, 414 A.2d 37 (Pa.), *appeal dismissed*, 449 U.S. 803 (1980).

The Pennsylvania Oil and Gas Act, Pa. Stat. Ann. tit. 58, §§ 601.1 to .605, specifically regulates development and operation of natural gas wells in Pennsylvania and in particular seeks to prevent pollution of groundwater resources. *See id.*, §§ 601.201, 601.207; *see also* DEP Oil and Gas Operator’s Manual, Guidance No. 550-0300, *posted at* <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8295>. The Environmental Quality Board has recently adopted revised regulations including, among other features, enhanced standards calling for “triple string” casing and specific gas pressure standards to determine whether the casing works properly to isolate the aquifer. 41 Pa. Bull. 805 (Feb. 5, 2011), *to be codified at* 25 Pa. Code chap. 78.

The Oil and Gas Act also provides a mechanism for the owner of a water well or other water supply to seek redress if oil or gas development activity causes “pollution or diminution” of the water supply. Section 208 allows the owner of the water well to complain to

the Department. The Department has ten days within which to commence an investigation, and must report back within 45 days. If the Department determines that the oil or gas well has caused pollution of the water well, the Department must require the oil or gas well permittee to restore or to replace the water supply. 25 Pa. Code § 78.51.

Section 208 also imposes a presumption that the oil or gas well has caused diminution or pollution of the water supply if the oil or gas well is within 1000 feet. Pa. Stat. Ann. tit. 58, § 601.208(c); *see also Pennsylvania Independent Petroleum Producers v. Department of Environmental Resources*, 525 A.2d 829 (Pa. Commw. Ct. 1987)(presumption not unconstitutional because of *possibility* that it could be applied in a criminal case; no criminal cases had been threatened or brought). The operator may rebut the presumption using certain enumerated defenses, Pa. Stat. Ann. tit. 58, § 601.208(d), including that the water pollution antedated the oil or gas well. *See* 25 Pa. Code § 78.52.

Thus, a gas well operator appears to have reasonably strict liability for groundwater contamination coupled with a shifting of the burden of persuasion as to any nearby problem. That has induced multiple neighbor lawsuits, mostly over gas migration. *See, e.g., Bidlack v. Chesapeake Appalachia, LLC*, No. 3:11-cv-129 (M.D. Pa.); *Otis v. Chesapeake Appalachia, LLC*, No. 3:11-cv-115 (M.D. Pa.); *Armstrong v. Chesapeake Appalachia, LLC*, No. 3:10-cv-2453 (M.D. Pa.); *Berish v. Southwestern Energy Production Co.*, No. 3:10-cv-1981 (M.D. Pa.); *Fiorentino v. Cabot Oil & Gas Co.*, No. 3:09-cv-2284 (M.D. Pa.). Motions to dismiss have been denied in *Fiorentino*, 2010 U.S. Dist. LEXIS 120566 (M.D. Pa. Nov. 15, 2010), and *Berish*, 2011 U.S. Dist. LEXIS 10626 (M.D. Pa. Feb. 3, 2011). In both opinions, the court has refused to decide on the pleadings that operating a natural gas well is *not* an abnormally dangerous activity and therefore subject to strict liability; neither judge has ruled that

a gas well *is* an abnormally dangerous activity. All of these cases allege other effectively strict liability theories including claims under section 1115 of the Pennsylvania Hazardous Sites Cleanup Act, Pa. Stat. Ann. tit. 35, § 6026.1115, and negligence *per se* on account of *any* regulatory violation. None of these claims has been dismissed on the pleadings in either case.

The regulations and the private tort litigation focus on migration of natural gas from the well bore into the aquifer. Some popular accounts of hydraulic fracturing portray the fracturing itself as a risk to groundwater. That is, some seem to focus on the possibility that hydraulic stimulation will crack confining layers and allow hydrocarbons (or fracturing chemicals) to migrate upward into water-bearing zones. *See, e.g.,* Statement of Dusty Horwitt, Environmental Working Group, to the New York City Council (Oct. 2009), *posted at* [http://www.ewg.org/EWG\\_Warns\\_of\\_Drilling\\_Threat\\_to\\_NYC\\_Drinking\\_Water](http://www.ewg.org/EWG_Warns_of_Drilling_Threat_to_NYC_Drinking_Water). Research has not uncovered a report of any such incident. It would require a massive failure of geology and engineering for fracture patterns to travel thousands of feet beyond their intended length, allowing gas to escape into an aquifer. No one has an incentive to allow that to occur. Accordingly, in the hierarchy of risks, this seems to be a distraction.

## **2. Surface Water Resources.**

Hydraulic fracturing requires a great deal of water. Much of that water returns during the process and has to be removed from the well site somehow. That flowback water (or the later-arriving “produced water”) will contain high concentrations of salts, typically measured as total dissolved solids (“TDS”) as well as hydrocarbons. As the New York Times series pointed out, the water may also contain higher than normal concentrations of naturally occurring radioactive material (“NORM”). NORM reflects the presence in the rock of small

concentrations of radioactive minerals, and is analogous (or identical) to the more familiar evolution of radon gas from rocks below the surface.

Discharge of flowback or produced water from a gas well to a surface water requires a National Pollution Discharge Elimination System (“NPDES”) permit under section 402 of the federal Clean Water Act, 33 U.S.C. § 1342. In Pennsylvania, and other states, the state issues and administers the NPDES permit under state authority, in Pennsylvania’s case the Clean Streams Law. An NPDES permit must incorporate conditions that, among other things, incorporate technology-based standards at least as stringent as federal effluent limitation guidelines, if ELGs exist, or the state must offer a good reason why the ELG should not be imposed. In the oil and gas context, a federal ELG prohibits the discharge of *any* flowback water or produced water from a well pad without treatment. 40 C.F.R. pt. 435. Consequently, no permit would ever be available to discharge from a well pad into a stream.

In Pennsylvania, the water cannot be discharged onto or into the ground without approval. The water is a non-hazardous industrial waste, known as “residual waste,” and disposal without a permit is prohibited under the Solid Waste Management Act, Pa. Stat. Ann. tit. 35, §§ 6018.101 to .1003. Moreover, a discharge to groundwater of any volume would require a state NPDES permit; the federal statute does not govern discharges to groundwater. Accordingly, operators must either reuse their wastewater, or they must treat it before discharge. Most of the time, they treat the wastewater partially, and then reuse it.

Commercial or municipal treatment plants do not treat well for TDS. In the Southwest, one can evaporate return water in open pits. In the Northeast, where it rains 42 inches annually, that just does not work well. Accordingly, dilution remains the principal treatment for large volumes of salty water.

An incident along the Monongahela River that reported fouled a water intake of a large water supplier spurred attention to the pretreatment standards imposed on oil and gas operators before they discharge wastewater into a wastewater treatment plant that discharges to a stream. The Pennsylvania Environmental Quality Board adopted changes to the rules generally, with specific rules for the natural gas industry. 40 Pa. Bull. 4835 (Aug. 21, 2010), *amending* 25 Pa. Code chap. 95. Wastewater from a natural gas operation may not be discharged into a sewage treatment plant that in turn discharges to a stream unless that wastewater has a concentration of TDS below 500 milligrams/liter (that is, parts per million). Under the Safe Drinking Water Act, standards govern the quality of water provided to the public for drinking. The primary drinking water standard protects health. The more stringent secondary standard assures adequate taste and odor and other characteristics of the water. The secondary drinking water standard for TDS is 500 mg/l; in order to discharge natural gas wastewater to a public sewer in Pennsylvania, the TDS concentration has to be low enough that the water could be sold as potable.

Not surprisingly, most wastewater operators attempt to reuse their water. Often this requires some treatment and dilution in order to make the water suitable for hydraulic fracturing, so the water may be treated and returned to a new well site.

Reports of the rate of reuse have varied, and at least one data entry error skewed the results for 2010. Nevertheless, the data from last year do not accurately reflect the regulatory conditions now in effect, because the Chapter 95 rules were not in effect until the end of 2010. Accordingly, what matters is current practice. The industry feels it is on safe ground asserting that more than half, and perhaps as much as 90 percent, of the flowback and produced water is reused in Pennsylvania.

Others do not agree. In a recent action, the University of Pittsburgh Environmental Law Clinic on behalf of certain environmental groups has served notice letters on two western Pennsylvania municipalities that operate sewage treatment plants threatening to bring citizen suits for violations of the Clean Water Act and Clean Streams Law on account of gas wastewater received without proper permits. Note that in order to maintain those actions, the plaintiffs will have to allege that the violations are not “wholly past,” and so a single incident will not suffice.

The New York Times’ focus on NORM has also induced a call for testing of outfalls of wastewater treatment plants and intakes of drinking water treatment plants. The radioactivity will largely be in the suspended solids, and most treatment plants treat effectively for small bits of solid suspended in a wastewater stream; that is, they are pretty good at getting out the chunks. So too with drinking water plants. Further, when treated wastewater discharges to a stream, the receiving water dilutes it a lot. That dilution further reduces any radiation levels, and no testing has revealed elevated radiation in water. While NORM may be a distraction, one cannot imagine the issue going away given the tragedy unfolding in Japan as I write.

Finally, as with any construction activity, natural gas development must comply with regulation governing erosion and sedimentation control. There is an issue as to whether natural gas wells are exempt from a requirement that they obtain stormwater NPDES permits under the Clean Water Act. However, they are not exempt from state law requirements, and consequently Pennsylvania natural gas wells all must have erosion and sedimentation control plans, and often permits. They typically proceed under Erosion and Sedimentation Control General Permit 1. ESCGP-1 is a permit-by-rule that imposes certain best management practices

as conditions. These construction requirements are not particularly exotic as compared with other construction near streams.

### **3. Location and Concentration of Activity.**

I would suggest that the real issue with natural gas development in the Marcellus region is change. There is a lot of industrial activity taking place in places that were rural. Some people who live in those places value the absence of industrial activity, and therefore the influx of drill rigs, trucks, and people disrupts what is for them a valuable attribute of their location.

Where uses are located and how intensively they can be pursued is ordinarily a subject of land use regulation. The Municipalities Planning Code (“MPC”) authorizes every municipality in Pennsylvania other than Philadelphia and Pittsburgh (which operate under separate authority) to adopt both a zoning ordinance and a subdivision and land development ordinance (“SALDO”). Pa. Stat. Ann. tit. 53, §§ 10101 to 11202. However, through much of the Marcellus region, land use regulation is not popular, and no general zoning ordinance or SALDO has been adopted either by the local municipality or by the county.

The Oil and Gas Act preempts local ordinances *other* than ordinances adopted under the MPC and the Flood Plain Management Act, and ordinances adopted under the MPC may not “contain provisions which impose conditions, requirements or limitations on the same features of oil and gas well operations regulated by [the Oil and Gas Act] or that accomplish the same purposes as set forth in [the Oil and Gas Act].” Pa. Stat. Ann. tit. 58, § 601.602; *see also* Pa. Stat. Ann. tit. 53, § 10603(b) (limitation zoning power in MPC to issues not preempted by Oil and Gas Act).

In 2009, the Pennsylvania Supreme Court decided two cases concerning the power of municipalities to regulate natural gas wells by zoning ordinances and SALDOs. *Huntley & Huntley v. Borough of Oakmont*, 964 A.2d 855 (Pa. 2009); *Range Resources-Appalachia, LLC v. Salem Twp.*, 964 A.2d 869 (Pa. 2009). *Huntley & Huntley* affirmed a local zoning ordinance that regulated setbacks and other physical and locational features of gas well pads. *Range Resources* invalidated a SALDO that regulated the manner in which drilling would be conducted and imposed requirements for bonding, site restoration, and the like. *Penneco Oil Co. v. County of Fayette*, 4 A.3d 722 (Pa. Commw. Ct. 2010), seems to agree. In that case, the county zoning ordinance permitted natural gas wells by special exception (that is, by individual authorization granted after a hearing by the Zoning Hearing Board) and that prescribed certain minimal conditions. Those conditions, however, had to do with setbacks and screening fences or shrubbery. While the Zoning Hearing Board was not precluded from imposing preempted conditions, it was not required to do so, and therefore the ordinance was not facially invalid.

These cases suggest that Pennsylvania municipalities, if they wish to do so, have some considerable latitude to regulate the location of natural gas activity. If the land use regulation is either not specific to natural gas operations or is otherwise not clearly intended to exclude the activity, it may not be preempted. Municipalities may not want to pay to defend their ordinances, but the power exists to impose some level of locational regulation. In principle, there are some places where a well should not go, and zoning can accomplish that end.

Municipalities, of course, have to be concerned that zoning which makes a landowner's gas entirely inaccessible may be a taking of private property requiring compensation. However, the government may prohibit an activity that would, if conducted, constitute a nuisance without that regulation constituting an uncompensated taking. *Machipongo*

*Land and Coal Co., Inc. v. Pennsylvania Department of Environmental Protection*, 799 A.2d 751 (Pa. 2002)(severed coal estate not necessarily taken when area declared unsuitable for surface mining).

In addition to land use regulation, the Clean Air Act, 42 U.S.C. §§ 7401-7671q, has some ramifications for the location of facilities like compressor stations and processing plants. Fundamentally, if too many sources of air pollution are located near one another, they will cause a degradation in air quality below permissible limits. More importantly, a dispute currently exists as to whether multiple emission sources owned by the same operator constitute a single source merely because they are part of the same natural gas gathering or transmission system. *See* Notice to Rescind and Remove From the Official List of Department Technical Guidance Documents the Interim Guidance for Performing Single Stationary Source Determinations for The Oil and Gas Industries (DEP ID: 270-0810-006) Published at 40 Pa.B. 7429, 41 Pa. Bull. 1066 (Feb. 26, 2011). If they are a single source, they will be subject to more stringent, and expensive, regulation that may make them uneconomic.

The Delaware River Basin Commission's proposed regulations address quite a number of the location and intensity questions. Indeed, some have asserted that the various setback requirements proposed by the Commission would preclude natural gas well pads in up to 95 percent of the basin.

#### **4. A General Approach to Regulation.**

When the status quo is acceptable -- environmentally, economically, or politically -- then any change is risky, and should only be undertaken with great care. Most environmental regulation proceeds from the assumption that denying permission to an activity is

environmentally safer than permitting it. Therefore, permission should only be granted after careful study and an opportunity for lots of input and process. In this model, multiple regulators may be somewhat inefficient, but they serve the important purpose of protecting the public from regulatory lapses by or “capture” of any one agency.

However, if one believes that the current condition is *not* acceptable -- environmentally, economically, or politically -- then change is imperative. The question is which change.

The United States relies on coal for electric power and petroleum for transportation. Many would say that that is not acceptable. Those fuels are environmentally risky. Their combustion results in conventional air pollutants in large amounts, emissions of hazardous air pollutants (like mercury), and very material loadings of greenhouse gases to the atmosphere. Their extraction entails other significant environmental impacts. To a large extent, oil is extracted in other countries, and so it offers only limited domestic economic benefit. Many of those foreign countries are either politically volatile or hostile to the United States.

Natural gas, as the commercial goes, is clean and domestic. Its combustion produces lower emissions of conventional air pollutants, hazardous air pollutants, or greenhouse gases than does coal or oil. To be sure, venting natural gas entails a substantial greenhouse gas impact because methane is roughly 20 times as “potent” a greenhouse gas as is carbon dioxide, but venting natural gas is not the idea behind extraction and so one would expect it to be limited relative to combustion. While natural gas extraction entails impacts and risks, as compared to coal mining, off-shore oil drilling, or transportation of oil in ships, one might well argue that the impacts are smaller.

In these conditions, I suggest that regulation ought to encourage development with care, but should not, as some suggest, “go slow.” It is not a good idea to take a “time out” for study. During that “time out,” we are not going to turn out the lights and garage the cars.

That does not imply that regulation ought not to learn from experience. One feature of natural gas development is that each individual well and each individual well pad is, in the scheme of things, a fairly modest industrial site. One can learn from regulatory or compliance failures how to improve the structure without risking catastrophic failure of one big facility. The last few years have reflected some of that adaptive management behavior, at least in Pennsylvania. Gas migration issues led to adoption of Chapter 78. Wastewater discharge issues led to adoption of Chapter 95.

## **5. Who Should Regulate.**

While adaptive management is a good idea, regulation by agencies without institutional capacity is not. The state environmental agencies have capacity and experience with the gas industry. Whether other governmental agencies at the federal, interstate compact, or municipal level do is an open question.